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CENTERS·OF EXCELLENCE

ANNUAL REPORT

Fiscal Year July 2000—June 2001

Published November 2001

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2000-2001 Centers of Excellence Annual Report

Executive Summary

Executive Summary

The Utah State Legislature established the Centers of Excellence Program (COEP) in 1986. They recognized that the growth of new industry and expansion of existing industry is highly dependant on a strong technology base, new ideas, concepts, innovations, and prototypes. Furthermore, the Legislature approved the annual allocation of economic development funds to the COEP, to be awarded to college and university faculty on a competitive basis.

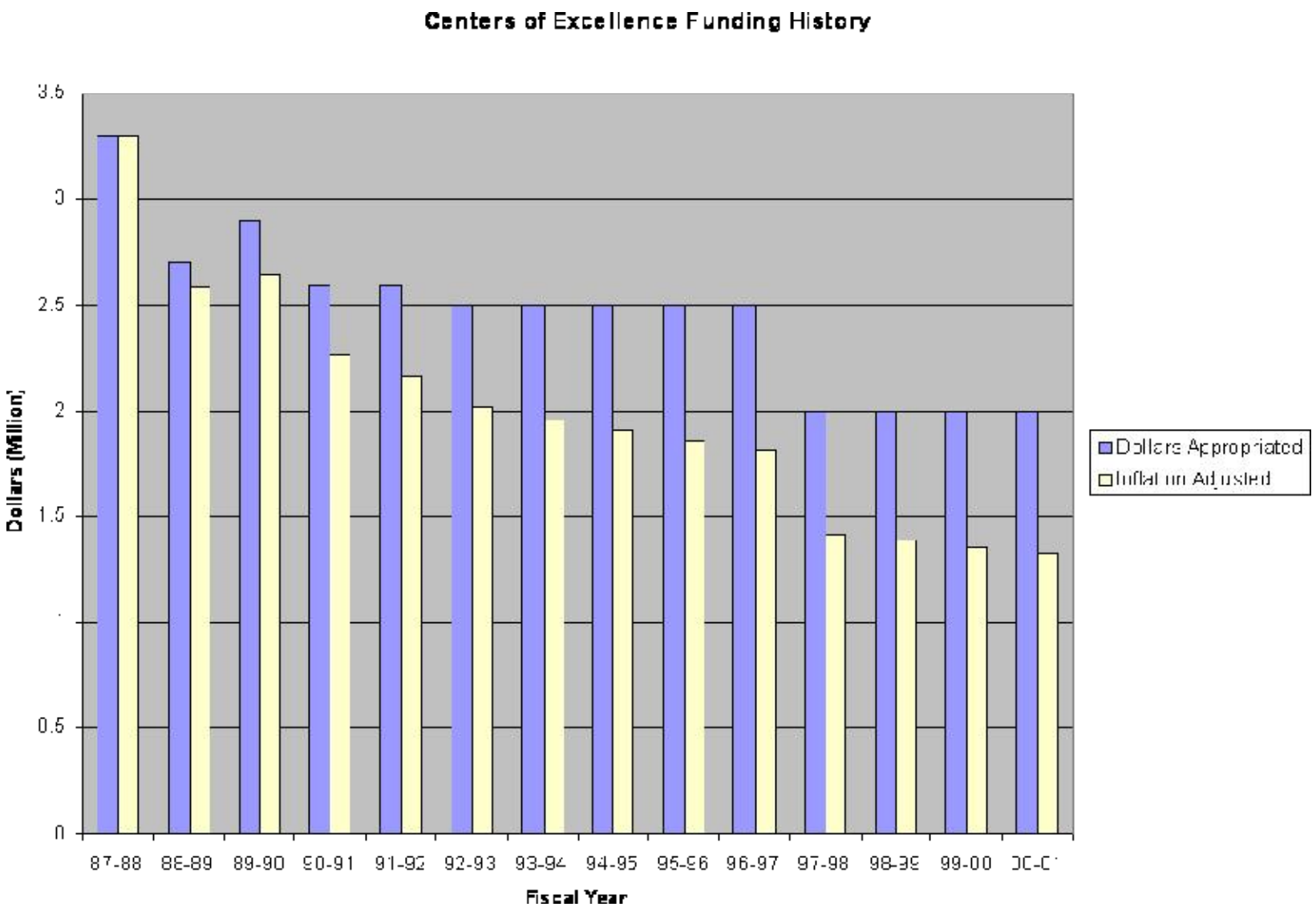
The goals of the COEP are to enhance and expand selected applied research and development activities, at Utah's institutions of higher education, focused on the development of technologies, which have potential for economic development in the state; and to assist in the actual commercialization of those technologies, in concert with the technology licensing offices at the respective institution. The proprietary value of technologies created is reflected in the number of patents/copyrights issued, which produce royalty-bearing licenses that are signed by businesses. The economic impact is the sum effect of the creation of new companies, the enhancement of business opportunities for existing companies that license COEP technologies, and in the growth of Utah's job opportunities.

During the 2000-2001 fiscal year the Centers Program issued $1.870 million in grants to 16 active Centers for use in bringing significant new technologies closer to the marketplace. In the competitive selection process, 10 centers received continued funding and 6 new centers were selected for funding. The Center distribution with respective funding was as follows: seven at University of Utah ($900,000), four at Utah State University ($460,000), and four at Brigham Young University ($460,000). In addition, the program also funded the commercialization consulting effort, at a level of $7,000 per funded Center, for a total of $112,000.

The 16 Centers received matching funds of $13.4 million, resulting in a matching fund ratio of 7.2 to one. The cumulative state funding for the COEP between 1986 and 2001 was $33.7 million and the cumulative matching funds received was $356.1 million, resulting in a matching fund ratio of 10.6 to one. This is believed to be the highest in the nation for programs of this kind and represents a critically important leverage for success in the program.

Over the full life of the program, intellectual property created by faculty participating in the Centers of Excellence accounts for 170 patents resulting in 197 license agreements. Since the inception of the program, 142 companies have been created and licensed proprietary technology from the program. Currently, companies that trace their origins to the Centers of Excellence Program employ an estimated 1300 persons, in the high technology sector of the economy. The wage for this workforce averages of $68,000.

The Centers of Excellence Program continues to be one of the nations most successful technology commercialization programs as measured by matching dollars, significant new commercialized products, and state economic impact. With strong emphasis on the importance of commercialization the program will have an ever expanding and important role to play in Utah's economic future.


Centers of Excellence Funding History
3.5
3
2.5
2
1.5
0.5
0
Dollars (Million)
87-88
88-89
89-90
90-91
91-92
92-93
93-94
94-95
95-96
96-97
97-98
98-99
99-00
Fiscal Year
Dollars Appropriated
Inflation Adjusted

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Program Description

PROGRAM DESCRIPTION

ECONOMIC IMPACT ON THE STATE OF UTAH FOR THE PAST FIVE YEARS

As of the close of the 2000-2001 fiscal year, the direct economic impact from the Centers of Excellence program on the State of Utah is 1,336 jobs created with an average wage of $68,000. The total direct and indirect impact is approximately 3,000 jobs created with an average wage of $61,600. (These numbers were gathered by the economic research office of the Department of Community and Economic Development.)

BACKGROUND

The Utah State Legislature created the Centers of Excellence Program (COEP) in 1986 recognizing that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. The Legislature recommended the allocation of economic development funds each year to the COEP, to be awarded to college and university faculty on a competitive basis. The objectives of the COEP are to enhance and expand the applied technical research activities at institutions of higher education in Utah, to develop technologies that are considered to have potential for economic development in the state, and to assist in the actual commercialization of those technologies. This research and technology commercialization process ultimately results in the creation of new companies, the enhancement of business opportunities for existing companies that license COEP technologies, and in the growth of Utah's job opportunities. In addition, the proprietary value of technologies created is reflected in the number of patents issued and the associated royalty-bearing licenses that are signed.

These measurement parameters (jobs created, companies assisted and/or created, inventions disclosed or patents issued, and license agreements signed) are summarized in this report as indicators of the value of the COEP to state economic development.

Ongoing funding of the program has been based upon the real and potential economic impact that the Centers of Excellence Program has had upon the State of Utah during the years since its creation. This Annual Report summarizes the significant accomplishments of the program during the recently completed fiscal year and attempts to identify the long-term economic value of that work.

OPERATIONS AND OBJECTIVES

The operating methods of the Centers Program have evolved over the years since its inception with a continuing goal of achieving the maximum economic benefit from the individual Centers that have been created. Upon selection on a competitive basis, new Centers are funded with a minimum requirement of a 2:1 matching fund ratio from the private and federal sectors. Matching funds are reported and audited on a regular basis. Centers are also audited regularly for the achievement of technical and commercial milestones. Center directors are required to submit annual reports to the COEP director. The Centers of Excellence Program Annual Report, here attached, is based on submitted reports and upon information gathered from site visits, audits and other data sources. In addition, each funded Center is assisted by one or more designated commercialization consultants who assist Center directors in defining commercialization strategies, performing market and competitive analysis and locating potential investors or licensees.

Centers are normally funded for a maximum of five years and are then expected to be self-sustaining through license contract royalties and new research grants. Centers with especially noteworthy histories and ongoing technological impact are designated as Distinguished Centers and thereafter may be funded on a project-by-project basis as requests are approved.

CENTER SELECTION PROCESS

Proposals from researchers for new Centers of Excellence or for renewal of existing Centers of Excellence are submitted to the COEP office in response to a Request for Proposal which is normally sent in late December. The incoming proposals are critically reviewed by the Centers of Excellence Advisory Council. Centers are selected for funding based on a ranking established in extended review sessions with the Centers Advisory Council.

Since its inception, and through FY 2000-01, the program has created 95 Centers of Excellence, seven of which have been designated as Distinguished Centers, 55 have graduated, and 16 are active during this reporting period.

The State Advisory Council for Science and Technology has advisory responsibility for the Centers of Excellence Program by statute. Members of the Science Council participate on the Centers Advisory Council in reviewing proposals and conducting site visits. This provides Science Council members with in-depth knowledge of the program, Center specific information and a strong technical and industrial perspective for making funding decisions. The State Science Advisor reviews the Annual Report and presents it to the Science Council for acceptance. The Director of the Office of Technology Development serves as an ex-officio member of the State Advisory Council for Science and Technology.

COMMERCIALIZATION PROCESS

Over the past five years, the Centers of Excellence Program has funded a consulting program to assist Center directors in preparing and implementing commercialization strategies. Each Center is unique in terms of which strategy is optimal - there is no single solution and each requires customized approaches.

Early market surveys and competitive analysis are conducted to discover which market segments are most promising and which product features will be of interest to potential customers and licensees. Consultants assist in targeting potential licensees for the technology and in positioning products for anticipated markets.

These early strategic discussions often reveal product variations that can be introduced to the marketplace earlier than previously planned. Such early commercialization has several benefits: (i) getting products to consumers for preliminary market validation and directional planning; (ii) early cash flow strengthens continuing research at the Center and hastens financial independence and; (iii) the future value of technology licenses are enhanced.

The Centers of Excellence Office works closely with the Technology Transfer Offices at the respective universities in an effort to extract maximum value from the licenses that are signed for Centers technologies. Through the commercialization consulting program, assistance is given in defining market opportunities, identifying potential target licensees, providing key information for license valuations, and consulting assistance to those companies considering license opportunities.

2000-2001 Funded Centers

CENTER FOR

ACOUSTIC COOLING

UNIVERSITY OF UTAH

CENTER

The Center for Acoustic Cooling Technologies has been established for the application of thermo acoustic devices to heat management and heat removal from microcircuits, computers, high speed electronics, and small scale applications.

Industrial collaboration with a local company
Venture Capital Investments from SUTI

ACCOMPLISHMENTS

This is the first year for the Center for Acoustic Cooling. It is structured on fundamental developments of miniature thermoacoustic devices supported by the Office of Naval Research, the interfacing of devices to microcircuits and computers as supported by DARPA (HERETIC Program), and industrial collaboration with a local company, for the development and commercialization of Center technologies. This effort has attracted the interest of a venture capital investment company, SUTI, in California.

Can you imagine…..

A miniature cooling device that replaces fans in airplane cockpit displays and personal computers using sound as the main energy source and measures from 4 cm to less than 1 cm?

TECHNOLOGY

The center's technology is based on two effects in thermo acoustics. The first is that heat can be converted into sound energy; and second, sound can pump heat. Both have been developed into devices with dimensions ranging from 4 cm to 0.8 cm with the possibility for further miniaturization and microcircuit integration.

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CENTER FOR

ADVANCED JOINING OF MATERIALS

BRIGHAM YOUNG UNIVERSITY

CENTER

The Center for Advanced Joining of Materials **(CAJM**) is developing enhancements and new technologies in friction stir welding (FSW). FSW is a relatively new innovative joining technology that is revolutionizing the way in which aluminum and copper materials are being joined. The objectives are to develop enhancements to this existing technology that will broaden the use of this process in new materials and applications.

TECHNOLOGY

The Center is currently focused on the development and marketing of three technological aspects of FSW: 1) tooling that will last longer, offer the ability to join a wider range of advanced materials, and enable better control of the resulting quality of weld and properties, 2) new control systems and hardware for large scale three-dimensional FSW capabilities; and 3) new methods and novel tooling for joining polymeric materials.

ACCOMPLISHMENTS

All of the first-year milestones have been met. To date, the Center has submitted three provisional patents . Of these, BYU has issued an exclusive license for the patent on super abrasive tools to a local Utah company. Co-development and marketing of these tools are continuing. BYU is presently seeking a partner for co-development on the FSW of polymeric materials. With respect to the direct machining and controls patent, BYU held a meeting in May at which a direct machining prototype was demonstrated. Those in attendance included Ford Motor Company, The Boeing Company, Intel, and Aires (Japan). Of those in attendance, there was a strong agreement that these companies wanted this technology to be moved to commercialization as soon as possible.

Can you imagine…..

A new method for welding metals and plastics that does not melt the material, does not add new material, and forms a joint that is base metal strong and virtually undetectable from the surrounding material?

As a result, BYU is presently establishing a consortium of end-users to fund the final phases of development. Likewise, BYU is seeking a business partner through which this technology can be licensed and marketed.

Exclusive Licensing agreement signed with a Utah company
3 provisional patents submitted

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CENTER FOR

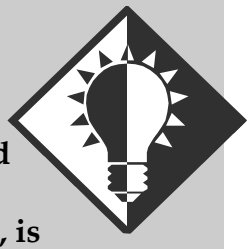
ADVANCED STRUCTURAL COMPOSITES

BRIGHAM YOUNG UNIVERSITY

CENTER

The objective of the Center for Advanced Structural Composites is to develop the commercial potential of the IsoTruss technology. The IsoTruss enables the creation of super lightweight grid structures with the potential of revolutionizing industries as diverse as civil infrastructure (e.g., communication and construction) aerospace, automotive, marine and sporting structures, virtually in any application area requiring high strength, high stiffness, light weight and superb corrosion resistance.

Can you imagine…..



A power line transmission tower that can withstand extreme wind conditions, support tremendously heavy loads, is corrosion free, is unaffected by temperature extremes, and weighs significantly less than conventional steel towers?

TECHNOLOGY

The core technology consists of an ultralightweight composite structural shape known as the IsoTruss. The IsoTruss is a novel, patented three-dimensional structural form that takes advantage of the highly directional properties of high strength composites to produce an extremely efficient and lightweight structure. The IsoTruss incorporates stable geometric configurations with helical members that spiral in opposing directions around a central cavity, coupled with longitudinal members that pass through the intersections.

ACCOMPLISHMENTS

Several companies are currently negotiating licensing agreements with BYU. This technology, along with expanding applicability, should provide many commercial and engineering solutions to structural problems.

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CENTER FOR

BIOMEDICAL OPTICS

UNIVERSITY OF UTAH

CENTER

The goal of the Center for Biomedical Optics is to commercialize optical technologies for diagnostic, therapeutic and disease risk assessment in medicine. Recent advances in novel light sources, laser materials and laser spectroscopy make these optical techniques highly attractive for novel, non-invasive assessment.

TECHNOLOGY

The Center's technologies include Resonant Raman Scattering detection of carotenoid antioxidants in human tissue and a novel light source for biomedical spectroscopy.

ACCOMPLISHMENTS

Nutriscan, Inc. was formed during the second year of COEP funding and negotiated a license for our US Patent No. 6,205,354B1: Method and Apparatus for Noninvasive Measurement of Carotenoids and Related Chemical Substances in Biological Tissue. This patent was issued March 20, 2001 for technology supported by earlier COEP funding. The other Center technologies are anticipated to require further development with COEP funding before commercialization can occur.

Can you imagine…..

A non-invasive optical laser technique that can detect and treat cancerous cells in the skin or mucosal tissue??

Licensed 2 fields of use, one patent issued

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CENTER FOR

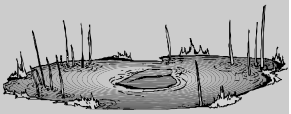
BIOREMEDIATION

WEBER STATE UNIVERSITY

CENTER

The Center for Bioremediation was established to channel research, development and marketing of innovative heavy metal removal, recovery and pollution prevention biotechnologies into a valuable resource for WSU and Utah. The Center's focus technology is biological selenium removal. Additionally, technologies include arsenic removal and cyanide degradation.

Can you imagine…..



A faster and more economical way to remove heavy metals, such as arsenic or cyanide, from wastewaters to a point below detection, with naturally occurring microorganisms?

TECHNOLOGY

The Center's biotechnologies are based on research conducted by the Center's principal investigators; and over 7.7 million US Bureau of Mines (USBM) research dollars are invested in the development of metal bioremediation technologies. At the forefront of the Center focus technologies is a field-proven selenium removal technology capable of economically removing this contaminant from wastewaters to a point below detection. The Center's selenium technology is based on a novel implementation path requiring a thorough front-end analysis, specially adapted, naturally occurring microorganisms, and a patent-pending proprietary process of configurations. This path provides unique bioremediation technologies that are more economical, faster and more durable than other technologies.

ACCOMPLISHMENTS

The Center's technology has been demonstrated to be approximately 1/10 the cost of EPA's past BDAT and removes selenium to lower levels. A final EPA report is expected later in 2001. The Montana site was viewed as a showcase site for selenium removal.

Technology is 1/10 the cost of past BDAT and removes selenium to lower levels

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CENTER FOR

CELL SIGNALING

UNIVERSITY OF UTAH

CENTER

The Center for Cell Signaling (CCS) develops and commercializes new technologies that are important to the treatment of cancer, allergy, asthma and inflammation. CCS has 20 participating faculty from eight different departments at the University of Utah, one faculty member from Brigham Young University and two from Utah State University, focusing their talents in a synergistic way to create and commercialize new technologies.

TECHNOLOGY

The CCS focuses on the synthesis and drug applications of new molecules involved in cell to cell communication, from controlling the biochemical pathways of signal transduction to designing instruments used to study these processes. Current developments include tools necessary for the elucidation of chemical pathways that regulate normal and abnormal cell responses. These tools include chemical synthesis, expression of recombinant proteins, preparation of monoclonal antisera, biomolecular interaction analysis and phage display of high affinity peptides. New methods are being developed to assay for signal binding and processing proteins, utilizing high throughput screening.

ACCOMPLISHMENTS

The Center faculty continues to excel in inventions. This year they filed 21 invention disclosures, 20 patents or provisionals on June 30, 2001. Two companies have been spun off using Center technology, Salus Therapeutics, Inc and Echelon Research Laboratories. Salus (established 1999), focuses on identifying ribozyme and antisense targets for specific diseases. The company has research collaborations with the Center and has received two SBIR awards totaling over $850,000.

continued….

Can you imagine…..

A new class of pharmaceuticals that provide therapeutic effects by artificially signaling selected cells in the body to perform desired actions to the benefit of the patient?

Echelon Research Laboratories, established in 1998, markets reagents and kits for identifying oncogene activators and suppressors important in cancer diagnosis. Echelon received six SBIR/STTR awards totaling over $2 million and has successfully licensed Center technologies, which are now in production.

21 Invention Disclosures
Two technology licenses signed
Two spin-off companies

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CENTER FOR

COMPLIANT MECHANISMS

BRIGHAM YOUNG UNIVERSITY

CENTER

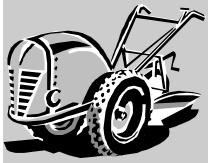
The objective of Compliant Mechanisms is to accelerate and streamline the development and commercialization process of compliant mechanisms so that they may be quickly licensed to existing or new companies. The use of innovative and patented compliant mechanisms will give existing companies a clear competitive advantage and will provide a unique and valuable product for new companies. The potential market applications and opportunities are immense.

ACCOMPLISHMENTS

Some examples of compliant mechanisms that have been designed and tested are: fishing reel, bicycle freewheel, derailleur and brakes, pull start for small gasoline engines, centrifugal clutches, string trimmer, small garden tiller clutch , go-cart clutch, continuously variable transmissions (CVT), general purpose belt drive CVT , second generation bicycle CVT prototype , bistable mechanisms, compliant parallel motion mechanisms, constant-force mechanisms, electrical contacts for PDA docking stations, fully compliant bistable micro mechanism,
thermal actuators, linear motion microbistable mechanism and two position latching mechanism.

Can you imagine…..

A method for redesigning any complex mechanical part to significantly reduce the numbers of parts, simplify the manufacturing process, reduce costs and end up with a more reliable and wear-resistant device?



TECHNOLOGY

The Center possesses methods for the design of compliant mechanisms that have reduced part count and reduced cost and increased precision compared to conventional mechanisms. A number of specific classes of mechanisms have been investigated and developed for commercialization.

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CENTER FOR

DAIRY TECHNOLOGY COMMERCIALIZATION

CENTER

UTAH STATE UNIVERSITY

The Center for Dairy Technology Commercialization was established to commercialize technologies developed at the Western Dairy Center, whose research is funded by a consortium of dairy food companies, for a variety of applications in the dairy industry.

TECHNOLOGY

The Center is currently pursuing commercialization of the following inventions: utilization of bacterial cultures that produce polysaccharides externally to increase cheese yield; production of flavored cheese using high pressure injection technology, using textured whey protein both as a meat extender and as a high protein snack food.

A new company was formed and is based in Tooele, Utah.

Can you imagine…..

A new method of modifying cheese flavor by using high-pressure injection technology?

ACCOMPLISHMENTS

Cheese trials have begun using the exopolysaccaride gene to determine commercial interest among cheese producers. A new injector was manufactured and sample product was sent to potential users of the technology. Two commercial companies are currently evaluating the technology. One company intends to modify the cheese flavor and the other company will use the technology as a method of creating new and novel cheeses for children.

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CENTER FOR

ELECTRONIC MEDICAL EDUCATION

UNIVERSITY OF UTAH

CENTER

The Center for Electronic Medical Education (CEME) is part of the Electronic Medical Education Resource Group (EMERG) in the Department of Radiology at the University of Utah (U of U). The overall goal of the CEME is to develop and commercialize component software originally created by EMERG that streamlines the collection, creation, access and retrieval of image intensive teaching and reference data. These needs addressed by EMERG are prevalent at medical institutions around the world. The focus of this center is to develop component software tools for use by end users and specialists in image intensive fields, specifically targeted towards the case creation and information management needs.

TECHNOLOGY

The center continues the development of software to streamline the use of image intensive teaching and reference data in medicine. The software consists of author and platform tools used to create medical reference and education products as part of a component based information management and processing system. The software tools will be used by both authors and end-users to continuously update the medical reference image data.

Can you imagine…..

A medical doctor who comes across a case he has not seen before, taps into a medical image database and accesses the most current database of images and case studies to help improve patient diagnosis instantaneously?

ACCOMPLISHMENTS

All of the software that has been developed within EMERG and the Center is owned by the U of U since its development involved significant use of University resources. Two technology disclosures have been submitted. Those disclosures are Medical Image Annotation Tool and publishing software (beans) for image-oriented print and digital outputs (screen display via CD-ROM, DVD, on-line, etc).

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CENTER FOR

INTELLIGENT COMPUTER TOOLS

CENTER

BRIGHAM YOUNG UNIVERSITY

The Center for Intelligent Computer Tools "graduated" this year. This was the fifth year of funding. The Center focuses on interactive image segmentation, composition and digital image editing, automated creation/browsing of digital (microfilm) libraries, semi-automated creation of virtual environments-especially with Virtual Venues for the 2002 Winter Olympics

Can you imagine…..

Careening down an Olympic bobsled run, aware of the twisting turns and angles of the sled while watching the surrounding landscape rush by, all on your computer screen with every visual sensation artificially created by software?

TECHNOLOGY

The technology development effort concentrates in Intelligent Scissors/Paint, represents full color images with limited palette and no visual loss, resolution enhancement to improve (internet) image appearance through data dependent triangulation; document understanding: automated zoning and browning of digital documents by content; line intersection: automated object-based line intersection for recovery of 3D (building) geometry; virtual environments: creation of realistic virtual environments (Olympics, BYU) from real-world images; image blending: automatic shape blending and image object blending, object-based image editing: ungroup, delete, texture synthesis; image-based object modeling: photographic based resolution enhancement of objects

ACCOMPLISHMENTS

Algorithms for intelligent paint segmentation and localization were updated with high level visual effects. The prototype digital microfilm parser/browser was enhanced with significant new tools. The virtual environment terrain database for the Virtual Olympics was expanded and terrain details such as buildings, a bobsled run, and ski runs were added. Additional license agreements were signed with Adobe Systems and Park City Entertainment.

License agreements signed with Park City Entertainment and Adobe Systems

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CENTER FOR

MICROBE DETECTION & PHYSIOLOGY

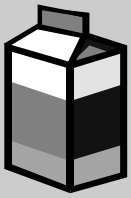
CENTER

UTAH STATE UNIVERSITY

The focus of this center is the development of technologies that lead to the real time detection of pathogenic micro-organisms. This involves the development of novel pathogen capture molecules, platform development, prototype development, and commercialization. Industries where this technology is useful include pharmaceuticals, biomedicine, biotechnology, veterinary, production agriculture, food processing, public health, defense, and water and sewage treatment.

Can you imagine…..

Being able to detect less than 10 cells of a harmful pathogen, such as salmonella or E. coli, for example in milk, within 30 minutes?



TECHNOLOGY

The primary focus of the Center is bacterial detection, but other targets are also investigated. To date, four technologies are under development: ImmunoFlow, ImmunoDNA, GlycoBind, and TissueTag. Each technology has a unique use and application but is not limited to a single type of use. For example, ImmunoFlow has many fields of use ranging from water to air and has the potential to detect many types of bacteria. Initial prototypes are available for Bacillus globgii spores, Lactobacillus, Salmonella and E. coli O157 cells. Each type of assay has a maximum detection time of 30 minutes with a sensitivity of less than 10 cells. A unique feature of each technology is that it is volume independent; both large (tens of liters) and small (1 to 100 milliliters) samples are commonly used. Each technology is at a different stage of development with ImmunoFlow being the most developed.

ACCOMPLISHMENTS

ImmunoFlow is under a license option agreement. A fully automated beta-prototype has been built to run ImmunoFlow.

Each technology has a unique use and application but is not limited to a single type of use.

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CENTER FOR

MULTI-DIMENSIONAL INFORMATION

UNIVERSITY OF UTAH

CENTER

The Center for the Representation of Multi-Dimensional Information (CROMDI) was established to commercialize audio-visualization technology (IntuInfo) that facilitates the rapid and accurate analysis of large quantities of quickly changing data. CROMDI is an interdisciplinary team dedicated to the innovative representation of information, comprised of experts in the fields of Architecture, Computer Science, Anesthesia, BioEngineering, Finance, Mathematics, Psychology, Communication and Music. These diverse experts participate with their own unique perspectives and provide solutions to complex information design needs through a unique methodology and iterative process.

TECHNOLOGY

By visually displaying multiple variables using various objects and colors, a wide range of information is clearly presented. The association between the graphical objects and the data is designed to facilitate rapid understanding of large quantities of data. To be "state of the art" in many fields is to represent information with tables of numbers, waveforms, pie charts, diagrams, icons and matrices. IntuInfo enables recognition of events that is significantly faster, more accurate, less mentally demanding and with less training than is possible using existing technologies. This patent pending technology has been applied in medicine, finance, and entertainment, and may also be successfully utilized in other applications where decision making depends on monitoring or analyzing large quantities of information.

Can you imagine…..

A new audio-visualization technology that facilitates the rapid and accurate analysis of large quantities of quickly changing data, such as stock market information?

ACCOMPLISHMENTS

Filed 5 patent extensions: 3 for medicine, 1 for finance and 1 for inertia; 3 additional medical display technology modules and enhancements; sponsored research by GE Medical Systems with an option to license financial display prototype. Market and sponsored research and licensing discussions with potential partner.

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CENTER FOR

PETROLEUM RESEARCH

UNIVERSITY OF UTAH

CENTER

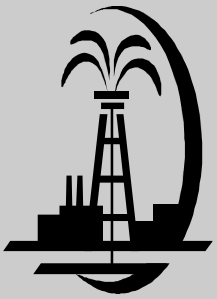
The mission of the Petroleum Research Center (PERC) at the University of Utah is to conduct research and development studies leading to practical, cost-effective solutions to liquid hydrocarbon production, handling and transportation. With funding from the U.S. Department of Energy and the petroleum industry, the PERC coordinates basic and applied research in: the physical properties and physical and chemical thermodynamics of naturally occurring hydrocarbons, development of pipeline transportation and flow assurance strategies, and simulation, optimization and control of oil and gas recovery methods.

TECHNOLOGY

Petroleum Research Center (PERC) was funded to commercialize and market two specific areas of work; understanding problems related to production, transportation and processing of waxy and asphaltenic crude oils and subsequent alleviation of these problems and developing a variety of methods and software tools (models) for the efficient and optimal production of oil and gas from underground reservoirs. Over the last several years, oil companies and federal agencies have funded (and continue to fund) research in PERC, which is an integral part of the Department of Chemical and Fuels Engineering at the University of Utah.

Can you imagine…..

A variety of methods and software tools for the efficient and optimal production of oil and gas from underground reservoirs?



ACCOMPLISHMENTS

Applicability of the discrete-fracture model demonstrated technology for wax measurement developed. First generation of thermodynamic and pipeline flow models complete.

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CENTER FOR

PROFITABLE USES OF AGRICULTURAL BYPRODUCTS

CENTER

UTAH STATE UNIVERSITY

The Center for Profitable Uses of Agricultural Byproducts was established to strengthen the economy of Utah, particularly the rural economy, by working closely with farmers and ranchers and other agricultural related businesses transferring technologies, utilizing agricultural production and processing byproducts. Byproducts of no or little value are transformed into energy and other salable items using technology developed at the center.

Can you imagine…..

A technology utilizing agricultural byproducts of little or no value at all and transforming these byproducts into a profitable business?

TECHNOLOGY

The technology developed at Utah State University for profitable uses for food production and processing byproducts is manifested in two major areas: 1) anaerobic systems that can produce energy (biogas) and soil amendment from manure and food processing waste, and 2) components of a high rate aerobic bioreactor (drum composter based) system that make the process more cost effective and products produced by the process more valuable. Most of the emphasis in the year 2000 was on the anaerobic technology.

ACCOMPLISHMENTS

A fully operational system has been built at the Caine Dairy at Utah State University, open for visits to see the system functioning, creating a showcase of this technology. This technology is very unique and easy to manage, with a high treatment rate and reliability. This Center has partnered with Specialized Analysis Engineering, a Utah company, and a new company is currently being formed.

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CENTER FOR

SMART SENSORS

CENTER

UTAH STATE UNIVERSITY

Smart Sensors probe the environment and modify their function in order to improve their data gathering capability. A smart sensor adapts to its environment and sends improved data to the main processing computer. A smart sensor melds sensor, signal processing, and computer technologies. Applications span medicine, precision agriculture, electronics manufacturing, wireless communication, transportation and radar.

Can you imagine…..

An early warning system for computer disk drive failure, a preflight test system for aging aircraft wiring and a system to protect military personnel from being overrun by tanks?

TECHNOLOGY

The Center for Smart Sensors focuses on two core technologies; imbedded antennas and circuits for measuring length, distance, and impedance. Four support technologies include wireless communication, complex 3D simulation, numerical optimization, and user interfaces. Projects in the center include an early warning system for computer disk drive failure, a preflight test system for aging aircraft wiring, and a system to protect military personnel from being overrun by tanks. Antennas to communicate with implanted medical devices, measure the moisture of corn, and detect weather-critical features of atmospheric plasma are under development.

ACCOMPLISHMENTS

Products under development include: Computer Sentinent Board, "Smart Wiring" in situ of aging wiring before flight, Imbedded Antenna for moisture measurement of corn, Imbedded Antenna for communication with medical implants, wireless communication system for environmental sensors on the H60 helicopter, water level sensor for irrigation, personnel avoidance safety system.

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CENTER FOR

SOLID OXIDE FUEL CELLS

UNIVERSITY OF UTAH

CENTER

This center "graduated" this year. SOFC was established to develop technology for the conversion of chemical energy of oxidation of gaseous fuels such as natural gas, coal, gas, biogas, and gasifiable fuels such as gasoline and diesel, into electricity for residential and remote applications, hospitals, malls, school buildings, office buildings, etc. The objective is to develop 1 to 5 kW modular units that can be readily integrated with a fuel processor. These units will also have applications in transportation as auxiliary units. In addition, the Center technology is ideally suited for small portable power units in the 10 to 100 W range. The applications include portable power for medical devices, laptop computers, portable power for soldiers, etc.

TECHNOLOGY

The principal Center technology is planar, anode-supported, thin YSZ film, low temperature, Solid Oxide Fuel Cell (SOFC). The main focus of the Center technology is the development of high performance, anode-supported SOFC in 5 cm x 5 cm size, and the development of stacking strategy. The stacks are internally manifolded and utilize flexible, glass-free seals. The cells and stacks are thermal shock-resistant.

ACCOMPLISHMENTS

Center work has led to the filing of numerous invention disclosures and two patents. Center funding has facilitated the establishment of SOFC Consortium between the University of Utah, Gas Technology Institute, Electric Power Research Institute and Materials and Systems Research, Inc. All four Consortium members have recently signed a Letter of Intent to form a new company for the commercialization of the Center SOFC technology. The University of Utah will be an equity participant. The Center funding has also led to other external funding from agencies such as DOE, DOC, DARPA.

Can you imagine…..

A portable generator you can take on your next camping trip that efficiently converts propane to electricity with no flame, no moving parts, no noise and only water vapor as exhaust pollutant?

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2000-2001 Financial Summary

CENTERS OF EXCELLENCE - 2000/2001 FINANCIAL SUMMARY

CENTERS FUNDED IN FISCAL 2000/2001	State Funding 2000/2001	Cumulative State Funding	Fed. Match 2000/2001	Private Match 2000/2001	Total Match 2000/2001	Cumulative Total Match
Acoustic Cooling Technology - U/U	$100,000	$100,000	$675,000	$10,000	$685,000	$685,000
Advanced Joining of Materials - BYU	$120,000	$230,000	$180,000	$116,000	$296,000	$694,000
Advanced Structural Composites - BYU	$110,000	$330,000	$84,029	$84,000	$168,029	$648,342
Biomedical Optics - U/U	$130,000	$250,000	$579,334	$0	$579,334	$1,108,310
Bioremediation - WSU	$50,000	$50,000	$18,000	$135,121	$153,121	$153,121
Cell Signaling - U/U	$180,000	$395,000	$6,000,000	$578,000	$6,578,000	$12,767,807
Compliant Mechanisms -BYU	$120,000	$230,000	$215,103	$172,250	$387,353	$760,773
Dairy Technology Commercialization - USU	$110,000	$345,000	$0	$691,113	$691,113	$1,520,576
Electronic Medical Education - U/U	$120,000	$240,000	$100,000	$140,000	$240,000	$480,000
Intelligent Computer Tools - BYU	$110,000	$305,000	$0	$831,135	$831,135	$3,370,537
Rapid Microbe Detection - USU	$150,000	$400,000	$124,314	$199,360	$323,674	$1,432,177
Multi Dimensional Information - U/U	$100,000	$100,000	$416,911	$0	$416,911	$416,911
Petroleum Research -U/U	$100,000	$100,000	$292,000	$374,000	$666,000	$666,000
Profitable uses of agricultural by-products-USU	$100,000	$100,000	$189,922	$65,000	$254,922	$254,922
Smart Sensors -USU	$100,000	$100,000	$167,063	$450,743	$617,806	$617,806
Solid Oxide Fuel Cells -U/U	$170,000	$500,000	$515,000	$0	$515,000	$2,172,397
Subtotals:	**$1,870,000**	**$3,775,000**	**$9,556,676**	**$3,846,722**	**$13,403,398**	**$27,748,679**
CENTERS FUNDED IN FISCAL 2000/2001:						
All Graduated Centers		$24,048,655				$181,148,660
All Distinguished Centers		$5,890,440				$147,118,784
TOTALS:		**$33,714,095**			**$13,403,398**	**$356,016,123**

2000/2001 MATCHING RATIO	**7.2**	**: 1**
CUMULATIVE MATCHING RATIO	**10.6**	**: 1**

CENTERS OF EXCELLENCE - 2000/2001: Summary of Key Commercial Accomplishments

	Spin-Off Companies		Companies	Patents/Copyrights		Licenses
	New	Total	Assisted	Pending	Issued	Signed
CENTERS FUNDED IN FISCAL 2000/2001						
Acoustic Cooling - U/U	0	0	1	0	0	0
Advanced Joining of Materials-BYU	0	0	50	5	0	1
Advanced Structural Composites - BYU	1	1	30	3	1	1
Biomedical Optics - U/U	0	0	9	3	1	2
Bioremediation - WSU	1	1	1	1	1	1
Cell Signaling - U/U	3	5	13	25	3	0
Compliant Mechanisms -BYU	0	0	9	11	2	4
Dairy Technology Commercialization - USU	0	1	9	4	0	0
Electronic Medical Education - U/U	1	1	0	2	4	0
Intelligent Computer Tools - BYU	0	0	9	0	0	2
Rapid Microbe Detection - USU	1	1	6	2	3	1
Multi-Dimensional Information-U/U	0	0	4	1	0	0
Petroleum Research - U/U	0	0	5	0	1	0
Profitable Uses of Agricultural Byproducts-USU	0	0	12	1	0	1
Smart Sensors-USU	0	0	13	4	0	0
Solid Oxide Fuel Cells -U/U	1	1	5	3	2	0
Subtotals:	8	11	175	65	18	13
ALL CENTERS TOTALLED *Graduated and Distinguished Centers Included*						
TOTALS:		**142**	**1046**		**125**	**197**

2001-2002 Funded Centers

Description of
Centers selected for funding
Fiscal Year 2001-2002

Acoustic Cooling Technology (U/U) – has developed novel miniature acoustic cooling devices and technologies for application in electronic circuits, computers, lap-top computers, and other small scale devices.

Advanced Joining of Materials (BYU) – has developed new friction stir welding tools and materials and also develop appropriate control systems and multi-axial capability for all levels of manufacturing.

Advanced Structural Composites (BYU) - develops commercial products for the integration of damping materials with composites and the creation of lightweight composite materials.

Biomedical Optics (U/U) – has developed optical technologies for medical diagnostic and therapeutic (surgical) treatments in medicine, e.g. non-invasive assessment and therapeutic treatments of mucosal tissues.

Bioremediation (WSU) – has a patented technology for the removal of selenium metal; additional multiple metal removal technologies are poised in the commercialization pipeline. One new company has been formed.

Cell Signaling (U/U) - is focused on technologies important to the treatment of cancer, allergy, asthma, and inflammation. Near-term products for commercialization include chemical agents developed in the center. Two new companies have been started.

Compliant Mechanisms (BYU) – accelerates and streamlines commercial applications of devices that obtain their motion from the deflection of flexible parts rather than from pin joints.

Electronic Medical Education (U/U) - develops marketable medical education products by authoring and packaging tools that will be used to create medical education products, and sell them as a component based medical information management and processing system. A new company was formed this year.

Nuclear, Medical and Environmental Technologies (U/U) – develops high specific activity, short-lived radioisotopes; production of irradiated seeds for use in treatment of selected cancers; and evaluation of performance of electronic components and integrated systems upon exposure to neutrons.

Petroleum Research (U/U) - Develops cost-effective solutions of liquid hydrocarbon production, handling and transportation. The focus is on assessing the physical properties and chemical thermodynamics of naturally occurring hydrocarbons; optimization of enhanced petroleum recovery; process control and production automation in oil and gas fields; and the development of pipeline transportation strategies.

Profitable Uses of Agricultural Byproducts (USU) - develops cost-effective technologies to treat and dispose of animal waste generated in agriculture. The conversion of the waste products by anaerobic systems results in "biogas" and nutrients to be used in soil amendments.

Rapid Microbe Detection (USU) – has developed an immuno-flow technology to detect contaminating microbes rapidly, to enhance real time decisions in several industries including food, pharmaceutical and public health.

Rapid Prototyping and Manufacturing (U/U) – has developed the capability of building very large prototypes and techniques for a large number of molded parts from CAD design in a short period of time.

Representation of Multi-Dimensional Information (U/U) – has developed a new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data. The patent pending technology could be utilized in a number of areas including medicine, finance, entertainment, process control, corporate management, quality assurance, network monitoring etc.

Smart Sensors (USU) – is engaged in the development and commercialization of sensor-based products. Product applications span a wide array of sensing and communication needs. An application close to market is the detection of faults in aircraft wiring.

Vascular Biotherapeutics (U/U) – is focused on commercializing medical strategies and devices that target blood vessel formation for the treatment of cancer and obstructive vascular diseases such as atherosclerosis.

Centers of Excellence Legislation

Part 6
Centers of Excellence

9-2-601. Purpose.

9-2-602. Short title - Definitions.

9-2-603. Administration - Grants.

9-2-601. Purpose.

(1) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. These generally come from strong research colleges and universities. Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development. Most states are enhancing their research base by direct funding, usually on a matching basis. The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas. The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.

(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis.

(3) The Legislature recommends that such funds be allocated on a competitive basis to the various colleges and universities in the state. The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.

History: C. 1953, 63-62-1, enacted by L. 1985, ch. 103, § 1; 1986, ch. 109, § 1; renumbered by L. 1992, ch. 241, § 60.

9-2-602. Short title - Definitions.

(1) This part is known as the "Centers of Excellence Act."

(2) As used in this part, "Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.

History: C. 1953, 63-62-2, enacted by L. 1985, ch. 103, § 2; 1986, ch. 109, § 2; renumbered by L. 1992, ch. 241, § 61.

9-2-603. Administration - Grants.

(1) This part shall be administered by the Division of Business and Economic Development.

(2) The department may award grants to the various colleges and universities in the state for the purposes of this part.

(3) Recommendations for funding shall be made by the division with the advice of the State Advisory Council for Science and Technology, with the approval of the board. Each proposal shall receive the best available outside review.

(4) In considering each proposal, the division shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development. Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.

(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the division in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

History: C. 1953, 63-62-3, enacted by L. 1986, ch. 109, § 3; renumbered by L. 1992, ch. 241, § 62.

Repeals and Reenactments. - Laws 1986, ch. 109, § 3 repealed former § 63-62-3, as enacted by L. 1953, ch. 103, § 3, relating to creation of a committee for technology excellence in engineering research, and enacted the above section.

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Governor

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Community and Economic
Development

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DIRECTOR
Division of Business and Economic
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MICHAEL A. KEENE, Ph.D, MBA
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DIRECTOR
Centers of Excellence

CENTERS • OF EXCELLENCE

ANNUAL REPORT

Fiscal Year July 2001—June 2002

Published December 2002

Utah!
Where ideas connect™

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2001-2002 Centers of Excellence Annual Report

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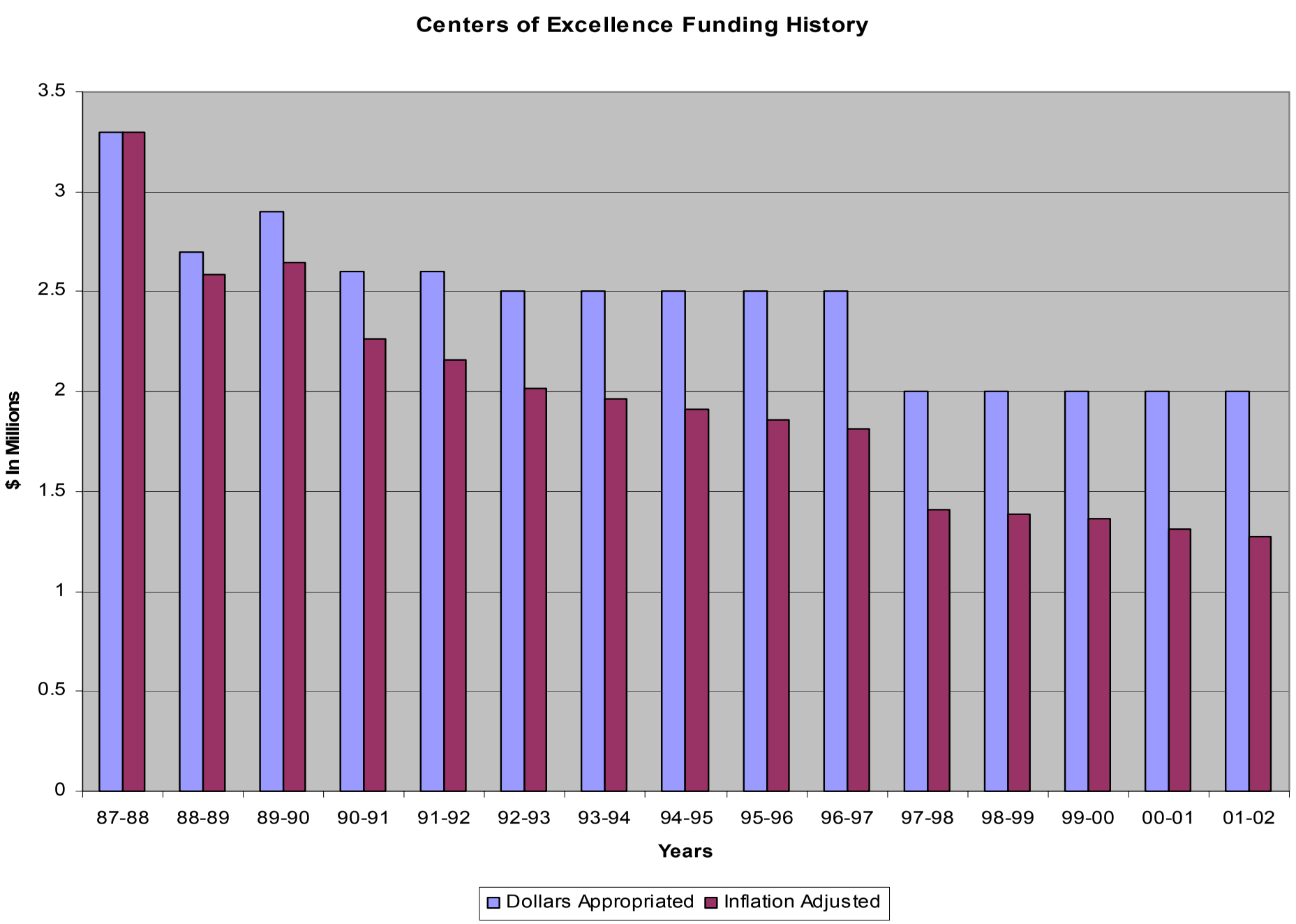
Executive Summary


Centers of Excellence Funding History
$ In Millions
3.5
3
2.5
2
1.5
1
0.5
0
87-88
88-89
89-90
90-91
91-92
92-93
93-94
94-95
95-96
96-97
97-98
98-99
99-00
00-01
01-02
Years
Dollars Appropriated
Inflation Adjusted

Executive Summary

Utah enjoys a rich and diverse legacy of technical innovation, ranging from the invention of television (by Philo Farnsworth, in 1927) to innumerable advances in the fields of computing and medicine during more recent decades. Unfortunately, many of these inventions went on to be commercialized elsewhere, robbing the state of the jobs, revenues and respect that it was rightfully due. The Utah State Legislature established the Centers of Excellence Program (COEP) in 1986 as part of a strategy to improve on that record. They approved the annual allocation of economic development funds, to be awarded to university faculty members on a competitive basis through the COEP, specifically to fund what federal grants from agencies like the National Science Foundation do not support: Highly targeted, market-driven projects that perform the applied research, prototype development and business planning necessary to successfully commercialize promising technical innovations here in Utah.

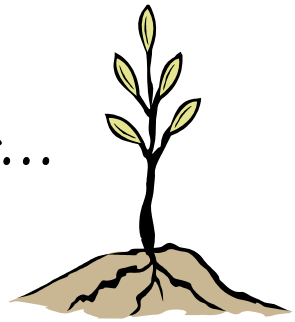
COEP projects require a 2:1 match with non-state funds, and are subject to an annual competitive renewal for up to five years of support. Over time, an Advisory Council composed of veteran technology executives has been formed to assist in reviewing and choosing the projects to be funded, and a requirement has been added that Centers work with independent, preapproved Commercialization Consultants to insure that projects remain commercially focused. As a result of this disciplined structure, the Utah Centers of Excellence Program continues to be one of the nations most successful technology commercialization programs as measured by matching dollars, new companies, new products, and state economic impact. During the last year, the program director has been interviewed by representatives of agencies hailing from Rhode Island to Romania.

During the 2001-2002 fiscal year the Centers Program issued $1.87 million in grants to 16 active Centers for use in bringing significant new technologies closer to the marketplace. In the competitive selection process, three centers were graduated, 13 centers received continued funding and 3 new centers were selected. The Center distribution was as follows: nine at the University of Utah ($1,090,000), three at Utah State University ($330,000), three at Brigham Young University ($380,000), and one at Weber State University ($68,000). In addition, the program also funded two Planning Grants and the commercialization consulting effort, at a level of $7,000 per funded Center, for a total of $2.0 million.

The 16 Centers received matching funds of $20.5 million, resulting in a matching fund ratio of 11:1, and (despite the recession) spun out eight new Utah companies. Over the first 16 years of the program, the Centers of Excellence have generated 179 patents, resulting in 204 license agreements, and 150 Utah-based companies have been created to license and market proprietary technology from the program. As of the last audit (2001), those companies directly employed over 1300 persons in the state, at an average wage of $68,000. With some earlier graduates of the program (Myriad Genetics, Inc. and Sonic Innovations, Inc., for example) just beginning to mature as significant, publicly held companies and scores of others developing and growing, it is clear that the entrepreneurial pipeline laid by the COEP will have an ever expanding and progressively more important role to play in Utah's economic future.

Success Stories

Acorns, Seedlings, Saplings, Oaks…



The Centers of Excellence have spawned over 150 Utah companies to date – 8 in the last fiscal year alone. From tiny startups to maturing, publicly held corporations with hundreds of employees, the commercial offspring of this incubator program form a growing pipeline that today provides exciting, well-paid jobs for recent grads and seasoned workers alike. The following pages illustrate just a few examples of spinout companies that are applying revolutionary technologies to create new jobs, new wealth, and new worldwide recognition for the achievements of Utahns.

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uniAMS	p. 19
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Echelon Biosciences	p. 27
Myriad Genetics	p. 33

Acorns, Seedlings, Saplings, Oaks…

IsoTruss Structures

The woman shown below is smiling because the 47 foot-long pole on her shoulder weighs only 23 pounds, but could support the weight of her car. Now, how about a bicycle frame stronger than steel but weighing only 2 pounds? These are the sort of achievements made possible by the work of Prof. David Jensen at BYU's Center for Advanced Structural Composites, and licensed to 2002 startup company IsoTruss Structures, Inc., in Heber City.

The U.S. Department of Energy has awarded an SBIR grant to the firm, which proposed to demonstrate how their lightweight girders could replace the steel towers that support 1.5 megawatt wind turbines today. Those turbines are over 200 feet tall, and the towers supporting the 250,000 pound load weigh over 300,000 pounds themselves. The proposed IsoTruss tower will weigh only 10,000 pounds, have the same load-bearing capacity and cost far less to transport and install.

The company's first product, however, is more prosaic – but indicative of the enormous potential markets for their technology. Priced at $325.00, the IsoTruss 'C' class 40 foot long utility pole weighs only 174 pounds, features both greater strength and higher wind resistance than wood poles, contains no poisonous preservatives, and carries a 100 year warranty.

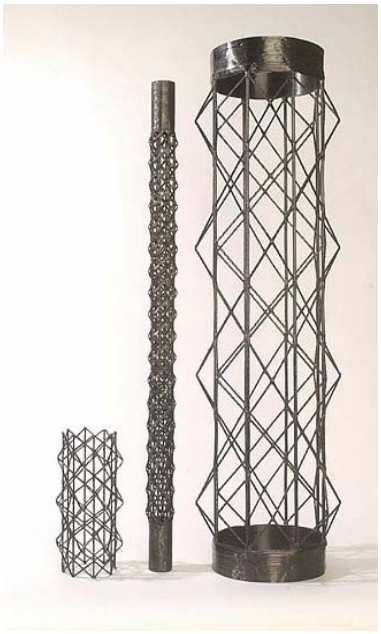
Professor David Jensen, BYU holding an IsoTruss structure.

IsoTruss Structures, Inc., headquartered in Heber City, Utah, manufactures and sells a revolutionary new material technology that delivers products which have significantly higher strength-to-weight and stiffness-to-weight ratios than common structural forms based on conventional materials such as steel, iron, aluminum, wood, etc. IsoTruss manufactures custom products that meet client specific end-use requirements both as replacement products as well as completely new and unique solutions where designers and engineers have not been limited by conventional materials.

Center for Advanced Structural Composites

The primary efforts of CASC are focused on the investigating, developing, and testing of advanced structural composites as well as the licensing of patented technologies, such as the IsoTruss. The IsoTruss is a revolutionary, patented (U.S. Patent #5,921,048), lightweight, three-dimensional structural form that takes advantage of the highly directional properties of advanced composite materials. This extremely efficient structure has the potential to enhance innumerable applications ranging from aerospace structures to mechanical systems to sporting equipment to civil infrastructure.

www.isotruss.com



IsoTruss Structures, Inc., is a composite technology company that develops, manufactures and distributes a superior composite structure ("IsoTruss") designed to leverage the weight and performance advantages of fiberglass and carbon composites at costs significantly lower than traditional composite methods. In many applications, the patented structural geometry of IsoTruss provides a superior structural solution that is lighter, stronger and more efficient than traditional composites, metals and wood.

The patented technology behind IsoTruss is the result of over six years and $3 million dollars in research. The Company has made significant progress in commercializing the IsoTruss technology by simplifying the product design process, developing cost efficient methods of manufacturing, identifying targeted vertical markets for the IsoTruss product and implementing strategies to penetrate those markets.

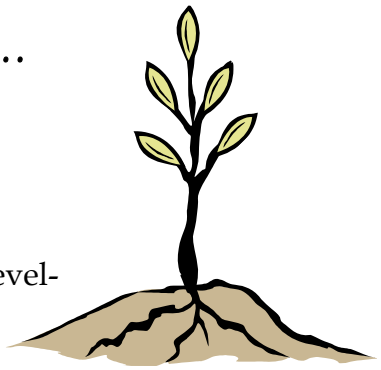
IsoTruss is the world's first advanced composite structure configured in a lattice geometry for superior strength. This makes IsoTruss the lightest, strongest, most efficient structure available. IsoTruss is 91 percent lighter than steel and 76 percent lighter than aluminum.

IsoTruss Structures, Inc. has the exclusive United States license to commercialize the IsoTruss technology.

The technology was developed by David W. Jensen, professor of civil engineering, at BYU's Center for Advanced Structural Composites, part of the state of Utah's Centers of Excellence program. Twelve of Jensen's graduate students have studied the IsoTruss for their master's theses, and about a dozen undergraduates also contributed to its development.

The company has received an SBIR Phase 1 award from the Department of Energy for the development of much taller, lighter weight and lower cost Wind turbine towers to generate electricity using IsoTruss ™ technology. Under the $100,000 IsoTruss Structures, Inc. eventually will try to build towers up to 600 feet high, or three times taller than standard steel wind turbine structures. Researchers say the new towers could generate five megawatts of power, compared with a typical 200-foot steel tower's 1.5-megawatt cap. Such a breakthrough could make wind energy cost competitive with fossil fuel produced energy.

Acorns, Seedlings, Saplings, Oaks…



uniAMS

When Samsung, the giant Korean firm, saw the technology developed by Prof. Hosin Lee in the U of U's Center for Advanced Construction Materials, they liked it – so much so that they partnered with the team to create uniAMS, an operating unit of Samsung SDS America (SDSA), and base it in downtown Salt Lake City, where their dozen employees now occupy the 12th floor of the Key Bank building.

Targeted primarily at government transportation authorities, the uniPAVEMENT and uniSURVEY products incorporate state-of-the-art digital image processing technology and user-friendly software to provide civil engineers with objective, cost-effective and facile methods for budgeting, optimizing and scheduling road asset maintenance and repair strategies. Best of all, they can provide the capability of a competing $500,000 product for under $25,000 – and it is easier to use.

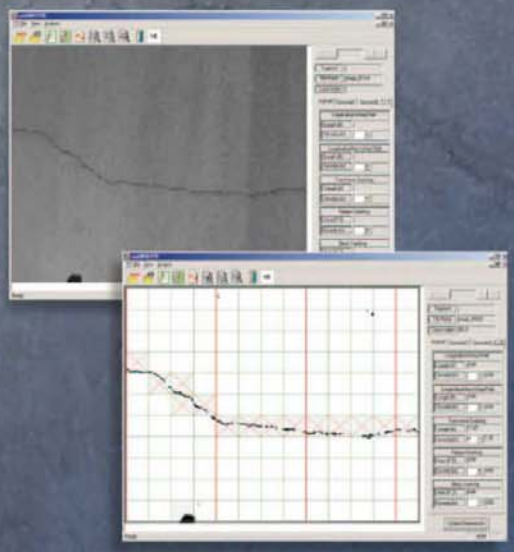
With customers in a number of states and countries and the ability to expand into other types of asset management markets, uniAMS is now beginning to get traction and grow. Dr. Lee notes that "Bringing SDSA to Utah is an example of successful technology transfer from academia to industry with support from the government. This success was only possible because of an initial seed grant from the Centers of Excellence Program at the Utah Department of Community and Economic Development to the University of Utah."

www.uniams.com

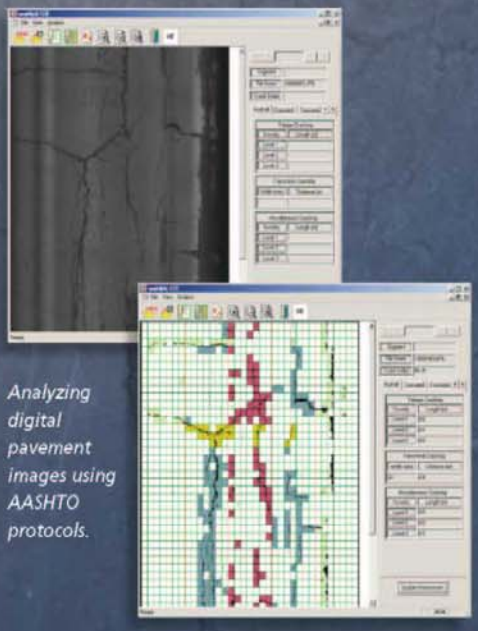
uniSurvey

Better Technology for Better Roads

uniSURVEY is road inventory & condition data surveying and distress measurement software. uniSURVEY uses a state-of-the-art digital image processing technology to analyze pictures of various types of pavement surfaces. By integrating with GIS systems, uniAMS helps city engineers schedule pavement, bridge, sign, and sidewalk condition & inventory surveys. uniSURVEY is able to accept pavement condition data, process that data, and then present images of the overall pavement condition on a color-coded digital map. The collection rules and survey routes are easily definable. uniSURVEY provides city engineers with objective, cost-effective and easy-to-use methods for optimizing and scheduling road asset maintenance and repair strategies.



Computing SHRP crack type, extent, and severity.



Analyzing digital pavement images using AASHTO protocols.

Features

- **Flexible configuration** for distress and inventory tracking.
- **GIS-based survey.** Using interactive digital map, the survey schedule can be planned. Asset condition and inventory data is also easily accessible from the digital map.
- **Built-in Device Interface** can easily control and configure survey equipment such as DMI, GPS, and X-Keypad.

Benefits

- Data collection process produces higher quality results.
- Survey results are easy to generate and easy to work with
- Increased level of objectivity of asset management systems and policies
- Streamlined integration with data collection system

uniBridge

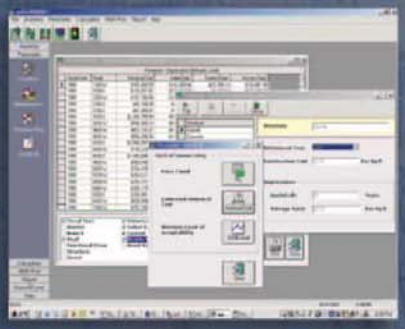
uniSidewalk

uniPavement

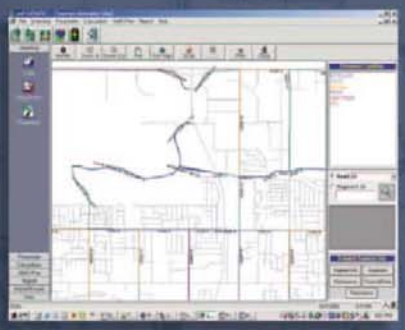
Mapping Maintenance Decisions

uniPAVEMENT is a GIS-based pavement management system that can automatically determine optimum maintenance strategies, schedule maintenance and program long-term budgets meeting new GASB 34 requirements. uniPAVEMENT helps civil engineers develop the most cost-effective pavement rehabilitation projects for various budgets scenarios. The software has been built with an emphasis on being user-friendly. Even users who are new to pavement management systems can quickly and easily master the intuitive point-and-click interface. uniPAVEMENT also provides extremely credible estimations of existing and future needs. uniPAVEMENT supplements existing local knowledge and practical experience regarding pavement data.

PDA module replaces written forms when performing inspections.



Historical data display and GASB-34 compliant documentation.



Access pavement information from database and GIS map.

Features

- **Easy to use system** with user-friendly menu navigation and screens.
- **User-configurable decision model.** Using the mouse, the user is able to define a customized decision model to process maintenance and repair strategies during budget planning.
- **Asset Value Calculator** calculates the value of an asset for GASB 34 reports automatically.
- **Simulation of multiple maintenance & repair plans** determines the best multi-year Maintenance & Repair strategies based on unlimited budget, condition driven and budget driven scenarios.
- **Section-specific deterioration model** predicts future asset condition of individual sections.

Benefits

- Provide better data to decision makers
- Generate the most cost-effective maintenance strategies
- Reduced time requirements
- Meeting GASB 34 requirements become easier

Services

Excellence from Concept to Completion

Data Collection Services

Samsung SDS America has the knowledge and tools regarding inventory, valuation, and asset condition management to assist government agencies in implementing GASB 34 standards. Samsung SDS America's roadway data collection services feature state-of-the-art automated equipment as well as refined manual methods to provide our clients with the data the need to efficiently manage their roadway infrastructure and inventory.

PROFESSIONAL SERVICES FROM SAMSUNG SDS AMERICA

- Data Collection Services
- Database Update and Conversion Services
- Installation Services
- Education Services
- Equipment Assembly Services
- GIS Map Services
  - Map creation
  - Map and data conversion
  - Map condition report
  - Map-book for data survey

Data Collection Equipment

Samsung SDS America supplies and installs the data collection equipment needed for using uniAMS. Samsung provides State of the Art integrated data collection systems including: high-speed digital cameras, differential GPS, accurate Digital Measuring Indexes, programmable key-boards, independent power sources. The uniAMS Data Collection Equipment can be mounted on to any vehicle and used for surveying immediately.

SAMSUNG SDS

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Samsung SDS America
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San Jose, CA 95134
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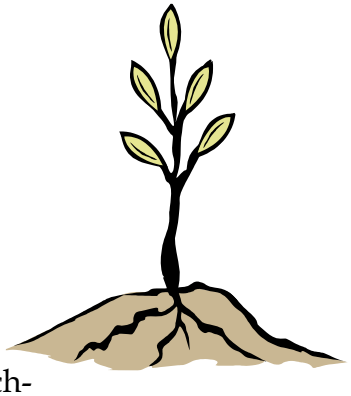
F 408.544.4966
sales@usa.samsung.com
www.samsungsdsa.com

SYSTEM REQUIREMENTS

CPU:	Pentium or higher
OS:	Windows 98, Me, 2000, XP
Hard Drive:	Minimum 64 MB available
Memory:	128 MB of RAM
CD ROM:	8x or higher
Monitor:	VGA minimum, SVGA recommended
Database:	Microsoft Access 2000 using ODBC, ADO

Acorns, Seedlings, Saplings, Oaks…



Applied Biosciences

The Center for Bioremediation at Weber State University is graduating early from the Centers of Excellence Program, having completed its mission of commercializing patented new technologies for cleansing waters contaminated by cyanide, selenium and other recalcitrant pollutants. One part of its legacy will be an undergraduate research laboratory that has both launched students into graduate and medical schools, and served as an inspiration for other faculty - resulting in new student research programs that have enhanced the quality of undergraduate education at WSU. The second legacy is Applied Biosciences, the spinout company that has licensed the technology and recently moved into larger quarters in Salt Lake City. From 2001 revenues of ca. $300,000, the firm has nearly doubled in the last year, despite the economic downturn, and now employs 11 people with average wages of over $40,000.

It is a notoriously long, difficult and expensive process for new technologies to gain acceptance in the remediation marketplace, which is dominated by conservative engineering firms and controlled by the Environmental Protection Agency (EPA). With the support of the Centers program, however, Prof. Jack Adams was able to demonstrate his method at full scale in an EPA-supervised, competitive evaluation for treating mine wastes. The WSU technology was not only the only one to actually achieve the EPA cleanup standard; it did so at one-tenth the cost of the existing BDAT (Best Demonstrated Available Technology, as designated by the EPA). Following official recognition as the new BDAT for selenium removal, the last hurdle for the WSU process was removed, and the pathway for the future success of Applied Biosciences was established.

The company expects to roughly double in size again in 2003, with continued rapid growth; based on current market estimates, management anticipates reaching a sales level of some $40 million by the end of this decade.

OUR MISSION is to help our customers meet strict water quality standards for metals and nitrate and to do it at the lowest possible cost. We work directly for end-user customers and with other water treatment providers to deliver complete and cost-effective treatment solutions

Applied Biosciences began in 1996 to provide innovative environmental solutions to the mining industry. Early successes with water treatment for selenium and arsenic quickly found application in other industries as well. We now provide solutions for a wide range of parameters in a variety of industries. We work closely with our end-user customers and with our engineering and water treatment partners to provide the most cost-effective water treatment systems available

Lead, South Dakota, Aug 28, 2002 – Applied Biosciences of Salt Lake City announced the continued successful operation of a new biological selenium removal plant at a gold mine in the Black Hills of South Dakota. On line since the winter of 2001, the water treatment plant at Wharf Resources in Lead has been removing selenium to below detection in a waste stream being discharged into a fresh-water creek. Selenium is naturally occurring in the Black Hills region and is common in mining run-off. Applied Biosciences worked closely with Wharf Resources personnel to design and build a treatment plant using an Applied Biosciences' biological process that would cost-effectively treat the selenium year-round. Treatment costs for the new plant have averaged $0.12 per 1000 gallons treated. Being successfully treated elsewhere on site are also arsenic and nitrate. Applied Biosciences specializes in water treatment for dissolved metals and other inorganic contaminants. For additional information contact Applied Biosciences at 800-280-7852.

SOLUTIONS

Applied Biosciences can design water treatment solutions to fit a wide variety of industries and contexts. Our team of experts in microbiology, chemistry, and engineering can solve new and complex water problems with affordable bench-scale testing and design.

TREATMENT SYSTEMS

For industries with recurring problems and similar streams, Applied Biosciences has developed proven treatment systems. Industrial process streams, mining waste streams and run-off, petroleum refinery water streams and others can be treated right away with ready-to-install designs. Systems range in complexity from low-maintenance pump-and-treat to passive, pond type systems for remote locations.

CONSULTING

Years of experience in bioremediation and water treatment are made available to Applied Biosciences' clients through consulting and customer support services.

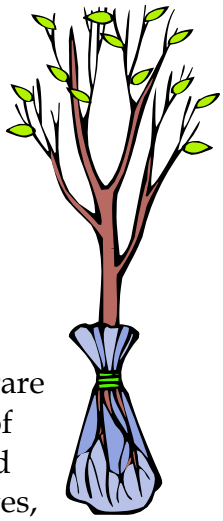
PROCESS ENGINEERING and IMPLEMENTATION

Applied Biosciences can design a solution and a system to treat any type of water stream or body. New and complex situations sometimes require new approaches and solutions. Applied Biosciences' engineers and project managers can design and implement step-by-step, from treatability testing through on-site pilot to full-scale, a cost-effective water treatment system for any variety of sites and industries.

WHY CHOOSE ABMet™?

ABMet™ solutions provide key benefits as compared to competing treatment methods: Treatment costs as low as $0.12 per 1000 gallons treated (a small fraction of the cost of conventional options). Simple system designs with low capital costs. Minimal sludge generation (100 to 1,000 times less than conventional treatment). No rejection stream. And most important, consistent treatment to below detection for target parameters

Acorns, Seedlings, Saplings, Oaks…



Echelon Biosciences

The first of three separate spin-off companies from the Center for Cell Signaling (CCS) at the University of Utah, Echelon Biosciences, Inc. has grown to 30 employees without raising a dime of investment capital – a rare achievement in the world of biotechnology firms. Building on the work of CCS Director Prof. Glenn Prestwich, the company initially developed and marketed a line of specialty reagents for use in research on cancer, diabetes, inflammation and other disorders.

With collaborations, research contracts, SBIR grants and burgeoning sales (over $1 million in 2001) fueling growth, Echelon has already out-grown its old space as the company waits to move into a new building at the Research Park (see photo), and their focus has shifted to the next phase of their corporate strategy: creating assays and finding drugs that can prevent the development and progression of diseases, including cancer and diabetes, by blocking lipid signaling pathways.

A two-time recipient of the national Tibbetts Award from the Small Business Administration, Echelon is now poised for a sustained period of growth in which new capital, new discoveries and new partnerships with leading pharmaceutical companies are expected to help forge a new flagship Utah biotechnology company from this successful spin-out.

Echelon Biosciences Inc is a unique drug discovery and development company identifying compounds as potential therapeutics that block critical lipid signaling pathways thereby preventing disease development and progression.

www.echelon-inc.com

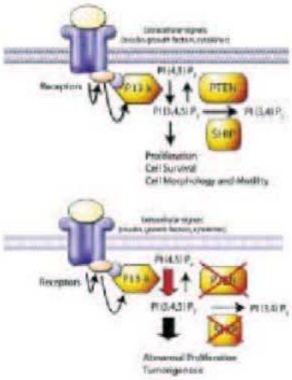
Echelon Biosciences, Inc. (EBI) is a private biotechnology company and is a leader in the field of lipid (phosphoinositide (PI) and isoprenoid) cell signaling research and product development.

Corporate Strategy

- **Phase I**: Development of a specialty product line of high quality reagents primarily intended for research in cancer, diabetes, inflammation, cardiovascular disease, and in immune disorders.
- **Phase II**: Development of high throughput assays to accelerate drug discovery in cancer, diabetes, anti-infectives and other human pathologies.
- **Phase III**: Utilize internally developed assays to discover molecules with therapeutic potential for cancer and diabetes.

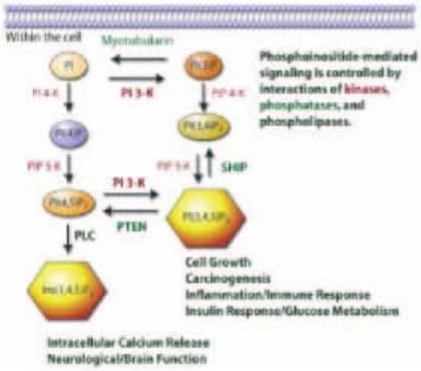
Phosphatidylinositol 3-kinase (PI3-K)

The importance of the PI3K– AKT pathway in various cancers is firmly established. Small molecules have exhibited success as kinase inhibitors in chronic myelogenous leukemia and in lung cancer. *Gleevec ™ is an example of a recently approved kinase inhibitor. EBI has identified a number of PI3K inhibitors and will target specific isoforms involved in ovarian, uterine, breast, and prostate cancer.



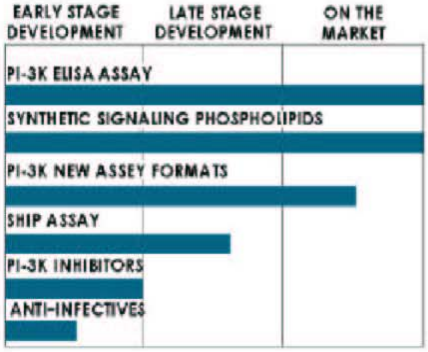
*Gleevec, imatinib mesylate is a registered trademark of Novartis Oncology

Phosphoinositide Targeting



- Phosphoinositide polyphosphates (PIPn) are key lipid second messengers in cellular signaling.
- Disruption in signaling enzymes like PI3K and SHIP2 are common in cancer, diabetes and inflammation.
- Disruptions in these enzymes are common to many disease states, including cancer, diabetes, inflammation, and disease.
- Inhibiting one or more of these enzymes (or their isoforms) may provide effective treatment of cancer, diabetes, and drug resistant infections.

Development Pipeline



Products and Opportunities

PRODUCTS

- Individual lipid signaling reagents
- Non-radioactive screening tools
- Antibodies to detect PIP_n in tissues
- Novel anti infective targets (MEP ENZYMES)

OPPORTUNITIES

- Licenses for screening tools
- Development collaborations in lipid signaling targeting
- Library screening for phosphoinositide converting enzyme inhibitors
- Enzyme isoform activity targeting
- Development of cell based assays
- Licensing opportunities for PI related technologies

Recent company news

September 2002 Echelon is awarded the national Tibbett's Award for Small Business Innovation Research

July 2002 Echelon Biosciences Inc. advances the fight against cancer with new PI-3 Kinase screening technologies

May 10, 2002 Echelon Research Laboratories, Inc. announces name change to Echelon Biosciences INC, and new president

January 2002 Echelon Research Laboratories, Inc. and ComGenex, Inc. announce a drug discovery alliance for novel inhibitors of lipid kinases and phosphatases

March 2001 NIH Awards Echelon Research Laboratories Inc. A Third Phase II SBIR Grant

Milestone Events (last 12 months)…

- Record sales of $1 million in 2001
- Alliance with ComGenex to identify leads in cancer, and inflammatory diseases.
- Release of the world's first non-radioactive PI3-Kinase assay system for drug discovery and development in cancer, diabetes, cardiovascular disease, and inflammation.

Next twelve month milestones

- Continued record revenue growth, fueled by new products.
- Tumor animal data on PI3-kinase inhibitors with ovarian cancer as target.
- Further collaborations/licenses with pharma companies for drug development.
- Expand patent portfolio

Alliances

ComGenex	Partner and combi-chem developer for compound screening
Molecular Probes	Marketing and re-distribution agreement
The University of Utah	Technology license agreement

Summary

EBI offers exciting development opportunities to participate in the rapidly expanding area of lipid cell signaling. It is a profitable and well developed company with a world class scientific and management team, proprietary and patented technology, large and compelling applications, rapidly developing collaborations, a strong customer list, and clear paths to revenues and profits. We encourage you to discover Echelon Biosciences Inc. by allowing us to tell you more about EBI's exciting future.

CONTACT INFORMATION

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ONLINE: www.echelon-inc.com

Acorns, Seedlings, Saplings, Oaks…

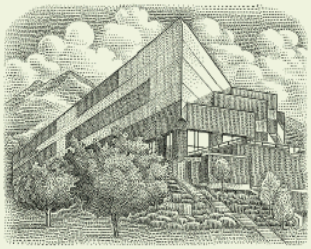
Myriad Genetics

In 1991, Prof. Mark Skolnick established the Center for Cancer Genetic Epidemiology in order to turn knowledge of the genetic causes and origins of common cancers into DNA-based diagnostic tools. By the time spin-off company Myriad Genetics, Inc. went public in late 1995, it already employed 60 people and had attracted international attention to Utah as a center of advanced knowledge and application in that field.

Today, they have in turn spun off two wholly owned subsidiaries: Myriad Pharmaceuticals, Inc., which is developing new drugs for the treatment of such diseases, and Myriad Genetic Laboratories, Inc., which develops and markets DNA diagnostics – as well as Myriad Proteomics, Inc., a joint venture with Oracle and Hitachi bent on analyzing every protein and its interactions in the human body within the next few years. The Myriad family of firms collectively employs over 500 Utahns and boasts over $50 million in annual sales. Their product range now covers breast cancer, colon cancer, endometrial cancer, melanoma and ovarian cancer. Already one of the most successful offspring of the Centers of Excellence Program, they are expected to keep growing for years to come.

Myriad Genetic Laboratories

Two product introductions during 2002 served to further our worldwide leadership position in cancer predictive medicine. Myriad's product range now covers breast cancer, ovarian cancer, colon cancer, endometrial cancer and melanoma skin cancer.



Myriad is the world leader in cancer predictive medicine. We are developing drugs to prevent and treat cancer and viral diseases to help people live longer, healthier lives.

Myriad Pharmaceuticals

At Myriad, our mission is to discover and develop a new generation of products in predictive and therapeutic medicines with a particular focus on saving lives through the prevention and treatment of cancer and viral diseases.

www.myriad.com

Myriad Genetics

Advancing Drug Discovery and Patient Care Through Genomics

Myriad Genetics Inc. is a biopharmaceutical company focused on the development of therapeutic and diagnostic products using genomic and proteomic technologies. The Company's emphasis on product development is demonstrated in its major business components:

- Therapeutic product development in important disease areas
- Identification of disease-causing genes, as potential drug targets, for major pharmaceutical company partners
- Disease pathway discovery through ProNet® and ProSpec® proteomic technologies to isolate drug targets for development
- Molecular diagnostic testing for inherited risk of disease
- Use of high-throughput DNA sequencing to reveal the genomes of important animal, plant and microbial species

Myriad has two wholly owned subsidiaries – Myriad Pharmaceuticals, Inc., which develops and intends to market therapeutic compounds, and Myriad Genetic Laboratories, Inc., which develops and markets proprietary predictive medicine products. The Company has established strategic alliances with Abbott, Bayer, DuPont, Eli Lilly, Hitachi, Pharmacia, Novartis, Oracle, Roche, Schering AG, Schering-Plough and Syngenta.

2001-2002 Funded Centers

CENTER FOR

ACOUSTIC COOLING

UNIVERSITY OF UTAH

CENTER

The Center for Acoustic Cooling Technologies has been established for the development of high frequency thermoacoustic engines for cooling applications. The Center is based on two thermoacoustic principles. The first principle is that heat can generate sound, the second is that sound can be used to pump heat. An important application for the above devices is in the heat management of computers, lap-tops, and microcircuits.

Can you imagine…..

A miniature cooling device that replaces fans in airplane cockpit displays and personal computers using sound as the main energy source and measuring from 4 cm to less than 1 cm?

ACCOMPLISHMENTS

The Center for Acoustic Cooling is structured on fundamental developments of miniature thermo-acoustic devices supported by the Office of Naval Research, the interfacing of devices to microcircuits and computers as supported by DARPA (HERETIC Program), and industrial collaboration with a local company, for the development and commercialization of Center technologies. Prototype devices have been constructed and successfully demonstrated by an independent company.

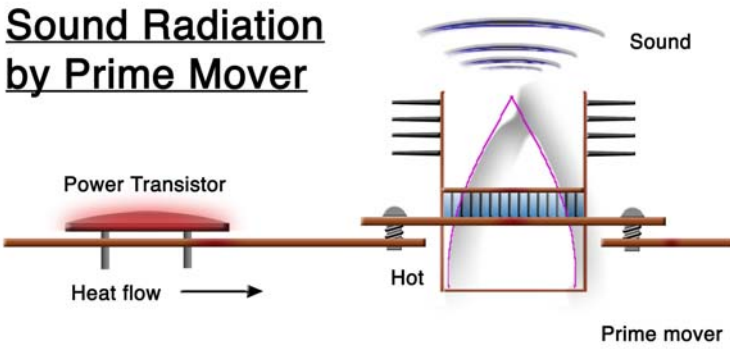
TECHNOLOGY

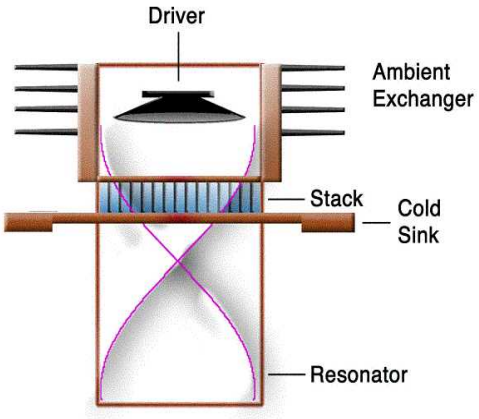
The Center's technology is based on two effects in thermo acoustics. The first is that heat can be converted into sound energy; and second, that sound can pump heat. Both have been developed into devices with dimensions ranging from 4 cm to 0.8 cm, with the possibility for further miniaturization and microcircuit integration.

CENTER FOR

ACOUSTIC COOLING

Figures below show the basic units for circuit applications: spot-cooling of heat pumping, and heat removal by acoustic radiation and energy conversion to electricity.





Contact Information

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CENTER FOR

ADVANCED JOINING OF MATERIALS

BRIGHAM YOUNG UNIVERSITY

CENTER

The Center for Advanced Joining of Materials **(CAJM**) is developing enhancements and new technologies based on friction stir welding (FSW). FSW is a relatively new, innovative joining technology that is revolutionizing the way in which aluminum and copper materials are being joined. The objectives are to develop enhancements to this existing technology that will broaden the use of this process in new materials and applications, and to transfer these technologies to local, national and international companies.

Can you imagine…..

A new method for welding metals and plastics that does not melt the material, does not add new material, and forms a joint that is base metal strong and virtually undetectable from the surrounding material?

ACCOMPLISHMENTS

All of the third-year milestones have been met. To date, the Center has submitted five provisional patents. Of these, BYU has issued an exclusive license for the patent on super abrasive tools to a local Utah company. Co-development and marketing of these tools are continuing. BYU is presently seeking a partner for co-development on the FSW of polymeric materials. The center is currently pursuing another licensee and co-development partner, and anticipates this to be finalized during year four of funding. The Direct Machine and Controls patent was transitioned into its own Center for fiscal year 2002-2003.

TECHNOLOGY

The Center is currently focused on the development and marketing of three technological aspects of FSW: 1) tooling that will last longer, offer the ability to join a wider range of advanced materials, and enable better control of the resulting quality of the weld and its properties; 2) new control systems and hardware for large scale, three-dimensional FSW capabilities; and 3) new methods and novel tooling for joining polymeric materials.

Contact Information

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tracy_nelson@byu.edu

CENTER FOR

ADVANCED STRUCTURAL COMPOSITES

BRIGHAM YOUNG UNIVERSITY

CENTER

The objective of the Center for Advanced Structural Composites is to develop the commercial potential of the IsoTruss technology. The IsoTruss enables the creation of super lightweight grid structures with the potential for revolutionizing industries as diverse as civil infrastructure (e.g., communication and construction), aerospace, automotive, marine and sporting structures and virtually any application area requiring high strength, high stiffness, light weight and superb corrosion resistance.

Can you imagine…..

A power line transmission tower that can withstand extreme wind conditions, support tremendously heavy loads, remain corrosion free, be unaffected by temperature extremes, and weighs significantly less than conventional steel towers?

TECHNOLOGY

The core technology consists of an ultra-lightweight composite structural shape known as the IsoTruss. The IsoTruss is a novel, patented, three-dimensional structural form that takes advantage of the highly directional properties of high strength composites to produce an extremely efficient and lightweight structure. The IsoTruss incorporates stable geometric configurations with helical members that spiral in opposing directions around a central cavity, coupled with longitudinal members that pass through the intersections.

IsoTruss STRUCTURES, INC.

ACCOMPLISHMENTS

Several companies are currently negotiating licensing agreements with BYU for the IsoTruss technology, and a new Utah firm has licensed the rights for domestic commercial applications. As the core technology matures, additional discoveries, applications, and developments will provide ever increasing requirements for research and opportunities for funding.

Contact Information

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CENTER FOR

AGRICULTURAL BYPRODUCTS (PROFITABLE USES OF)

CENTER

UTAH STATE UNIVERSITY

The Center for Profitable Uses of Agricultural Byproducts was established to strengthen the economy of Utah, particularly the rural economy, by working closely with farmers, ranchers and other agricultural related businesses to transfer technologies utilizing agricultural production and processing byproducts. Byproducts of no or little value are transformed into energy and other salable items using technology developed at the center.

Can you imagine…..

A technology utilizing agricultural byproducts of little or no value and transforming these byproducts into a profitable business?

ACCOMPLISHMENTS

A fully operational system has been built at the Caine Dairy at Utah State University and is open for visits to see the system functioning, creating a showcase of this technology. Biogas can be seen burning at this site to produce hot water. A new, larger system is soon to come on line at the Ballard pig farm in Benson, UT. This new system is designed to produce enough electricity for 65 homes while treating pig manure. The system will be housed in an attractive metal building. This system is scheduled to be fully operational in early spring, 2003. The IBR technology is very unique and easy to manage, with a high treatment rate and reliability. The Ballard system will be controlled using a touch screen computer. This Center has partnered with HEE, a new Utah company, to provide engineering design. Another new Utah company is being formed to build the systems.

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CENTER FOR

AGRICULTURAL BYPRODUCTS (PROFITABLE USES OF)

UTAH STATE UNIVERSITY

TECHNOLOGY

The technology developed at Utah State University for the profitable use of food production and processing byproducts is manifested in two major areas: 1) anaerobic systems that can produce energy (biogas) and soil amendment from manure and food processing waste, and 2) components of a high rate aerobic bioreactor (drum composter based) system that make the process more cost effective, and the products produced by the process more valuable.

Placement and painting of tanks for the IBR system at Ballard farm, Benson, UT

CENTER FOR

BIOMEDICAL OPTICS

UNIVERSITY OF UTAH

CENTER

The goal of the Center for Biomedical Optics is to commercialize optical technologies for diagnostic, therapeutic and disease risk assessment in medicine. Recent advances in novel light sources, laser materials and laser spectroscopy make these optical techniques highly attractive for novel, non-invasive assessment.

TECHNOLOGY

The Center's technologies include Resonant Raman Scattering detection of carotenoid antioxidants in human tissue and a novel light source for biomedical spectroscopy.

ACCOMPLISHMENTS

Nutriscan, Inc. was formed during the second year of COEP funding and negotiated a license for our US Patent No. 6,205,354B1: Method and Apparatus for Noninvasive Measurement of Carotenoids and Related Chemical Substances in Biological Tissue. This patent was issued March 20, 2001 for technology supported by earlier COEP funding. In September, Raman detection technology was licensed to Cardoderm, Inc.

Can you imagine…..

A non-invasive optical laser technique that can detect and treat cancerous cells in the skin or mucosal tissue??

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CENTER FOR

BIOREMEDIATION

WEBER STATE UNIVERSITY

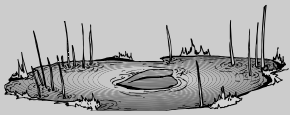
CENTER

The Center for Bioremediation develops, refines, and implements innovative biotechnologies for the removal of heavy metal and other inorganic contaminants. The Center's technology focus is biological selenium removal. Additional technologies include technologies for arsenic removal and cyanide degradation with a current emphasis on enzymatic cyanide degradation.

TECHNOLOGY

The Center's field-proven biotechnologies include Selenium reduction, Arsenic Reduction and Cyanide Biooxidation Technology. Selenium Reduction technology is capable of economically removing this contaminant from wastewaters to below detection levels. The Center's selenium technology is based on a novel implementation path requiring a front-end analysis, specially adapted naturally occurring microorganisms, and patented and proprietary process configurations. This path provides unique bioremediation technologies that are more economical, faster, and more durable than other bioremediation technologies. The Arsenic Reduction Technology is based on selected and specially adapted naturally occurring microorganisms, and patented and proprietary process configurations.

Can you imagine…..



A faster and more economical way to remove heavy metals, such as arsenic or cyanide, from wastewaters to a point below detection, with naturally occurring microorganisms?

The Cyanide Biooxidation technology is based on selected and specially adapted naturally occurring microorganisms and patented and proprietary process configurations and developing enzymatic technology

ACCOMPLISHMENTS

The Center's technology has been demonstrated to be approximately 1/10 the cost of EPA's past BDAT and removes selenium to lower levels. Applied Biosciences is a successful spin out company.

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CENTER FOR

CELL SIGNALING

CENTER **UNIVERSITY OF UTAH**

Cell signaling consists of the set of biochemical interactions that mediate physiological changes within and between living cells. When a ligand binds to a receptor, for example, the interaction causes a biochemical response within the cell. Many diseases are associated with signaling pathways that have gone awry -- cancer, allergy, asthma, and acute inflammation are all examples of cellular responses unchecked by normally self-regulating pathways. The absence of a single protein or lipid can result in the disruption of a pathway that may be crucial for cellular function. The CCS Faculty seeks to understand these fundamental signaling pathways. By identifying technologies to manipulate the signaling processes, highly selective pharmaceutical agents can be developed to treat cancer, diabetes, and cardiovascular disease.

ACCOMPLISHMENTS

Echelon Biosciences, Inc., initially started in 1997 as Echelon Research Laboratories as the first spin-off company from CCS, has grown to 30 employees, has received a total of nineteen Phase I and Phase II SBIR awards, and surpassed the $1 M sales mark in 2002. With the recruitment of former Iomed executive W. Tim Miller as its president and its expansion to new space in Spring 2003, Echelon is positioned to become a premier, home-grown biotechnology company. Locally, Echelon and CCS have met with the governor's technology development officials to foster the growth of a Wasatch front biotech cluster. Echelon was awarded the Tibbetts' Award for Small Businesses again in 2002, following its first award in 1999. Echelon has established a cancer drug discovery alliance with ComGenex, a Hungarian company, a product distribution agreement with Molecular Probes, Inc. in Eugene, OR. Its discovery of signal transduction inhibitors has generated interest in alliances or investments by a dozen major pharmaceutical companies and other potential investors.

CENTER FOR

CELL SIGNALING

UNIVERSITY OF UTAH

TECHNOLOGY

Five core faculty and fifteen faculty associates bring extensive, complementary research expertise to focus on understanding the molecular mechanisms by which cells communicate, both under normal conditions and in disease states. The interdisciplinary collaborations among the faculty have produced unique insights into the molecular basis of disease. Understanding these biomolecular interactions can lead to the development of new drugs that enhance or interfere with cell signaling by small molecules. New technology from CCS has also been developed and licensed by Echelon to create a molecular sensor for directly monitoring heparin levels in blood. A microbiological assay platform invented by Dr. C. D. Poulter for identification of selective anti-anthrax agents was also optioned by Echelon. The discovery in 2002 of a natural ligand for the nuclear protein target of the $3 B/yr diabetes drug rosiglitazone emerged from collaboration by Drs. McIntyre, Prestwich, and Zimmerman.

Can you imagine…..

A new class of anti-cancer drugs that correct a molecular defect that can be diagnosed very early, while the cancer can still be cured?

echelon
biosciences incorporated

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CENTER FOR

COMPLIANT MECHANISMS

BRIGHAM YOUNG UNIVERSITY

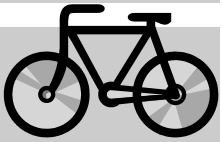
CENTER

The objective of Compliant Mechanisms is to accelerate and streamline the development and commercialization process of compliant mechanisms, so that they may be quickly licensed to existing or new companies. The use of innovative and patented compliant mechanisms will give existing companies a clear competitive advantage, and will provide a unique and valuable product for new companies. The potential market applications and opportunities are immense.

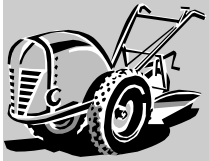
ACCOMPLISHMENTS

Some examples of compliant mechanisms that have been designed and tested are: fishing reel, bicycle freewheel, derailleur and brakes, pull start for small gasoline engines, centrifugal clutches, string trimmer, small garden tiller clutch , go-cart clutch, continuously variable transmissions (CVT), general purpose belt drive CVT , second generation bicycle CVT prototype , bistable mechanisms, compliant parallel motion mechanisms, constant-force mechanisms, electrical contacts for PDA docking stations, fully compliant bistable micro mechanism,
thermal actuators, linear motion micro-bistable mechanism and two position latching mechanism.

Can you imagine…..



A method for redesigning any complex machine part to significantly reduce the number of parts, simplify the manufacturing process, reduce costs and end up with a more reliable and wear- resistant device?



TECHNOLOGY

The Center possesses methods for the design of compliant mechanisms that have reduced part count reduced cost and increased precision compared to conventional mechanisms. A number of specific classes of mechanisms have been investigated and developed for commercialization.

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CENTER FOR

(CROMDI) REPRESENTATION OF MULTI-DIMENSIONAL INFORMATION

UNIVERSITY OF UTAH

CENTER

The Center for the Representation of Multi-Dimensional Information (CROMDI) was established to commercialize a new audio-visualization technology (IntuInfo) that facilitates the rapid and accurate analysis of large quantities of real-time data. CROMDI is an interdisciplinary team dedicated to the innovative representation of information and comprised of experts in Architecture, Art, Communication, Computer Science, Engineering, Finance, Mathematics, Medicine, Music, and Psychology. These diverse experts participate with their own unique perspectives and provide solutions to complex information design needs through a unique methodology and iterative process that has been refined over the years.

TECHNOLOGY

Information is intuitively presented with specifically designed audio-visual objects that exhibit changes in color, shape, size, sound, etc., driven by data variables and their relationships. IntuInfo can maximize information per screen space, integrate many variables, enable comparison to normative values, simultaneously display present and historical data and zoom to global or local contexts. Because of its intuitive features, IntuInfo enables to the user to recognize, understand and act on events faster, more accurately, with less mental effort, and with less training than is possible using existing data visualization technologies. In fact, the state of the art in many fields is to represent information with plots, pie charts, graphs, icons, and matrices that need extensive training and have limitations to the display of large quantities of data.

ACCOMPLISHMENTS

In the second year of funding CROMDI licensed the "cardiovascular display" to GE Medical Systems, formed a company called MedVis Inc. to commercialize the "drug display" and developed seven potential licensees. CROMDI received the First Place Award for "Best New Technology" from the Anesthesia Safety Association. Also, a NASA STTR grant was awarded to monitor the physiologic state of astronauts. CROMDI has received a DARPA seed grant to develop a pilot study and audio-visualization concepts for displaying the network status and resources to commanders. Also, a new audio-visual concept has been conceived (and is being patented) to support scheduling problems: this shall apply to both resource management and intelligence (detecting patterns of hackers, terrorists, etc.). A demo of financial displays was presented in New York City to 11 firms (investment banks, financial data vendors, and electronic exchanges) and elicited particular interest;: CROMDI is preparing for a better financial market condition to cement a partnership. CROMDI has also recently started working with the Flying J refinery for a process control demo.

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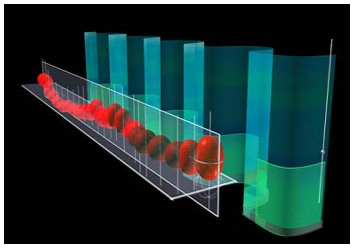
CENTER FOR

CROMDI (MULTI-DIMENSIONAL INFORMATION)

UNIVERSITY OF UTAH

ANESTHESIA. Anesthesiologists face unexpected incidents during 20 percent of all procedures. One quarter of these incidents represent critical events posing significant danger to patients. Therefore, quick and accurate decisions are of major importance in anesthesia. The environment is stressful and the task is difficult, because 30 or more variables need to be monitored and mentally correlated and integrated. The CROMDI team developed working prototypes that significantly reduce recognition times for detecting, diagnosing and treating anesthesia-related critical events. Testing showed a statistically significant decrease in detection time in several critical scenarios: Clinicians detected anesthesia-related critical events sooner (3.1 vs. 5.5 min). Abnormal events were diagnosed more accurately (error rate 1.1% vs. 4.1%) *Problems were corrected in one-third the time (17 sec vs. 45 sec) and drug delivery was better controlled (EC95 error 21% vs. 44%).

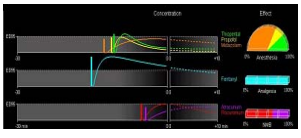
FINANCE. Investment professionals and individuals have access to a wealth of information about companies as well as real-time, historical and comparative market data. They want access to more data, but complain about too much data on their displays: this problem seems contradictory, and it can not be solved with current display technology. CROMDI developed prototypes that integrate large quantities of data in a way that will lead the user to make rapid and accurate decisions. Macro and middle level displays allow the trader to quickly view the performance of sectors and stocks in a portfolio. The micro level display allows the trader to analyze the current information on a single stock and quickly view its trend. A customer specified toolkit allows each user to determine the form of objects and select the financial variables to be displayed.



IntuInfo+Anesthesia

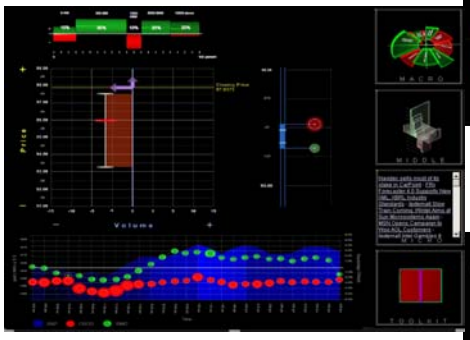
Traditional Anesthesia Display

Cardiovascular and Pulmonary



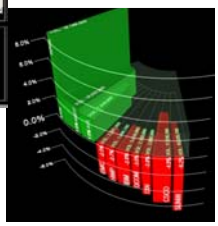
Drug Display

IntuInfo+Finance



Micro-View *displays three objects showing the current information on a single stock.*

Macro-View
Middle-View *shows the same variables*



CENTER FOR

ELECTRONIC MEDICAL EDUCATION

CENTER

UNIVERSITY OF UTAH

The Center for Electronic Medical Education (CEME) is part of the Electronic Medical Education Resource Group (EMERG) at the University of Utah Health Sciences Center (UofU). The focus of this Center is to develop component software technology for use by physicians and scientists in image intensive fields, specifically targeted at annotation and knowledge representation. Initially, the software consisted of author tools for medical case creation and information management of image intensive data for publishing web-based clinical reference material. In fiscal year 2002, the original technology development was extended into decision support and evidenced-based medicine solutions, biomedical imaging and bioinformatics. CEME established itself as a multidimensional technology hub by extending technology development into three additional markets. Those markets are: 1) cross-media publishing and digital content distribution, 2) electronic medical records (EMR) , specifically collection of expert knowledge and annotation of visual data as part of the clinical workflow, and 3) biomedical/biotechnology imaging informatics.

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ACCOMPLISHMENTS

As part of our objectives, CEME has adopted an intellectual property strategy of maximizing commercial potential by decomposing CEME technologies into as many individually licensable pieces as possible. This strategy recognizes that software applications developed for medical publishing contain intellectual property threads that can be pulled out into individual invention disclosures and woven into new combinations to meet market needs. The additional markets lead to new commercial entities that push the technology into new markets.

The following is a list of accomplishments:

A commercial spin-off, AMIRSYS, Inc., that produces electronic reference material.

A right to use license with AMIRSYS, Inc. for UofU image content.

Established the CEME as a multidimensional technology hub that addresses the needs of image integration in the electronic medical record and field of biomedical imaging informatics.

Strategic positioning of CEME technology with key industry participants that has resulted in a Memorandum of Understanding and Teaming Agreement to get CEME technology into Battlefield Telemedicine.

Patent on the core technology.

CEME technology generated multiple invention disclosures as part of a multidisciplinary collaboration and technology development effort.

CENTER FOR

ELECTRONIC MEDICAL EDUCATION

A new commercial spin-off company, Resilient Imaging, that is a services-based company for integration of annotation and knowledge representation technology.

Two SBIR grants have been submitted to the NIH National Institute for Biomedical Imaging and Bioengineering and the NIH National Cancer Institute for further development of CEME technology.

Resilient Imaging is in the process of negotiating a non-exclusive license for the CEME technology and patent with the Technology Transfer Office at the University of Utah.

TECHNOLOGY

CEME technology provides clinicians and basic scientists with knowledge representation tools built on the need to visually annotate (identify and label) images and add expert clinical knowledge (e.g., diagnosis, pathology report or clinical note) image data in the healthcare enterprise. The technology enables collaboration and sharing of results at each stage of the clinical management of a patient or clinical study, and provides a mechanism to track multiple images that are generated from multiple imaging modalities that exist in disparate file systems across the research and healthcare enterprise. CEME technology was developed in response to the critical need to capture the growing and evolving base of imaging results and expert knowledge, so that downstream experts can utilize previous results. The goal is to improve the process of scientific discoveries and healthcare by developing technology for the purposes of consistent, context-appropriate communication and collaboration, standardization and interoperability of clinical tools and interactive presentation of data.

CEME technology solutions facilitate the incremental and collaborative collection of expert knowledge in the form of non-destructive visual annotations and text that readily make the collected information available to other experts. The following list outlines the benefits of CEME technology:

Reduces repetition of work by image re-interpretation. Gives physicians and scientists the ability to incrementally add expert knowledge. Supports multi-specialty authoring of single images. Enables sharing of images and applied expert knowledge. Reduces replication of reference images that complicates storage and retrieval. Developed technology uses visual annotations that are not embedded in the images and subsequently do not alter or destroy the image data (i.e., image pixels). Provides the ability to integrate lexicons and medical vocabularies. Structured textual information with image information. Provides a solution to link image and expert knowledge. Interactive, instructive representation of multi-specialty expert knowledge. Enables physician-physician, physician-scientist and physician-patient interaction..

CENTER FOR

MICROBE DETECTION & PHYSIOLOGY

CENTER

UTAH STATE UNIVERSITY

The focus of this center is the development of technologies that lead to the real time detection of pathogenic micro-organisms. This involves the development of novel pathogen capture molecules, platform development, prototype development, and commercialization. Industries where this technology is useful include pharmaceuticals, biomedicine, biotechnology, veterinary, production agriculture, food processing, public health, defense, and water and sewage treatment.

Can you imagine…..

Being able to detect less than 10 cells of a harmful pathogen, such as salmonella or E. coli, in a quart of milk, within 30 minutes?

TECHNOLOGY

The primary focus of the Center is bacterial detection, but other targets are also investigated. To date, four technologies have been developed: ImmunoFlow, ImmunoDNA, GlycoBind, and TissueTag. Each technology has a unique use and application, but is not limited to a single type of use. For example, ImmunoFlow has many fields of use ranging from water to air, and has the potential to detect many types of bacteria. Initial prototypes are available for Bacillus globgii spores, Lactobacillus, Salmonella and E. coli O157 cells. Each type of assay has a maximum detection time of 30 minutes with a sensitivity of less than 10 cells. A unique feature of each technology is that it is volume independent; both large (tens of liters) and small (1 to 100 milliliters) samples are commonly used. Each technology is at a different stage of development, with ImmunoFlow being the most developed.

ACCOMPLISHMENTS

The Center has licensed the ImmunoFlow technology to Stellar Technologies, and is ready to proceed with alpha and beta testing. A new company was formed (BioMatrix Solutions) to produce and market ImmunoFlow under the name of LumiFlow. Initial marketing efforts are being directed to the food and beverage industry.

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CENTER FOR

NUCLEAR, MEDICAL AND ENVIRONMENTAL TECHNOLOGIES

CENTER

UNIVERSITY OF UTAH

Large companies are currently downsizing, outsourcing, and eliminating risky and costly nuclear research and development (R&D) capabilities, and are teaming with universities with established nuclear engineering programs and research facilities to perform key services. An additional market trend is for companies to off-load ownership and operation of their nuclear testing, diagnostic, and irradiation facilities, and to contract with new owners for specific access and services. Others are simply decommissioning their nuclear facilities without replacement. The result is a decrease in availability of licensed facilities. That, in combination with an increasing demand for services from the private sector, provides the basis for a solid commercial opportunity. The commercial strategy of the **Center for Nuclear, Medical, and Environmental Technology (CNMET)** is to acquire selected spun-off facilities and consolidate existing niche markets into a single, well-managed and licensed entity that can provide a convenient source for a full range of nuclear services. E-Cubed and Nuclear Labyrinth will assume commercial production to reduce costs, implement uninterrupted production cycles, and achieve economies of scale. Appropriate R&D functions then will be merged and contracted to universities with nuclear facilities, such as the University of Utah's TRIGA reactor, to promote innovation, train co-operatively, and supply a steady stream of knowledgeable and seasoned potential employees to the workforce.

ACCOMPLISHMENTS

CNMET has investigated market sector definition and market research studies for medical radioisotopes (seeds); neutron, gamma, and x-ray radiography; irradiation survivability of electronic components; and plutonium (Pu)-bioassays. CNMET is currently in a position to launch a new company, called "Nuclear Labyrinth LLC," and to facilitate the growth of a second business, E-Cubed Inc. These Utah-based companies will implement contracts for the use of the University of Utah's reactor. The CENTER will perform R&D activities for these companies that will result in new IP, which subsequently can be licensed through the TTO. CNMET continues to identify other underserved clients through its targeted market research.

CNMET will graduate from the state-supported Centers of Excellence (COE) program at the end of its fiscal year's funding (June 30, 2003). Beginning July 1, 2003, after only two years, CNMET plans to be financially independent, without further need for COE resources.

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CENTER FOR

NUCLEAR, MEDICAL AND ENVIRONMENTAL TECHNOLOGIES

TECHNOLOGY

A newly spawned entity, Nuclear Labyrinth LLC, along with an existing Utah business, E-cubed Inc., will offer a variety of commercial nuclear production services. Both Utah-based companies plan to contract major portions of their R&D functions to the University of Utah's Center for Excellence in Nuclear Technology, Engineering, and Research (CENTER) and license back any applicable intellectual property (IP) from the Technology Transfer Office (TTO). The CENTER will provide valuable hands-on training functions for both of its partner organizations. Combined commercial missions will improve and expand nuclear services to existing and underserved clients. Operations will be conducted, via contracts, at four locations:
1) Little Mountain, Utah. E-Cubed Inc.'s activities will include introducing commercial opportunities into the Survivability and Vulnerability Integration Center located at Little Mountain, Utah. E-Cubed and Hill Air Force Base (HAFB), the owner of the Little Mountain facility, will enter into an industrial partnership in 2003. E-Cubed will be performing material diagnostics for civilian work from major commercial parts manufacturers (aerospace, automotive, energy, electronic, etc.). Non-defense work is initially estimated to be at least $1 million/year. 2) California. A major multinational company recently retained one of its divisions that operates a nuclear reactor in California in order to consummate a recent spin-off transaction. Due to the sensitivity of the information and current negotiations, the identity and location cannot be cited here. The parent company now wants to divest itself of the material diagnostic activities that use a reactor, because of burdensome regulations and perceived operational risks involved in conducting operations outside their core business. The company is willing to self-finance the reactor sale to a suitable buyer over a period of three to five years. Furthermore, transfer of reserve-fund obligations and liabilities associated with decommissioning the reactor to a buyer can be achieved on advantageous terms for the buyer. E-Cubed is ideally suited to acquire the reactor facility and to assume full operational responsibilities at the current reactor's site; to convert its technology to all-digital production format; and to add related interpretative and design services (i.e., radiation detection, dosimetry, analysis etc.) to significantly increase revenues. 3) Salt Lake City, Utah. Nuclear Labyrinth will operate a computational group engaged in simulating and modeling advanced radiation technologies and related processes. This group will be active in international activities supported by government and industry. 4) University of Utah CENTER. Nuclear Labyrinth and E-Cubed plan to contract with the CENTER at the University of Utah for various research and development projects, such as the digitization of current California radiography imaging technology, the development of rapid bioassay techniques, and to enhance computer codes. The newly developed proprietary technologies then will be licensed back to the two companies via the TTO. CNMET intends to conduct targeted market research to identify other underserved clients for both Nuclear Labyrinth and E-Cubed.

CENTER FOR

PETROLEUM RESEARCH

UNIVERSITY OF UTAH

CENTER

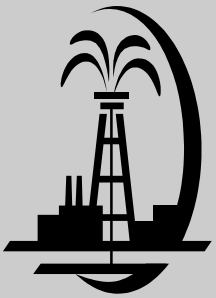
The mission of the Petroleum Research Center (PERC) at the University of Utah is to conduct research and development studies leading to practical, cost-effective solutions to liquid hydrocarbon production, handling and transportation. With funding from the U.S. Department of Energy and the petroleum industry, the PERC coordinates basic and applied research in: the physical properties and physical and chemical thermodynamics of naturally occurring hydrocarbons, development of pipeline transportation and flow assurance strategies, and simulation, optimization and control of oil and gas recovery methods.

TECHNOLOGY

The Petroleum Research Center (PERC) was funded to commercialize and market two specific areas of work: understanding problems related to the production, transportation and processing of waxy and asphaltenic crude oils and the subsequent alleviation of these problems and developing a variety of methods and software tools (models) for the efficient and optimal production of oil and gas from underground reservoirs. Over the last several years, oil companies and federal agencies have funded (and continue to fund) research in PERC, which is an integral part of the Department of Chemical and Fuels Engineering at the University of Utah.

Can you imagine…..

A variety of methods and software tools for the efficient and optimal production of oil and gas from underground reservoirs?



ACCOMPLISHMENTS

Schlumberger and Halliburton donated software worth about $10 million, making the Center the premier state of the art oil reservoir simulation facility. Alyeska Pipeline Service Company employed a professional with a Ph. D. in Salt Lake City to monitor technology development at the Center. Universal Oil Products and Flying J conducted a project to test the performance of one of their new process units at the Center.

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CENTER FOR

RAPID PROTOTYPING

UNIVERSITY OF UTAH

CENTER

The Center for Rapid Prototyping is focused in the areas of ultrasonic sensing of injection molding, and physical and virtual geometric modeling for computer aided design.

TECHNOLOGY

This Center is focusing on several projects which include machining techniques to include a method for making Powder metal parts, a low cost software allowing the production of prototype parts on a 2 or 3 axis computer controlled router or mill, and machining of molds for micro-injection molding. Examples of products include:

*A series of new sensors and control techniques for improved polymer processing

*A new Personal Prototyping System (PPS) that makes rapid prototyping available to small companies and perhaps the private consumer.

*A low cost 3D scanning system that, used in conjunction with the PPS becomes a 3D fax machine.

*A device that is capable of building very large prototypes (Shapemaker).

*A photopolymer based technique to create prototypes in a single step (Inverse Tomographic Construction or ITC).

Can you imagine…..

A personal prototyping system that develops and creates prototypes at a very low cost on your own inkjet or laserjet printer???

ACCOMPLISHMENTS

In the first year of funding, several milestones were met including the completed commercial RapidPro software, proof of principle demonstration of the Personal Prototyping System, a demonstration of the Ultrasound sensor to a local company, and a completed calibration demonstration for the 3D scanner.

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CENTER FOR

SMART SENSORS

UTAH STATE UNIVERSITY

CENTER

Smart Sensors probe the environment and modify their function in order to improve their data gathering capability. A smart sensor adapts to its environment, and sends improved data to the main processing computer. A smart sensor melds sensor, signal processing, and computer technologies. Applications span medicine, precision agriculture, electronics manufacturing, wireless communication, transportation and radar.

TECHNOLOGY

The Center for Smart Sensors focuses on two core technologies that have the greatest commercial potential, and five support technologies that are key aspects of the Center and enable the development and implementation of products utilizing the core technologies. This year we have added to the methods available for our core technologies, and are actively seeking license agreements in each of our core technology areas. Additional patents and invention disclosures have been filed in both core areas this year. Both families of technologies are based on simple ideas and simple circuits that result in two critical advantages **-- Small and Cheap**. This makes them applicable to a wide array of applications.

Can you imagine…..

An early warning system for computer disk drive failure, a preflight test system for aging aircraft wiring, and a system to protect military personnel from being overrun by tanks?

ACCOMPLISHMENTS

A lot of recent media attention has occurred surrounding the Center's smart wiring devices. This is driving potential partners and buyer agencies to demand our technology earlier than expected, and we may be able to sell a prototype design soon. We have begun to systematically dissect the technologies that may compete with our imbedded antenna technology to look for applications that could benefit from smaller and cheaper smart sensors.

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CENTER FOR

VASCULAR BIOTHERAPEUTICS

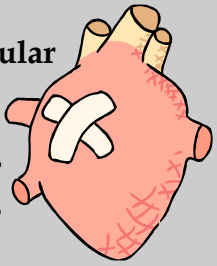
CENTER

UNIVERSITY OF UTAH

The Center for Vascular Biotherapeutics is focused on commercializing medical strategies and devices that target blood vessel formation for the treatment of cancer and obstructive vascular diseases such as atherosclerosis. This Center capitalizes on a robust scientific program aimed at deciphering the molecular blueprint for vessel regeneration using human genetics and transgenic mice technologies; these technologies were pioneered at the University of Utah. The "Functional Vascular Genetics" program established at the University of Utah is identifying genes that are essential for vascular development. This program has significantly contributed to the understanding of how blood vessels are formed, and produced publications in the most prestigious scientific journals (e.g. *Nature, Science, Nature Genetics, Journal of Clinical Investigation, American Journal of Physiology).*

Can you imagine…..

Deciphering the molecular blueprint for vessel regeneration, in order to treat cancer and other vascular diseases such as atherosclerosis?



TECHNOLOGY

There are two major thrusts of the program. The first involves understanding the role of the matrix protein elastin in regulating vascular smooth muscle cell proliferation, migration and differentiation. The second is to identify novel molecular pathways involved in angiogenesis. The purpose of the center is to commercialize the scientific discoveries of the program.

ACCOMPLISHMENTS

In the first year, the Center has met all three of its critical commercialization objectives: testing therapeutics in pre-clinical trials, licensing its intellectual property to private industry, and spinning off a biotechnology company.

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Program Description

PROGRAM DESCRIPTION

BACKGROUND

The Utah State Legislature created the Centers of Excellence Program (COEP) in 1986 recognizing that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. The Legislature recommended the allocation of economic development funds each year to the COEP, to be awarded to college and university faculty on a competitive basis. The objectives of the COEP are to enhance and expand the applied technical research activities at institutions of higher education in Utah, to develop technologies that are considered to have potential for economic development in the state, and to assist in the actual commercialization of those technologies. This research and technology commercialization process ultimately results in the creation of new companies, the enhancement of business opportunities for existing companies that license COEP technologies, and in the growth of Utah's job opportunities. In addition, the proprietary value of technologies created is reflected in the number of patents issued and the associated royalty-bearing licenses that are signed.

These measurement parameters (jobs created, companies assisted and/or created, inventions disclosed or patents issued, and license agreements signed) are summarized in this report as indicators of the value of the COEP to state economic development.

Ongoing funding of the program has been based upon the real and potential economic impact that the Centers of Excellence Program has had upon the State of Utah during the years since its creation. This Annual Report summarizes the significant accomplishments of the program during the recently completed fiscal year and attempts to identify the long-term economic value of that work.

OPERATIONS AND OBJECTIVES

The operating methods of the Centers Program have evolved over the years since its inception with a continuing goal of achieving the maximum economic benefit from the individual Centers that have been created. Upon selection on a competitive basis, new Centers are funded with a minimum requirement of a 2:1 matching fund ratio from the private and federal sectors. Matching funds are reported and audited on a regular basis. Centers are also audited regularly for the achievement of technical and commercial milestones. Center directors are required to submit annual reports to the COEP director. The Centers of Excellence Program Annual Report, here attached, is based on submitted reports and upon information gathered from site visits, audits and other data sources. In addition, each funded Center is assisted by one or more designated commercialization consultants who assist Center directors in defining commercialization strategies, performing market and competitive analysis and locating potential investors or licensees.

Centers are normally funded for a maximum of five years and are then expected to be self-sustaining through license contract royalties and new research grants. Centers with especially noteworthy histories and ongoing technological impact are designated as Distinguished Centers and thereafter may be funded on a project-by-project basis as requests are approved.

CENTER SELECTION PROCESS

Proposals from researchers for new Centers of Excellence or for renewal of existing Centers of Excellence are submitted to the COEP office in response to a Request for Proposal which is normally sent in late December. The incoming proposals are critically reviewed by the Centers of Excellence Advisory Council. Centers are selected for funding based on a ranking established in extended review sessions with the Centers Advisory Council.

The State Advisory Council for Science and Technology has advisory responsibility for the Centers of Excellence Program by statute. Members of the Science Council participate on the Centers Advisory Council in reviewing proposals and conducting site visits. This provides Science Council members with in-depth knowledge of the program, Center specific information and a strong technical and industrial perspective for making funding decisions. The State Science Advisor reviews the Annual Report and presents it to the Science Council for acceptance. The Director of the Office of Technology Development serves as an ex-officio member of the State Advisory Council for Science and Technology.

COMMERCIALIZATION PROCESS

Over the past five years, the Centers of Excellence Program has funded a consulting program to assist Center directors in preparing and implementing commercialization strategies. Each Center is unique in terms of which strategy is optimal - there is no single solution and each requires customized approaches.

Early market surveys and competitive analysis are conducted to discover which market segments are most promising and which product features will be of interest to potential customers and licensees. Consultants assist in targeting potential licensees for the technology and in positioning products for anticipated markets.

These early strategic discussions often reveal product variations that can be introduced to the marketplace earlier than previously planned. Such early commercialization has several benefits: (i) getting products to consumers for preliminary market validation and directional planning; (ii) early cash flow strengthens continuing research at the Center and hastens financial independence and; (iii) the future value of technology licenses are enhanced.

The Centers of Excellence Office works closely with the Technology Transfer Offices at the respective universities in an effort to extract maximum value from the licenses that are signed for Centers technologies. Through the commercialization consulting program, assistance is given in defining market opportunities, identifying potential target licensees, providing key information for license valuations, and consulting assistance to those companies considering license opportunities.

2001-2002 Financial Summary

CENTERS OF EXCELLENCE - 2001/2002 FINANCIAL SUMMARY

	Years Funded	State Funding 2001/2002	Fed. Match 2001/2002	Private Match 2001/2002	Total Match 2001/2002
CENTERS FUNDED IN FISCAL 2001/2002					
Acoustic Cooling Technology-U/U	2	$100,000	$214,982	$0	$214,982
Advanced Joining of Materials-BYU	3	$130,000	$230,000	$35,000	$265,000
Advanced Structural Composites - BYU	4	$120,000	$150,000	$210,000	$360,000
Agricultural by-products, profitable uses of-USU	2	$100,000	$247,000	$50,000	$297,000
Biomedical Optics - U/U	3	$150,000	$170,356	$645,534	$815,890
Bioremediation-WSU	4	$68,000	$184,000	$0	$184,000
Cell Signaling - U/U	5	$170,000	$6,095,000	$200,000	$6,295,000
Compliant Mechanisms -BYU	3	$130,000	$284,000	$0	$284,000
Electronic Medical Education - U/U	3	$120,000	$47,000	$193,000	$240,000
High Performance Computing-U/U	2	$130,000	$473,314	$0	$473,314
Microbe Detection - USU	4	$120,000	$0	$356,000	$356,000
Nuclear, Medical and Environmental Technologies-U/U	1	$100,000	$154,000	$52,000	$206,000
Petroleum Research-U/U	2	$120,000	$275,000	$8,300,000	$8,575,000
Rapid Prototyping-U/U	1	$100,000	$534,720	$0	$534,720
Smart Sensors-USU	2	$110,000	$541,198	$0	$541,198
Vascular Biotherapeutics-U/U	1	$100,000	$867,649	$0	$867,649
Subtotals:		**$1,868,000**	**$10,468,219**	**$10,041,534**	**$20,509,753**
2001/2002 MATCHING RATIO		11.0 :1			
$7000 per center for consulting program		$112,000			
Total amount distributed		$1,980,000			
Remaining amount for planning grants		$20,000			
Total amount funded FY 01-02		$2,000,000			

CENTERS OF EXCELLENCE - 2001/2002: Summary of Key Commercial Accomplishments

	Spin-Off Companies		Companies	Patents/Copyrights		Licenses
	New	Total	Assisted	Pending	Issued	Signed
CENTERS FUNDED IN FISCAL 2001/2002						
Acoustic Cooling - U/U	0	0	12	2	0	0
Advanced Joining of Materials-BYU	1	1	50	7	0	1
Advanced Structural Composites - BYU	1	3	65	6	0	4
Biomedical Optics - U/U	0	1	5	3	1	2
Bioremediation - WSU	0	1	10	0	1	1
Cell Signaling - U/U	0	3	12	0	1	1
Compliant Mechanisms -BYU	0	0	8	11	2	5
Electronic Medical Education - U/U	1	1	3	0	7	1
Microbe Detection - USU	3	4	20	5	2	1
Multi-Dimensional Information-U/U	1	1	10	1	0	0
Nuclear, Medical & Environmental Technologies-U/U	0	0	6	0	0	0
Petroleum Research - U/U	0	0	10	0	4	0
Profitable Uses of Agricultural Byproducts-USU	0	0	15	1	0	1
Rapid Prototyping-U/U	0	0	3	2	0	1
Smart Sensors-USU	0	0	10	7	0	0
Vascular Biotherapeutics-U/U	1	1	3	6	0	1
Subtotals:	8	15	242	51	18	19
All Graduated Centers		109	680	n/a	54	73
All Distinguished Centers		22	191	n/a	33	87
Other Centers not classified above					20	24
TOTALS:	**8**	**150**	**1113**	**51**	**125**	**204**

2002-2003 Funded Centers

Centers selected for funding
Fiscal Year 2002-2003

Acoustic Cooling Technology (U/U) – has developed novel miniature acoustic cooling devices and technologies for application in electronic circuits, computers, lap-top computers, and other small scale devices.

Advanced Joining of Materials (BYU) – Has developed new friction stir welding tools and materials, appropriate control systems and multi-axial capability for all levels of manufacturing.

Advanced Structural Composites (BYU) - Develops commercial products for the integration of damping materials with composites, and the creation of lightweight composite materials.

Biomedical Optics (U/U) – Has developed optical technologies for medical diagnostic and therapeutic (surgical) treatments, e.g. non-invasive assessment and therapeutic treatments of mucosal tissues.

Bioremediation (WSU) – Has a patented technology for the removal of selenium metal; additional multiple metal removal technologies are poised in the commercialization pipeline.

Compliant Mechanisms (BYU) – Accelerates and streamlines commercial applications of devices that obtain their motion from the deflection of flexible parts rather than from pin joints.

Computational Testing & Design (U/U) - Developing powerful computational packages capable of designing and predicting the electrical, mechanical and structural characteristics of novel materials, especially nanostructured materials and components such as carbon nanotube-based electromechanical devices.

Direct Machining And Control (BYU) - Developing method that allows a manufacturing machine controller to directly interpret CAD/CAM models, resulting in superior resolution for complex shapes. An open architecture, software based controller has been designed and implemented.

Electronic Medical Education (U/U) - Authoring and packaging tools that will be used to create medical education products, and sell them as a component based medical information management and processing system.

High-Speed Information Processing (USU) - Designs, prototypes and commercializes fast algorithms for families of IC chips known as Application Specific Integrated Circuits, or ASIC, which have value in most military and compact consumer electronic devices.

Nuclear, Medical and Environmental Technologies (U/U) – Develops high specific activity, short-lived radioisotopes; production of irradiated seeds for use in treatment of selected cancers; and evaluation of performance of electronic components and integrated systems upon exposure to neutrons.

Petroleum Research (U/U) - Develops cost-effective solutions of liquid hydrocarbon production, handling and transportation. The focus is on assessing the physical properties and chemical thermodynamics of naturally occurring hydrocarbons; optimization of enhanced petroleum recovery; process control and production automation in oil and gas field; and the development of pipeline transportation strategies.

Profitable Uses of Agricultural Byproducts (USU) - Develops cost-effective technologies to treat and dispose of animal waste generated in agriculture. The conversion of the waste products by anaerobic systems results in "biogas" that can be used to produce energy, and nutrients to be used in soil amendments.

Rapid Microbe Detection (USU) – has developed an immuno-flow technology to detect contaminating microbes rapidly, to enhance real time decisions in several industries including food, pharmaceutical and public health.

Rapid Prototyping and Manufacturing (U/U) – Has developed the capability of building very large prototypes and techniques for a large number of molded parts from CAD design in a short period of time.

Representation of Multi-Dimensional Information (CROMDI) (U/U) – Has developed a new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data, with applications in medicine, finance etc.

Smart Sensors (USU) – Engaged in the development and commercialization of sensor-based products. Product applications span a wide array of sensing and communication needs. An application close to market is the detection of faults in aircraft wiring.

Vascular Biotherapeutics (U/U) – Focused on commercializing medical strategies and devices that target blood vessel formation for the treatment of cancer and obstructive vascular diseases such as atherosclerosis.

Centers of Excellence Legislation

Part 6
Centers of Excellence

9-2-601. Purpose.

9-2-602. Short title - Definitions.

9-2-603. Administration - Grants.

9-2-601. Purpose.

(1) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. These generally come from strong research colleges and universities. Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development. Most states are enhancing their research base by direct funding, usually on a matching basis. The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas. The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.

(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis.

(3) The Legislature recommends that such funds be allocated on a competitive basis to the various colleges and universities in the state. The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.

History: C. 1953, 63-62-1, enacted by L. 1985, ch. 103, § 1; 1986, ch. 109, § 1; renumbered by L. 1992, ch. 241, § 60.

9-2-602. Short title - Definitions.

(1) This part is known as the "Centers of Excellence Act."

(2) As used in this part, "Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.

History: C. 1953, 63-62-2, enacted by L. 1985, ch. 103, § 2; 1986, ch. 109, § 2; renumbered by L. 1992, ch. 241, § 61.

9-2-603. Administration - Grants.

(1) This part shall be administered by the Division of Business and Economic Development.

(2) The department may award grants to the various colleges and universities in the state for the purposes of this part.

(3) Recommendations for funding shall be made by the division with the advice of the State Advisory Council for Science and Technology, with the approval of the board. Each proposal shall receive the best available outside review.

(4) In considering each proposal, the division shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development. Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.

(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the division in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

History: C. 1953, 63-62-3, enacted by L. 1986, ch. 109, § 3; renumbered by L. 1992, ch. 241, § 62.

Repeals and Reenactments. - Laws 1986, ch. 109, § 3 repealed former § 63-62-3, as enacted by L. 1953, ch. 103, § 3, relating to creation of a committee for technology excellence in engineering research, and enacted the above section.

Utah!
Where ideas connect

MICHAEL O. LEAVITT
Governor

CENTERS · OF EXCELLENCE

ANNUAL REPORT

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2002-2003 Centers of Excellence Annual Report

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Executive Summary

Executive Summary

Utah enjoys a rich and diverse legacy of technical innovation, ranging from the invention of television (by Philo Farnsworth, in 1927) to innumerable advances in the fields of computing and medicine during more recent decades. Unfortunately, many of these inventions went on to be commercialized elsewhere, robbing the state of the jobs, revenues and respect that it was rightfully due. The Utah State Legislature established the Centers of Excellence Program (COEP) in 1986 as part of a strategy to improve on that record. They approved the annual allocation of economic development funds, to be awarded to university faculty members on a competitive basis through the COEP, specifically to fund what federal grants from agencies like the National Science Foundation do not support: Highly targeted, market-driven projects that perform the applied research, prototype development and business planning necessary to successfully commercialize promising technical innovations here in Utah.

COEP projects require a 2:1 match with non-state funds, and are subject to an annual competitive renewal for up to five years of support. Over time, an Advisory Council composed of veteran technology executives has been formed to assist in reviewing and choosing the projects to be funded, and a requirement has been added that Centers work with independent, preapproved Commercialization Consultants to insure that projects remain commercially focused. As a result of this disciplined structure, the Utah Centers of Excellence Program continues to be one of the nations most successful technology commercialization programs as measured by matching dollars, new companies, new products, and state economic impact. During the last year, the program director has been interviewed by representatives of agencies hailing from Rhode Island to Romania.

During the 2002-2003 fiscal year the Centers Program issued $2.162 million in grants to 18 active Centers for use in bringing significant new technologies closer to the marketplace. In the competitive selection process, one center graduated, 15 centers received continued funding and 3 new centers were selected. The Center distribution was as follows: ten at the University of Utah ($1,260,000), three at Utah State University ($332,000), four at Brigham Young University ($500,000), and one at Weber State University ($70,000).

The 18 Centers received matching funds of $6.98 million, resulting in a matching fund ratio of 3.2:1. As of the last audit (2001), those companies directly employed over 1300 persons in the state, at an average wage of $68,000. With some earlier graduates of the program (Myriad Genetics, Inc. and Sonic Innovations, Inc., for example) just beginning to mature as significant, publicly held companies and scores of others developing and growing, it is clear that the entrepreneurial pipeline laid by the COEP will have an ever expanding and progressively more important role to play in Utah's economic future.

2002-2003 Funded Centers

ACOUSTIC COOLING

U N I V E R S I T Y O F U T A H

CENTER

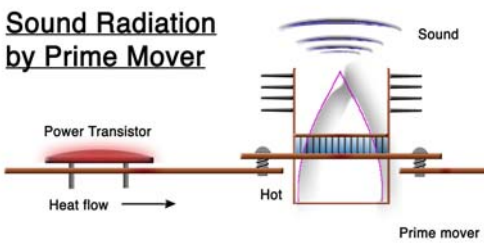
The Center for Acoustic Cooling Technologies has been established for the development of high frequency thermoacoustic engines for cooling applications. The Center is based on two thermoacoustic principles. The first principle is that heat can generate sound, the second is that sound can be used to pump heat. An important application for the above devices is in the heat management of computers, lap-tops, and microcircuits.

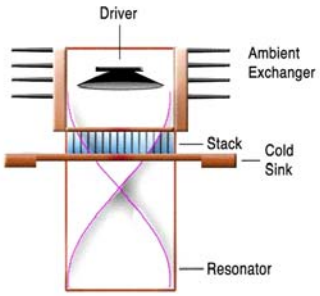
TECHNOLOGY

The Center's technology is based on two effects in thermo acoustics. The first is that heat can be converted into sound energy; and second, that sound can pump heat. Both have been developed into devices with dimensions ranging from 4 cm to 0.8 cm, with the possibility for further miniaturization and microcircuit integration.

ACCOMPLISHMENTS

The Center for Acoustic Cooling is structured on fundamental developments of miniature thermo-acoustic devices supported by the Office of Naval Research, the interfacing of devices to microcircuits and computers as supported by DARPA (HERETIC Program), and industrial collaboration with a local company, for the development and commercialization of Center technologies. Prototype devices have been constructed and successfully demonstrated by an independent company.

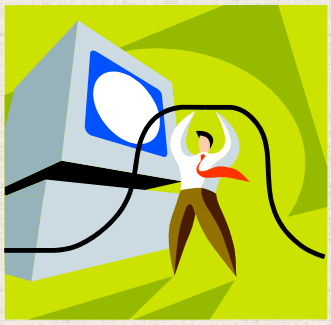




THINK TANK

What if there was...

A miniature cooling device that replaces fans in airplane cockpit displays and personal computers using sound as the main energy source and measuring from 4 cm to less than 1 cm?



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Advanced Joining of Materials

BRIGHAM YOUNG UNIVERSITY

CENTER

The Center for Advanced Joining of Materials **(CAJM**) is developing enhancements and new technologies based on friction stir welding (FSW). FSW is a relatively new, innovative joining technology that is revolutionizing the way in which aluminum and copper materials are being joined. The objectives are to develop enhancements to this existing technology that will broaden the use of this process in new materials and applications, and to transfer these technologies to local, national and international companies.

TECHNOLOGY

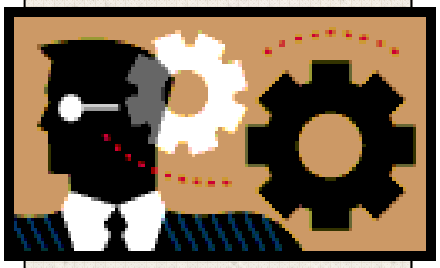
The Center is currently focused on the development and marketing of three technological aspects of FSW: 1) tooling that will last longer, offer the ability to join a wider range of advanced materials, and enable better control of the resulting quality of the weld and its properties; 2) new control systems and hardware for large scale, three-dimensional FSW capabilities; and 3) new methods and novel tooling for joining polymeric materials.

ACCOMPLISHMENTS

All of the fourth year milestones have been met. During its tenure as a Center of Excellence, FSW has submitted five provisional patents, two of which were submitted in year four. Of these, BYU has finalized and issued an exclusive license for the patent on super abrasive tools to a local Utah company. Co-development and marketing of these tools are continuing. BYU is presently seeking a partner for co-development on the FSW of polymeric materials. The center is currently pursuing another licensee and co-development partner. The Center continues development on the Versatile FSW Apparatus.

THINK TANK

What if there was...



A new method for welding metals and plastics that does not melt the material, does not add new material, and forms a joint that is base metal strong and virtually undetectable from the surrounding material?

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Advanced Structural Materials

B R I G H A M Y O U N G U N I V E R S I T Y

IsoTruss STRUCTURES, INC.

CENTER

The objective of the Center for Advanced Structural Composites is to commercialize the IsoTruss technology. The IsoTruss enables the creation of super lightweight grid structures with the potential for revolutionizing industries as diverse as civil infrastructure (e.g., communication and construction), aerospace, automotive, marine and sporting structures and virtually any application area requiring high strength, high stiffness, light weight and superb corrosion resistance.

TECHNOLOGY

The core technology consists of an ultra-lightweight composite structural shape known as the IsoTruss. The IsoTruss is a novel, patented, three-dimensional structural form that takes advantage of the highly directional properties of high strength composites to produce an extremely efficient and lightweight structure. The IsoTruss incorporates stable geometric configurations with helical members that spiral in opposing directions around a central cavity, coupled with longitudinal members that pass through the intersections.

ACCOMPLISHMENTS

In 2003, this Center was the recipient of the Stoel Rives Utah Innovation Award in the Mechanical Devices and Advance Materials Category. Several license agreements were negotiated with BYU for the IsoTruss technology, and a new Utah firm, known as IsoTruss Structures Inc. has licensed the rights for domestic commercial applications.

THINK TANK

What if there was...

A power line transmission tower that can withstand extreme wind conditions, support tremendously heavy loads, remain corrosion free, be unaffected by temperature extremes, and weighs significantly less than conventional steel towers?

Center for Advanced CASC Structural Composites

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Agricultural Byproducts

UTAH STATE UNIVERSITY

CENTER

The Center for Profitable Uses of Agricultural Byproducts was established to strengthen the economy of Utah, particularly the rural economy, by working closely with farmers, ranchers and other agricultural related businesses to transfer technologies utilizing agricultural production and processing byproducts. Byproducts of no or little value are transformed into energy and other salable items using technology developed at the center.

TECHNOLOGY

The technology developed at Utah State University for the profitable use of food production and processing byproducts is manifested in two major areas: 1) anaerobic systems that can produce energy (biogas) and soil amendment from manure and food processing waste, and 2) components of a high rate aerobic bioreactor (drum composter based) system that make the process more cost effective, and the products produced by the process more valuable.

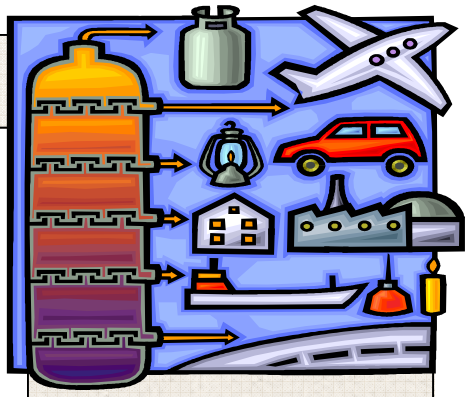
ACCOMPLISHMENTS

A fully operational system has been built at the Caine Dairy at Utah State University and is open for visits to see the system functioning, creating a showcase of this technology. Biogas can be seen burning at this site to produce hot water. A new, larger system is now online at the Ballard pig farm in Benson, UT. This new system is designed to produce enough electricity for 80 homes by utilizing waster from about 650 animals. The permits were obtained from Cache county and the system was installed by early spring 2003. A microturbine generates electricity, a "zone" heating system directs 30 gallons per minute water heated to about 185 degrees from the turbine to heat manure coming into the digester and heat the building.

A contract was negotiated with Pacificorp to accept electricity generated by the this system. It is the first contract of this kind with Pacificorp. Pacificorp pays for the electricity produced at the farm.

The IBR technology is very unique and easy to manage, with a high treatment rate and reliability. The Caine dairy has been operational for over two years without plugging.

Agricultural Byproducts



Placement and painting of tanks for the IBR system at Ballard farm

Benson, Utah

THINK TANK

What if there was...

A technology utilizing agricultural byproducts of little or no value and transforming them into electricity???

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BIOMEDICAL OPTICS

U N I V E R S I T Y O F U T A H

CENTER

The goal of the Center for Biomedical Optics is to commercialize optical technologies for diagnostic, therapeutic and disease risk assessment in medicine. Recent advances in novel light sources, laser materials and laser spectroscopy make these optical techniques highly attractive for novel, non-invasive assessment as well as therapeutic treatment of disease.

TECHNOLOGY

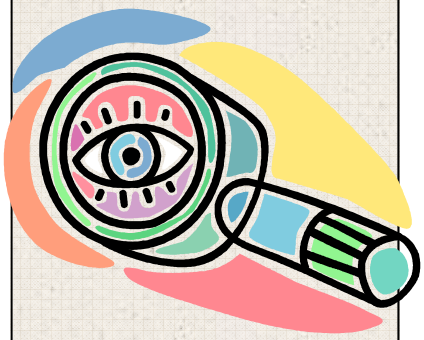
The Center's technologies include Resonant Raman Scattering detection of carotenoid antioxidants in human tissue and a novel light source for biomedical spectroscopy.

ACCOMPLISHMENTS

Nutriscan, Inc. was formed during the second year of COEP and in September of 2002, Raman detection technology was licensed to Cardoderm, Inc. In this funding cycle, a contract was obtained with Yale University from NIH to develop Raman technology for use in cancer epidemiology and also achieved Raman imaging of living human tissue and continued integrating novel, fiber-based light sources into instrumentation prototypes.

THINK TANK

What if there was...



A non-invasive optical laser technique that can detect and treat cancerous cells in the skin or mucosal tissue??

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BIOREMEDIATION

WEBER STATE UNIVERSITY

CENTER

The Center for Bioremediation develops, refines, and implements innovative biotechnologies for the removal of heavy metal and other inorganic contaminants. The Center's technology focus is biological selenium removal. Additional technologies include technologies for arsenic removal and cyanide degradation with a current emphasis on enzymatic cyanide degradation.

TECHNOLOGY

The Center's field-proven biotechnologies include Selenium reduction, Arsenic Reduction and Cyanide Biooxidation Technology. Selenium Reduction technology is capable of economically removing this contaminant from wastewaters to below detection levels. The Center's selenium technology is based on a novel implementation path requiring a front-end analysis, specially adapted naturally occurring microorganisms, and patented and proprietary process configurations. This path provides unique bioremediation technologies that are more economical, faster, and more durable than other bioremediation technologies. The Arsenic Reduction Technology is based on selected and specially adapted naturally occurring microorganisms, and patented and proprietary process configurations. The Cyanide Biooxidation technology is based on selected and specially adapted naturally occurring microorganisms and patented and proprietary process configurations and developing enzymatic technology

ACCOMPLISHMENTS

The Center's technology has been demonstrated to be approximately 1/10 the cost of EPA's past BDAT and removes selenium to lower levels. Applied Biosciences is a successful spin out company.

THINK TANK

What if there was...

A faster and more economical way to remove heavy metals, such as arsenic or cyanide, from wastewaters to a point below detection, with naturally occurring microorganisms?

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COMPLIANT MECHANISMS

BRIGHAM YOUNG UNIVERSITY

CENTER

The objective of Compliant Mechanisms is to accelerate and streamline the development and commercialization process of compliant mechanisms, so that they may be quickly licensed to existing or new companies. The use of innovative and patented compliant mechanisms will give existing companies a clear competitive advantage, and will provide a unique and valuable product for new companies. The potential market applications and opportunities are immense.

ACCOMPLISHMENTS

Some examples of compliant mechanisms that have been designed and tested are: fishing reel, bicycle freewheel, derailleur and brakes, pull start for small gasoline engines, centrifugal clutches, string trimmer, small garden tiller clutch , go-cart clutch, continuously variable transmissions (CVT), general purpose belt drive CVT , second generation bicycle CVT prototype , bistable mechanisms, compliant parallel motion mechanisms, constant-force mechanisms, electrical contacts for PDA docking stations, fully compliant bistable micro mechanism, thermal actuators, linear motion micro-bistable mechanism and two position latching mechanism.

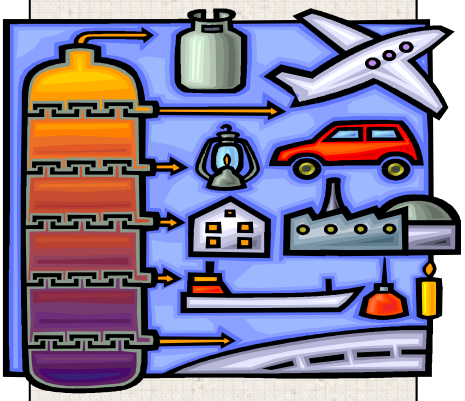
TECHNOLOGY

The Center possesses methods for the design of compliant mechanisms that have reduced part count reduced cost and increased precision compared to conventional mechanisms. A number of specific classes of mechanisms have been investigated and developed for commercialization.

THINK TANK

What if there was...

A method for redesigning any complex machine part to significantly reduce the number of parts, simplify the manufacturing process, reduce costs and end up with a more reliable and wear-resistant device?



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Computational Design and Testing

U N I V E R S I T Y O F U T A H

CENTER

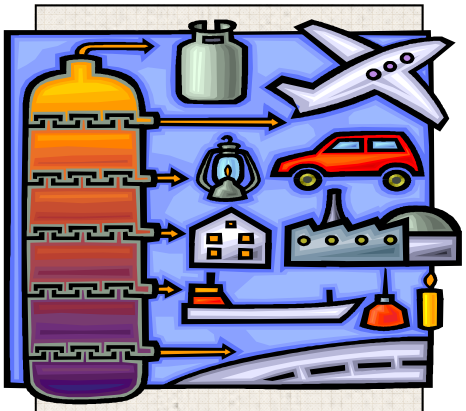
The objective of this Center is to develop computational technologies for industrial design and testing of novel materials and device elements, with a special focus on nanostructured materials and devices.

TECHNOLOGY

The center's technology is based upon several different ideas. First is computational algorithms for first-principles materials design and testing, computational engine I: materials designer and computation engine II: device simulator. Web based user interface for on-line computational applications. Licensed designs of novel nanostructued materials and device elements.

ACCOMPLISHMENTS

This is the first year of funding for this center. In the first year several goals were accomplished. A design for a carbon nanotube electromechanical pressure sensor, developed a prototype of web-interface for on-line computations and developed the first version of Mades, a computational engine.



THINK TANK

What if there was...

A way to model semiconductors and other materials by computer, to evaluate their properties before incurring the expense of prototyping?

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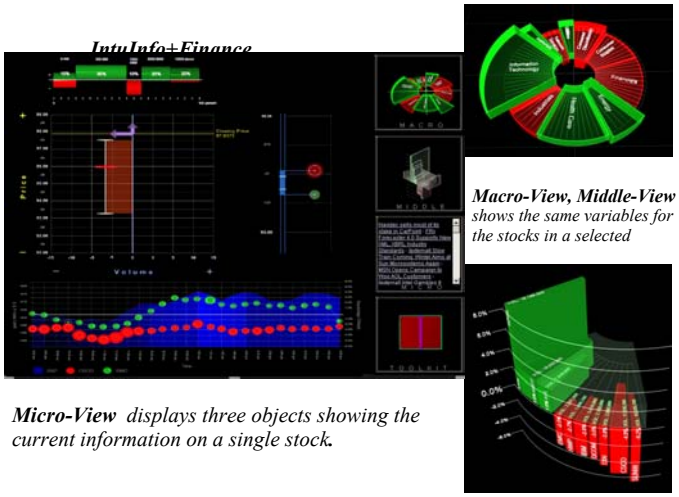
Representation of Multi-Dimensional Information (CROMDI)

U N I V E R S I T Y O F U T A H

CENTER

The Center for the Representation of Multi-Dimensional Information (CROMDI) was established in 2000 to commercialize a new audio-visualization technology (IntuInfo) that facilitates the rapid and accurate analysis of large quantities of quickly changing data. CROMDI is an interdisciplinary team dedicated to the innovative representation of information, comprised of experts of Architecture, Computer Science, Anesthesia, BioEngineering, Finance, Mathematics, Psychology, Communication and Music. These diverse experts participate with their own unique perspectives and provide solutions to complex information design needs through a unique methodology and iterative process that has been refined over the years.



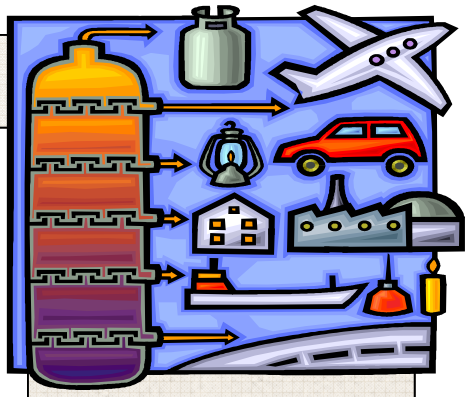
Micro-View *displays three objects showing the current information on a single stock.*

Macro-View, Middle-View *shows the same variables for the stocks in a selected*

TECHNOLOGY

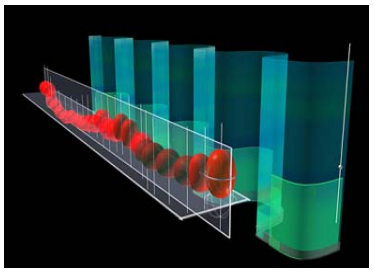
IntuInfo embodies the ancient proverb that "a picture is worth ten thousand words." By visually displaying multiple variables using various objects and colors, a wide range of information is clearly presented. The association between the graphical objects and the data is designed to facilitate rapid understanding of large quantities of data. The state of the art in many fields is to represent information with tables of numbers, waveforms, pie charts, diagrams, icons, matrices. IntuInfo enables recognition of events that is significantly faster, more accurate, less mentally demanding and with less training than is possible using existing technologies. This patent pending technology has been applied in medicine, finance, defense, and entertainment, and may also be successfully utilized in other applications where decision making depends on monitoring or analyzing large quantities of information (process control, vehicle operation and traffic control, corporate management, quality assurance, network monitoring).

CROMDI



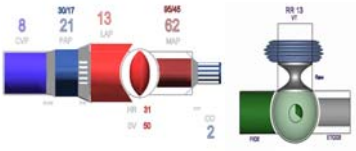
ACCOMPLISHMENTS

In the second year of funding CROMDI licensed the "cardiovascular display" to GE Medical Systems. Since then, CROMDI received a NASA STTR phase II grant in the amount of $250,000, awarded for "Graphic Displays to Support Treatment of Medical Emergencies." CROMDI received a DARPA seed grant to research preliminary audio-visualization concepts to convey to commanders the status of network resources under cyber-attack. Also, to support scheduling problems applying to both resource management and intelligence (detecting patterns of hackers, terrorists, etc.), a new audio-visual concept provisional patent has been filed, a prototype has been developed and contact with several partners has been made to utilize this technology. Several patents were filed in the Medical field ranging from drug display to pulmonary graphic metaphors.

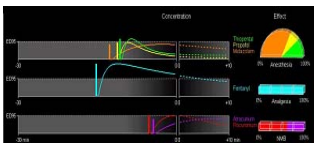


IntuInfo+Anesthesia

Traditional Anesthesia Display



Cardiovascular and Pulmonary

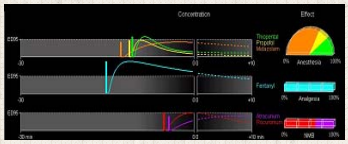


Drug Display

THINK TANK

What if there was...

A more efficient way to evaluate mass amounts of information more clearly and accurately???



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Direct Machine and Control

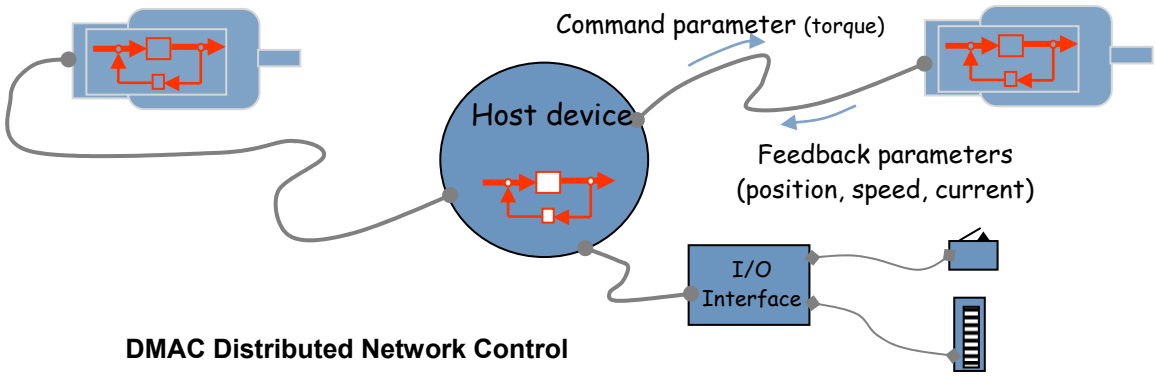
BRIGHAM YOUNG UNIVERSITY

CENTER

The center is developing a software-based digital control architecture configured on a host computing device to control, in real-time, a distributed high speed network of motors, sensors and other I/O devices. The primary control loops are closed over the high speed network. Only the torque/current loops are closed at the motor using digital power electronics. Although the primary focus is software development, some supporting hardware has been developed and/or configured to support the control network, including dual CPU control processors, machine tool enabled Coordinate Measurement wireless hardware, and Ethernet enabled sensor boards and motor control boards. The advantage of this new distributed approach to control is reduced control hardware, control of distributed rather than collected devices, reduced control costs, and greater control flexibility through modern control methods that cannot be enabled under the restrictions of modern controllers. DMAC is currently working on other technologies in relation to the DMAC technology.

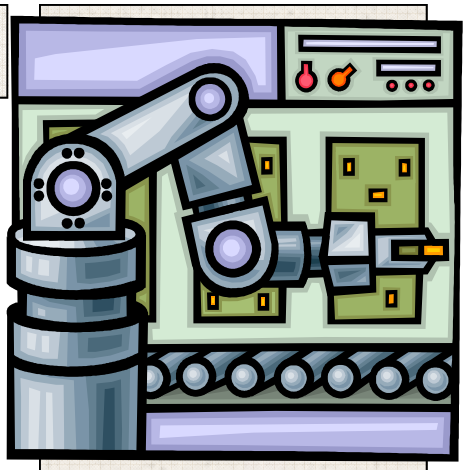
TECHNOLOGY

The DMAC technology is based on the development of an open architecture controller and supporting control algorithms for general control of advanced mechanisms such as 5-axis machine tools. This controller uses a dual CPU PC/controller so that the CAD/CAM application can run under Windows, while the real-time control software can run under a second CPU. The motors and machine Input/Output (I/O) are commanded over a high speed network such as fiber optic and IEEE 1394 (firewire). The control software consists of object oriented libraries that integrate motion planning, trajectory generation, servo-control, communication, and user interfaces. In addition, new control methods are being developed such as curvature matched machining (CM2), and higher dimensional methods of representing and passing geometric tool path data between the CAD/CAM application and the DMAC controller. The center has also been used to investigate and evaluate current process planning applications for industry.



DMAC Distributed Network Control

DMAC



ACCOMPLISHMENTS

In the first year of funding DMAC has accomplished several milestones which includes the following: the DMAC motion control library near commercial grade; new NURBS look-ahead algorithms for motion planning; control across both fiber optic and IEEE 1394 networks; DMAC control retrofit of the GM donated 5-axis Taurus mill underway; the Proof-of-concept for direct process planning in Alias/Waveform geometric modeling application and work performed for General Motors; Proof-of-concept for using N-dimensional NURBS to pass advanced tool paths to the DMAC controller. Continued support of Direct Controls, Inc. in commercialization of DMAC controller. Developed API control interface library jointly with Wilcox for direct control of CMM process by PC-DMIS application which is now in testing phase; developed VMAC control architecture for variable frequency control of different devices; developed new VMAC I/O and control board hardware that uses 802.3 communication standards, modified for real-time control using a *speak when only spoken to* protocol; developed new user XML user interface methods for control of the distributed VMAC devices. We have used grant money from Ford to compare/evaluate 5-axis tool path planning among the more popular commercial CAM application software packages. Grants have been obtained from Wilcox of wireless CMM hardware and PC-DMIS software and installed on Sugino 3-axis mill. Communications have been established between application and hardware.

THINK TANK

What if there was...

A way to control, in real-time, a high speed network of motors sensors and other devised with a software-based digital control computing device???

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Electronic Medical Education

U N I V E R S I T Y O F U T A H

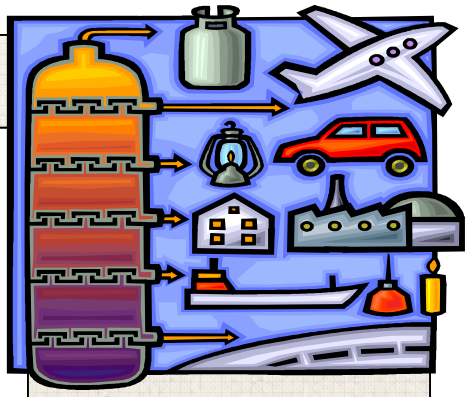
CENTER

The Center for Electronic Medical Education (CEME) is located at the University of Utah Health Sciences (UofU). The focus of this Center is to develop component software technology for use by physicians and scientists in image intensive fields, specifically targeted at visual annotation and knowledge representation. Initially, the software consisted of author tools for medical case creation and information management of image intensive data for publishing web-based clinical reference material. In 2001 Amirsys Inc., a commercial spin-off, licensed the medical case creation and annotation tools for medical case creation. In fiscal year 2002, the original technology development was extended into decision support and evidenced-based medicine solutions, biomedical imaging and bioinformatics. CEME established itself as a multidimensional technology hub by extending technology development into three additional markets. Those markets are: 1) telemedicine and remote consultation, 2) electronic medical records (EMR) specifically collection of expert knowledge and annotation of visual data as part of the clinical workflow and 3) biomedical/ biotechnology imaging informatics annotation and knowledge representation.

TECHNOLOGY

CEME technology provides clinicians and basic scientists with knowledge representation tools built on the need to visually annotate (identify and label) images and add expert clinical knowledge (e.g., diagnosis, pathology report, or clinical note) to image data in the healthcare enterprise. The technology enables consultation and sharing of results at each stage of the clinical management of a patient, research or clinical study, and provides a mechanism to track multiple images and textual results. CEME technology can be integrated into existing imaging systems as a layer that facilitates communication or exist as a standalone application in a research or healthcare enterprise. CEME technology was developed in response to the critical need to capture the growing and evolving base of imaging results and expert knowledge, such that downstream experts can utilize the expert knowledge base. The goal is to improve the process of delivering healthcare and scientific discoveries by developing technology for the purposes of consistent, context-appropriate communication and collaboration, standardization and interoperability of clinical tools and interactive presentation of data.

Electronic Medical Education



ACCOMPLISHMENTS

As part of our objectives, CEME has adopted an intellectual property strategy of maximizing commercial potential by decomposing CEME technologies into as many individually licensable pieces as possible. This strategy recognizes that software applications developed for medical publishing contain intellectual property threads that can be pulled out into individual invention disclosures and woven into new combinations to meet market needs. The additional markets lead to new commercial entities that push the technology into new markets.

The accomplishments include—A commercial spin-off, AMIRSYS, Inc., that produces electronic reference material. A right to use license with AMIRSYS, Inc. for U of U image content. Established the CEME as a multidimensional technology hub that addresses the needs of image integration in the electronic medical record and field of biomedical imaging informatics. Strategic positioning of CEME technology with key industry participants that has resulted in a Memorandum of Understanding and Teaming Agreement to get CEME technology into Battlefield Telemedicine. Patent on the core technology. CEME technology generated multiple invention disclosures as part of a multidisciplinary collaboration and technology development effort. A new commercial spin-off company, Resilient Imaging, that is a services-based company for integration of annotation and knowledge representation technology. Two SBIR grants have been submitted to the NIH National Institute for Biomedical Imaging and Bioengineering and the NIH National Cancer Institute for further development of CEME technology. Resilient Imaging is in the process of negotiating a non-exclusive license for the CEME technology and patent with the Technology Transfer Office at the University of Utah.

THINK TANK

What if there was...

A way to share visually annotated images with other healthcare professionals throughout the healthcare system???

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High-Speed Information Processing

UTAH STATE UNIVERSITY

CENTER

The purpose of this center (CHIP) is to design, prototype, and commercialize fast algorithm technologies for specific families of high-speed integrated circuit (IC) chips. When implemented in IC chips, fast algorithms such as these add great value to chip designers, chip manufacturers, and original equipment manufacturers (OEM) because their products are cheaper, faster, smaller, and less power hungry than those with standard algorithms that use multipliers and large amounts of memory. The use of our technologies offers additional benefits through faster design cycles, compact imple-

TECHNOLOGY

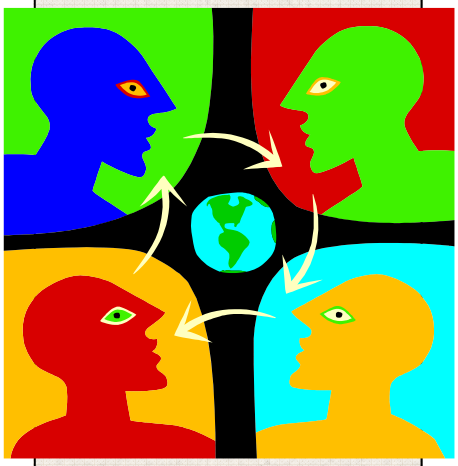
The center holds rights to several technologies such as: multiplier-free digital filters: design methodology and architecture; multiplier-free algorithms for hyperspectral image restoration and compression.; full-duplex echo canceller: algorithm and architecture; feedback cancellation algorithms for hearing aids.; Fast Integer Fourier Transform (FIFT).

ACCOMPLISHMENTS

This is the first year of funding for this Center. During this year multiplier-free algorithms for hyperspectral image restoration and compression was completed, a patent filed on full-duplex echo canceller and a patent filed on multiplier-free digital filter design. In CHIP, we have developed a full-duplex echo canceller using advanced signal processing. The new echo canceller enables natural, face-to-face like conversations with speaker phones and never cuts off or enters half-duplex mode. We have implemented the new echo canceller on a digital signal processing (DSP) chip that could be put into speaker phones for the home or office.

THINK TANK

What if there was...



A way to have face-to-face like conversations with a speaker phone without those annoying echos and cut offs???

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RAPID MICROBE DETECTION

UTAH STATE UNIVERSITY

CENTER

The focus of this center is the development of technologies that lead to the real time detection of pathogenic micro-organisms. This involves the development of novel pathogen capture molecules, platform development, prototype development, and commercialization. Industries where this technology is useful include pharmaceuticals, biomedicine, biotechnology, veterinary, production agriculture, food processing, public health, defense, and water and sewage treatment.

TECHNOLOGY

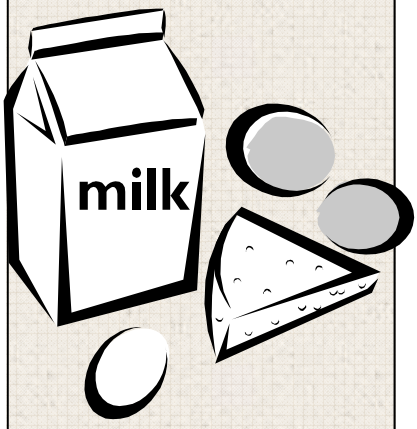
The primary focus of the Center is bacterial detection, but other targets are also investigated. To date, four technologies have been developed: ImmunoFlow, ImmunoDNA, GlycoBind, and TissueTag. Each technology has a unique use and application, but is not limited to a single type of use. For example, ImmunoFlow has many fields of use ranging from water to air, and has the potential to detect many types of bacteria. Initial prototypes are available for Bacillus globgii spores, Lactobacillus, Salmonella and E. coli O157 cells. Each type of assay has a maximum detection time of 30 minutes with a sensitivity of about 1000 cells. A unique feature of each technology is that it is volume independent; both large (tens of liters) and small (1 to 100 milliliters) samples are commonly used. Each technology is at a different stage of development, with ImmunoFlow being the most developed.

ACCOMPLISHMENTS

The Center has licensed the ImmunoFlow technology to Stellar Technologies. Demonstration of a prototype to several large food companies began in 2002.

THINK TANK

What if there was...



Being able to detect less than 10 cells of a harmful pathogen, such as salmonella or E. coli, in a quart of milk, within 30 minutes?

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Nuclear, Medical and Environmental Technologies (CNMET)

U N I V E R S I T Y O F U T A H

CENTER

The commercial strategy of the **Center for Nuclear, Medical, and Environmental Technology (CNMET)** is to acquire selected spun-off facilities and consolidate existing niche markets into a single, well-managed and licensed entity that can provide a convenient source for a full range of nuclear services. Large companies are currently downsizing, outsourcing, and eliminating risky and costly nuclear research and development (R&D) capabilities, and are teaming with universities with established nuclear engineering programs and research facilities to perform key services. An additional market trend is for companies to off-load ownership and operation of their nuclear testing, diagnostic, and irradiation facilities, and to contract with new owners for specific access and services. Others are simply decommissioning their nuclear facilities without replacement. The result is a decrease in availability of licensed facilities. That, in combination with an increasing demand for services from the private sector, provides the basis for a solid commercial opportunity. E-Cubed and Nuclear Labyrinth will assume commercial production to reduce costs, implement uninterrupted production cycles, and achieve economies of scale. Appropriate R&D functions then will be merged and contracted to universities with nuclear facilities, such as the University of Utah's TRIGA reactor, to promote innovation, train co-operatively, and supply a steady stream of knowledgeable and seasoned potential employees to the workforce.

TECHNOLOGY

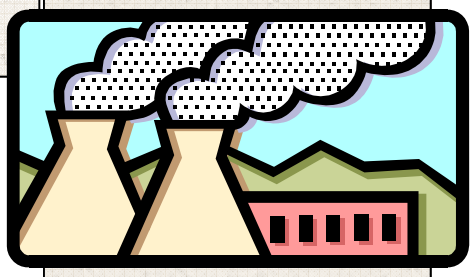
The operating entity for the University's research reactor and is primarily used for teaching, research, and limited fee-based irradiation services for external clients. Teaching and research activities include radiation chemistry and bioassays. Commercial services include ultra-sensitive fission track analysis (FTA), ultra-sensitive neutron induced autoradiography (NIA), advanced Pu diagnostics, high specific activity short-lived radioisotopes (for example, F-18), irradiation of unique medical "seeds" for cancer treatment, and performance testing of military electronic components and integrated systems upon exposure to neutrons. All intellectual property (IP) that results from CENTER activities is the property of the University and is licensed through the Technology Transfer Office (TTO).

E-Cubed: An independent entity that facilitates and integrates University reactor services with other intercollegiate and international reactors under research/grant programs administered by the DOE, NRC, and other related governmental agencies.

Nuclear Labyrinth: A newly formed company under CNMET that will engage in commercial nuclear production services beginning in January 2004. Nuclear Labyrinth will exclusively contract out all its research and development functions to the CENTER and license back applicable IP through the University's TTO. Together with the CENTER, Nuclear Labyrinth will provide valuable hands-on training functions for E-Cubed and its partners.
Nuclear Labyrinth's marketing mission is to provide improved and expanded
nuclear services to existing and underserved clients in the Western U.S. with nuclear production and testing needs.

1) **Little Mountain, Utah.** Boeing is currently in the process of closing its radiation facilities in California, and is a prime candidate to initially bring in

CNMET (cont.)



commercial work displaced by the closing. Thus, a unique opportunity exists for Nuclear Labyrinth to contract with Little Mountain for increased civilian work. An initial estimate of at least $1 million/year is estimated for non-defense work.

2) **Aerotest, Oakland, California.** Aerotest Corporation operates an explosives and jet engine neutron radiography business. During an earlier divestiture, the Autoliv-ASP company (originally based in Ogden, Utah) retained Aerotest (along with its nuclear reactor) as a stipulation to the spin-off transaction. AutoLiv now has indicated that it would like to divest itself of the reactor in part due to perceived operational risks and burdensome regulations required to conduct an operation that is outside of their core business. Nuclear Labyrinth is currently in negotiation to acquire the Oakland facility. If sale terms are reached and concluded, then Nuclear Labyrinth will assume full operational responsibility of the current reactor. Nuclear Labyrinth plans to convert the reactor's technology to all-digital format to significantly increase marketability of its commercial services.

ACCOMPLISHMENTS

Nuclear Labyrinth plans to contract with the CENTER on various research and development (R&D) projects, such as the digitization of Aerotest existing imaging technology and other R&D activities currently being conducted in Oakland. Segregation of R&D activities from scheduled production will dramatically increase capacity and efficiency at the Aerotest facility. Nuclear Labyrinth may contract with the CENTER to develop rapid bioassay techniques. If perfected, this new technology would greatly expand Utah market opportunities with commercial entities such as Envirocare. Nuclear Labyrinth intends to conduct targeted market research to identify and approach other potential underserved clients. Future contracts with the CENTER to develop new technologies shall be licensed back to the University via TTO.

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PETROLEUM RESEARCH

U N I V E R S I T Y O F U T A H

CENTER

The mission of the Petroleum Research Center (PERC) is to conduct research and development studies leading to practical, cost-effective solutions to liquid hydrocarbon production, handling and transportation. With funding from the U.S. Department of Energy and the petroleum industry, the PERC coordinates basic and applied research in: the physical properties and physical and chemical thermodynamics of naturally occurring hydrocarbons, development of pipeline transportation and flow assurance strategies, and simulation, optimization and control of oil and gas recovery methods.

TECHNOLOGY

PERC works to understand problems related to the production, transportation and processing of waxy and asphaltenic crude oils and the subsequent alleviation of these problems and developing a variety of methods and software tools (models) for the efficient and optimal production of oil and gas from underground reservoirs. Over the last several years, oil companies and federal agencies have funded (and continue to fund) research in PERC, which is an integral part of the Department of Chemical and Fuels Engineering at the University of Utah.

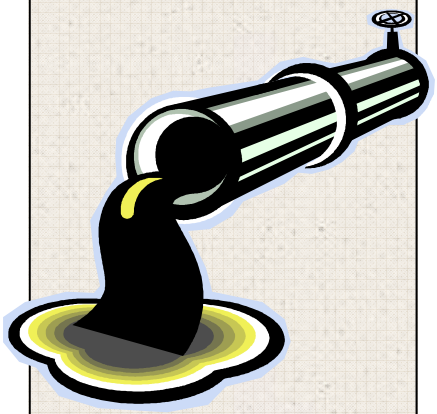
ACCOMPLISHMENTS

A patent on wax temperature measurement and wax amounts determination using spectroscopic methods was filed along with identifying two potential instrument manufacturers willing to produce commercial online units utilizing PERC technology. A property database enhancing online wax technology and Chemometrics model has been partially completed.

THINK TANK

What if there was...

A variety of methods and software tools for the efficient and optimal production of oil and gas from underground reservoirs?



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Rapid Prototyping

U N I V E R S I T Y O F U T A H

CENTER

The Center for Rapid Prototyping is focused in the areas of ultrasonic sensing of injection molding, and physical and virtual geometric modeling for computer aided design.

TECHNOLOGY

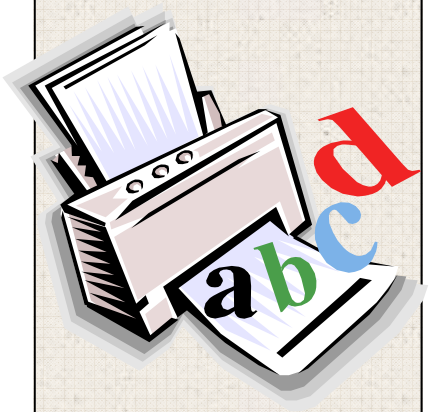
The Center for Rapid Prototyping works on several projects including: machining techniques that allow prototyping of geometric objects of arbitrary complexity on a 3 axis CNC mill with limited tools and little operator skill required; a series of new sensors and control techniques for improved polymer processing; a Personal Prototyping System (PPS) that makes rapid prototyping affordable for small companies and perhaps even the average consumer; low cost 3D scanning technologies that make acquisition of 3D geometric data practical and affordable for reverse engineering, medical imaging/reconstruction, etc.; a device that is capable of producing very large prototypes (Shapemaker); a photopolymer based technique to create prototypes in a single step (Inverse Tomographic Construction). New micro and nano-scale polymer manufacturing techniques have been developed to include a micro forging technique and a nano scale injection molding machine.

ACCOMPLISHMENTS

In the second year of funding, several milestones were met including the production of the first micro-scale injection molded part, the first successful machine scan of the human face and completed a production-type prototype of high temperature ultrasound transducer and control system. The Center for Rapid Prototyping also conducted a market survey for the 3D Scan Machine franchise concept.

THINK TANK

What if there was...



A personal prototyping system that develops and creates prototypes at a very low cost on your own inkjet or laser jet printer???

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SMART SENSORS

UNIVERSITY OF UTAH

CENTER

Smart Sensors probe the environment and modify their function in order to improve their data gathering capability. A smart sensor adapts to its environment, and sends improved data to the main processing computer. A smart sensor melds sensor, signal processing, and computer technologies. Applications span medicine, precision agriculture, electronics manufacturing, wireless communication, transportation and radar.

TECHNOLOGY

The Center for Smart Sensors focuses on two core technologies that have the greatest commercial potential, and five support technologies that are key aspects of the Center and enable the development and implementation of products utilizing the core technologies. This year new methods have been added and are available for the core technologies, license agreements are near in each of the core technology areas. Additional patents and invention disclosures have been filed in both core areas this year. Both families of technologies are based on simple ideas and simple circuits that result in two critical advantages **-- Small and Cheap**. This makes them applicable to a wide array of applications.

ACCOMPLISHMENTS

This year the Center for Smart Sensors moved to the University of Utah from Utah State University. After this move, a number of critical partnerships were established and a spin out company was created to act as a development intermediary. The center funding has been a critical part in developing prototypes that are of interest to potential licensees.

THINK TANK

What if there was...

An early warning system for computer disk drive failure, a pre-flight test system for aging aircraft wiring, and a system to protect military personnel from being overrun by tanks?

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VASCULAR BIOTHERAPEUTICS

U N I V E R S I T Y O F U T A H

CENTER

The Center for Vascular Biotherapeutics is focused on commercializing medical strategies and devices that target blood vessel formation for the treatment of cancer and obstructive vascular diseases such as atherosclerosis. This Center capitalizes on a robust scientific program aimed at deciphering the molecular blueprint for vessel regeneration using human genetics and transgenic mice technologies; these technologies were pioneered at the University of Utah. The "Functional Vascular Genetics" program established at the University of Utah is identifying genes that are essential for vascular development.

TECHNOLOGY

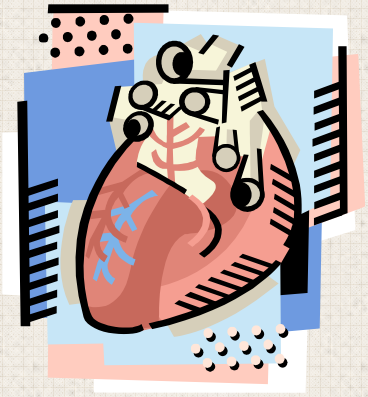
The Center for Vascular Biotherapeutics offers three fundamental and complementary technology benefits. First, using a functional human genetics approach, we have identified genes that are required for vascular development. Knowing which genes are essential for blood vessel formation and understanding their mechanism of action are required for developing strategies to modulate vessel growth in the treatment of cancer and vascular diseases. This center has also generated assays that rely on genetically manipulated cell lines that are proprietary and enable us to discover new signaling pathways and the Center focuses on developing real products.

ACCOMPLISHMENTS

New IP has been filed and discussions with companies on developing targets are being initiated. Negotiations for a licensee are in progress and we have designed and tested a first generation elastin sheath-stent and showed it to be effective in preventing restenosis in a porcine model. This success has directly led to the development of a second-generation elastin peptide stent.

THINK TANK

What if there was a way to...



Decipher the molecular blueprint for vessel regeneration, in order to treat cancer and other vascular diseases such as atherosclerosis?

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Program Description

PROGRAM DESCRIPTION

BACKGROUND

The Utah State Legislature created the Centers of Excellence Program (COEP) in 1986. The Legislature recommended the allocation of economic development funds annually to the COEP, to be awarded to college and university faculty on a competitive basis. Recognizing that both the growth of new industry and the expansion of existing industry, in the next century would require a strong technology base, a steady supply of new ideas, concepts, innovations, and prototypes. The objectives of the COEP are to enhance and expand the applied technical research activities at institutions of higher education in Utah, to develop technologies that are considered to have potential for economic development in the state, and to assist in the actual commercialization of those technologies. This research and technology commercialization process ultimately results in the creation of new companies, the enhancement of business opportunities for existing companies that license COEP technologies, and in the growth of Utah's job opportunities. In addition, the proprietary value of technologies created is reflected in the number of patents issued and the associated royalty-bearing licenses that are signed.

These measurement parameters (jobs created, companies assisted and/or created, inventions disclosed or patents issued, and license agreements signed) are summarized in this report as indicators of the value of the COEP to state economic development.

Ongoing funding of the program has been based upon the real and potential economic impact that the Centers of Excellence Program has had upon the State of Utah during the years since its creation. This Annual Report summarizes the significant accomplishments of the program during the recently completed fiscal year.

OPERATIONS AND OBJECTIVES

The operating methods of the Centers Program have evolved over the years since its inception, with a continuing goal of achieving the maximum economic benefit from the individual Centers that have been created. Upon selection on a competitive basis, new Centers are funded with a minimum requirement of a 2:1 matching fund ratio from the private and federal sectors. Matching funds are reported and audited on a regular basis. Centers are also audited regularly for the achievement of technical and commercial milestones. Center directors are required to submit annual reports to the COEP director. The Centers of Excellence Program Annual Report, attached here , is based on submitted reports and upon information gathered from site visits, audits and other data sources. In addition, each funded Center is assisted by one or more designated commercialization consultants, who assist Center directors in defining commercialization strategies, performing market and competitive analysis, and locating potential investors or licensees.

Centers are normally funded for a maximum of five years, and are then expected to be self-sustaining through license contract royalties and new research grants. Centers with especially noteworthy histories and ongoing technological impact are designated as Distinguished Centers, and thereafter may be funded on a project-by-project basis as requests are approved.

CENTER SELECTION PROCESS

Proposals from researchers for new Centers of Excellence or for renewal of existing Centers of Excellence are submitted to the COEP office in response to a Request for Proposal which is normally published in late December. The incoming proposals are critically reviewed by the Centers of Excellence Advisory Council. Centers are selected for funding based on a ranking established in extended review sessions with the Centers Advisory Council.

The State Advisory Council for Science and Technology (SAC) has advisory responsibility for the Centers of Excellence Program by statute. SAC members participate on the Centers Advisory Council, reviewing proposals and conducting site visits. This provides Science Council members with in-depth knowledge of the program, Center specific information and a strong technical and industrial perspective for making funding decisions. The State Science Advisor reviews the Annual Report and presents it to the Science Council for acceptance.

COMMERCIALIZATION PROCESS

Over the past seven years, the Centers of Excellence Program has funded a consulting program to assist Center directors in preparing and implementing commercialization strategies. Each Center is unique in terms of which strategy is optimal - there is no single solution, and each requires customized approaches.

Early market surveys and competitive analyses are conducted to discover which market segments are most promising, and which product features will be of interest to potential customers and licensees. Consultants assist in targeting potential licensees for the technology and in positioning products for anticipated markets.

These early strategic discussions often reveal product variations that can be introduced to the marketplace earlier than previously planned. Such early commercialization has several benefits: (i) getting products to consumers for preliminary market validation and directional planning; (ii) early cash flow strengthens continuing research at the Center and hastens financial independence, and (iii) the future value of technology licenses is enhanced.

The Centers of Excellence Office works closely with the Technology Transfer Offices at the universities in an effort to extract maximum value from the licenses that are signed for Centers technologies. Through the commercialization consulting program, assistance is given in defining market opportunities, identifying potential target licensees, providing key information for license valuations, and consulting assistance to those companies considering license opportunities.

2002-2003 Financial Summary

CENTERS OF EXCELLENCE - 2002-2003 FINANCIAL SUMMARY

CENTERS FUNDED IN FISCAL 2002/2003	State Funding 2001/2002	State Funding 2002/2003	Cumulative State Funding	Fed. Match 2002/2003	Private Match 2002/2003	Total Match 2002/2003
Acoustic Cooling Technology-U/U	$100,000	$99,000	$299,000	$194,158	$34,000	$228,158
Advanced Joining of Materials-BYU	$120,000	$130,000	$490,000	$230,000	$135,000	$365,000
Advanced Structural Composites - BYU	$120,000	$120,000	$570,000			$0
Biomedical Optics - U/U	$130,000	$150,000	$410,000	$175,728	$304,885	$480,613
Bioremediation-WSU	$68,000	$70,000	$188,000	$184,000	$0	$184,000
Compliant Mechanisms -BYU	$120,000	$130,000	$490,000	$219,000	$114,580	$333,580
Electronic Medical Education - U/U	$120,000	$125,000	$485,000	$0	$267,000	$267,000
Rapid Microbe Detection - USU	$120,000	$77,000	$597,000	$124,314	$199,360	$323,674
Multi Dimensional Information-U/U	$130,000	$140,000	$377,000	$693,095	$0	$693,095
Petroleum Research-U/U	$120,000	$111,000	$331,000	$250,000	$144,000	$394,000
Profitable uses of Agricultural by-products-USU	$100,000	$105,000	$305,000	$91,312	$191,431	$282,743
Smart Sensors-U/U	$100,000	$150,000	$350,000	$434,175	$0	$434,175
Vascular Biotherpeutics-U/U	$100,000	$140,000	$240,000	$457,351	$0	$457,351
High Speed Information Processing - USU	$0	$150,000	$115,000	$445,000	$122,200	$567,200
Computational Design and Testing - U/U	$0	$115,000	$115,000	$230,000	$0	$230,000
Direct Machine and Control - BYU	$0	$120,000	$120,000	$0	$967,400	$967,400
Rapid Prototyping and Manufacturing - U/U	$100,000	$130,000	$230,000	$569,024	$0	$569,024
Nuclear Medical and Technologies - U/U	$100,000	$100,000	$200,000	$160,000	$40,000	$200,000
Subtotals:	**$1,648,000**	**$2,162,000**	**$5,912,000**	**$4,457,157**	**$2,519,856**	**$6,977,013**

2002/2003 MATCHING RATIO 3.2 :1

2003-2004 Funded Centers

Utah Centers of Excellence Program

Description of Centers Selected for Funding 2003-2004

Center (University)

Acoustic Cooling Technology (U/U)
Developing novel miniature acoustic cooling devices without moving parts for application in computers and other electronics.

Advanced Imaging LADAR (USU)
Developing an airborne high-resolution, laser-based 3D color imaging platform for both military and civilian use.

Advanced Joining of Materials (BYU)
Developed new friction stir welding tools and materials capable of joining a wide range of metals, now being transferred to industry for aerospace, military and other manufacturing.

Advanced Structural Composites (BYU)
Developing manufacturing technology and commercial products based on the IsoTruss structures formed from lightweight composite materials.

Computational Testing & Design (U/U) - Developing powerful computational packages capable of designing and predicting the electrical, mechanical and structural characteristics of novel materials, especially nanostructured materials and components such as carbon nanotube-based electromechanical devices.

Direct Machining And Control (BYU)
Developing method that allows a manufacturing machine controller to directly interpret CAD/CAM models, resulting in superior resolution for complex shapes.

Electronic Medical Education (U/U)
Authoring tools used to create medical education products, and selling them as a component based medical information management and processing system.

Global Knowledge Management (U/U)
Developing Knowledge Fusion and Dynamic Knowledge Refreshing software to enable next-generation data mining technology.

High-Speed Information Processing (USU)
Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices.

Homogeneous DNA Analysis (U/U)
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office.

In Situ Ozonator for Remediation (U/U)
Developing new equipment to integrate biological and chemical treatment processes for the detoxification and restoration of waterways contaminated by PCBs and other pollutants.

Petroleum Research (U/U)
Develops cost-effective solutions for liquid hydrocarbon production, handling and transportation. Optimizes petroleum recovery; process control and production automation in oil and gas fields.

Profitable Uses of Agricultural Byproducts (USU)
Develops cost-effective technologies to treat animal wastes, generating "biogas" that can be used to produce energy, and nutrients to be used in soil amendments.

CROMDI (U/U)
Developed new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data, with applications in medicine, finance…

Smart Sensors (USU)
Engaged in the development and commercialization of sensor-based products, such as an application for the detection of faults in aircraft wiring.

Titanium Boride Surface Hardening (U/U)
Developing harder, longer-lived components and devices for the aerospace, biomedical and industrial markets.

Legislation

Part 6
Centers of Excellence

9-2-601. Purpose.

9-2-602. Short title - Definitions.

9-2-603. Administration - Grants.

9-2-601. Purpose.

(1) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. These generally come from strong research colleges and universities. Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development. Most states are enhancing their research base by direct funding, usually on a matching basis. The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas. The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.

(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis.

(3) The Legislature recommends that such funds be allocated on a competitive basis to the various colleges and universities in the state. The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.

History: C. 1953, 63-62-1, enacted by L. 1985, ch. 103, § 1; 1986, ch. 109, § 1; renumbered by L. 1992, ch. 241, § 60.

9-2-602. Short title - Definitions.

(1) This part is known as the "Centers of Excellence Act."

(2) As used in this part, "Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.

History: C. 1953, 63-62-2, enacted by L. 1985, ch. 103, § 2; 1986, ch. 109, § 2; renumbered by L. 1992, ch. 241, § 61.

9-2-603. Administration - Grants.

(1) This part shall be administered by the Division of Business and Economic Development.

(2) The department may award grants to the various colleges and universities in the state for the purposes of this part.

(3) Recommendations for funding shall be made by the division with the advice of the State Advisory Council for Science and Technology, with the approval of the board. Each proposal shall receive the best available outside review.

(4) In considering each proposal, the division shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development. Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.

(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the division in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

History: C. 1953, 63-62-3, enacted by L. 1986, ch. 109, § 3; renumbered by L. 1992, ch. 241, § 62.

Repeals and Reenactments. - Laws 1986, ch. 109, § 3 repealed former § 63-62-3, as enacted by L. 1953, ch. 103, § 3, relating to creation of a committee for technology excellence in engineering research, and enacted the above section.

Utah!

Where ideas connect

Olene S. Walker
Governor

CENTERS · OF EXCELLENCE

ANNUAL REPORT

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Centers of Excellence

Fiscal Year July 2003—June 2004

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2003-2004
Centers of Excellence
Annual Report

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Executive Summary

Executive Summary
CENTERS OF EXCELLENCE
2003 ANNUAL REPORT

MISSION STATEMENT

The purpose of the Office of Technology Development's Utah Centers of Excellence Program is to promote the creation, development, and expansion of technology based businesses and industry. To accomplish this, the goals include:

· Maximizing the economic impact of research and development performed at Utah's universities.

· Facilitating the licensing of mature technologies to Utah businesses.

· Encouraging the establishment and growth of Utah businesses based on new and developing technologies.

· Promoting the availability and use of technical and capital resources for Utah's technology based businesses.

HIGHLIGHTS

Through fiscal year 2001, the Office of Technology Development's Utah Centers of Excellence Program leveraged a cumulative state investment of $35.6 million with non-state matching funds totaling $377 million. To date, the program was responsible for the creation of:

- 150 new high technology companies
- 176 new patents either issued or pending
- 204 licenses signed between businesses and Utah universities
- 10.6:1 cumulative match ratio

The Utah Centers of Excellence Program, widely regarded as one of the nation's most productive and successful programs of its type, sponsors the development and commercialization of technologies currently being researched at Utah's universities. By helping to introduce these commercially important new products, the Centers program plays a vital role in the growth of Utah's high technology economy.

During the fiscal year, the Centers program continued to manage a legislative appropriation of $2 million. New appointees to the Centers advisory council have strengthened the technical expertise of the council. Expanded consulting services provided to Center directors have greatly improved the commercialization opportunities for funded Centers. Planning grants have been reduced from $10,000 to $5,000 to fund more potential Centers with greater focus on market analysis.

2003-2004
Funded Centers

Acoustic Cooling

U N I V E R S I T Y O F U T A H

CENTER

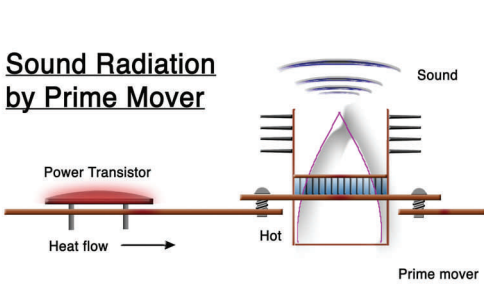
The Center for Acoustic Cooling Technologies was originally established to commercialize novel high frequency thermoacoustic engines for cooling applications. One important application for this technology is in the heat management of computers and other devices employing dense arrays of microcircuits. Subsequent work has resulted in the demonstration of a prototype device capable of converting heat into electricity at high efficiency.

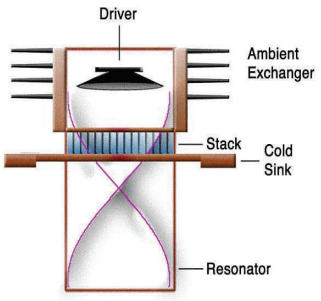
TECHNOLOGY

The Center for Acoustic Cooling is leveraging fundamental developments in miniature thermo-acoustic devices supported by the Office of Naval Research and DARPA. The Center's technology is based on two effects in thermo acoustics: The first is that heat can be converted into sound energy, and the second is that sound can pump heat. Both have been employed in devices with dimensions ranging from 4 cm to 0.8 cm. Piezoelectric materials have now been incorporated in order to recover electricity in some cases.

ACCOMPLISHMENTS

Prototype devices have been constructed and successfully demonstrated by an independent company. The last year has seen more successful miniaturization and improved heat transfer, which is the limiting factor for cooling power. Prototype heat to sound to electricity converters have been built and tested with efficiency ranging from 10-25% at a temperature difference of 50 C.

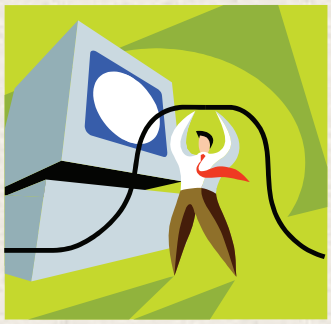




THINK TANK

What if there was...

A miniature cooling device with no moving parts and using sound as its main energy source, that could replace the fans in desktop computers and other devices and appliances?



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Advanced Imaging LADAR

UTAH STATE UNIVERSITY

CENTER

The Center for Advanced Imaging LADAR was formed to commercialize a now patented camera technique that uniquely combines laser distance measurement with digital color imaging, resulting in detailed, 3-D color images that can be captured in real time and also stored for later analysis and manipulation in virtual reality environments. Civilian and military markets exist for stationary, airborne and spaceborne versions of the technology.

TECHNOLOGY

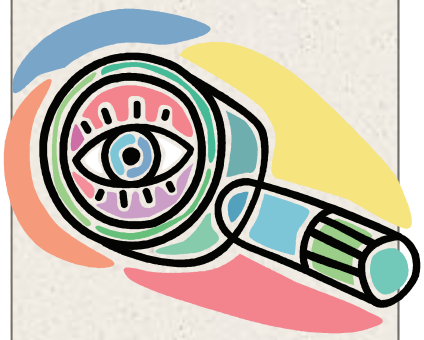
CAIL's technology couples existing 3D LADAR (Laser Detection and Ranging) technology with 2D digital color imaging in the unique 3D Texel Camera. Previously, distance and spectral datasets had to be collected separately, carefully registered, and then superimposed – laborious reprocessing that often required days to weeks. The CAIL technology works in real time – the first system to enable precise 3D color imaging when either the scene, the camera or both are moving.

ACCOMPLISHMENTS

Their key patent issued in December 2003, and a Utah company (RappidMapper, Inc.) is pursuing the manufacturing and marketing of land-based systems while the development of airborne platforms continues.

THINK TANK

What if there was...



A way to take high-resolution 3-D color photos incorporating GPS location data in real time instead of days??

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Advanced Joining of Materials

BRIGHAM YOUNG UNIVERSITY

CENTER

The Center for Advanced Joining of Materials **(CAJM**) is developing enhancements and new technologies based on friction stir welding (FSW). FSW is a relatively new, innovative joining technology that is revolutionizing the way in which aluminum, copper and other materials are being joined. The objectives are to develop enhancements to this existing technology that will broaden the use of this process in new materials and applications, and to transfer these technologies to local, national and international companies.

TECHNOLOGY

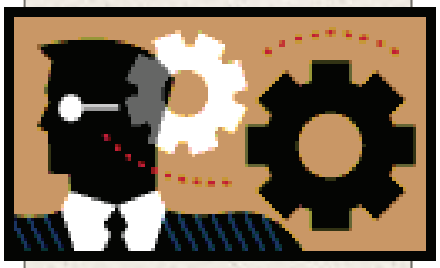
The Center has been focused on the development and marketing of three technological aspects of FSW: 1) tooling that will last longer, offer the ability to join a wider range of advanced materials, and enable better control of the resulting quality of the weld and its properties; 2) new control systems and hardware for large scale, three-dimensional FSW capabilities; and 3) new methods and novel tooling for joining polymeric materials.

ACCOMPLISHMENTS

In this last year of funding, FSW rode a rising tide of interest to claim $2.1 million in federal and industrial matching dollars, for a return of 23:1 on state dollars invested. During its tenure as a Center of Excellence, FSW has generated 11 pending and 2 issued patents. BYU issued an exclusive license for the patent on super abrasive tools to MegaStir, a spinout Utah company that already employs nearly 20 people, and granted additional licenses to the existing firm Advanced Metal Products. Interest from the pipeline, auto and shipbuilding markets is strong and growing, with major multinational customers already established. The Center continues development of the technology for additional materials on its own with federal and industrial funding.

THINK TANK

What if there was...



A new method for welding different metals that didn't melt the material, didn't add new material, and formed a joint that was base metal strong and nearly indistinguishable from the adjacent material?

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Advanced Structural Composites

BRIGHAM YOUNG UNIVERSITY

IsoTruss STRUCTURES, INC.

CENTER

The objective of the Center for Advanced Structural Composites is to commercialize the IsoTruss technology. The IsoTruss enables the creation of super lightweight grid structures with the potential for revolutionizing industries as diverse as civil infrastructure (e.g., communication and construction), aerospace, automotive, marine and sporting structures and virtually any application area requiring high strength, high stiffness, light weight and superb corrosion resistance.

TECHNOLOGY

The core technology consists of an ultra-lightweight composite structural shape known as the IsoTruss. The IsoTruss is a novel, patented, three-dimensional structural form that takes advantage of the highly directional properties of high strength composites to produce an extremely efficient and lightweight structure. The IsoTruss incorporates stable geometric configurations with helical members that spiral in opposing directions around a central cavity, coupled with longitudinal members that pass through the intersections.

ACCOMPLISHMENTS

A new Utah firm, known as IsoTruss Structures Inc., licensed the rights for domestic commercial applications and has begun to sell products, aiming to first displace wooden utility poles. Conventional poles weigh half a ton and last 5-40 years, while IsoTruss poles weigh 300 pounds and are expected to last 60-100 years for the same price, while costing less to transport and install.

THINK TANK

What if there was...

A corrosion free power line tower that weighed far less than existing steel towers but could resist high winds, bear heavy loads, and remain unaffected by extreme temperatures?

Center for Advanced CASC Structural Composites

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Agricultural Byproducts, Profitable Use of

U T A H S T A T E U N I V E R S I T Y

CENTER

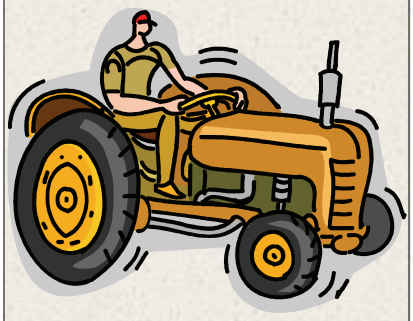
The Center for Profitable Use of Agricultural Byproducts was established to commercialize technologies utilizing agricultural production and processing byproducts. Waste materials of little or no value are transformed into energy and other salable items using technology developed at the center.

TECHNOLOGY

The USU technology has two basic components: 1) an induced sludge bed anaerobic reactor that can produce energy (biogas) and soil amendment from manure and food processing waste, and 2) a high rate aerobic (drum composter based) bioreactor that make the system more cost effective, and the products produced by the process more valuable. The scalable, modular system is reliable and easily managed.

ACCOMPLISHMENTS

There are now three plants in Utah which are fully operational and producing electricity. One of these plants generates enough electricity to power its own farm and then put enough electricity back into the grid to earn a monthly check of $1,000 or more from Pacificorp! There is now one issued and one pending patent on the technology, and a new Utah company, Andigen, has been formed to build the anaerobic systems on farms. Increased funding has been flowing from the USDA and DOE, and commercial interest is growing throughout the Western U.S.



THINK TANK

What if there was...

A technology that took agricultural waste of little or no value and turned it into electricity and salable products???

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Computational Design and Testing

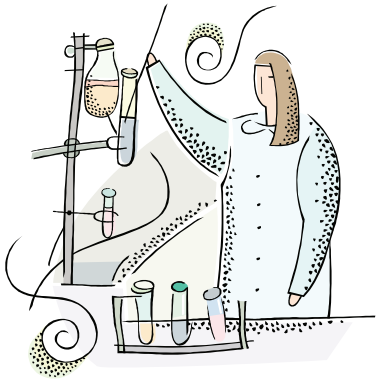
U N I V E R S I T Y O F U T A H

CENTER

The objective of this new Center is to commercialize computational engines that facilitate and accelerate the design and testing of novel materials and device elements, with a special focus on nanostructured materials and devices.

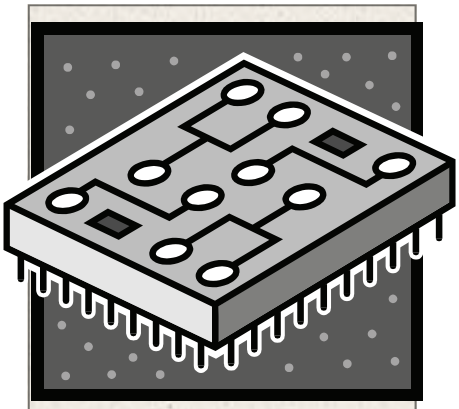
TECHNOLOGY

The center is focused on two computational engines: Materials Designer (MaDes) and Device Simulator (DeSim). The algorithms of MaDes predict the structural and mechanical properties of new materials based on first-principles analysis at the level of atomic forces, while DeSim models the electrical properties and performance of components constructed with novel materials.



ACCOMPLISHMENTS

Several goals have been accomplished in the first two years of funding for this Center. A patent is now pending on the design for a carbon nanotube electromechanical pressure sensor developed with these tools, a web based user interface for on-line computational applications has been successfully demonstrated, and industry-funded work in the electronic component area is moving forward.



THINK TANK

What if there was...

A way to virtually eliminate the need for costly and time-consuming trial-and-error in the development of materials like semiconductors?

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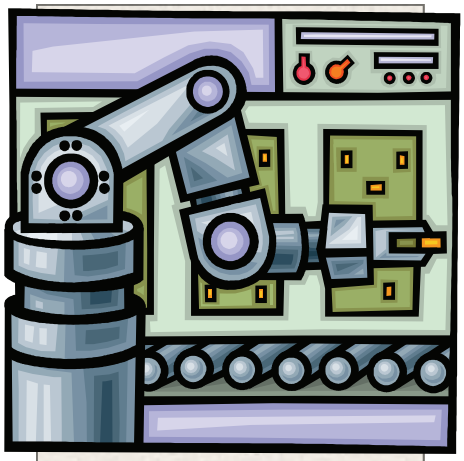
Direct Machining and Control

BRIGHAM YOUNG UNIVERSITY

CENTER

This Center is commercializing a disruptive technology for manufacturing: A new paradigm of one controller for many devices. That is, multiple machine tools can be run by one operator, through a network, rather than by individual operators. Instead of every machine having its own control panel, one program and one controller could theoretically manage all the machines within a plant—creating dramatic cost savings. A related application of the core technology (VMAC) is being developed for the home automation market.



TECHNOLOGY

The DMAC technology is based on the development of an open architecture controller and supporting control algorithms for general control of advanced mechanisms such as 5-axis machine tools. This controller uses a dual CPU PC/controller so that the CAD/CAM application can run under Windows, while the real-time control software can run under a second CPU. The motors and machine Input/Output (I/O) are commanded over a high speed network such as fiber optic and IEEE 1394 (firewire). The control software consists of object oriented libraries that integrate motion planning, trajectory generation, servo-control, communication, and user interfaces.

ACCOMPLISHMENTS

Technical progress has continued across numerous fronts, such as the development of a VMAC control architecture for variable frequency control of different devices; the Center now has four patents pending as well as multiple contracts from major industrial partners. Direct Controls, Inc., a spin-off company in Orem, Utah, has just released its first product, and industry visits to the Center are averaging one per week.

THINK TANK

What if there was...

A way to control, in real time, a high speed network of motors, sensors and other components with a software-based digital control system???

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Electronic Medical Education

U N I V E R S I T Y O F U T A H

CENTER

The goal of this Center has been to commercialize visual annotation and knowledge representation software technology for use by physicians and scientists in image intensive fields. Key target markets have been: 1) Telemedicine and remote consultation, 2) Electronic medical records (EMR), specifically collection of expert knowledge and annotation of visual data as part of the clinical workflow, and 3) Biomedical/biotechnology imaging informatics annotation and knowledge representation.

TECHNOLOGY

CEME technology provides clinicians and basic scientists with knowledge representation tools built on the need to visually annotate (identify and label) images and add expert clinical knowledge (e.g., diagnosis, pathology report, or clinical note) to image data in the healthcare enterprise. The technology enables consultation and sharing of results at each stage of the clinical management of a patient, research or clinical study, and provides a mechanism to track multiple images and textual results in real time. CEME technology can either be integrated into existing imaging systems as a layer that facilitates communication, or exist as a standalone application in a research or healthcare enterprise.

ACCOMPLISHMENTS

CEME has leveraged its impressive 7 issued patents through the formation of two spinout companies that together already boast a seven-figure payroll: AMIRSYS, Inc., a producer of electronic medical reference material, and Global Matics, Inc., a service-based company managing information using images. The Center now has an MOU and Teaming Agreement to get CEME technology into Battlefield Telemedicine.

THINK TANK

What if there was...

A way to visually annotate images, share and discuss them in real time with colleagues throughout the world???

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Global Knowledge Management

U N I V E R S I T Y O F U T A H

CENTER

This new Center was formed to effect the commercialization of software tools representing the next generation of data mining technology, with the potential to leapfrog competing approaches by enabling customers to both quickly and inexpensively discover useful knowledge from databases and efficiently manage that knowledge over time as the underlying data or conditions of use change.

TECHNOLOGY

The rules, algorithms and programs developed by the Center address deficiencies in existing products by facilitating 'Knowledge Fusion' (integrating data mining techniques to discover more accurate or previously unattainable knowledge) and 'Dynamic Knowledge Refreshing' (automatically monitoring and updating changes in data related to previously discovered knowledge).

ACCOMPLISHMENTS

The Center has initially focused on implementing alpha versions of their Portal Wizards products for online businesses, and expect to be able to provide services using a version of this module for their analysts and end users by late 2004.

THINK TANK

What if there was...

A way for firms to constantly maximize the value of the information buried in their website records?

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High-Speed Information Processing

UTAH STATE UNIVERSITY

CENTER

This center is driving the creation of smaller, cheaper and faster chips to run miniature digital devices, by commercializing fast algorithm technologies for specific families of high-speed integrated circuit (IC) chips. When implemented in IC chips, fast algorithms add great value to chip designers, manufacturers, and OEMs because their products are cheaper, faster, smaller, and less power hungry than those with standard algorithms that use multipliers and large amounts of memory. Additional benefits flow from faster design cycles, compact implementation and low-cost hardware.

TECHNOLOGY

The center holds rights to several technologies such as: multiplier-free digital filters: design methodology and architecture; multiplier-free algorithms for hyperspectral image restoration and compression; full-duplex echo canceller: algorithm and architecture; feedback cancellation algorithms for hearing aids.; Fast Integer Fourier Transform (FIFT).

ACCOMPLISHMENTS

Patents are pending on the full-duplex echo canceller and on the multiplier-free digital filter design. The Center developed a full-duplex echo canceller that enables natural, lifelike conversations with speaker phones and never cuts off or enters half-duplex mode. They implemented the new echo canceller on a digital signal processing (DSP) chip that can be put into speaker phones for the home or office, and licensed the technology to a new Utah company, SP Communications, that plans to enter both the cell phone and speaker phone markets. A larger existing (confidential) Utah firm is funding work and incorporating related technology into their products as well.

THINK TANK

What if there was...

A way to have face-to-face like conversations with a speaker phone without those annoying echoes and cut offs???

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Homogeneous DNA Analysis

U N I V E R S I T Y O F U T A H

CENTER

This new center was formed to commercialize a novel suite of fast, user-friendly and inexpensive DNA sequence analysis tools that could be fielded in a doctor's office rather than requiring the services of an expensive reference laboratory, and which will reach markets including cancer testing, the diagnosis of inherited diseases, and rapid bioterrorism detection.

TECHNOLOGY

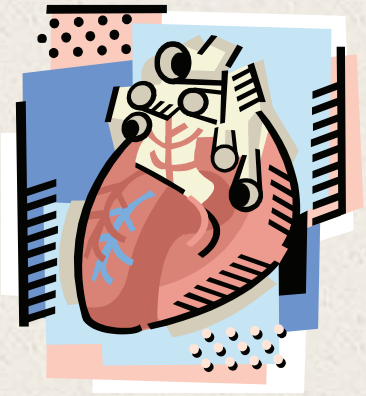
The central innovation involves a new, high-resolution twist on a very old technique for DNA sequence analysis: thermal denaturation profiles. A fluorescent dye, added before amplification via polymerase chain reaction (PCR), allows the melting transition of the PCR product to be continuously monitored without ever moving it from the same tube. Data processing allows even minute sequence changes to be readily identified through their effect on the melting profile.

ACCOMPLISHMENTS

The Center's first product has already been licensed to a Utah firm, Idaho Technologies, Inc., which has commenced commercial sales. Additional applications, instruments and software are currently in development, and collaboration with another Center of Excellence in the College of Engineering has begun.

THINK TANK

What if there was a way to...



Perform DNA-based diagnostic tests right in your doctor's office, instead of waiting weeks for your results?

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In Situ Sediment Ozonator

U N I V E R S I T Y O F U T A H

CENTER

This Center was newly created to commercialize the promising in situ ozonator (ISO) process, which when used together with other chemical-biological treatment technologies could remediate sediments contaminated with PCB, DDT and other recalcitrant organic contaminants. Such contaminated sediments are a serious problem in many industrialized countries, and there are currently no economically and technically feasible methods for treating them in place (in situ).

TECHNOLOGY

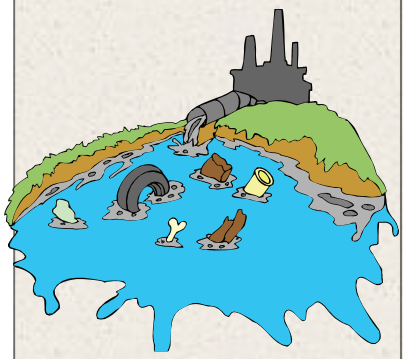
The powerful oxidizing power of ozone is harnessed in a safe, effective mechanism wherein sediments are processed and redeposited in a minimally invasive manner – immediately arresting contaminant release into the water, capping deeper contaminated layers, and promoting the onset of natural biodegradation.

ACCOMPLISHMENTS

This new Center has already completed laboratory treatment tests on PCBs and DDT, and commenced construction of a small prototype device. They have applied for an international patent, and attracted the interest and funding of both government and industry partners.

THINK TANK

What if there was...



A faster and cheaper way to remove DDT, PCBs and other tough contaminants from sediments to protect the environment and meet EPA standards?

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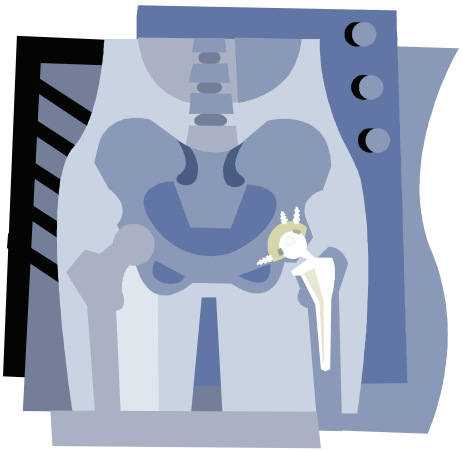
Novel TiB Surface Hardening

U N I V E R S I T Y O F U T A H

CENTER

This new Center is commercializing a novel method for hardening the surface of components fabricated from Titanium. Originally developed with government funding for use in creating lightweight Titanium armor, their approach for the first time makes this strong metal suitable for use in applications such as hip replacements, bearings and cutting tools where superior hardness coupled with wear resistance create a superior product.



TECHNOLOGY

The Center technology involves the incorporation of titanium monoboride (TiB) crystals into the surface of titanium components, creating a stable, spall-resistant surface layer conferring the advantages of hardness and wear resistance coupled with electrical and thermal conductivity.

ACCOMPLISHMENTS

The Center has applied for international patents, and a license has already been signed with Ortho Development Corporation, a Utah company, for the development and FDA validation of orthopedic implants using the TiB coating – offering for the first time the potential for implants that last a lifetime, even with young recipients.

THINK TANK

What if there was...

A method for adding a tightly bonded coating onto lightweight titanium parts to create superior hardness and wear resistance?

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Petroleum Research

U N I V E R S I T Y O F U T A H

CENTER

The Petroleum Research Center (PERC), which is an integral part of the Department of Chemical and Fuels Engineering at the University of Utah, is developing practical, cost-effective solutions to liquid hydrocarbon production, handling and transportation. PERC specifically works to understand problems related to the production, transportation and processing of waxy and asphaltenic crude oils, and alleviate those problems by developing a variety of methods and software tools (models) for the efficient and optimal production of oil and gas from underground reservoirs.

TECHNOLOGY

The Center is commercializing products in three areas: Flow Assurance (tools to help keep oil products moving through pipelines despite changing conditions or constituents), Oil Simulants (environmentally safe yet accurate substitutes for crude oil), and Reservoir Simulators (finite-element models for optimizing production from geometrically complex oil and gas fields). With funding from the U.S. DOE and the petroleum industry, the PERC coordinates basic and applied research in the physical properties and physical and chemical thermodynamics of naturally occurring hydrocarbons.

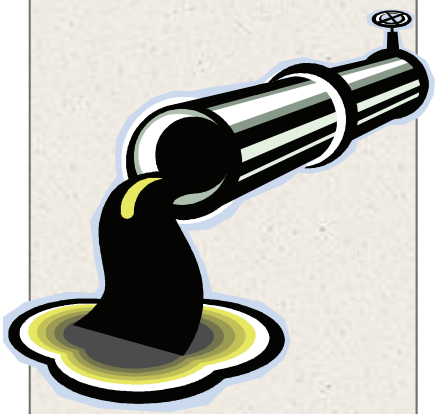
ACCOMPLISHMENTS

The Center has partnered with a manufacturer to field a new oil property prediction system using near-infrared spectroscopy and chemometrics. They have more than a 20:1 cumulative matching funds ratio, one issued patent and an additional patent pending. Work in partnership with major oil companies is continuing and expected to result in commercial deployment in the near future.

THINK TANK

What if there were...

A variety of methods and software tools to optimize the safe production of oil and gas from underground reservoirs?



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Rapid Prototyping

U N I V E R S I T Y O F U T A H

CENTER

The Center for Rapid Prototyping is focused on commercializing technologies related to ultrasonic sensing for injection molding processes, and physical and virtual geometric modeling for computer aided design.

TECHNOLOGY

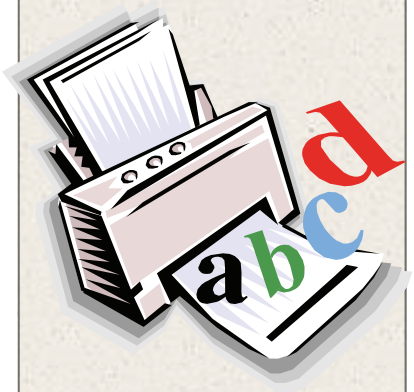
The Center has been working on multiple projects, including: Machining techniques that allow the prototyping of geometric objects of arbitrary complexity on a 3 axis CNC mill with limited tools and little operator skill required; a series of new sensors and controls for improved polymer processing; a Personal Prototyping System (PPS) that makes rapid prototyping affordable for small companies and perhaps even the average consumer; low cost 3-D scanning technologies that make the acquisition of 3-D geometric data practical and affordable for reverse engineering, medical imaging/reconstruction, etc.; a device that is capable of producing very large prototypes (Shapemaker); and a photopolymer-based technique to create prototypes in a single step (Inverse Tomographic Construction). New micro and nano-scale polymer manufacturing techniques have been developed, including a micro-forging technique and a nanoscale injection molding machine.

ACCOMPLISHMENTS

Milestones met include the production of the first micro-scale injection molded parts, the completion and testing of a production-type prototype high temperature ultrasound transducer and control system, and the production and test marketing of individualized replicas of human faces captured in a polymer-based collectible. With a cumulative 15:1 ratio of matching funds and one spin-off company already formed, the Center continues to progress toward graduation.

THINK TANK

What if there was...



A product that develops and creates simple prototypes at a very low cost on your own desktop printer???

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Representation of Multi-Dimensional Information (CROMDI)

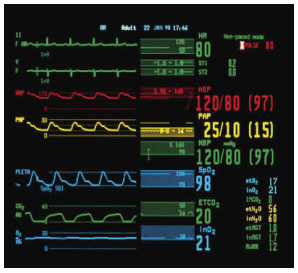
U N I V E R S I T Y O F U T A H

CENTER

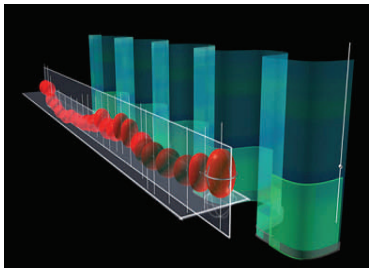
The Center for the Representation of Multi-Dimensional Information (CROMDI) was established to commercialize a newly patented audio-visualization technology (IntuInfo) that facilitates the rapid and accurate analysis of large quantities of quickly changing data.

TECHNOLOGY

The state of the art in many fields is to represent information with tables of numbers, waveforms, pie charts, diagrams and the like. IntuInfo embodies the ancient proverb that "A picture is worth ten thousand words." By visually displaying multiple variables using various objects and colors, a wide range of information is clearly presented. The association between the graphical objects and the data is designed to facilitate rapid understanding of large quantities of data. IntuInfo enables recognition of events that is significantly faster, more accurate, less mentally demanding and with less training than is possible using existing technologies.



Before Vs After



ACCOMPLISHMENTS

With two issued and three pending patents, a thriving spinout company (Applied Medical Visualization, Inc.), licenses with several existing firms and some $4.5 million in other contracts and grants, the Center continues to move into new markets including finance, time management and the military.

THINK TANK

What if there was...

A faster, more effective way to understand, evaluate and act on large amounts of complex data ?

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Smart Sensors

U N I V E R S I T Y O F U T A H

CENTER

In a general sense, Smart Sensors meld sensor, signal processing, and computer technologies to create new functionalities such as the ability to probe the environment and modify their function in order to improve their data gathering capability. Applications envisioned by this Center span medicine, precision agriculture, electronics manufacturing, wireless communication, transportation and radar.

TECHNOLOGY

The Center for Smart Sensors focuses on two core technologies that have the greatest commercial potential: The first core technology is circuitry for measuring length, distance or impedance; this enables a Smart Wire inspection system that can detect and locate faults or insulation breaks in aircraft wiring in real time. The second is the Imbedded Microstrip Antenna (IMA), which can sense or communicate in a buried environment. Both families of technologies are based on simple ideas and simple circuits that result in two critical characteristics -- they are **Small and Cheap**. This makes them applicable to a wide array of applications.

ACCOMPLISHMENTS

A single IMA antenna has now been demonstrated that can both sense and communicate. With a dozen pending and one issued patent, nearly seven figures worth of industry funding and two Utah spinout companies (LiveWire Test Labs, Inc. and RF Sensor Innovations), this Center is poised to make a significant contribution to Utah's presence in a number of markets. The commercialization of airline wiring fault detection is being accelerated with over $1 million in funding from the FAA and commercial aircraft firms.

THINK TANK

What if there was...

Early warning for disk drive failure, real-time detection of shorts in aircraft wiring, and a system to keep soldiers from being run over by tanks?

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Program Description

PROGRAM DESCRIPTION

BACKGROUND

Recognizing that both the growth of new industry and the expansion of existing industry in the next century would require both a strong technology base and a steady supply of new ideas, concepts, innovations, and prototypes, the Utah State Legislature created the Centers of Excellence Program (COEP) in 1986. The Legislature recommended the allocation of economic development funds annually to the COEP, to be awarded to college and university faculty on a competitive basis. The objectives of the COEP are to enhance and expand the applied technical research activities at institutions of higher education in Utah, to develop technologies that are considered to have potential for economic development in the state, and to assist in the actual commercialization of those technologies. This research and technology commercialization process ultimately results in the creation of new companies, the enhancement of business opportunities for existing companies that license COEP technologies, and in the growth of Utah's job opportunities. In addition, the proprietary value of technologies created is reflected in the number of patents issued and the associated royalty-bearing licenses that are signed.

Ongoing funding of the program has been based upon the real and potential economic impact that the Centers of Excellence Program has had upon the State of Utah during the years since its creation. This Annual Report summarizes the significant accomplishments of the program during the recently completed fiscal year.

OPERATIONS AND OBJECTIVES

The operating methods of the Centers Program have evolved over the years since its inception, with a continuing goal of achieving the maximum economic benefit from the individual Centers that have been created. Upon selection on a competitive basis, new Centers are funded with a minimum requirement of a 2:1 matching fund ratio from the private and federal sectors. Matching funds are reported and audited on a regular basis. Centers are also audited regularly for the achievement of technical and commercial milestones. Center directors are required to submit annual reports to the COEP director. The Centers of Excellence Program Annual Re-

port, attached here , is based on submitted reports and upon information gathered from site visits, audits and other data sources. In addition, each funded Center is assisted by one or more designated commercialization consultants, who assist Center directors in defining commercialization strategies, performing market and competitive analysis, and locating potential investors or licensees.

Centers are normally funded for a maximum of five years, and are then expected to be self-sustaining through license contract royalties and new research grants. Centers with especially noteworthy histories and ongoing technological impact are designated as Distinguished Centers, and thereafter may be funded on a project-by-project basis as requests are approved.

CENTER SELECTION PROCESS

Proposals from researchers for new Centers of Excellence or for renewal of existing Centers of Excellence are submitted to the COEP office in response to a Request for Proposal which is normally published in late December. The incoming proposals are critically reviewed by the Centers of Excellence Advisory Council. Centers are selected for funding based on a ranking established in extended review sessions with the Centers Advisory Council.

The State Advisory Council for Science and Technology (SAC) has advisory responsibility for the Centers of Excellence Program by statute. SAC members participate on the Centers Advisory Council, reviewing proposals and conducting site visits. This provides Science Council members with in-depth knowledge of the program, Center specific information and a strong technical and industrial perspective for making funding decisions. The State Science Advisor reviews the Annual Report and presents it to the Science Council for acceptance.

COMMERCIALIZATION PROCESS

Over the past seven years, the Centers of Excellence Program has funded a consulting program to assist Center directors in preparing and implementing commercialization strategies. Each Center is unique in terms of which strategy is optimal - there is no single solution, and each requires customized approaches.

Early market surveys and competitive analyses are conducted to discover which market segments are most promising, and which product features will be of interest to potential customers and licensees. Consultants assist in targeting potential licensees for the technology and in positioning products for anticipated markets.

These early strategic discussions often reveal product variations that can be introduced to the marketplace earlier than previously planned. Such early commercialization has several benefits: (i) getting products to consumers for preliminary market validation and directional planning; (ii) early cash flow strengthens continuing research at the Center and hastens financial independence, and (iii) the future value of technology licenses is enhanced.

The Centers of Excellence Office works closely with the Technology Transfer Offices at the universities in an effort to extract maximum value from the licenses that are signed for Centers technologies. Through the commercialization consulting program, assistance is given in defining market opportunities, identifying potential target licensees, providing key information for license valuations, and consulting assistance to those companies considering license opportunities.

2003-2004 Financial Summary

University	Center	03-04 Funding	Total Funding	03-04 Matching	Patents (Pending)	Patents (Issued)	Spin-Offs
UU	Acoustic Cooling	90,000	389,000	238,439	1	0	0
USU	Advanced Imaging LADAR	135,000	135,000	259,068	0	1	0
BYU	Advanced Joining of Materials	90,000	470,000	2,100,000	11	2	1
BYU	Advanced Structural Composites	108,000	458,000	479,428	0	0	4
UU	Computational Design & Test	50,000	165,000	260,000	2	0	0
UU	Representation Multidimension	150,000	670,000	1,197,165	3	2	1
BYU	Direct Machining & Control	122,000	317,000	272,500	4	0	1
UU	Electronic Medical Education	150,000	515,000	271,000	48	7	2
UU	Global Knowledge Mgmt.	113,000	113,000	238,424	1	0	0
USU	High-Speed Information Processing	135,000	135,000	755,600	0	0	1
UU	Homogeneous DNA Analysis	150,000	150,000	307,000	1	1	0
UU	In Situ Sediment Ozonator	105,000	105,000	95,000	1	0	0
UU	Novel TiB Surface Hardening	72,000	157,000	175,000	2	1	0
UU	Petroleum Research	100,000	480,000	400,000	0	1	0
USU	Profitable Ag Byproducts	120,000	485,000	262,312	2	1	3
UU	Rapid Prototyping & Mfg	120,000	350,000	487,500	0	0	1
UU	Smart Sensors	115,000	557,000	910,002	2	0	2

2004-2005
Funded Centers

Utah Centers of Excellence Program

Description of Centers Selected for Funding 2004-2005

Center (University)

Advanced Communications Technology (BYU)
Improved wireless communications and data transmission is achieved through the use of MIMO (multiple-input multiple=output) technology with multiple antenna elements.

Advanced Imaging LADAR (USU)
Developing an airborne high-resolution, laser-based 3D color imaging platform for both military and civilian use.

Advanced Satellite Manufacturing (USU)
Leveraging the capabilities of Utah's Space Dynamics Laboratory to develop and commercialize a low cost, modular small satellite platform for commercial, science and military missions.

Alternate Strategies of Parasite Removal (U/U)
Currently refining a safe, nontoxic and rapid treatment for Pediculosis, a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers.

Biomedical Microfluidics (U/U)
Technology that controls the movement of fluids in channels smaller than a human hair; micropumps that can deliver tiny quantities of drugs are just one product example.

Compliant Mechanisms (BYU)
Accelerates and streamlines commercial applications of devices that obtain their motion from the deflection of flexible parts rather than from pin joints.

Direct Machining And Control (BYU)
Developing method that allows a manufacturing machine controller to directly interpret CAD/CAM models, resulting in superior resolution for complex shapes.

Global Knowledge Management (U/U)
Developing Knowledge Fusion and Dynamic Knowledge Refreshing software to enable next-generation data mining technology.

High-Speed Information Processing (USU)
Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices.

Homogeneous DNA Analysis (U/U)
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office.

Miniature Unmanned Aerial Vehicles (BYU)
Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies.

Nanosize Inorganic Material Powders (U/U)
Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for nanotechnology applications.

Petroleum Research (U/U)
Develops cost-effective solutions for liquid hydrocarbon production, handling and transportation. Optimizes petroleum recovery; process control and production automation in oil and gas fields.

Profitable Uses of Agricultural Byproducts (USU)
Develops cost-effective technologies to treat animal wastes, generating "biogas" that can be used to produce energy, and nutrients to be used in soil amendments.

Representation of Multidimensional Information (CROMDI) (U/U)
Developed new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data, with applications in medicine, finance…

Smart Sensors (USU)
Engaged in the development and commercialization of sensor-based products, such as an application for the detection of faults in aircraft wiring.

Therapeutic Biomaterials (U/U)
Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs.

Titanium Boride Surface Hardening (U/U)
Developing harder, longer-lived components and devices for the aerospace, biomedical and industrial markets.

Legislation

Part 6
Centers of Excellence

9-2-601. Purpose.

9-2-602. Short title - Definitions.

9-2-603. Administration - Grants.

9-2-601. Purpose.

(1) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. These generally come from strong research colleges and universities. Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development. Most states are enhancing their research base by direct funding, usually on a matching basis. The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas. The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.

(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis.

(3) The Legislature recommends that such funds be allocated on a competitive basis to the various colleges and universities in the state. The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.

History: C. 1953, 63-62-1, enacted by L. 1985, ch. 103, § 1; 1986, ch. 109, § 1; renumbered by L. 1992, ch. 241, § 60.

9-2-602. Short title - Definitions.

(1) This part is known as the "Centers of Excellence Act."

(2) As used in this part, "Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.

History: C. 1953, 63-62-2, enacted by L. 1985, ch. 103, § 2; 1986, ch. 109, § 2; renumbered by L. 1992, ch. 241, § 61.

9-2-603. Administration - Grants.

(1) This part shall be administered by the Division of Business and Economic Development.

(2) The department may award grants to the various colleges and universities in the state for the purposes of this part.

(3) Recommendations for funding shall be made by the division with the advice of the State Advisory Council for Science and Technology, with the approval of the board. Each proposal shall receive the best available outside review.

(4) In considering each proposal, the division shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development. Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.

(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the division in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

History: C. 1953, 63-62-3, enacted by L. 1986, ch. 109, § 3; renumbered by L. 1992, ch. 241, § 62.

Repeals and Reenactments. - Laws 1986, ch. 109, § 3 repealed former § 63-62-3, as enacted by L. 1953, ch. 103, § 3, relating to creation of a committee for technology excellence in engineering research, and enacted the above section.

Description of Centers Selected for Funding
Fiscal 2003-2004

Acoustic Cooling Technology (U/U)
Developing novel miniature acoustic cooling devices without moving parts for application in computers and other electronics.

Advanced Imaging LADAR (USU)
Developing an airborne high-resolution, laser-based 3D color imaging platform for both military and civilian use.

Advanced Joining of Materials (BYU)
Developed new friction stir welding tools and materials capable of joining a wide range of metals, now being transferred to industry for aerospace, military and other manufacturing.

Advanced Structural Composites (BYU)
Developing manufacturing technology and commercial products based on the IsoTruss structures formed from lightweight composite materials.

Direct Machining And Control (BYU)
Developing method that allows a manufacturing machine controller to directly interpret CAD/CAM models, resulting in superior resolution for complex shapes.

Electronic Medical Education (U/U)
Authoring tools used to create medical education products, and selling them as a component based medical information management and processing system.

Global Knowledge Management (U/U)
Developing Knowledge Fusion and Dynamic Knowledge Refreshing software to enable next-generation data mining technology.

High-Speed Information Processing (USU)
Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices.

Homogeneous DNA Analysis (U/U)
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office.

In Situ Ozonator for Remediation (U/U)
Developing new equipment to integrate biological and chemical treatment processes for the detoxification and restoration of waterways contaminated by PCBs and other pollutants.

Petroleum Research (U/U)
Develops cost-effective solutions for liquid hydrocarbon production, handling and transportation. Optimizes petroleum recovery; process control and production automation in oil and gas fields.

Profitable Uses of Agricultural Byproducts (USU)
Develops cost-effective technologies to treat animal wastes, generating "biogas" that can be used to produce energy, and nutrients to be used in soil amendments.

CROMDI (U/U)
Developed new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data, with applications in medicine, finance etc.

Smart Sensors (USU)
Engaged in the development and commercialization of sensor-based products, such as an application for the detection of faults in aircraft wiring.

Titanium Boride Surface Hardening (U/U)
Developing harder, longer-lived components and devices for the aerospace, biomedical and industrial markets.

Governor's Office of
Economic Development

Centers of Excellence

Jon Huntsman, Jr.
Governor

ANNUAL REPORT

Dick Bradford ◆◆ EXECUTIVE DIRECTOR
Governor's Office of Economic Development

Martin Frey ◆◆ MANAGING DIRECTOR
Governor's Office of Economic Development

MICHAEL A. KEENE, Ph. D, MBA ◆◆ DIRECTOR
Centers of Excellence (through Jan 2005)

NICOLE TOOMEY DAVIS, MBA ◆◆ DIRECTOR
Centers of Excellence (From May 2005)

Fiscal Year July 2004—June 2005

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2004-2005
Centers of Excellence
Annual Report

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Executive Summary

Executive Summary
CENTERS OF EXCELLENCE
2004-05 ANNUAL REPORT

The Centers of Excellence program has a nearly 20 year history of helping to mature technologies developed at Utah's colleges and universities and bring them into the marketplace. Throughout its history the program has spun out many startups as well as supported many existing Utah companies through licensing of compelling, unique technologies.

The purpose of the Centers of Excellence Program (COEP) is to accelerate the commercialization of promising technologies that have value for Utah.

Since its inception in 1986, the program has helped create thousands of high-tech jobs, assisted in the creation of spin-off companies, and through improving products and processes has helped hundreds of Utah's high-technology companies experience tremendous growth. Over the first 19 years of the program, the Centers of Excellence Program has generated 179 patents, resulting in 204 license agreements, and 175-plus Utah-based companies have been created to license and market proprietary technology from the program. As of the last audit (2003), those companies directly employed over 2008 persons in the state, at an average wage of $59,000.

Examples of significant success of the Centers of Excellence program include Myriad Genetics, Inc. (MYGN), Sonic Innovations, Inc. (SNCI), Theratech - Acquired by Watson Pharmaceuticals (WPI) , and Echelon Biosciences Inc. - An Aeterna Zentaris Company (AEZS). Emerging successes include TechniScan Medical Systems, Inc., PartNET, Inc, Intelisum, Inc., and Sarcos, Inc. Startups emerging from the Centers program in the past two years include Wasatch Microfluidics Inc., Intellivis LLC, Castlerock Engineering, INOTEC INC, Glycosan Biosystems, and Sentrx Animal Care. These firms, and many more, continue to generate new jobs in Utah and strengthen Utah's high tech business community and are strong examples of the compelling research being created in Utah's colleges and universities.

For the 2004-05 year, 18 Centers of Excellence received funding totaling approximately $2 million, including 7 Centers that are new to the program. Technologies range from the profitable use of agricultural byproducts to new therapeutic biomaterials to state of the art software. Universities represented in the program this year include Brigham Young University, the University of Utah and Utah State University. Each Center works with a business consultant who assists in developing industry contacts, developing business plans and otherwise developing a "go to market" strategy and plan.

2004-2005 Funded Centers

Advanced Communications Technology

BRIGHAM YOUNG UNIVERSITY

CENTER

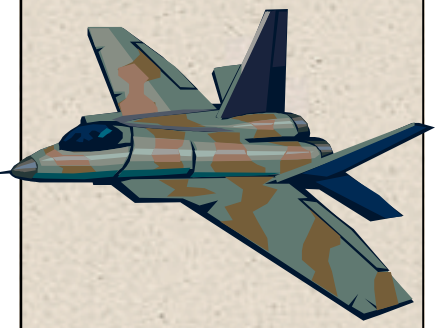
The Center for Advanced Communications Technology was formed to commercialize multi-antenna wireless communications: the main focus is using multiple antennas for robust wireless links to maneuvering air vehicles (tactical aircraft and UAV's). A secondary focus is in applying multi-antenna technology to improvement of commercial wireless communications. The Center has forged strong links with industry and with government as they've developed and refined the technology.

TECHNOLOGY

The Center designs solutions that help compensate for interference in wireless signals, with a particular emphasis on solutions for aircraft performing difficult maneuvers such as rolls as well as new solutions for helicopters communicating with a satellite. Historically these solutions have been focused on multi-antenna systems, but recent breakthroughs allow a single receiver to detect either of the two waveforms currently adopted for telemetry transmission.

ACCOMPLISHMENTS

The Center has filed 3 provisional patents and continues to demonstrate the success of their technology with a successful prototype flight-test held at Edwards Air Force Base. In March, the Center secured nearly $900,000 in funding from the US DOD to develop a real time prototype of the system which is scheduled for completion in the summer of 2006. Ongoing development has allowed the concept to be applied to helicopters communicating with satellites (where moving rotors interrupt communication). In addition, the Center has developed new telemetry technology which allows a single hardware system to be used to accommodate two distinct communication waveforms



THINK TANK

What if there was...

A way for a rolling Air Force jet to always stay in communication with the ground, even when the wings and tail interfere with the signal ?

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Advanced Imaging LADAR

UTAH STATE UNIVERSITY

CENTER

This Center focuses on commercializing three dimensional camera intellectual property based on laser radar (ladar) and digital camera technology. This year the Center succeeded in developing a new 3D camera prototype that is convenient and affordable for field work. It has been licensed and sold to Rappidmapper, Salt Lake City, Utah and has already been used in Japan, Alaska and various other states in the U.S. Unexpectedly, the successful prototype generated interest from NASA for space applications.

TECHNOLOGY

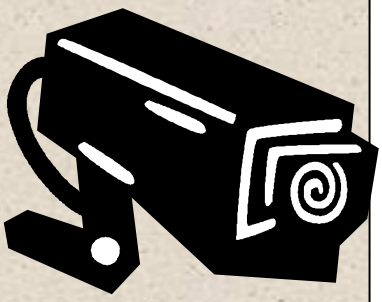
The CAIL technology, called the 3D Texel Camera uniquely combines (1) three-dimensional Laser Detection And Ranging (3D LADAR) technology with 2- dimensional digital photography (2D Imagery). 3D LADAR measures the precise distance to, and shape of, objects or terrain in a scene. 2D imagery records the color (or spectra) of the objects or terrain. CAIL's technology records the looks of a scene and the exact distance to objects in the view. It can take numerous images and integrate them all in real time. The system will be the first in the world to enable precise 3-D color imagery when either the scene or the camera or both are moving.

ACCOMPLISHMENTS

A new patent has been filed entitled "System and Method for Improving Lidar Data Fidelity Using Pixel-Aligned Lidar/Electro-Optic Data". This technology will enable automatic assembly of multiple 3D data sets (pictures) to create one big picture of the scene. The automation will increase the efficiency of use of data produced by the 3D camera prototype. Experimental work has been completed on a small handheld LADAR, this will be integrated into a new smaller 3D camera prototype during FY05-06.

THINK TANK

What if there was...



A way to take a picture and have a true, 3D image of the world? What if we could map the world with such a system?

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Advanced Satellite Manufacturing

UTAH STATE UNIVERSITY

CENTER

The Center for Advanced Satellite Manufacturing is seeking to create a viable Utah-based satellite manufacturing enterprise based upon years of expertise and projects within Utah State University and its Space Dynamics Laboratory. The Center is pursuing the development of novel advanced manufacturing and design techniques to reduce the cost and time involved with satellite manufacturing while improving quality and performance.

TECHNOLOGY

The Center received $25,000 of seed money during the '04-'05 year. This money enabled the Center to seek and win STTR funding from the National Science Foundation and to increase its visibility to outside organizations by participation in conferences, presentations at government and industry locations, and development of new proposals for funding. It also provided impetus for USU to spend $185,000 of its own money to purchase the Ultrasonic Consolidation equipment necessary for furthering the research in this area.

Ultrasonic Consolidation is the primary advanced manufacturing technology upon which advanced satellite manufacturing techniques are being developed. Combining advanced manufacturing tools with new design techniques should yield highly modular and easy to build, reliable satellites that can accommodate a wide variety of different functions, thus placing Utah in the leadership in small satellite manufacturing.

ACCOMPLISHMENTS

Establishment of the Center and building the infrastructure needed for future work in this area.

THINK TANK

What if there was...

A way to make modular, standardized small satellites so that the development of new satellites with new functions was "plug and play"?

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Biomedical Microfluidics

U N I V E R S I T Y O F U T A H

BIOMEDICAL MICROFLUIDICS

The primary focus of the Center for Biomedical Microfluidics is to develop and deliver to market a device for the creation of microarrays composed of proteins, nucleic acids, cells, lipids, sugars, or other materials. The system is unique in that it delivers spots of the desired materials in a system similar to an inkjet printer, providing low cost, high accuracy arrays for the biomedical industry. As part of this focus, the Center is working to develop new applications of the technology and to expand the number and quality of spots that can be produced simultaneously. The elements of the commercialization plan include: partnering with OEMS who will incorporate the spotter in existing sensing tools, researchers and research companies who will use a stand alone spotter to produce their own chips and establish their own protocols for depositing biomaterials and Microarraying companies that produce microarrays and other platforms requiring small spots.

TECHNOLOGY

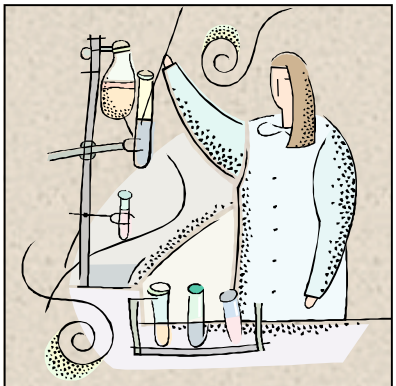
This year, in addition to the existing Continuous Microfluidic Spotter for Proteins and Nucleic acids (DNA), the Center has added the same capabilities for Cells and Lipids. In addition, the Center has collaborated with the Center for Homogenous DNA to develop systems for DNA extraction, amplification, and sensing arrays using microfluidics. Peripheral areas such a micropump design uses an Osmotic pump for delivery over 1 month as well as a Diffusion pumping system are also in development.

ACCOMPLISHMENTS

The Center's accomplishments this year include:

- Generation of over $600,000 in external funding related to Center technologies
- Five new invention disclosures submitted and 2 provisional patent applications filed
- Generation of significant leads for licensing opportunities

In addition, the Center has a spinout, Wasatch Microfluidics, which has been created to assist in taking the Center's technology to market.



THINK TANK

What if there was...

A way to "print" biomedical compounds onto a slide, quickly, easily and inexpensively?

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COMPLIANT MECHANISMS

BRIGHAM YOUNG UNIVERSITY

CENTER

The objective of the Compliant Mechanisms Center is to help rapidly move the design of a wide variety of compliant mechanisms into industry. A compliant mechanism transfers or transforms motion, force, or energy, but, unlike rigid-link mechanisms (such as traditional pliers), compliant mechanisms gain at least some of their mobility from the deflection of flexible members rather than from movable joints only. During its final year in the program, the Center focused its efforts on the successful completion of projects aimed at finalizing licenses and patent applications.

ACCOMPLISHMENTS

By reducing the number of parts, reducing or eliminating the need for lubrication, reducing weight and easing miniaturization, the use of innovative compliant mechanisms can give companies a significant advantage in the marketplace over traditionally designed products.

The Center has designed and tested many compliant mechanisms in partnership with industry ranging from exercise and athletic equipment components, electric switches, clutches and transmissions, and prosthetics. During the 5 year life of the Center, the team has filed 15 patents and 9 of them have been issued.

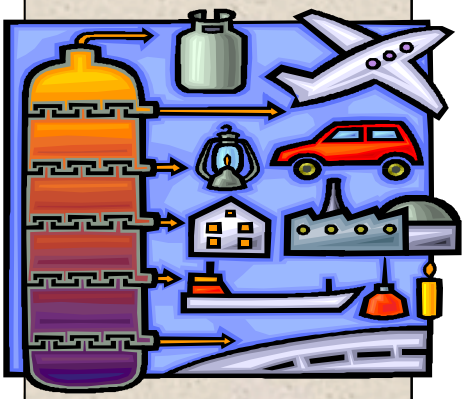
TECHNOLOGY

The range of technologies developed by the Center can be categorized under Advanced Bicycle components, Power Transmissions, Force Displacement Systems, Bistable Mechanisms and Microelectromechanical Systems (MEMS). Utah companies such as ATL, Inc., and Happy Jack, Inc. have benefited from the Center's work.

THINK TANK

What if there was...

A way to dramatically simplify the design of mechanical components to reduce cost, complexity, weight and the need for lubrication?



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CASPeR

U N I V E R S I T Y O F U T A H

CENTER

The Center for Alternate Strategies of Parasite Removal (CASPeR) is preparing to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they are teenagers.

TECHNOLOGY

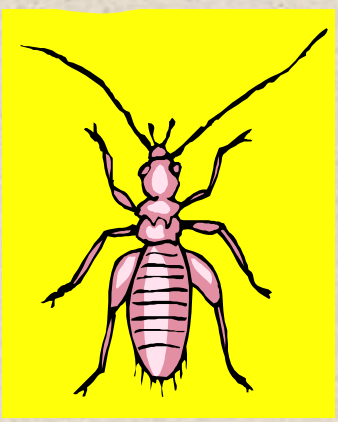
CASPeR has developed a device - the LouseBuster™- is a revolutionary new approach for eradicating head lice. It is a non-chemical approach that controls lice by rapidly desiccating (drying) them out with blasts of warm air applied to the scalp. Lice and their eggs (nits), which are glued to the hair, are vulnerable to desiccation because of their high surface to volume ratio. The LouseBuster™ blows more than twice as much air as a standard blow dryer, but at a temperature of only 140°F (blow dryers operate at 150-160°F). It kills lice remarkably quickly - normally in less than 30 seconds. In addition to killing hatched lice, the LouseBusterTM also kills eggs, which shampoos have never been able to do. Shampoos require two applications, 7-10 days apart, in order to kill eggs that hatch after the first treatment. In short, the LouseBusterTM represents a potential "magic bullet" solution to head lice that differs completely from previous methods.

ACCOMPLISHMENTS

The Center submitted a full patent application in May '05. The Center also created a LouseBuster™ beta prototype for human use including the development of a disposable hand piece attachment for the LouseBuster™ . The Center also conducted significant human clinical testing of the LouseBusterTM alpha prototype with success approaching a 100% cure rate. The Center also continued to expand relationships with local schools, clinics and other entities. During the year the Center treated about 100 families in the Salt Lake Valley for head lice, thus alleviating significant trauma for these families, and their schools. The LouseBuster treatments allowed children to return to school earlier than would have otherwise been possible, benefiting schools and families.

THINK TANK

What if there was...



A safe, non-toxic way to thoroughly kill head lice in a 1 hour, non-chemical treatment? What if that were to help the 25% of children in the U.S. who get head lice before they're teens?

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Direct Machining and Control

B R I G H A M Y O U N G U N I V E R S I T Y

CENTER

This Center is developing a software-based digital control architecture configured on a host computing device to control, in real-time, a distributed high speed network of motors, sensors and other I/O devices. The vision is for a PC-controlled and networked enabled direct control manufacturing environment enabling multiple machine tools to be run by one operator, through a network, rather than individual operators, delivering dramatic cost savings.

TECHNOLOGY

The DMAC technology is based on an open architecture controller and supporting control algorithms for general control of mechanisms such as 5-axis machine tools. The primary focus in the Center is software development, including object oriented libraries that integrate motion planning, trajectory generation, servo-control, communication and user interfaces, with some supporting hardware. Hardware includes dual CPU control processors, machine tool enabled Coordinate Measurement wireless hardware, and Ethernet enabled sensor boards and motor control boards. The advantage of this new distributed approach to control is reduced control hardware, control of distributed rather than collected devices, reduced control costs, and greater control flexibility through modern control methods that cannot be enabled under the restrictions of modern controllers.

ACCOMPLISHMENTS

Technical progress has continued across numerous fronts, with significant progress on new algorithms to improve direct machining performance. Direct Controls, Inc., a spin-off company in Orem, Utah, has released the first direct controlled machining robot. In addition, in ongoing commercialization work, the Center is tacking the issue of how to deliver its disruptive technology into industry and is receiving strong support from key industry players.

Recent product released by Direct Controls, Inc. is the first direct controlled machining robot

THINK TANK

What if there was...

A way to dramatically reduce the cost of manufacturing by putting control of an entire manufacturing process in the hands of one or two skilled operators, and a direct machining technology infrastructure?

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Global Knowledge Management

U N I V E R S I T Y O F U T A H

CENTER

Since its inception in mid- 2003, the Global Knowledge Management Center (GKMC) has been defining, creating, and offering technologies, products and services based on data mining and optimization methods that enhance and sustain return on investment in data. The Center has selected web optimization as the initial application domain of its technologies, before expanding the scope to include homeland security, bio-medical, financial and marketing applications.

TECHNOLOGY

GKMC has focused on the following process for selecting and creating our technologies/products/services:

- Developing or applying data mining algorithms that discover patterns or relationships useful for better understanding problems, performance evaluations and solutions automation.
- Defining and evaluating meaningful metrics to better assess or predict the states of the world pertaining to important problems. Such metrics typically are dependent on the discovered patterns.
- Developing automated algorithms that optimize or enhance the states in a problem domain.

ACCOMPLISHMENTS

One major accomplishment of the Center this year has been to develop automated solution algorithms to provide web site operators with automated suggestions of ways to improve their site's performance. During this year the center Completed a pre-beta version of the Aculink software system that provides link recommendations and link performance metrics using the Link Selector algorithm and developed and tested a variety of new algorithms to improve the value of the system.

In addition, the Center developed and evaluated web-based and email-based investment recommendation sharing workflow for potential value to financial knowledge management and decision support. This technology could evolve into investment recommendation and knowledge management portal for the large Internet community.

THINK TANK

What if there was...

A way for companies who depend on the web to optimize their website to maximize customer satisfaction as well as web-based transactions?

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High-Speed Information Processing

UTAH STATE UNIVERSITY

CENTER

The Center for High-Speed Information Processing (CHIP) bridges the gap between university research and industrial applications in the field of advanced algorithms for a variety of signal processing applications. Companies often need to see a proof-of-concept before licensing a signal processing algorithm. CHIP builds demonstrable prototype systems in a variety of different industrial applications, including a range of voice applications.

TECHNOLOGY

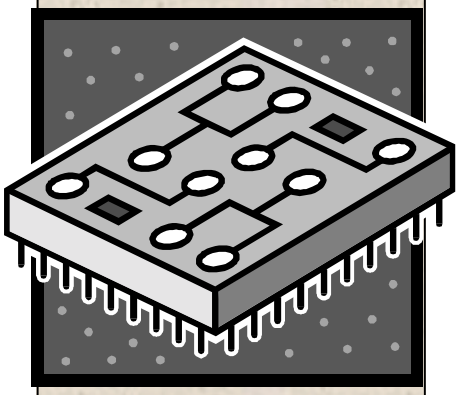
In addition to existing signal processing technologies developed by the Center, this year CHIP has developed or improved a variety of new algorithms such as a convolutional decoder, Viterbi algorithm, various rates and codes (software/hardware) as well as an LDPC decoder, various rates and codes, and DVBS2 software and hardware. These technologies all improve the area of digital sound and digital voice, with a particular emphasis on reducing echoes and feedback. Commercial applications include hearing aids and speakerphones.

ACCOMPLISHMENTS

CHIP has spent the current year working to transfer its technology and experience into the commercial market, with particular emphasis on its partnership with SP Communications, Inc., an advanced speakerphone licensing partner of the Center. Overall CHIP is working to deliver faster, more powerful signal processing algorithms on smaller integrated circuit chips and their work is being well received in all areas of this field as it helps to reduce size, complexity and power usage for new devices.

THINK TANK

What if there was...



A way for audio devices to be smaller, lighter and use less power because of advanced information processing algorithms?

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Homogeneous DNA Analysis

U N I V E R S I T Y O F U T A H

CENTER

This Center, in its second year, continued their innovative work to commercialize rapid "hands-off" DNA testing. In the past year the Center has demonstrated the feasibility of "repeat typing" (for genetics and identity testing), "sequencing", and transplant compatibility testing using their rapid, low cost methods. A new development is gene dosage assessment, such as a simple test for trisomy 21 that may replace more complicated cytogenetic analysis. These innovations have application in cancer testing, the diagnosis of inherited diseases, and rapid bioterrorism detection.

TECHNOLOGY

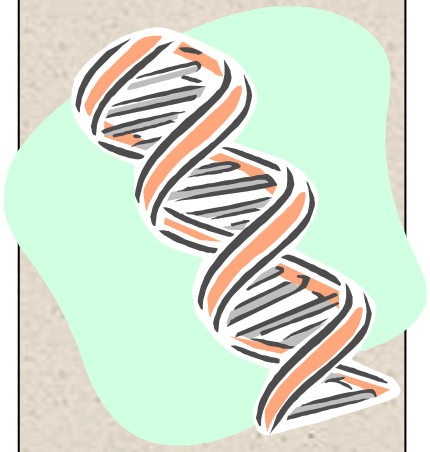
The central innovation of this Center involves High Resolution DNA melting analysis which is performed in solution, as in a test tube, in only 1-2 min without requiring any processing. This technique uses high-resolution, fluorescent melting analysis which means that a fluorescent dye, added before amplification via polymerase chain reaction (PCR), allows the melting transition of the PCR product to be continuously monitored. Ongoing work within the Center aims to apply it to new problems. Major new techniques this year include unlabeled probe genotyping, simultaneous mutation scanning and genotyping allele fraction assessment (more sensitive than sequencing), and "micro-melting" (scaling down 1000-fold to 10 nl samples).

ACCOMPLISHMENTS

This year the feasibility of sequencing and repeat typing by melting was demonstrated, a blind clinical trial of transplant matching completed, and software tools for assay design and analysis have been developed. The Center's main licensee, Idaho Technologies, Inc. has launched two DNA melting instrument platforms based on the technologies, with both having very good early sales results. In addition, two Phase II STTRs are funded that directly result from Center technology at a value of $1.7M in research funds. The estimated total value of the benefit received to the State so far is just under $3M.

THINK TANK

What if there was a way to...



Know "on the spot" if a potential transplant organ was a genetic match, which dramatically reduces the risk of organ rejection.

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Miniature Unmanned Air Vehicles

BRIGHAM YOUNG UNIVERSITY

CENTER

The main focus of the Center is the development of technologies to extend the capabilities of autonomous miniature air vehicles (AMAVs, also referred to as UAV's) and to license those technologies which are commercially viable. An AMAV may only be a couple of feet across and, with such a small size, AMAVs permit remote surveillance, information gathering and other functions that are either too expensive or dangerous with current technologies. The vision of the Center is to enable "anyone" to fly an AMAV, without complex skills, and to extend the abilities integrated into the AMAV to a wide variety of commercial applications.

TECHNOLOGY

The Center is advancing a variety of technologies crucial to this vision of the turnkey AMAV.

- Inexpensive turnkey AMAV – a fully integrated system
- Easy-to-use, intuitive user interfaces for non-pilot AMAV operation (including PDA based control)
- Pan and tilt camera gimbal system for AMAVs
- "Eye-on-Target" video surveillance, monitoring, and targeting with AMAVs
- AMAV with integrated synthetic aperture radar (SAR)
- Video image stabilization

ACCOMPLISHMENTS

Procerus Technologies of Vinyard, Utah is a major licensee of the Center and is in the second year of commercial shipments of UAV systems and components. The Center continues development of innovative new technologies of interest both to Procerus and to potential partners in other vertical markets. In addition, the Center continues to receive strong support from Federal, military and other funding sources.

THINK TANK

What if there was...

A way to fly a miniature plane over a chemical leak or forest fire in order to evaluate the damage or range of the disaster, and to do it using a handheld PDA as the control system?

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Nanosize Inorganic Material Powders

UNIVERSITY OF UTAH

CENTER

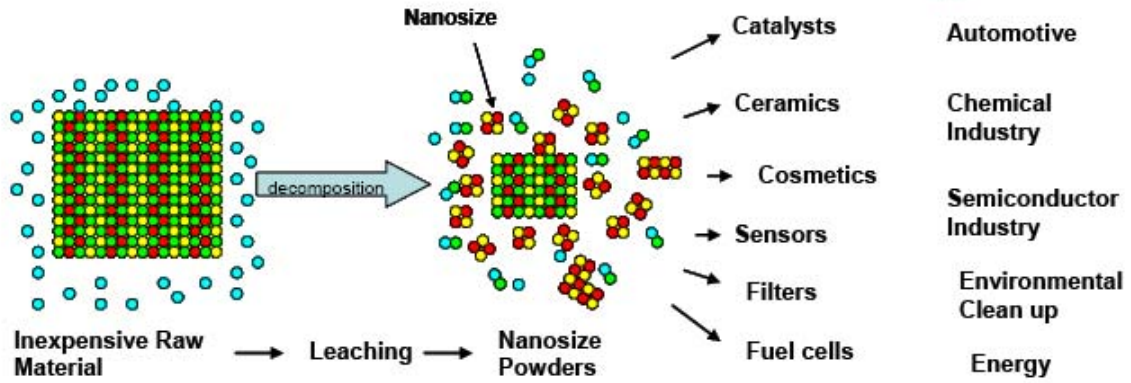
The main focus of this new Center has been to synthesize nanosize oxide powders by a low-cost, commercially scalable process using low-cost precursors. These powders find applications in numerous technologies. During the past year, one patent application was filed and one patent was issued. During the year, the use of nanosize powders in sensors and as a material for fuel cells, an energy conversion device which converts chemical energy of fuels directly into electricity was explored.

THINK TANK

What if there was...

A way that inexpensive raw materials could be easily converted into nanosize powders to enable a wide array of com-

TECHNOLOGY



ACCOMPLISHMENTS

This year the Center Synthesized nanosize powders of ZrO2, CeO2, TiO2, BaTiO3, and SrTiO3, initiated a number of contacts with potential commercial partners and began planning for one or more business ventures for the commercialization of nanosize powders for ceramic manufacture and catalysts and for the fabrication and commercialization of sensors and filters.

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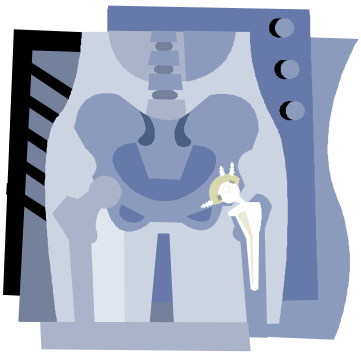
Novel TiB Surface Hardening

U N I V E R S I T Y O F U T A H

CENTER

Now in its second year, this Center is commercializing a variety of materials that use boron to harden and otherwise improve the performance of titanium under applications with a lot of wear. The unique advantages of the TiB surface hardening technology include a stable surface layer, hardness and wear resistance coupled with electrical conductivity ideal for applications such as biomedical implants (i.e. hip/knee replacements), bearings and cutting tools. The nanostructured bulk titanium boride and the functionally graded titanium boride are novel material technologies for innovative applications such as armor, gun barrels and die inserts.



TECHNOLOGY

The Center technology involves the (i) incorporation of titanium monoboride (TiB) crystals to harden the surfaces of titanium, (ii) creation of nanostructured titanium boride bulk material and (iii) functionally graded titanium boride materials for high performance components and devices. These materials also have significant advantages over existing materials in the market in terms of manufacturability and low cost. Applications include titanium biomedical devices, bearings for aerospace, industrial and sports applications, armor and gun barrel applications.

ACCOMPLISHMENTS

A key accomplishment in 2004-05 is the creation of a new type of titanium boride material, nanostructured Titanium Boride Systems and the associated patent filing. The nanostructured titanium boride material is a novel, very high strength material that has higher reliability and lower cost of manufacturing compared to most conventional ceramics. Possible applications include armor and dies and inserts. Utah-based Ortho Development Corporation, continues to be a major supporter and beneficiary of the Center's work, targeting the development and FDA validation of orthopedic implants using the TiB coating – offering for the first time the potential for implants that last a lifetime, even with young recipients. In addition, the Center is pursuing commercial partnerships in the other fields of use, with very exciting potential partnerships developing.

THINK TANK

What if there was...

A way to make lightweight titanium boride body armor to protect police, troops and security forces? What if the same material could double the life of a hip, knee or spine replacement joint?

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Petroleum Research

U N I V E R S I T Y O F U T A H

CENTER

The Petroleum Research Center (PERC) at the University of Utah conducts research and development studies leading to practical, cost-effective solutions to petroleum production, handling and transportation, especially for waxy and asphaltenic crude oils. In the current year, the development of a three-dimensional, three-phase fractured reservoir simulator with commercial potential was completed. This is the Center's final year in the program.

TECHNOLOGY

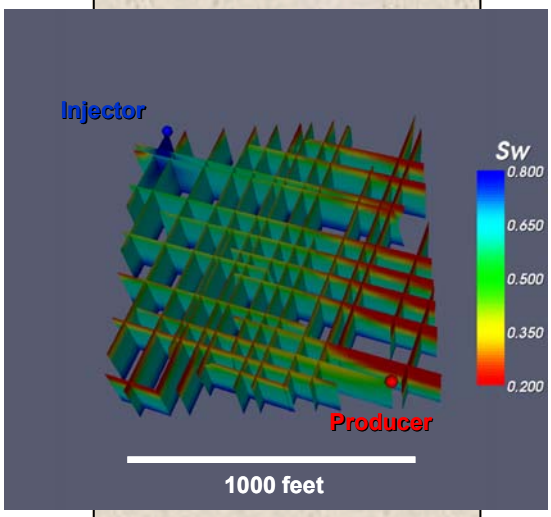
- PERC has developed a new Near-IR/ Chemometrics method for crude oil properties prediction; good correlations were demonstrated for several properties. Commercial progress is underway to make suitable online instruments for field implementation.
- A series of comparison tests between oils and oil simulants were developed and catalogued which demonstrated the effectiveness of simulants as crude oil substitutes. The results were widely disseminated and results and samples were shipped to the U.S. EPA laboratories. Patent applications for the two simulant formulations were filed.
- A three-dimensional, three-phase reservoir simulator that models fractured reservoirs was completed.

ACCOMPLISHMENTS

Two patents for this Center were filed as well as an additional significant copyrighted work. The primary license agreements of this Center are with LT Industries, Inc., Gaithersberg, MD, Exxon Mobil, Fairfax, VA, Golder, Inc., Redmond, Washington.

THINK TANK

What if ...



Seamless integration of the simulation tool with a commercial fracture generation software system.

(Reservoir simulation results for a basement reservoir generated using the grid created by the fracture generation software, FRED from Golder.)

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Profitable Uses of Agricultural Byproducts

U T A H S T A T E U N I V E R S I T Y

CENTER

The Center for Profitable Uses of Agricultural Byproducts (CPUAB) located at Utah State University was established in 2000 to strengthen the rural economy by working closely with agricultural related businesses to transfer technologies that they need and want. In particular the Center works to transform agricultural waste products into useful items such as energy. This was the Center's final year in the program.

TECHNOLOGY

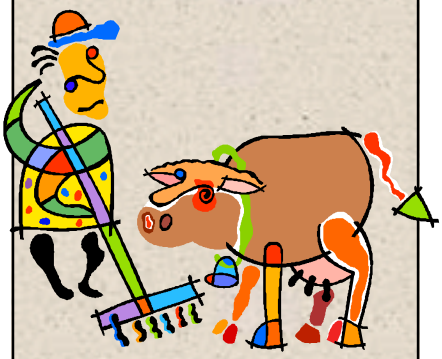
The main technology developed thus far at the Center is the induced blanket reactor (IBR) anaerobic digester. Electricity can be made from manure using the IBR. The manure produced by a typical 1000 cow dairy or 6000 pigs can produce enough electricity for 100 homes. Even more importantly, the major advantage of using the reactor is ease of manure handling and pollution control, including odor remission. Large farms are under increasing restrictions to use advanced waste treatment which includes managing nutrients, controlling odor and further minimizing the pollution potential of water and soil.

ACCOMPLISHMENTS

Andigen is a company that was started to market the technology developed at CPUAB, which includes two issued patents. Andigen has deployed four large IBR systems in Utah and Idaho with two more presently being built in Montana and California. Additional systems are planned for Southeastern Idaho, Ontario, Canada, and Southern California with a number of other locations in the negotiating stage. The company has a strong potential of being the largest supplier of farm scale anaerobic digesters in the US in the near future.

THINK TANK

What if there was...



A system that could improve the odor control and waste management of large farming operations that could pay for itself and even generate a profit?

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Representation of Multi-Dimensional Information (CROMDI)

U N I V E R S I T Y O F U T A H

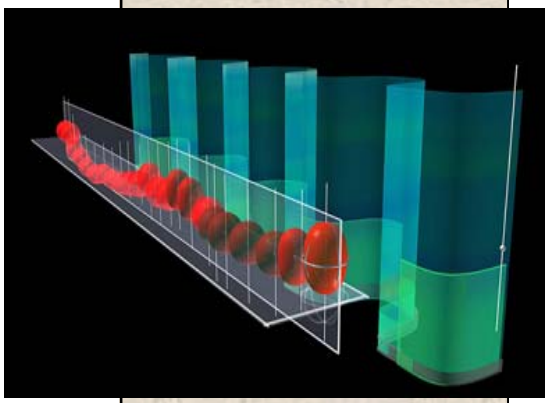
CENTER

CROMDI was established in 2000 and has completed its final year as a Center, delivering technologies that facilitate the rapid and accurate analysis of large quantities of complex and quickly changing data. A crucial capability is the ability to correlate many seemingly unrelated inputs to identify a developing problem before it is a disaster. Areas of opportunity include process control, vehicle operation and traffic control, corporate management, quality assurance, medical visualization and network monitoring. Current successes include medical visualization, computer network security, homeland security and infrastructure security.

TECHNOLOGY

CROMDI's work is being commercialized in two key areas, the medical visualization and the security visualization industries. In the security industry, the VisAlert product is a visual data analysis tool that aids in the detection, diagnosis and remedy of computer security events across multiple logs. The visual paradigm correlates all information through the use of a plug-in architecture (new alert types and sensors can easily be integrated) and with the "W^4" paradigm, the *what*, *where*, *when* , and *who* of a network alert.

Before Vs After



ACCOMPLISHMENTS

With two issued and many pending patents and disclosures, CROMDI has launched two spinout companies, Medvis (medvis.com), a 5 person company in the medical visualization industry, and Intellivis (intellivis.com) a new startup in the security visualization industry. CROMDI has received over $5million in other contracts and grants and is being well received in the intelligence , military, and ISP communities.

THINK TANK

What if there was...

A way to help identify clusters of food born illness as they develop instead of after the fact? What if the same technology could help Railroads easily see when problems (or rail cars) begin piling up anywhere in the country?

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Smart Sensors

UNIVERSITY OF UTAH

CENTER

This Center focuses on the creation of Smart Sensors, devices that combine sensor, signal processing, and computer solutions. These smart sensors probe the environment and then adapt their capabilities accordingly. This new generation of devices has applicability in medicine, agriculture, electronics manufacturing, wireless communication, transportation and radar. This is the Center's final year of support in the program.

TECHNOLOGY

The Center includes two core technology areas. The first core technology area is similar to a "mini-radar" system that measures length, distance, or impedance in a cable or circuit environment.. These are cheap and simple. A successfully demonstrated application is for a "Smart Wire" in situ inspection system for aging aircraft wiring. Additional methods developed/developing in the Center include a tiny and inexpensive ($2) timer circuit, capacitance sensors, an SWR meter, a direct sequence spread spectrum system, and correlation sensors based on communication theory.

The second core technology is the Imbedded Microstrip Antenna. The basic antenna design (a spiral or serpentine printed on a circuit board) can be adapted for either communication with buried objects (like cardiac pacemakers) or can be used for sensing (such as moisture of grain) and this year a combined design that can both sense and communicate was completed. The Center has developed a potential design for moisture measurement of soil for agriculture and water management, has identified Utah-based partners, and is actively pursuing a joint development project with a potential licensee.

ACCOMPLISHMENTS

A small Utah company, LiveWire Test Labs, Inc. has been established to act as the development partner for aircraft wiring test products and it has already received a number of Federal SBIR grants. Additional corporate partnerships are being developed with firms such as The Boeing Company, Texas Instruments, ATK (Brigham City) and Hamilton-Substrand (IL) as well as many others.

THINK TANK

What if there was...

An easy, low cost way to monitor moisture content throughout an agricultural field and adjust irrigation accordingly?

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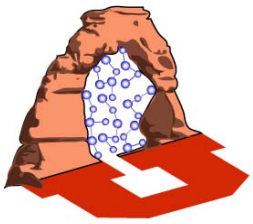
Therapeutic Biomaterials

U N I V E R S I T Y O F U T A H

Center

The Center for Therapeutic Biomaterials (CTB) prepares and uses new biomaterials for reparative medicine for the 3-D culture of human cells. The Center Develops applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs as well as permitting evaluation of cell response to various compounds. The compounds also have application in a variety of non-medical applications, such as cosmetics.



Center for Therapeutic Biomaterials

TECHNOLOGY

In year one, the CTB made substantial progress in engineering its core technology -- the synthetic extracellular matrix (sECM) -- in order to produce materials specific for each of the product areas above. The CTB achieved all of its technological specific aims. By developing materials for healing of acute and chronic wounds, bone and cartilage repair, sinus surgery, repair of ruptured eardrums, soft tissue reconstruction, engineering of functional liver tissue in vivo, revascularization of damaged myocardial tissues, and prevention of post-surgical adhesions.

Moreover, the Center established protocols for growth of primary rat liver cells in the 3-D sECM for drug testing in vitro, for obtaining and culturing primary human adipose-derived stem cells and human cancer cells in mouse xenograft models.

ACCOMPLISHMENTS

The Center's new chemical (HA) derivative (Carbylan^{TM}), received the 2005 Stoel Rives Innovation Award in Chemistry. Sentrx Surgical, Inc. was launched during the first year with an option to license from CTB, although licensing was not complete before the end of the reporting year. In addition, the CTB's spin-out company, Sentrx Surgical received three NIH STTR awards in the first year, totaling $300,000 in total contracts. In 2004-05, the Director of CTB, Dr. Prestwich, delivered more than 15 invited academic talks and another 15 investor and corporate talks world-wide to promote the CTB's mission and foster commercialization of the technology. Another Utah firm, U.S. Tissue & Cell has an option to license to the skin life preservation technology.

THINK TANK

What if there was...

A way grow cells in culture that allowed them to behave like cells inside the body? And those cells could now detect drug toxicity or mimic human response to compounds?

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Program Description

PROGRAM DESCRIPTION

BACKGROUND

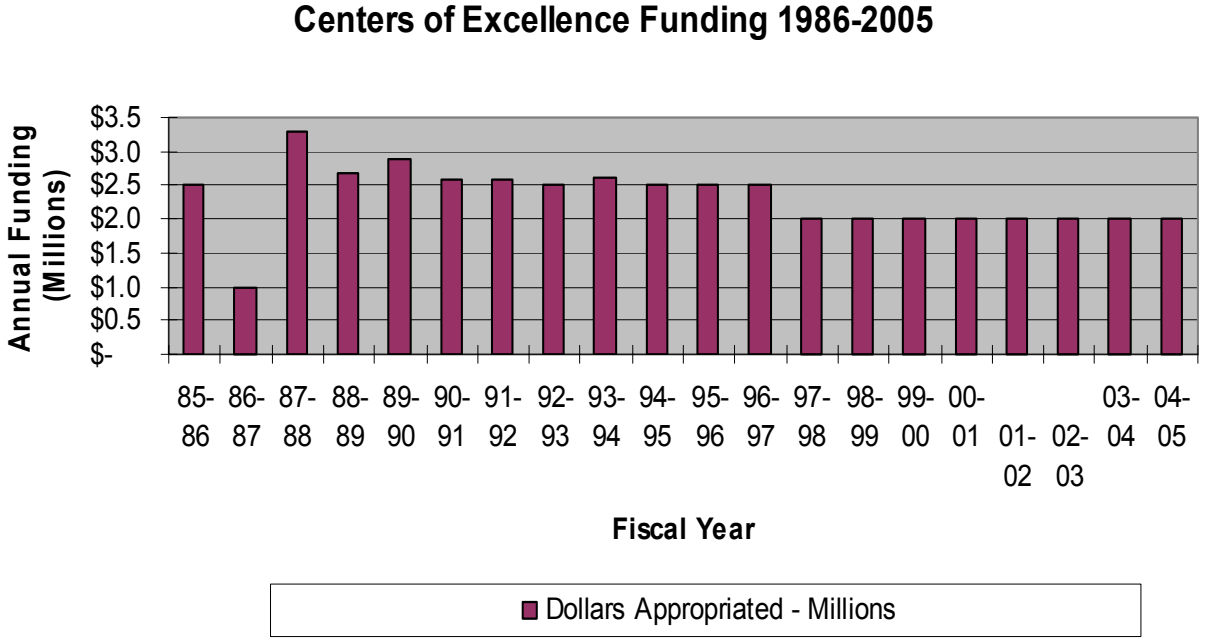
Recognizing that both the growth of new industry and the expansion of existing industry in the next century would require both a strong technology base and a steady supply of new ideas, concepts, innovations, and prototypes, the Utah State Legislature created the Centers of Excellence Program (COEP) in 1986. The Legislature has recommended the allocation of economic development funds annually to the COEP, generally to be awarded to college and university faculty on a competitive basis. The objectives of the COEP are to support the technical maturation of technologies that are considered to have potential for economic development in the state, and to assist in the actual commercialization of those technologies.

This research and technology commercialization process ultimately results in job creation through the creation of new companies and the enhancement of business opportunities for existing companies. In addition, the value of technologies created is reflected in the number of patents issued and the associated royalty-bearing licenses that are signed. The revenues received from licensing and from equity stakes in licensees of COE-supported technologies accrue directly to the licensing university, an attractive benefit of the COE program.

The State does not take or hold an equity position in the licenses. The return on investment to the state comes solely from the success of helping to convert university developed technologies into job and wealth creating products and services in successful businesses.

Ongoing funding of the program has varied during the years. The program started well funded at $2.5 million and maintained approximately that level until 1996-97. However, since the 1996-97 fiscal year the program has been funded at the level of $2 million, a level that has not grown, nor, unfortunately, has it kept pace with inflation.

On the next page, the chart shows the history of funding for the Centers of Excellence program, up to and including the 2004-05 Fiscal Year. Starting with 1985-86 funding level of $2.5 Million, adjusted for inflation (see bls.gov/cpi), the Centers of Excellence program would have been funded with approximately $4.45 Million in 2004-05.



It is to be hoped that positive momentum developing during the beginning of the 05-06 fiscal year can be continued. If funding for the Centers of Excellence program had kept pace with inflation since its inception in 1985-86 fiscal year, the funding level for 2005-06 would be roughly $4.52 million.

Ongoing work with the Legislature to highlight successes of the program and its strong record of creating high paying jobs is expected to help strengthen its funding position over the coming years.

An important way to look at the Centers of Excellence program is to compare the investment made throughout the program's history with the number of jobs created in Utah. It is very difficult to track the jobs that have derived from over 100 Centers of Excellence over nearly 20 years.

In order to begin to quantify this job creation, in 2003 the Centers of Excellence program conducted a survey to attempt to quantify jobs resulting from the program with a particular emphasis on spinouts from the various Centers. This survey focused on companies linked to about 45 Centers and showed an actual count of 2008 jobs stemming from spinouts and licensees of Centers of Excellence.

Over the same period (through the end of the 2002-2003 fiscal year), the Centers program had invested $42.14 million in the program for a net cost of $20,987 per job created.

A modest extrapolation from the roughly 45 Centers surveyed to the full 101 Centers at the time, would yield an investment closer to the range of $10,000/position created. This is similar to the range of job incentives provided when the state recruits a new company to our State. Updated statistics are expected to be compiled over the coming few years.

OPERATIONS AND OBJECTIVES

The goal of the Centers of Excellence program, particularly under the Huntsman administration, is clearly to help grow the economy of the state of Utah. As the new Director has said to every Center team and their business team colleagues, "our job is jobs." In order to help foster job growth, the COE program emphasizes licensing of Centers-supported technology to either existing Utah business to help them develop innovative new products and services, or the startup of a new company (often called a spinout), specifically to take a new technology to market. The program continues to mentor Centers who have graduated, where possible, to help foster success, introduce them to sources of funding and identify management and other talent that might be of help to the Center.

Under the statute governing the 2004-05 funding year, Centers are required to have 2:1 matching funds. These funds are reported and reviewed on a regular basis. A key element of the program is the emphasis during the renewal and selection process of achievement of milestones and commitment to commercialization.

Center directors are required to submit annual reports to the COEP director. This Centers of Excellence Program Annual Report, begins with a summary of the reports prepared by each Center Director and is supplemented, as appropriate, by information gathered from site visits, meetings and other sources.

During this fiscal year, each Center was assisted by consultants who were selected and paid through a block grant from the COE program, by the technology transfer offices of the appropriate university, from a slate of approved consultants. These block grants estimated an average of 80 hours per year per Center of consulting time.

Consultants were assigned to assist the Center directors in defining and evaluating potential markets, helping to make industry connections and contacts and otherwise supporting the transition from university technology to market product. Admittedly, at such a modest funding level, consultants were not able to invest as much time as wisdom would dictate would be required to accelerate these technologies to success. However, even this level of funding is considered unique in the national environment of similar programs.

Ending with the 2004-05 Fiscal year, Centers had been funded up to a maximum of five years. Some Centers have emerged as ongoing Centers with national stature, some have terminated with the fruits of their work expressed in such companies as Myriad Genetics, Inc., Sonic Innovations, Inc., Theratech - Acquired by Watson Pharmaceuticals (WPI), and Echelon Biosciences Inc. - An Aeterna Zentaris Company (AEZS).

Beginning with the 2005-06 Fiscal year, the Centers of Excellence program targets funding up to a maximum of 4 years, at higher annual funding levels, with the goal of accelerating the commercialization of the technology. Some Centers entered the program with a target of only 2 years to successful commercialization, based on the needs of that Center.

CENTER SELECTION PROCESS

In late December, the COE program issues an RFP, advertised to the universities, their Technology Commercialization Offices (TCOs) and existing PI's and other industry contacts, as well as on the COE website. In response to this RFP, prospective Center Directors as well as existing Center Directors prepare a proposal for either a new Center or for renewal of funding. The review process is a very demanding element of the Centers of Excellence program, but also demonstrates the strong support the program has among industry and the overall Utah community. Between 20 and 30 individuals with strong technology business backgrounds, all of them at the Director or VP level and above, volunteer to serve on the Centers of Excellence Advisory Council as Reviewers for the program. At least two reviewers, along with the Director and other GOED team members as appropriate, review the written proposal and then conduct a site visit and review. This meeting, usually several hours long, permits the Reviewers to hear directly from the Principal Investigators and their colleagues about the technology and business opportunity.

After all proposed centers have received a site visit and evaluation, the Reviewers gather for a one and a half day retreat of the full Council and discuss each of the proposals and recommend each proposal for funding, or not.

The State Advisory Council for Science and Technology (SAC) has advisory responsibility for the Centers of Excellence Program by statute. SAC members participate on the Centers Advisory Council, reviewing proposals and conducting site visits. This provides SAC members with in-depth knowledge of the program, Center specific information and a strong technical and industrial perspective for making funding recommendations. The SAC also reviews the Centers of Excellence Annual Report before its delivery to the Legislature and its being made available to the public.

In addition, the DBED Board (Department of Business and Economic Development Board) also provides members who participate in the COE review process. These members also are able to represent to the DBED board that the selection process has been fair and has been conducted in a way to help advance economic development in the state of Utah. For the 2004-05 funding year, the DBED Board had final approval, as a policy board, of the budget and budget allocation for the Centers of Excellence Program. The proposed Centers and their budgets were reviewed by the DBED Board and then a vote of approval was given.

COMMERCIALIZATION PROCESS

For a number of years, the Centers of Excellence Program has funded a consulting program to assist Center Directors in preparing and implementing commercialization strategies. Because of budget limitations, approximately 80 hours per year of consulting assistance was available to each Center. These funds were administered by each university's Technology Commercialization Office, which received a block grant of funds for all of their Centers. These funds were to be expended on "COE approved" consultants, of which there was a pool of approximately 20. These individuals ranged from general business consultants to some market specific consultants.

In general, the consultants were able to focus on a high level overview of a business plan or market survey and competitive analysis for the Center. Whenever possible, additional resources were brought in by the consultants, Center Director or TCO to further push the commercialization forward.

For the 2005-06 fiscal year, the consulting program has undergone a complete overhaul to result in the COE Business Team program. Under the Business Team program, seasoned technology executives, serial entrepreneurs and market experts are recruited through a statewide RFP to meet the specific needs of each Center. In addition, the funding level was increased to pay for approximately 250 hours of assistance per year for each Center, significantly increasing the ability of the Business Team members to help move the technologies out of the university and into industry.

A major objective of the Centers of Excellence program under the Huntsman Administration is to significantly increase the interaction between members of industry and university talent in order to facilitate the exchange of technologies and opportunities. Strong economies around the world are built around the movement of technologies from research institutions into industry, and the subsequent flow of funds and talent back to the institutions. It is the goal of the COE Director that the Centers of Excellence Program can help increase this virtuous cycle in Utah and further strengthen our high tech economy.

2004-2005 Financial Summary

The Financial Summary is a summary of the information provided by each Center in their annual report to the program and the funding summary is based on the funds granted during the fiscal year. For reference, "Total Funding" means COE funding since starting with the program, "Patents Pend. 04-05" means patents newly filed during the fiscal year, "New Patents (Issued)" refers to those issued during the fiscal year and "Spin-Offs/ Licensees" refers to companies which have been formed to "spin-off" technology from the Center while "Licensees" refers to companies which already existed which have licensed the technology.

University	Center	04-05 Funding	Total Funding	04-05 Matching	Patents Pend. 04-05	New Patents (Issued)	Spin-Offs/ Licensees
BYU	Advanced Communications Technology	110,000	110,000	766,203	3	0	0
USU	Advanced Imaging LADAR	134,900	269,900	297,190.25	1	0	2
USU	Advanced Satellite Manufacturing	25,000	25,000	50,960.09	0	0	0
UU	Advanced Strategies for Parasite Removal	135,000	135,000	270,000	1	0	0
UU	Biomedical Microfuludics	120,000	120,000	514,720	2	0	1
BYU	Compliant Mechanisms	56,000	546,000	302,500	0	2	Multiple licensees
UU	CROMDI	150,000	677,000	747,165	1	0	3
BYU	Direct Machining & Control	75,000	317,000	150,000	1	0	1
UU	Global Knowledge Mgmt.	120,000	233,000	318,557	0	0	0
USU	High-Speed Information Processing	149,500	409,500	488,250	0	0	3
UU	Homogeneous DNA Analysis	144,000	294,000	504,000	1	0	1
BYU	Miniature Unmanned Air Vehicles	110,000	110,000	808,643	0	0	1
UU	Nanosize Inorganic Material Powders	90,000	90,000	700,000	1	1	0
UU	Novel TiB Surface Hardening	85,000	157,000	200,000	1	0	1
UU	Petroleum Research	80,000	511,000	300,000	2	0	3
USU	Profitable Ag Byproducts	60,000	485,000	156,000	0	2	1
UU	Smart Sensors	112,500	557,500	486,000	1	1	1
UU	Therapeutic Biomaterials	130,000	130,000	$1,254,968	0	0	2

2005-2006 Funded Centers

Utah Centers of Excellence Program

Description of Centers Selected for Funding in Fiscal 2005-2006

Center (University)

Acoustics Research (BYU)
Commercializing active sound control technology with superior ability to both reduce noise in varied settings (vehicle cabins, computer fans and telecommunications, e.g.) and modify sounds for commercial benefit.

Advanced Communications Technology (BYU)
Improved wireless communications and data transmission for both military and commercial markets is achieved through the use of MIMO (multiple-input multiple-output) technology with multiple antenna elements.

Advanced Imaging LADAR (USU)
Commercializing land-based and airborne high-resolution, laser-based 3D color-imaging platforms for both military and civilian use. One license to RapidMapper, Inc., a Utah company.

Advanced Satellite Manufacturing (USU)
Leveraging the capabilities of Utah's Space Dynamics Laboratory to develop and commercialize a low cost, modular small satellite platform for commercial, research, and military missions.

Alternate Strategies of Parasite Removal (U/U)
Preparing to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers.

Biomedical Microfluidics (U/U)
Engineering technology that controls the movement of fluids in channels smaller than a human hair; micro-pumps that can deliver tiny quantities of drugs and improved devices for DNA screening are some product examples. Wasatch Microfluidics, Inc., is being spun out.

Computational Design & Testing of Novel Materials (U/U)
Commercializing powerful computational packages capable of designing novel materials and predicting the electrical, mechanical and structural characteristics of electromechanical devices, especially nanostructured materials and components.

Global Knowledge Management (U/U)
Developing Knowledge Fusion and Dynamic Knowledge Refreshing software to enable next-generation data mining technology. A new startup company, Aculus, Inc., is being launched to market commercial implementations of some programs.

High-Speed Information Processing (USU)
Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices. An echo cancellation application enabled the creation of SP Communications, Inc. to make improved speaker phones in Logan, Utah.

Homogeneous DNA Analysis (U/U)
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office. One application licensed to Idaho Technologies, Inc. (a Utah company).

Interactive Ray-Tracing & Photo-Realistic Visualization (U/U)
Producing a commercial form of two programs that can process 3-D graphics based on large data sets found in CAD, film animation and scientific models, which existing GPUs cannot handle.

Magnetic Sensor & Actuator Materials (U/U)
Working to commercialize a novel magnetorestrictive alloy exhibiting a large physical effect in response to small magnetic fields, which may find use in applications from antilock brakes to nanomachining and ultrasonic devices.

Microarray Technology (U/U)
Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Miniature Unmanned Air Vehicles (BYU)
Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies. An autopilot design has been licensed to Procerus, Inc. in Utah.

Modified Activated Carbons Technology (U/U)
Developing improved products for gas and water treatment, as well as metal recovery or removal, based on modifications to granular activated carbon.

Nanosize Inorganic Material Powders (U/U)
Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

Therapeutic Biomaterials (U/U)
Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs. One Utah company, Sentryx Surgical, Inc., has already been spun out of the Center.

Titanium Boride Surface Hardening (U/U)
Commercializing harder, longer-lived components and devices – ranging from armor to bearings and orthopedic implants - for the military, biomedical and industrial markets.

Pre-Center Candidates (Assigned a Business Team)

Acoustic Cooling Technology (U/U)
Developing novel miniature acoustic power conversion devices without moving parts for energy recovery from waste heat.

Control of Flow in Manufacturing (USU)
Applying Computational Fluid Dynamics to improve manufacturing processes including particle sorting and Electrical Discharge Machining (EDM).

Direct Machining And Control (BYU)
Developing programming that allows a manufacturer to automatically optimize part production by adjusting for the actual specifications and tolerances of each item.

Legislation Governing 2004-05

Part 6
Centers of Excellence

9-2-601. Purpose.

9-2-602. Short title - Definitions.

9-2-603. Administration - Grants.

9-2-601. Purpose.
(1) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. These generally come from strong research colleges and universities. Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development. Most states are enhancing their research base by direct funding, usually on a matching basis. The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas. The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.
(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis.
(3) The Legislature recommends that such funds be allocated on a competitive basis to the various colleges and universities in the state. The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.
History: C. 1953, 63-62-1, enacted by L. 1985, ch. 103, § 1; 1986, ch. 109, § 1; renumbered by L. 1992, ch. 241, § 60.

9-2-602. Short title - Definitions.
(1) This part is known as the "Centers of Excellence Act."
(2) As used in this part, "Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.
History: C. 1953, 63-62-2, enacted by L. 1985, ch. 103, § 2; 1986, ch. 109, § 2; renumbered by L. 1992, ch. 241, § 61.

9-2-603. Administration - Grants.
(1) This part shall be administered by the Division of Business and Economic Development.
(2) The department may award grants to the various colleges and universities in the state for the purposes of this part.
(3) Recommendations for funding shall be made by the division with the advice of the State Advisory Council for Science and Technology, with the approval of the board. Each proposal shall receive the best available outside review.
(4) In considering each proposal, the division shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development. Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.
(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the division in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.
History: C. 1953, 63-62-3, enacted by L. 1986, ch. 109, § 3; renumbered by L. 1992, ch. 241, § 62.
Repeals and Reenactments. - Laws 1986, ch. 109, § 3 repealed former § 63-62-3, as enacted by L. 1953, ch. 103, § 3, relating to creation of a committee for technology excellence in engineering research, and enacted the above section.
[92603].
6338f704.

Governor's Office of
Economic Development

Centers of Excellence

Jon M. Huntsman, Jr.
Governor through Aug. 10, 2009

Gary R. Herbert
Governor from Aug. 11, 2009

ANNUAL REPORT

Jason Perry ◆◆ EXECUTIVE DIRECTOR through Sept 2009
Governor's Office of Economic Development

Spencer P. Eccles ◆◆ EXECUTIVE DIRECTOR from Sept 2009
Governor's Office of Economic Development

Gary Harter ◆◆ MANAGING DIRECTOR
Governor's Office of Economic Development

NICOLE TOOMEY DAVIS ◆◆ DIRECTOR
Centers of Excellence

Fiscal Year July 2009—June 2010

2009-2010 COE Advisory Council

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Rescue Rigger (Iterum, LLC)
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Michael D. Brehm, P. E.
Horrocks Engineers / Brehm Environmental, LLC
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William Borghetti
Sendside Networks
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Forrest Fuller, Ph. D.
Elitra Pharmaceuticals, Inc.
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George Gerpheide, Ph. D.
C2MW4, LLC.
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Wade Hull
Zars Pharma, Inc.
Salt Lake City, Utah

Tim Hunt
Entrepreneur
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Sarah Jones
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Nikos Linardakis, M.D.
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Tharos Labs
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Nick Mecham
Xbar Ventures
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Rich Nelson
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FatPipe Networks, Inc.
Salt Lake City, UT

Vern Rice
Workman Nydegger
Salt Lake City, Utah

Richard B. White
Earthfax Engineering
Salt Lake City, Utah

Hal Widlansky
Entrepreneur
Salt Lake City, Utah

2009-2010
Centers of Excellence
Annual Report

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Executive Summary

Executive Summary

Centers of Excellence (COE)

The purpose of the Centers of Excellence Program is to accelerate the commercialization of promising technologies that have strategic value for Utah. The program provides grant funding for companies which license technology developed at Utah's colleges and universities, to help accelerate the commercialization process. The process is a competitive annual selection process with grants of up to $100,000 in the first year of participation and, in a second year, up to the remainder of $500,000 total over two years of funding. The end goal of the COE Program is to help drive economic development and job creation.

During the 2007 Legislative Session the Legislature passed and the Governor signed into law changes to the COE statute that permitted ongoing support of grants to companies which are Licensees of technologies developed at Utah's colleges and universities. 2008-09 was the first year that focused the program's funding on Licensee Grants and 2009-10 continued this focus.

This COE grant funding is intended to help accelerate the process of taking these leading- edge technologies to market. Both existing companies and startups are eligible to apply for funding, as long as they have licensed a technology from a Utah college or university and the funds are used to move this technology to market. The goal of the program as part of the Governor's Office of Economic Development is to spur new products and new companies and the associated job creation.

During the 2009-10 fiscal year, the Centers of Excellence program focused exclusively on funding licensees of technologies developed at Utah's colleges or universities, no longer funding Centers within a Utah College or University. The goal of this emphasis was to help accelerate the commercialization of the target technologies and subsequently job creation.

For the 2009-10 fiscal year, the Centers of Excellence Program had a budget of $2.5 million and received proposals from 28 companies which are licensees of a technology developed at one of Utah's colleges or universities with a total of $5 million in requested funds.
Of the 28 proposals, 13 were awarded funding totaling $2.46 million.

2009-2010 Funded Licensees

Cosmas, Inc.

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

Cosmas, Inc., a Licensee of the Center for the Production of Nanometer Sized Metals, Alloys, Metal Oxides and Mixed Metal Oxide Powders. Cosmas was organized to commercialize a novel method of making an almost unlimited array of metal and metal oxide nanoparticles that was developed at the Center. Nanoparticles are being introduced into a plethora of applications which can broadly be categorized as coatings (active and protective) and surface chemically reactive. Cosmas has found its best market opportunities, local technical expertise and application of its technology in the latter, specifically in the field of high surface area chemical catalysts. It is initially focusing on two tracks within the category: 1) catalysts for clean tech applications such as producing liquid fuels (gasoline & diesel) from biomass, and 2) ceramic catalyst support materials used in exhaust gas pollution control and high temperature industrial gas phase processes.

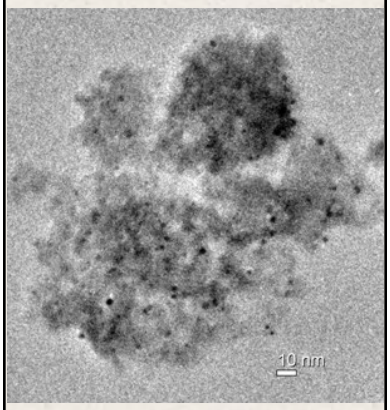
TECHNOLOGY

The Cosmas method is a very simple, cost effective and environmentally friendly method of making nanoparticles to be used in chemical catalysis. This approach enables a paradigm shift from traditional multi-step, several-day processes currently used to make many catalysts to a simple process requiring no more than a few hours. Cosmas is developing an iron/copper/potassium catalyst for Fisher-Tropsch production of liquid fuels from gases obtained from anaerobic digestion of animal and agricultural waste, or gasification of municipal waste or coal. It is also developing highly porous aluminum oxide ceramic materials which, because of the very small size of the nanoparticle starting materials, is more porous and has more surface area than ceramics produced by current methods.

PROGRESS

Cosmas is collaborating with three other Utah companies in a biogas-to-liquids coalition, and is exploring commercialization of the alumina ceramic catalyst supports with a large international company. With COE funding, Cosmas has been able to move to its own facilities. These facilities and equipment were required to develop the catalysis technology. Cosmas has also received an SBIR Phase I grant from the National Science Foundation and STTR Phase I and Phase II grants.

Imagine...



A very simple process to custom produce and easily develop catalysts of high quality nanoparticles.

Lynn Astle
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GlycoMira, LLC

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

GlycoMira, LLC, a development stage company formed in 2008, licensed from the University of Utah all rights to develop semi-synthetic glycosaminoglycan ether (SAGE) technology for treatment of anti-inflammatory diseases. GlycoMira is located at the University of Utah in laboratories in Research Park. SAGE products synthesized by GlycoMira demonstrate in animal models broad utility in blocking key inflammatory pathways and thereby show notable potential in a variety of human diseases. The company is developing SAGE technology for the treatment of dermal and ophthalmic uses, inflammation of the bladder (interstitial cystitis), gingivitis (inflammation of the gums leading to periodontitis) and cancer (metastasis of cancer cells).

TECHNOLOGY

GlycoMira's technology is a unique family of anti-inflammatory products known as semi-synthetic glycosaminoglycan ethers, or SAGEs. SAGEs are sulfated polysaccharide compounds derived from naturally occurring hyaluronic acid (HA). SAGEs modulate inflammation in three ways. First, SAGEs inhibit cationic proteases of polymorphonuclear leukocytes, quelling inflammation. Second, SAGEs block P- and L-selectin, which are required for leukocyte migration into areas of inflammation. Third, and most importantly, SAGEs block activation of the receptor for advanced glycation end-products (RAGE). RAGE acts as a biological rheostat, amplifying immune and inflammatory responses.

PROGRESS

GlycoMira has submitted and was awarded NIH grants, rented laboratory space in Research Park, hired scientific staff, initiated studies in animal models of inflammation, and began funding discussions with venture capital and angel investment groups. GlycoMira now has one issued patent and five pending applications. Specific achievements in advancing potential products include:

1. Active Pharmaceutical Ingredient (API) Production and Testing. .
2. Treatment of bladder inflammation. There are limited options for physicians treating interstitial cystitis currently.
3. Expansion of IP portfolio. GlycoMira's submitted an accelerated patent for dermatology.

To permit further development of SAGE technology, GlycoMira entered into sublicense in April 2010 with Brickell Biotech, Inc (BBI). Under the terms of the agreement BBI will develop the dermatological and ophthalmic uses of SAGE products, and will share details of manufacturing, analysis, preclinical toxicology, and human safety and efficacy data with GlycoMira, which is actively developing other uses.

Imagine...

A unique chemical process that yields drugs, that mimic the natural anti-inflammatory agent heparin, that are used in the treatment for inflammatory skin disorders.

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Heavystone Laboratory, LLC

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Heavystone Laboratory, a Licensee of the Center for Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composites, is a "technology company" founded upon breakthrough technology that dramatically improves the wear resistance of materials without sacrificing its impact resistance, and vice versa. This is achieved by using functionally graded cemented tungsten carbide. These materials have a multitude of applications in many manufacturing sectors including metal machining, mining, oil, gas, and geothermal energy explorations, and other industrial applications.

TECHNOLOGY

Cemented tungsten carbide is an indispensable material for many manufacturing sectors of our economy. Compared to conventional homogeneous cemented tungsten carbide, functionally graded cemented tungsten carbide made using Heavystone Laboratory's technology offers superior combinations of wear resistance, fracture toughness, and strength, and provides superior engineering performance. Therefore, these materials have the potential to drastically improve the durability and reliability of industrial tools that are currently made using conventional tungsten carbide materials and designed for metal machining, mining, oil, gas, and geothermal energy explorations, and other industrial applications where extreme wear resistance is required. A wide range of industries will see significant productivity improvements by employing the proposed process technology and the products developed using this process.

PROGRESS

Heavystone Laboratory has formed industrial alliances and cooperative relationships with several international leading companies in the above industries to develop tool and products with superior performance in their perspective applications. These include Corporate R&D service contracts, NSF SBIR Phase 1 and Phase 1B grants, as well as Strategic Partnerships.

Imagine...

A breakthrough technology that dramatically improves the wear resistance of materials without sacrificing its impact resistance.

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iVeena, LLC

UNIVERSITY OF UTAH

DEFINITION OF COMPANY

iVeena, LLC, is an early-stage biotechnology company with the mission of developing novel proprietary drugs and drug delivery devices for treatment of the leading ocular diseases. iVeena's core technologies are licensed from the Corneal Research Laboratory of the Moran Eye Center, under the direction of Dr. Bala Ambati. iVeena will fundamentally change the way eye diseases are treated and improve the quality of life of more than 1 million people/year in the United Sates and potentially 3 million/year worldwide by preserving their vision with its line of Capsule Delivery Ring (CDR) products. iVeena, LLC. is developing a novel ocular drugs and drug delivery devices that takes advantage of lens capsule placement. Use of the iVeena "Capsule Delivery Ring (CDR)" device will increase patient comfort, compliance, and convenience and at the same time increase drug performance with improved sustained delivery.

TECHNOLOGY

Designed as a result of Dr. Ambati realizing that the lens capsule has significant open space after a cataract removal and intraocular lens (IOL) implantation, the Capsule Delivery Device (CDR) was conceptualized and prototyped as a collaboration between the Corneal Research Laboratory and the Center for Biomedical Microfluidics both at the University of Utah. The CDR takes advantage of the extra space in the lens capsule of the eye. The CDR sits around the intraocular lens or "IOL". The long-term CDR is composed of a biocompatible material bonded to a permeable membrane which eludes the drug through the permeable membrane Current studies have used Genentech's Avastin® drug. The mid-term bioerodable CDR is designed to dissolve over a predetermined treatment period, eluting the anti-inflammatory drug dexamethasone as the ring dissolves. A number of diseases may be treated with drugs delivered via the CDR, including:

- Age-Related Macular Degeneration (AMD)
- Glaucoma
- Diabetic retinopathy
- Retinitis pigmentosa
- Chronic Infection/Anti-Allergy

PROGRESS

iVeena has seen significant progress, including conducting a pre-IND meeting with the FDA, as preparation for the initiation of a phase 1 or phase 2b human trial. iVeena has completed prototype animal testing on the first product and expects to commence GLP data collection within the next year.

Imagine...

CDR Schematic **shows the prototype CDR. The device will be guided into the lens capsule through a standard clear-corneal incision after cataract extraction. One-way check valves allow the reservoir to be refilled.**

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JSK Therapeutics, Inc

UNIVERSITY OF UTAH

DEFINITION OF COMPANY

JSK Therapeutics, JSKT, is an early stage pharmaceutical company created to develop a new class of cancer treatment drugs which use glutathionylation (GLN) to kill cancer cells. GLN is a biochemical reaction between glutathione (a natural substance) and proteins. Certain key proteins required by cancer cells for growth are inactivated by glutathionylation, providing a new, highly potent means to treat a broad spectrum of cancers. The two JSKT scientific founders have identified and filed patents for GLN agents and associated drug formulation technology. The GLN agents constitute a drug pipeline with the first completing Phase I clinical trial and in a limited Phase II clinical trial. The second drug is in pre-clinical development and an IND will be filed first quarter of 2012.

TECHNOLOGY

The first glutathionylation agent (Disulfuram and copper or zinc) is a specific combination and dosing mechanism of two orally delivered pharmaceuticals, Disulfiram and metal compounds such as Zinc or Copper. The initial targets for the Disulfuram metal combination are cancers involving the liver where the combination therapy has been demonstrated effective *in vitro*, in animals and in one human case.

The second agent (called JS-K) is a pro-drug that selectively delivers nitric oxide (NO) to cancer cells. NO is potently cytotoxic to leukemia and solid tumor cells, however, because of NO's potential toxic effects, it has not been possible to use NO-generating compounds for cancer therapy. Unlike other compounds investigated, JS-K does not release NO spontaneously but activates the release of NO upon reaction with Glutathione S-Transferases (GST). GST's are found at significantly higher levels in cancer cells as compared to normal cells. The JS-K compound therefore exploits the upregulation of GST in cancer cells to selectively deliver a toxin (NO) to them.

PROGRESS

A phase I trial, conducted at the Huntsman Cancer Research Institute, with Disulfuram and copper has been on going over the past year. A limited phase II trial, also at Huntsman Cancer Research Institute, using Disulfiram and zinc for relapsed/refractory melanoma was initiated in 2011 and is ongoing. Preclinical development of JS-K is underway, GMP manufacture of JS-K has been completed and development of the drug formulation is progressing. Preclinical toxicology studies should be completed in the first quarter of 2012 and an IND for JS-K ready for submission in the second quarter of 2012.

Imagine...

Two new ways to treat all types of cancer.

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(801) 581-6310
bedington@jskthera.com

NanoInjection Technologies, LLC

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

NanoInjection Technologies, LLC was formed for the express purpose of acquiring and developing technology which has come to be called "nanoinjection," which was in early development at Brigham Young University (BYU) directed to new tools for making transgenic animals. Because this technology has the potential to replace the microinjection" technology that has been in use for the past three decades, it is expected that development may be difficult, time consuming, and expensive. Our current focus is to identify those difficulties and identify solutions that will ultimately lead to development of one or more nanoinjection products.

TECHNOLOGY

The company's mission is to provide tools that make it easier to create transgenic animals – animals that contain a gene that has been introduced through a laboratory procedure. For the past thirty years, the conventional technique used to create a transgenic mouse has been to insert DNA into a pronucleus of a fertilized mouse egg (a zygote) prior to fusion of the two pronuclei to form the nucleus of a developing embryo, using a very thin glass "microinjector" pipette run by a highly skilled technician.

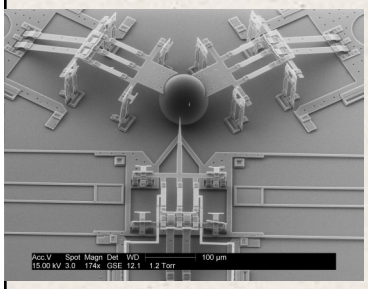
Not all DNA is suitable for microinjection and not all of the embryos so treated survive. The company is researching new ways to introduce DNA into a zygote. One product under research and development is an integrated nanoinjection device, which includes a movable lance and a cell restrainer. The lance is solid and very thin and handles the introduction of DNA very differently than a micropipette. At the outset, the lance is given a positive charge so that it will attract and hold the negatively charged phosphate backbone of the DNA that is to be inserted into a zygote. Once the DNA-carrying lance is inserted into a desired location, reversal of the charge from positive to negative will eject the DNA at the desired location. This strategy makes it less likely the zygote will be damaged and can deliver much larger lengths of DNA than can be passed through the small channel through a microinjection pipette.

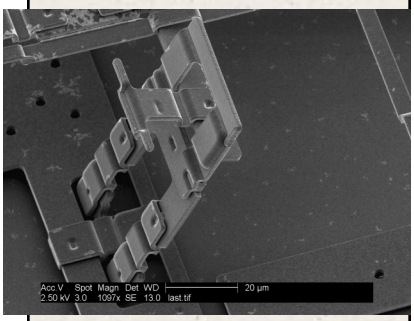
PROGRESS

The company continues to make progress in the very difficult process of making a transgenic animal. The BYU team has made and tested numerous different nanoinjectors in order to test mechanical features, electrical features, and features to test effects on the egg cells and DNA.

Imagine...

A precision device to manipulate cells at the "nano" level.





David O. Seeley
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NeuroAdjuvants, Inc

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

NeuroAdjuvants, Inc. (NAI) was formed in July 2005 to develop and commercialize novel therapeutics for the treatment of neurological disorders. The initial focus of NAI is to identify novel therapies for pain and epilepsy. NAI's proprietary technologies were developed at the University of Utah (U of U) by its scientific co-founders, Assistant Professor Grzegorz Bulaj, Ph.D., in the Department of Medicinal Chemistry, and Professor H. Steve White, Ph.D., from the Department of Pharmacology and Toxicology. These technologies have been exclusively licensed from the University of Utah by NAI.

TECHNOLOGY

Drs. Bulaj and White have invented novel technologies that facilitate the movement of neuropeptides across the blood-brain-barrier (BBB) when administered systemically. Enhancing the pharmacological and pharmaceutical properties of peptide analogs to enable them to penetrate the BBB has been long sought by drug developers. Such an innovation would create a new powerful class of drugs to treat a wide range of central nervous system disorders (CNS). The Company has initially focused on modifying neuropeptides that have anticonvulsant activity when administered directly into the brain, but lack such properties following systemic delivery. The first neuropeptide that the Company has targeted is galanin, an endogenous neuropeptide in the central nervous system that has been recognized as a potential anticonvulsant agent but is limited by its marginal metabolic stability and inability to cross the BBB.

PROGRESS

The prototype drug candidates that have been developed to date appear to be effective in animal models of CNS-based conditions including pain and epilepsy. In order to be an attractive drug development platform technology, NeuroAdjuvants needs to 1) definitively show its candidates cross the BBB in consistent, measurable, and dose dependent fashion and 2) demonstrate the utility of its technology in several neuropeptides to support a platform strategy. During the 2009-10 funding period, NAI advanced its platform and it appears that certain chemical modifications to the peptides under consideration may prevent their transit of the BBB. Should this prove to be true, a peripherally-acting drug platform could also arise from the NAI development program potentially enabling a second product family. The company has successfully applied for and received additional federal funding to further advance this technology.

Imagine...

NeuroAdjuvants

Novel therapies for pain and epilepsy.

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Sera Prognostics, Inc.

BRIGHAM YOUNG UNIVERSITY/UNIVERSITY OF UTAH

DEFINITION OF COMPANY

Sera Prognostics is using a novel serum proteomics technology to identify and commercialize biomarkers from blood samples of pregnant women to predict those at risk for preterm birth (PTB), preeclampsia (PE) and other pregnancy complications. PTB and PE are both major healthcare problems, afflicting respectively almost 13% and 8% of pregnant women in the U.S. and worldwide. Adequate advance warning of women at risk for these complications would permit clinicians to administer a number of medical interventions to treat the mother and improve the outcome of the baby. Sera has identified a combination of proprietary peptide and well-studied protein markers for PTB that have a predictive level of 94% sensitivity and 85% specificity. Its top peptide markers for PE have a sensitivity of 96% and specificity of 100%. Validation testing with larger blood specimen sets is underway to confirm these results.

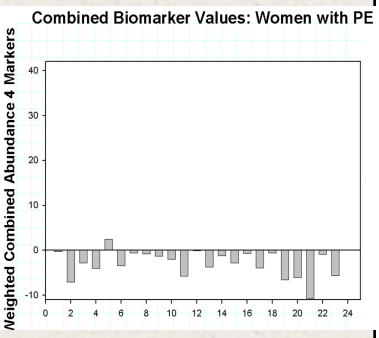
TECHNOLOGY

Sera's first-of-kind serum proteomics approach couples capillary liquid chromatography (cLC) separation technology with electrospray ionization time-of-flight mass spectrometry (MS) to measure molecular mass. Non-informative proteins, which are in high abundance, are removed by a precipitation process. The proteomics platform can observe 4,000 to 5,000 different peptides, small proteins and other molecular species in a single blood specimen in real time. Using this powerful proteomics platform, Sera Prognostics is able to identify biological molecules that differ quantitatively between patients with a disease and those who have no medical complication.

PROGRESS

Collaboration discussions are ongoing with a number of major partners for commercialization of these innovations in a "CLIA" lab. Tests developed and validated in CLIA labs are not currently subject to FDA approval. After initial market penetration by CLIA lab tests, FDA approved antibody test kits will be developed to greatly broaden the market by allowing for high throughput screening on automated immunoanalyzer equipment available at ~ 15,000 hospital and clinic labs throughout the country.

Imagine...



A novel technology that identifies biomarkers from blood samples of pregnant women to predict those at risk for preterm birth and other pregnancy complications.

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SparkleCream, LLC

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

SparkleCream was established to commercialize a technology that carbonates frozen yogurt and other soft-serve dessert products. The company's focus is licensing and selling the hardware needed to carbonate the soft-serve product. The team has also developed a brand that accompanies the hardware. The hardware, and accompanying brand, will be licensed to yogurt stores, and other retail dessert operators as an additional novelty product to add incremental revenue to their operations.

TECHNOLOGY

The technology to carbonate frozen yogurt was invented by Dr. Lynn Ogden at the BYU Food Science program and includes three patents. The first patent covers carbonating viscous foods. The second and third patents cover the actual hardware that is used to carbonate the soft-serve product. The hardware is simple to operate and attaches to a standard soft-serve ice cream machine. The carbonation process is most effective when either sealed, or when served "fresh" and the Sparkle Cream concept is to serve fresh, carbonated yogurt.

PROGRESS

When the team initially licensed the technology, it was thought that the hardware was market-ready. However, as is common in university technologies, the hardware needed to be reengineered in order to be commercially viable in this market. We team completed the re-design of the hardware, and filed the third patent (through BYU). The company plans to have market-ready hardware by October 1, 2011.

The COE program has allowed the SparkleCream team to take an amazing idea and technology, one that already had significant amounts of money invested into it by the university, and actually take it to market. The COE program's funding was instrumental in this process.

Imagine...

Frozen Yogurt that "sparkles" on your tongue!

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Thermal Management Technologies, Inc.

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF COMPANY

Thermal Management Technologies Inc. (TMT), a Licensee of the Center for Thermal Management Technologies specializes in solutions to thermal heating and cooling problems specific to the high tech requirements of space flight instrumentation and the demanding requirements of environmental impact mitigation requirements associated with oil and gas production. The current company focus is the development of isothermic structural modular panels sponsored by AFRL and the reclamation of contaminated oil field production water as sponsored by Purestream Technologies.

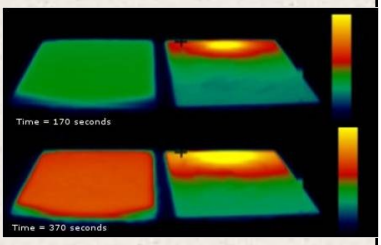
TECHNOLOGY

Thermal Links, the original technology of TMT, continues to benefit the space programs associated with USU's Space Dynamics Lab and USURF. It is anticipated that this technology will be transferred by USURF to TMT before the end of 2010. Thermal Links and other space related technologies from TMT are expected to produce over $1 MM in revenue in FY 2011. Improvements to Channel Panel, a technology that incorporates very robust heat spreading capability into structural panels, are now being funded by an AFRL SBIR and Channel Panel is expected to be utilized in satellite programs during 2011. Flow Meter and other technologies programs are still developmental. Functional engineering prototypes exist for these and environmental impact mitigation projects such as the vapor recompression "single well solution" sponsored by Purestream Technologies.

PROGRESS

The company is organized and progressing with contracted work. TMT's engineering and business support staff is growing. Experienced and highly qualified people are joining the TMT team. Phase I and phase II SBIR contracts sponsored by Air Force Research Laboratory totaling $810,000 have been secured. Excellent progress toward working prototypes is ongoing. Contracts for development of "single well solution" prototypes in the amount of $420,000 from Purestream have also been secured and $17,474 of sub-contract work was been performed during the contract period. Additional R&D funds provided to date from USURF provided by sponsors toward development of these and other technologies have totaled around $363,722.

Imagine...



Technologies for managing heat in very high performance situations

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Thermimage, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Thermimage is commercializing a medical device technology that meets the need for a safe and non-invasive means of diagnosing pediatric Vesicoureteral Reflux (VUR), a condition in which bladder urine flows backwards up into the ureters and into the kidneys, exposing the kidneys to infection and potential lifelong health problems. Although most have never heard of VUR, more than 2.5 million new cases of VUR are diagnosed annually, and over 10 million children are being treated for VUR at any one time. Medical "best practice" states that a child under 5 years of age that has a single urinary tract infection (UTI) should be tested for VUR - this practice is rarely followed by physicians today because of the traumatic process used to diagnose VUR. Thermimage's Thermuflux Scanner™ is very novel and solves this problem by providing a non-invasive, comfortable diagnostic process that will replace the majority of invasive and traumatic VCUG's currently used to diagnose pediatric VUR. Thermimage recently doubled the market size of their technology focus by expanding the product line to include non-invasive brain temperature monitoring.

TECHNOLOGY

The Thermaflux Scanner™ will:

- Eliminate the majority of current invasive procedures
- Increase the detection rate
- Decrease untreated/undiagnosed cases of VUR
- Reduce the use of unnecessary antibiotics
- Prevent potentially devastating health consequences later in life

The AccuTemp Probe™ will provide a non-invasive, safe, reliable, comfortable, and cost effective means of monitoring deep tissue temperature in the body. The device will:

- Provide accurate internal temperatures of the brain or other organs during surgery and post-op
- Allow for decreased hospital stays by allowing temperatures to be returned to normal faster

PROGRESS

The company is in final product testing prior to beginning regulatory filings for approval in the United States and Europe. In 2010, the company raised a Series A1 equity round and continues to be able to raise additional outside equity investment.

Imagine...

Innovative medical devices that provide a safe and noninvasive way to detect pediatric VUR and deep tissue temperature monitoring.

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ViroPan, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

For this grant, VIROPAN is developing "*Intracept*™," a potent virus-inhibiting product (microbicide), based on a proprietary controlled-release formulation and vaginal *in situ* delivery system. *Intracept*™ is break-through advancement against HPV that prevents infection of a broad range of HPV types in sexually active women. The *Intracept*™ product takes advantage of both the intellectual property (IP) of VIROPAN, and an exclusive worldwide license to substantial IP from the University of Utah Research Foundation in the field of therapeutics and products for the prevention and treatment of sexually transmitted infections (STIs) in humans.

TECHNOLOGY

ViroPan's proprietary intravaginal ring (IVR) is a sustained-release system delivering one or more active agents. The ViroPan IVR is flexible and self-inserted intravaginally where it remains for a prolonged period of time (i.e., up to 30 days). This allows the woman to be protected at all times in a very unnoticeable manner. The Company is developing the only product, *Intracept*™, that delivers an anti-HPV agent.

PROGRESS

ViroPan has successfully achieved all of the aims set forth in its application for the COE grant, namely:

- developed a slow release formulation of LCG that can be mounted in an IVR;
- evaluated the antiviral activity of LCG in vaginal fluids;
- developed an IVR prototype to deliver the formulation above;
- determined the loading versus release of the compounds;
- conducted additional mechanical and release studies of the compounds under specific conditions.

Imagine...

A way for a woman to protect herself against certain sexually transmitted diseases in a non-intrusive manner.

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Wastewater Compliance Systems, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Wastewater Compliance Systems, Inc (WCS), a Licensee of the Center for Water Treatment Technology at the University of Utah, is a company that sells a patented, submergible, igloo-shaped aeration product called Poo-Gloo™ that dramatically enhances the efficiency of wastewater lagoons. Our economical product is an easy-to-install retrofit solution for lagoon operators faced with compliance, cost, and capacity issues. The Company was formed in February, 2008, and profitably completed first year operations with commercial beta sites located at two Utah municipalities that were implemented with Centers of Excellence financial support.

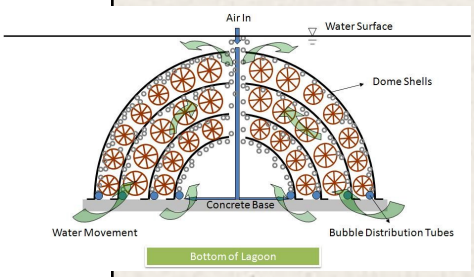
TECHNOLOGY

Poo-Gloos increase efficiency and capacity of wastewater lagoons by providing a large surface area of aerated bio-film in a dark, warm environment. Biological conditions created within each Poo-Gloo promote growth of beneficial microbes that accelerate nutrient removal and enhance remediation. The Poo-Gloo is simple to install and appears deceptively simple. However, Poo-Gloos are a disruptive and energy efficient solution to a difficult problem in small and medium size cities and towns, as well as globally in developing countries and other areas where expensive, complex, hard to maintain conventional sewage treatment plants are not feasible.

PROGRESS

WCS, Inc has been conducting scaled technology and product evaluations in test beds hosted in Salt Lake and Davis Counties. The tests are conducted in large tanks under controlled conditions using live municipal waste streams to evaluate product performance and to develop protocols to support commercial field activities. Second year 2009-10 CoE funds were combined with angel-seed investment to support the Company's effort to develop a national sales rep network; including launch of a revenue bearing pilot program to shorten sales cycles associated with new product regulatory acceptance in other states. WCS plans to achieve self-sustaining operations during 2011. The University of Utah conducts pure R&D activities for the company under mutually beneficial sponsored projects to investigate new scientific discoveries in lagoon wastewater treatment technology. WCS also contracts with UU to provide ongoing analytical lab testing and support services for our municipal test beds and commercial field sites. A first new patent has been filed, with more filings in process.

Imagine...



A low cost aeration Solution to Increase the performance and capacity of wastewater lagoons.

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801-647-0068
fred@wcs-utah.com

Program Description

PROGRAM DESCRIPTION

Utah Centers of Excellence Program
2009-10
"Our Job is Jobs"

The purpose of the Centers of Excellence Program is to accelerate the commercialization of promising technologies that have strategic value for Utah. The end goal of the COE Program is to help drive economic development and job creation.

The Centers of Excellence program is a State funded grant program to accelerate companies which license technology developed at Utah's colleges and universities and move the products to market more quickly. The process is a competitive annual selection process with grants of up to $100,000 in the first year of participation and, in a second year, up to the remainder of $500,000 total over two years of funding. The end goal of the COE Program is to help drive economic development and job creation.

Historically, the COE program provided funding to teams within Utah's colleges or universities. However, this often resulted in a significant gap in funding between the lab and the marketplace, often referred to as the "chasm of death". In 2007, changes to the COE statute were enacted that permitted ongoing support of grants to companies which are Licensees of technologies developed at Utah's colleges and universities. 2008-09 was the first year that focused the program's funding on Licensee Grants and 2009-10 exclusively focused on Licensees.

The intent of COE grant funding is to help accelerate the process of taking these leading- edge technologies to market. Funding in this crucial gap helps companies mature the technology while they secure industry funding. Companies of any size are eligible to apply, including startups as well as existing, Utah-based companies which are planning to create a new product or product line from the licensed technology. The goal of these funds is to help defray the risk in taking these innovative new technologies to market in order to encourage more such licensing and the accompanying job creation that comes from exciting new market opportunities. The Centers of Excellence Program had a budget of $2.5 million during the 2009-10 fiscal year.

The program received proposals from 28 companies which are licensees of a technology developed at one of Utah's colleges or universities. Requested funding totaled over $5 million. Of the proposals received, 13 were in the category of Manufacturing, Materials, Energy and Environmental technologies, 12 were in the Life Sciences category, and 3 were from the Information Technology industry. The number of IT proposals was notably low, in past years the program received 12 or 13 IT proposals, or about 1/3 of total proposals. Of the total 28 proposals, 17 were new proposals to the program, and 11 were second year proposals, from Licensees which had received funding the prior year.

Of the 28 proposals, 13 were awarded funding totaling $2.46 million. Of this funding approximately $2.158 million was awarded directly to the companies and $301, 000 was sub-contracted to a university to advance research in support of the company. These partnerships, made at the

request of the proposing company, were to help smooth the transitions of these advanced technologies out of the lab and into industry.

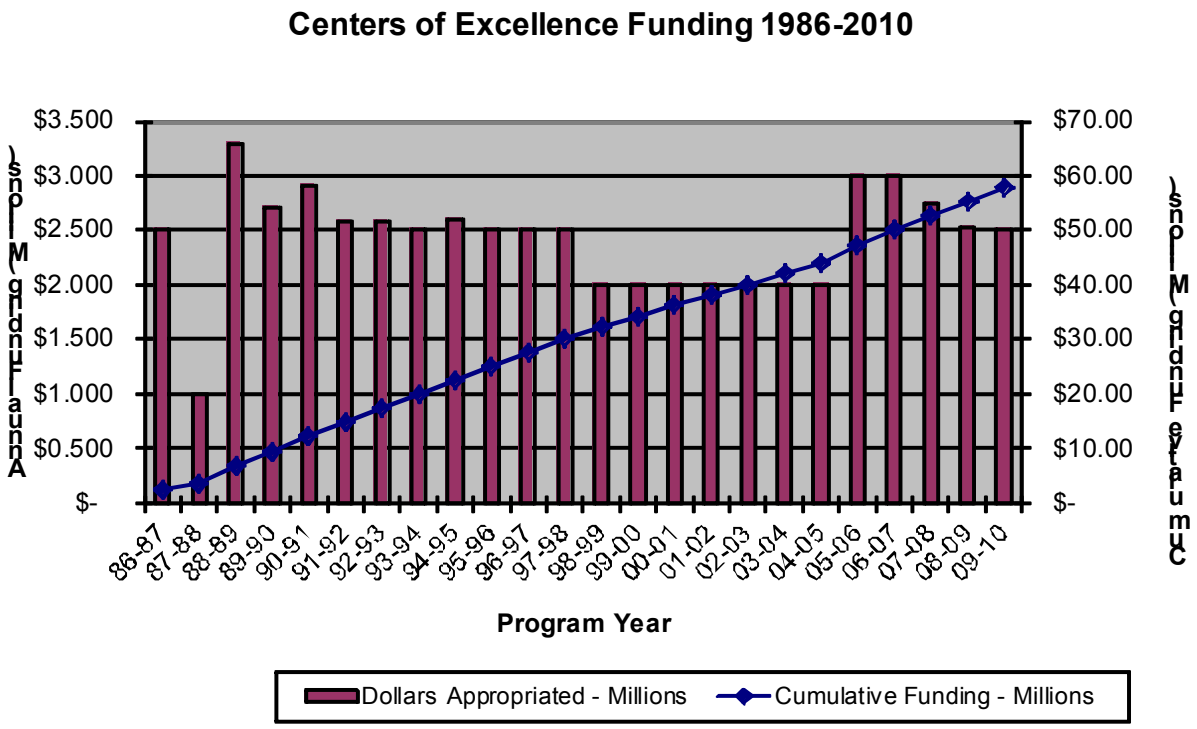
All Licensees are required to provide a 1:1 match from either industry or Federal sources, and, when a sub-contract is provided, teams from universities that grant doctoral degrees must provide 2:1 matching funds. A 1:1 match is required for all other institutions.

Of the 13 teams awarded funding, all 13 properly executed their contracts. This was a very difficult year to raise matching funds due to the ongoing recessionary economy. Unlike in previous years, companies submitted multiple invoices during the year to claim portions of their matching funds, as they "dribbled" in. Only a few teams used investor funding (equity) as their match, most used either sub-licensing agreements or Federal SBIR or STTR funds to serve as their match for the COE funding.

Of the 13 Licensees, 12 received full matching funds, and thus a full disbursement, of their funds. Of these, more than half required a short contract extension (of 6 months or less) in order to finalize their matching funds. Because of the tremendously difficult economy, these extensions seemed prudent. The final licensee received partial funding.

HISTORICAL FUNDING

This graph shows the history of funding for the COE program



2009-10 CENTER SELECTION PROCESS

The 2009-10 Centers of Excellence solicitation was issued in the first quarter of 2009 with a proposal deadline of Tuesday June 30, 2009. The review process was conducted in July and awardees were announced August 5, 2009. The review process includes an in-person presentation by the proposing team in front of members of the Centers of Excellence Advisory Council, who are volunteer experts from Utah's technology business community.

The 2009-10 proposal included gathering a lot of information about the company, technology, backers, aimed at helping the COE Advisory Council gauge the commitment of the company founders/leaders to the technology and the potential for job creation success of the venture. The COE Advisory Council is a group of seasoned technology industry executives, CEOs and CTOs, VPs and Senior Directors, who are interested in helping Utah and the Centers of Excellence Program succeed. This year there were 19 volunteer reviewers on the Advisory Council, 4 of them new to the program for 2009-10. For the 2009-10 selection year, the COE Advisory Council conducted 28 reviews of Licensee Grant proposals. The funding requests this year were in excess of $5million.

During the selection process, building on successful changes in 2008-09, each proposal was assigned to one of three categories. These categories are:

- Materials / Manufacturing / Environmental / Energy
- Information Technology / Communications / Aerospace/Defense / Electronics/Electrical Devices
- Life Sciences

Each category was assigned a day of meetings for our Reviewers. Each proposing team was then assigned a roughly 30 minutes time slot in the morning. For the first half of the day, the sub-committee members of the Advisory Council listened to back-to-back proposal presentations by the proposing teams. After all of the teams had presented to 2-4 Advisory Council members, the sub-committee as a whole sat down together for the first phase review and prioritization.

During this process, the sub-committee members discussed each proposal, evaluated the proposed funding request, and made the initial recommendations for funding and amount of funding. Each proposal that was recommended for funding also received a score on a scale of 0-5 (5 is high score). The average of the reviewers' score was assigned to the proposal, and then each sub-committee's selections were ranked by score. This process narrowed the field of proposals from 28 down to 15 which were considered by the full Advisory Council. 6 proposals from the MMEE sub-committee, 1 proposal from the IT sub-committee and 8 from the Life Sciences sub -committee were forwarded to the full committee for review.

On July 22, 2009 the full COE Advisory Council met as a group to review the 15 proposals forwarded from the sub-committees. Of the 15 considered, 13 were recommended for funding for 2009-10.

During the final review process, the members of the Advisory Council in attendance either accepted the committee's recommendation, or modified the recommendation. All recommenda-

tions must be accepted by a majority vote, and the process of discussion and recommendation continued until a majority vote was reached for each proposal. Each recommendation included whether or not the proposed application was recommended for funding, and the amount of funding recommended for the Licensee and, if requested by the proposing team, the amount of funding recommended to be contracted back to the university team.

The summary of the awards is as follows:

Total Proposals – 28 Submitted – 13 Awarded Funding:
12 Second Year Submissions– 8 Awarded funding
16 First Year Submissions - 5 Awarded funding

BYU – 4 Awarded Funding (9 Submitted)
USU – 1 Awarded Funding (2 Submitted)
UU – 8 Awarded Funding (16 Submitted)
CEU – 0 Awarded Funding (1 Submitted)

Proposals by Track
MMEE - 13
LS – 12
IT – 3

The total budget of awards was $2.46 million, with $2.121 million awarded to Licensees (companies) and $339,000 awarded to universities to do work on behalf of and in conjunction with licensees.

This was the second year that the "speedpitch" process was used, combined with the ongoing sub-committee approach. All feedback on this updated approach was that it continued to be very successful. It provided enough time for the proposing teams to communicate their technology and their business plan and strategy, while allowing the Council members to see a wider array of the proposing teams and also to prioritize them within areas of expertise before the final Council meeting.

The key requirements for funding this year included: The potential for a technology to create a significant Utah employer, whether the proposing team or management team was credible to accomplish the needed commercialization activities, and for teams already in the program, whether the program was "on track" and meeting key milestones. Unlike in past years, no funding was allocated to business teams or consultants. During the 2009-10 year, the plan was to focus funding on entrepreneurs and their companies.

On a sad note, Dr. Gerald Sharp, of Salt Lake City, Utah, a long time and valued member of the Centers of Excellence Advisory Council, passed away on May 22, 2009. Barely a month earlier, April 16, 2009, Gerry had served the State on the COE Advisory Council in the 2008-09 Part B review, sharing his expertise and experience. Dr. Sharp will be missed by the COE program and by his colleagues on the COE Advisory Council and was honored with a minute of silence at the July final meeting.

2009-2010 Financial Summary

The Financial Summary is a summary of the information provided by each Center in their annual report to the program and the funding summary is based on the funds granted during the fiscal year. For reference, "Total Funding" means COE funding awarded since starting with the program, "Patents Pend...." means patents newly filed during the fiscal year, "New Patents (Issued)" refers to those issued during the fiscal year and "Licensees" refers to companies which licensed the technology from a former Center of Excellence, while those marked "N" are Licensees of other university developed technology..

University	Funded Companies	09-10 Funding	Total Funding	Total Disbursed	09-10 Matching	Patents Pend. 09-10	New Patents (Issued)	Spin-Offs/ Licensees
BYU	Cosmas, Inc.	200.000	375.000	37500	250,000	NA	NA	Y
UU	GlycoMira, LLC	325.000	500.000	371.427	196.427	NA	NA	N
UU	Heavystone Laboratory, LLC	120,000	120,000	120,000	90,000	NA	NA	Y
UU	iVeena, LLC	100.000	100.000	100.000	100.000	NA	NA	N
UU	JSK Therapeutics	100.000	100.000	100.000	100.000	NA	NA	N
BYU	NanoInjection Technologies, LLC	100.000	100.000	100.000	100.000	NA	NA	N
UU	NeuroAdjuvants, Inc.	300.000	500.000	450.300	250.300	NA	NA	N
BYU/UU	Sera Prognostics, Inc.	300.000	400.000	400.000	300.000	NA	NA	N
BYU	Sparkle Cream, LLC	100,000	100,000	100.000	100.000	NA	NA	N
USU	Thermal Management Technologies, Inc.	95,000	195,000	195,000	95,000	NA	NA	Y
UU	Thermimage, Inc.	300,000	500,000	500,000	300,000	NA	NA	N
UU	Wastewater Compliance Systems, Inc.	300,000	500,000	500,000	300,000	NA	NA	Y
UU	ViroPan, Inc.	100,000	100,000	100,000	100,000	NA	NA	N

If a company which received funding is a spin-off or licensee of a former University Center of Excellence, then it is marked as “Yes”. If the company is a university licensee of a technology that was not supported by the COE program in previous years, it is marked as “No”.

2010-2011 Funded Centers

Funding Recipients for the 2010-11 Centers of Excellence Program (Review 1)

Total proposals submitted: 45
Total awarded funding: 21
12 Licensees,
5 affiliates,
2 internal UU teams
2 USU internal teams

The technologies are emerging from the following universities:
5 from BYU
11 from UU
5 from USU

LICENSEES

Anaerobic Digestion Technologies, Inc.
CEO/Principal: Jason Miller
Affiliate/Licensee/Univ.: Licensee
Award Amt.: $40,000 – Company
Univ.: BYU
Cluster: LS

A patent-pending, low-cost, low-maintenance, scalable methane filtration solution. The system is comprised of multiple filter cylinders and gas routing hardware, with an automated electronic control system. The BCS is skid-mounted for easy delivery and installation. The System removes corrosive contaminants and impurities from well-produced and waste-generated methane gas streams at 1/10th to 1/15th the cost of currently marketed technologies. Hydrogen sulfide, water, and other destructive agents are extracted to negligible levels by the BCS, significantly prolonging the life of pipeline infrastructure and electrical generation equipment associated with gas resources. Ground-breaking innovation is manifest in the thermal management system of the BCS. Low levels of excess system heat are utilized to replenish the filter beds and release contaminants in a concentrated gas stream. Successful management of this process makes the system unique and industry-changing in character.

Aviradyne Technologies, Inc.
CEO/Principal: Ronald D. Jones
Affiliate/Licensee/Univ.: Licensee
Award Amt.: $40,000 – Univ
Univ.: USU
Cluster: MMEE

Hybrid rockets are significantly safer than Liquid and Solid counterparts. Hybrid motors can be stored and operated without risk of explosion. This makes hybrids ideal for commercial spaceflight except for two significant short-comings attributable to current manufacturing processes: motor-to-motor variability that precludes motor clustering, and lack of a for volume production method to support the required flight rates for the growing commercial space launch industry. The proposed production method uses robotic manufacturing technologies to effectively remedy both of these deficiencies: Digital-Direct Manufacturing to fabricate hybrid rocket fuel grains that are uniformly produced, and Filament/Tape Winding systems to form the composite case and assemble the motor in a single process. Factory automation and application of advanced polymer materials will significantly reduce motor-to-motor performance variability, enable FAA certification, and cut production costs by more than 50%.

Black Box Engineering, Inc.
CEO/Principal: Zac Humes **Univ.:** USU
Affiliate/Licensee/Univ.: Licensee **Cluster:** MMEE
Award Amt.: $40,000 – Company

Coanda Assisted Spray Manipulator (CSM) gives the user the ability to change the direction of the flow of flame and particles leaving existing flame spray guns. The CSM will be designed as an add-on to existing flame spray gun technology. These flame spray guns are used for coating the interior of pipes, cylinders, and other surfaces using different materials. The coatings are used to improve performance of the substrate and reduce maintenance costs. Current technology limits this process to being performed on large diameter pipes, usually greater than 48 inches in diameter, because it requires a person to be inside the pipe to control the direction of the flow. The CSM device will allow the process to be completed on smaller diameter pipes and surfaces without the need for human labor to control the direction of the flow. This process will also be completed more quickly, accurately, and affordably as it removes the need for such intensive manual labor as is currently necessary.

CAT-Credibility Assessment Technologies
CEO/Principal: Donald R. Sanborn **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** IT
Award Amt.: $40,000 – Company

Oculomotor Deception Detection© (ODD) holds significant promise for numerous security screening and intelligence applications. This revolutionary technology, based on five years of scientific research, provides a powerful new methodology for detecting deception. The ODD measures cognitive responses to deception as detected by a highly accurate eye tracking system that records eye movements and pupil diameter changes as a subject reads true/false questions presented by a computer. The current standard for lie detection technology is the polygraph which takes up to 3 hours to administer, requires a highly skilled examiner, costs about $970 and is 85% accurate. The ODD test takes only 25 minutes, is easily-administered by minimally trained examiners and costs a fraction of the polygraph with the same accuracy.

Crocker Spinal Technologies
CEO/Principal: David Hawkes **Univ.:** BYU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS
Award Amt.: $40,000 - Univ.

The FlexSuRe™ is a spinal implant developed at BYU and licensed by Crocker Spinal Technologies, Inc. The FlexSuRe™ was designed to restore stability to the spine after surgeries such as discectomy or laminectomy. It shares load with other spinal structures, maintaining healthy motion while providing mechanical resistance to painful, nonphysiologic motion. The existing FlexSuRe™ is already market-separated due to its unique compliant-mechanism design. However, based on recommendations by the surgeon advisor board advising Crocker Spinal Technologies, the implant can be improved to increase its market acceptance. The COE award will be used to change the existing design to decrease size, modify orientation, and restore height to the segment. As a result, the device will restore nutrient flow to the disc while biomechanically mimicking the motion of a healthy segment. These characteristics make the device forward-looking to complementary technologies for spinal disc regeneration.

E-Sens (Formerly Sensicore China)
CEO/Principal: Jack Buchanan **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** MMEE
Award Amt.: $40,000 – Company

Sensicore has developed a silicon-based chemical sensing technology to address the world's water monitoring needs. The company's lab-on-a-chip sensors monitor multiple chemicals with an array of sensors selective to different analytes. The sensor array takes advantage of the mass fabrication manufacturing technology of the semiconductor industry to produce a low cost per test solution. The sensor array chip will be replaced periodically, eliminating the need for constant maintenance of the sensors. Its small size reduces the need for calibration solution, making it practical to produce small hand-held sensing systems, and to implement remote, unattended sensor network nodes.

HOT Water Global
CEO/Principal: Brandon Lloyd **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** MMEE
Award Amt.: $40,000 – Univ

This new technology involves repeated pressure cycles each consisting of a compression stage and a venting stage. The compression stage reaches 100-150 psi in the headspace of a closed vessel by use of a compressor, saturating the water being treated with an ozone/air mixture. The venting stage (to ambient pressure) produces rapidly expanding gas bubbles of all sizes from nano, micro, and centimeter sizes that provide abundant reactive interfacial ozone for ozone and contaminants. Repeated pressure cycles result in conversion of dispersed and dissolved oil into forms that can be removed by conventional sand filtration or biodegradable products. This project will use a pilot reactor (200 L) to demonstrate treatment of produced water and flow-back water from the oil and gas industry. The process represents an application of University Technology (U-3996).

Microsurgical Innovations
CEO/Principal: Jay Agarwal **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS
Award Amt.: $20,000 – Company; $20,000 – Univ.

An arterial anastomotic device, referred to as an arterial coupling device (ACD), which will replace the hand suturing technique currently used to connect arteries in microsurgery and macrovascular end-to-end arterial repair surgeries. This device would consist of a barbed cap that would be placed at the end of each artery and then connected together to attach the two arterial ends. This approach would reduce the time required in the surgery suite, reduce costs associated with surgery, and reduce the likelihood of failure of the anastomoses, by minimizing human error and stenting open the anastomosis. There are currently no arterial anastomotic devices available. This technology has the ability to simplify technically challenging microvascular repair and to expand the scope of microsurgery by facilitating these types of procedures in third world countries and in battlefield hospital settings.

TranquilMed
CEO/Principal: Jared Edgel **Univ.:** BYU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS
Award Amt.: $40,000 - Company

RestEasy will be the only non-drug treatment for Restless Legs Syndrome (RLS) on the market. It uses patent pending treatment of near-infrared light that penetrates the skin deep into the tissue. Dr Mitchell's studies show 52% reduction in RLS symptoms in 12 treatments and give a p-value less than 0.001. Our device consists of a neoprene pad with adjustable straps. The back of the pad has an array of LEDs that when applied to the lower leg emits near-infrared light that penetrates the skin. This releases Nitric Oxide which then causes the blood vessels to dilate. Vasodilation in turn increases blood flow, satisfying the urge to move and mitigating RLS symptoms. Features for safe home-use and convenience include: a lithium-ion battery that allows free movement during treatment and a control interface that is simple to use. Additionally the device has thermocouples in place to shut the device down if the temperature of the leg gets too high.

Solan LLC
CEO/Principal: Brandon Lloyd **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** MMEE
Award Amt.: $40,000 – Univ

A technology that will fabricate solar cells based on lithographically defined graphite, so-called carbon nanoribbons (CNRs). The electronic properties of CNRs exhibit a dependence on the ribbon dimension. Reducing ribbon width to nanometer scale can turn graphite into a semiconductor, and with the proper selection of metal contacts with different work functions (ϕ), one can form Schottky barrier solar cells. Upon excitation of the incident light, free electrons and holes will be generated within CNRs. Due to device building-in potential, which equals to the difference in ϕ between the two metal leads, free electrons and holes will be extracted to the electrodes, generating electricity. Due to the abundance of graphite material and convenience to tune the material bandgap, we expect to fabricate low-cost and high-efficiency solar cells. A patent, filed on this invention jointly by University of Utah and University of Wisconsin-Madison, has been allowed and licensed to Solan.

Veritract, LLC
CEO/Principal: Arlo McGinn **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS
Award Amt.: $40,000 - Company

Nasogastric feeding tubes are the most commonly placed gastrointestinal devices in hospitals today. Over 80% of ICU patients and many more patients in general hospital floors (1.25 million total US patients) receive nutrition via these tubes. Because most of these feeding tubes are placed blindly, without any guidance, many thousands of these tubes are misplaced to the lung causing serious injury and even death. To verify proper placement, most hospitals require X-ray confirmation of tube placement but incur significant extra expense as a result.
Veritract leverages the advancements made in endoscopic technology to allow these technologies to be built into an inexpensive disposable device. Our design integrates optics for vision, and steering for guidance, allowing feeding tubes to be guided and placed into the intestinal tract under direct visualization. This allows for a much quicker, safer, and economical placement and improves patient care while streamlining hospital procedures.

2010-11 (R1) AFFILIATE COMPANIES

Cajun Archery
CEO/Principal: David White
Affiliate/Licensee/Univ.: Affiliate
Award Amt.: $12,500 – Univ.
Univ.: USU
Cluster: MMEE

Through a market analysis, Cajun Archery, a manufacturer and supplier of bowfishing equipment, has identified a need for a bowfishing reel. Currently, there are two bowfishing reels that dominate the bowfishing market. One of these reels releases line very efficiently, while the other retrieves line well. Neither reel excels at performing both of these tasks. This project is to design a bowfishing reel that is able to both release and retrieve line efficiently, is easy to operate, requires minimal maintenance, and is cost effective to manufacture. Through the use of computer-aided design (CAD) rapid prototyping, and computer numerical control (CNC) machining the Research Group for Product Engineering and Prototyping at USU is able to quickly design, test and develop products to meet market demands. Through the engineering design process we will be able to meet design criteria and reduce commercialization risks for Cajun Archery.

Domain Surgical, Inc.
CEO/Principal: David J. McNally
Affiliate/Licensee/Univ.: Affiliate
Award Amt.: $40,000 – Company
Univ.: UU
Cluster: LS

Surgery requires the cutting and coagulation of bleeding tissues and vessels, as well as the re-attachment of tissues or their destruction. Because of this, a large market has evolved based upon the promise of improved outcomes related to the excision, dissection, hemostasis, and healing of tissue. Many innovations have been introduced in recent years, but many surgeons are still dissatisfied that there is not a tool that meets all the criteria. Our patent-pending ferromagnetic inductive heating technology holds the promise of producing surface-only tissue effects with energy that does not pass through the patient; frictionless cutting with elimination of tissue distortion and sticking; on-demand rapid onset and offset of effect as various tissues or bleeding are encountered; and easy cleaning and disposability. These attributes position our technology as an ideal energy modality for cardiothoracic surgical procedures.

Enerlyte, LLC
CEO/Principal: Seth M Phillips
Affiliate/Licensee/Univ.: Affiliate
Award Amt.: $40,000 - Univ
Univ.: BYU
Cluster: MMEE or IT

Enerlyte's intelligent, clean technology, energy conservation program is a revolutionary web-based software for tracking energy efficiency & conservation. The software tracks both user activity and results of utility conservation programs. Using system data, Enerlyte software makes recommendations to users and utilities for improving energy usage. Users get graphs and customized tips on their monthly utility bill. Utilities get an online dashboard providing usage analysis that maximizes utility ROI for each dollar spent on efficiency & conservation. Enerlyte groups users into peer groups (households with similar size/age of home, family size, location, etc.) and monitors changes in energy use when users take specific actions to conserve. Enerlyte's product uniquely addresses both user & utility demand for energy usage information that can lead to improved efficiencies in energy usage & conservation.

Euclid Timber Frames LLC
CEO/Principal: Kip Apostal **Univ.:** UU
Affiliate/Licensee/Univ.: Affiliate **Cluster:** MMEE
Award Amt.: $7,500 – Company; $7,500 – Univ.

Interlocking Cross Laminated Timber (ICLT) is a prefabricated cross-laminated solid wood wall and roof panel fabricated from 2-5 layers of alternating direction 3" x 6" to 3" x 8" pine stock milled from beetle kill trees. ICLT utilizes no fasteners and no adhesives, removing the reliance on volatile organic compound (toxic) adhesives, allowing the panel to be disassembled at end of life to be repurposed in the building material supply chain. Layering gives the panel strength, allowing low-grade wood to be used in a high value structural situation, estimated to last upwards of 100 years. ICLT can be built up to nine stories in some cases, efficient in speed of construction, and given the availability of material, potentially affordable for both production home building and large commercial structures. This proposal is for ICLT commercialization research between university and industry in preparation for market acceptance in the next two years.

Fusion Diagnostics
CEO/Principal: Ben Rollins **Univ.:** UU
Affiliate/Licensee/Univ.: Affiliate **Cluster:** LS
Award Amt.: $40,000 – Company

Developing glasses with a novel coating that blocks the light spectrum that triggers migraines and other neurological disorders such as blepharospasm. By wearing these coated glasses, migraine sufferers may experience significant reduction in the frequency and severity of their migraine attacks. These coatings can be applied to spectacle lenses, contact lenses, and various types of light sources.

Linear Signal, LLC
CEO/Principal: Greg Mockett **Univ.:** BYU
Affiliate/Licensee/Univ.: Affiliate **Cluster:** IT
Award Amt.: $40,000 – Univ.

Traditional satellite dish antenna technology suffers from quality of service problems due to poor mount installation, wind loading, rain, roof sag, and satellite orbital wobble. Smart electronically steered phased array feed antennas adjust the antenna beam adaptively to maintain maximum signal quality. Linear Signal has developed a critical enabling part for smart antennas, an integrated beamformer chip, which will be combined with high efficiency, low noise phased array antenna technology developed for radio astronomy by Prof. Warnick at BYU to produce smart antenna feeds for commercial satellite antennas on buildings, aircraft, vehicles, and ships.

2010-11 (R1) UNIVERSITIES

Large-Scale Semiconductor Nanocrystal Fabrication
CEO/Principal: Michael H. Bartl **Univ.:** UU
Affiliate/Licensee/Univ.: UU **Cluster:** MMEE or IT
Award Amt.: $40,000 – Univ

Nanocrystals (1 to 100 nm in size) are considered cornerstones of emerging energy, information, and biomedical technologies due to their unique size-dependent electronic and optical properties. However, their widespread use is severely limited by current high-cost and small-scale fabrication methods requiring high temperatures. In contrast to existing techniques, we have developed a novel synthesis method for high-quality nanocrystals that operates at low reaction temperatures (patents pending). Our method promises enormous impact for commercial applications, since low-temperature synthesis enables easier scale-up (high throughput fabrication) with reduced engineering requirements while keeping high product quality and reproducibility. Moreover, our method uses inexpensive, industry-tested and reusable reaction components (e.g. solvents) and therefore should not only result in significantly reduced manufacturing costs, but also in environmentally-friendlier "greener" fabrication.

Smart Antenna Technology
CEO/Principal: Bedri A. Cetiner **Univ.:** USU
Affiliate/Licensee/Univ.: USU **Cluster:** IT
Award Amt.: $40,000 – Univ

The technology developed at USU is an adaptive smart antenna technology that enables a single antenna element to dynamically change its properties such as operation frequency, beam direction, and polarization. An adaptive antenna is an indispensible part of the next generation wireless communications systems such as upcoming 4G systems in order to achieve targeted system performances, i.e., higher data rate, capacity, etc. With the existing technologies for a system to provide dynamically adaptive features, a large number of antennas in conjunction with ancillary electronic components need to be used. The existing technology, therefore, is cost and size prohibitive for commercial wireless systems. On the other hand, our technology provides a superior performance with a single antenna element which can be realized at low cost and size. The microfabrication technology developed by the PI's research group, which will be patented by the USU TCO, is based on a novel microfluidic technology

Smart Occupancy
CEO/Principal: Aravind Dasu **Univ.:** USU
Affiliate/Licensee/Univ.: USU **Cluster:** IT
Award Amt.: $40,000 – Univ

The Smart Occupancy Sensor is a dual mode hardware device (Passive IR + Video camera) that can be mounted on a ceiling in an office room, and expected to reliably and near-instantaneously turn lights on when occupied and turn them off when unoccupied. The unique features are: (a) Its response time is ~5 seconds compared to 15-20 minutes for motion sensors, (b) It can be configured and setup via software using a graphical user interface, (c) It does not suffer the infamous 'hand waving' problem that motion sensors do, and (d) It can be upgraded via software updates for daylight aware lighting control and task control.

Trace Explosives Detection
CEO/Principal: Ling Zang
Affiliate/Licensee/Univ.: UU
Award Amt.: $40,000 - Univ

Univ.: UU
Cluster: MMEE

Portable devices that are suited for infield explosives detection. The sensory materials are composed of well-defined nanofibers fabricated from different building-block molecules. As covered in our five IPs, the nanofibers are highly efficient for vapor detection of explosives, via optoelectronic modulation upon interaction with the targeted explosives. Upon integration into a small chip, the entangled nanofibers form a mesh-like, highly porous film, providing maximal sampling of explosives, enabling expedient vapor detection with unprecedented efficiency (down to ppt range). This is superior to the common solid film-based sensory materials, for which the sampling of trace analysts remains difficult due to the limited surface area. Compared to conventional electronic detection systems like those based on MS or IMS, the nanofibers represent a class of simple, small and adaptable detection system.

Funding Recipients for the 2010-11 Centers of Excellence Program / Technology Commercialization and Innovation Program (Review 2)

As of March 2011, the Utah Legislature changed the name of the Centers of Excellence Program (COE) to the Technology Commercialization & Innovation Program (TCIP). Review 2 was conducted under the new name.

Total proposals reviewed: 42
Total recommended for funding: 22
- **Licensees: 14**
- **Affiliates: 5**
- **UU Internal teams: 2**
- **USU internal teams: 1**

The technologies are emerging from the following universities:
- **12 of 22 from UU**
- **5 of 7 from BYU**
- **3 of 9 from USU**
- **1 of 2 from SLCC**
- **1 of 1 from UVU**
- **0 of 1 from WSU**

FUNDED

Aciont
CEO/Principal: John Higuchi **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS

The project is a preclinical proof of concept research plan as a premise to create the ultimate achievement in ophthalmic therapy: to treat non-invasively, age related macular degeneration (AMD) and diabetic retinopathy. The project intends to develop a safe and an effective, an approximate 20 minute iontophoresis treatment for the delivery of macromolecules such as Avastin® to the posterior section of the eye, which can be administered by a nurse or paraprofessional or potentially, patients themselves. This Visulex® system is a combination novel ocular iontophoresis device - an eye applicator resembling a scleral lens - and enhancement formulation capable of delivering large, antibody agents to the posterior segment of the eye. Iontophoresis is a method of delivering drugs through body tissue using the aid of a mild electrical current. Visulex offers a customized, localized controlled release therapy designed to minimize unnecessary patient exposure to the drug.

Akadi Technologies
CEO/Principal: Wes Christiansen **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** IT

Akadi digital signage is unique in that it creates a network of displays, organized by time, geographic location and demographic audience which can be managed by any user from any web enabled device. Value in the network increases as the reach of the network grows, enabling advertisers and diverse interest groups to target unique audiences with specific and relevant information. For advertisers to be successful today they have to stand out! Success in business today is less about advertising and more about connecting through social media, viral messaging and other meaningful interactions. Targeted messaging and information that is personalized and relevant is the only way to reach through the clutter of messages we are bombarded with on a daily basis. Akadi Technologies is perfectly positioned to be able to leverage a number of technologies, existing and currently under development, to redefine digital signage and targeted and interactive messaging.

AnalySwift
CEO/Principal: Allan Wood **Univ.:** USU
Affiliate/Licensee/Univ.: Licensee **Cluster:** MMEE/IT

VABS is a unique technology capable of rigorously modeling 3D slender solids with complex microstructures, such as wind turbine blades, helicopter rotor blades, bridges, and other beam-shaped structures. VABS has been consistently demonstrated to be much better than other technologies regarding accuracy, efficiency, and versatility. This technology can save several orders of magnitude in computing time with little loss of accuracy and is gaining an international reputation in rotorcraft and wind power industries. Major companies such as Boeing, Siemens, AeroVironment have licensed VABS. All the other competitive technologies have a very limited set of capabilities and few of them can treat composites which are extensively used now. Furthermore, none of the existing tools have a strong endorsement from the research-oriented community as VABS has. We strongly believe that VABS will become a very competitive product and the tool of choice for modeling composite beam structures.

Credibility Assessment Technologies
CEO/Principal: Donald R. Sanborn **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** IT

Ocular-motor Deception Test (ODT) is the first major breakthrough in deception detection technology in 20 years, with numerous security screening and intelligence applications. This revolutionary technology provides a powerful new methodology for detecting deception. The ODT measures cognitive consequences of deception with a highly sensitive eye tracking system that records eye movements and pupil diameter changes as the subject reads true/false questions presented by a computer. The ODT compared with other technologies like the polygraph, it is more competitive: It is easily-administered, takes only 25 minutes, is cost effective, achieves the same accuracy (85%), can be administered in multiple languages and settings, facilitates high volume testing, and is customizable to different needs. In conclusion, the ODT reduces the need for time-consuming and expensive polygraph examinations and brings simplicity, speed, and convenience to screening process.

DBS Electrode Array
CEO/Principal: Alan Dale Dorval II **Univ.:** UU
Affiliate/Licensee/Univ.: UU **Cluster:** IT/LS

Massive-Multielectrode, Cross-Hatched Planar Arrays for Deep Brain Stimulation. This device will allow the user to control the direction and shape of the electric field. The proposed device will allow for complete control over the electric field including its shape and direction. No longer will the field center be limited to the electrode contact, and no longer will it be limited to a spherical shape. By using a unique cross shaped electrode with approximately 10,000 contacts, this device will be able to shape the field to fit the particular region of the brain that requires stimulation, without crossing over into undesired regions. DBS treatment with this device will be more effective and safe, and more flexible, as different regions of the brain would not require specially shaped electrodes.

Distal Access
CEO/Principal: Shawn P. Fojtik **Univ.:** UU
Affiliate/Licensee/Univ.: Affiliate **Cluster:** LS/MMEE

Doctors spin needles, catheters, and wires to access deep inside organs or clear catheters and vessels. Spinning by hand gives surgeons feel & control but lack power & speed. Electrical powered 'drill-like' devices give power & speed, but are bulky, expensive, and lack feel & control. Clinicians need a device that combines power & speed with feel & control. The SPINR is a hand-held, mechanical, cost-effective device that spins needles, catheters, and wires when the doctor squeezes their hand. SPINR's simple 6-piece molded design includes a helical gear that coverts the squeeze of the handles into axial rotation. Gearing can be adjusted for high-rotation or high-torque applications. Connecting guidewires to the SPINR helps wires vibrate and advance through narrowings or blockages. Oscillating shaped wires and catheter with the SPINR creates a powerful device to macerate blockages in catheters and vessels. SPINR: the speed of a motor with the feel of the hand.

Domain Surgical
CEO/Principal: David J. McNally **Univ.:** UU
Affiliate/Licensee/Univ.: Affiliate **Cluster:** LS

Surgery often requires the cutting and coagulation of vascularized tissues and blood vessels, including the sealing of individual large arteries, veins, and lymphatics. A large market has evolved based upon the promise of improved outcomes related to the sealing and cutting of blood vessels. Innovations intended to improve the speed and integrity of sealing vessels have been introduced in recent years, but many surgeons are still dissatisfied with the performance and security of those devices. Our patent-pending ferromagnetic inductive heating technology holds the promise of producing surface-only tissue effects with energy that does not pass through the patient; uniform sealing with elimination of tissue distortion and sticking; minimizing of collateral or adjacent tissue injury or thermal damage; on-demand rapid onset and offset of effect as various tissues or bleeding are encountered; and easy cleaning and disposability. These attributes position our technology as an ideal energy modality for surgical procedures requiring the sealing of blood vessels of a wide range of sizes.

Epitel
CEO/Principal: Mark Lehmkuhle **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** IT/LS

A small, user friendly, wireless device for human EEG monitoring is currently lacking. We propose an individual-use patch-type telemetry device for simplified EEG recording from human patients. This device will enable user-friendly application of the EEG electrode and real-time recording of the EEG signal either in the ICU, in an out-of-hospital setting (e.g., the home or work environment), or for research (e.g., antiepileptic drug testing). The device will consist of a small EEG electrode/transmitter unit that both wirelessly transmits EEG signals to a receiver and "logs" EEG data for later retrieval. The only component placed on the patient will be a small unit that is roughly the size of a Band-Aid™ and will have the look and feel of a "patch." Our primary objective is to create a user-friendly, unobtrusive device that can be used to reliably record acute and/or chronic electrographic seizures under conditions where traditional ambulatory EEG is not feasible or practical.

H2O TECH
CEO/Principal: Timothy Nelson **Univ.:** BYU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS/MMEE

The Neptune Water Drill provides a scientifically engineered jet stream of water that is less than the thickness of a piece of paper, mixed with tiny particles of abrasive that removes dental caries. It is the most precise cutting device in the dental industry (the Neptune water drill stream diameter is 1/7 the thickness of the most used dental drill bits), which improves the art of dentistry and increases patient satisfaction.
It is a patented invention of Dr. Robert Todd, Professor of Mechanical Engineering at Brigham Young University and Scott C. Hansen. Major benefits include: (1) precision-cutting dentistry, (2) no heat from friction, (3) natural matte finish eliminates phosphoric acid etchings in the drilled out cavity, (4) no drilling sound or vibrations, (5) less irritation of the nerves, (6) reduced need for anesthesia, (7) less post operative pain, discomfort and chance for infection, (8) and lower risk of reoccurring dental caries.

Holorad
CEO/Principal: Stephen J Hart **Univ.:** UVU
Affiliate/Licensee/Univ.: Affiliate **Cluster:** IT

Holorad's technology prints animated interactive color holograms from Computer Graphics scenes designed in animation programs such as Autodesk Maya. This provides glasses-free 3D holograms for entertainment, advertising, and medical applications. These are holographic prints, projecting out in front of the observer with true depth. No other technology provides this rich combination of visual stimuli, and the resulting holograms are very compelling. Hologram production and replay requires custom optical systems, and for cost-effective commercial applications these need to use highly-divergent beams which inherently produce highly distorted holograms. To correct this, Holorad pre-distorts the printed data so that the distortions cancel, producing an undistorted result. The general mathematical basis for this is known in the geometrical optics literature, but has not been extended to the required 3D formulation and implementation, so Holorad currently uses a slow iterative fine-tuning.

Knudra Transgenics
CEO/Principal: Chris Hopkins **Univ.:** SLCC
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS

Knudra makes biosensors detecting toxicities in our environment, food, and medicines. The nematode worm's capacity to detect toxins is harnessed by genetic engineering the worm to turn green upon exposure to toxin. The observation of turning green is a biosensor of toxicity. We make many types of worm biosensors to detect different types of toxins. We arrange the worm biosensors into arrays where every array well contains a different type of biosensor. Different toxins create different patterns of biosensor activation. A digital readout of toxicity is achieved. This simplifies data interpretation. Data sets are inherently normalized allowing the most important toxic mechanism to be easily identified. Our competition has a wide variety of methods with very little standardization between tests, which leads to confusion in data interpretation. Our method is faster, cheaper, and more reliable than current methods and it uniquely reveals which toxicity mechanism is of highest concern.

Linear Signal
CEO/Principal: Greg Mockett **Univ.:** BYU
Affiliate/Licensee/Univ.: Licensee **Cluster:** IT

Traditional satellite dish antenna technology suffers from quality of service problems due to poor mount installation, wind loading, rain, roof sag, and satellite orbital wobble. Smart electronically steered phased array feed antennas adjust the antenna beam adaptively to maintain maximum signal quality. Linear Signal has developed a critical enabling part for smart antennas, an integrated beamformer chip, which will be combined with high efficiency, low noise phased array antenna technology developed for radio astronomy by Prof. Warnick at BYU to produce smart antenna feeds for commercial satellite antennas on buildings, aircraft, vehicles, and ships.

Motion Sensor Suit
CEO/Principal: Carlos Mastrangelo **Univ.:** UU
Affiliate/Licensee/Univ.: UU **Cluster:** IT

We are developing a wireless sensor "suit" that measures the exact movement of the body. This is a superior method to the industry standard motion capture cameras and can be used in 3D animation, life sciences, and sports science. Our sensor system is will be the first of its kind and will overcome the major drawbacks of cameras which require a direct line-of-site and a studio. It is based on state-of-the art MEMS inertial sensors and a local wireless network.

Natural Asphalt Solutions
CEO/Principal: Kimball Young **Univ.:** UU
Affiliate/Licensee/Univ.: Affiliate **Cluster:** MMEE

Today's commercial/conventional asphalt products represent the tail end of the crude oil refining process. Simply, they are what's left after the best parts of the crude are dedicated to other uses. Naturally occurring Utah oil sands are crude oil before refining. Utah oil sands, based on anecdotal and scientific review, are much better performing road surfacing material in durability and resilience. This technology replaces commercial/conventional asphalt in road surfacing hot mixes with oil sands based on a UDOT specification now in the final stages of development.

Sera Prognostics
CEO/Principal: Andrew Sauter **Univ.:** BYU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS

Sera has licensed from BYU and UofU the development and commercial rights to newly discovered biomarkers for multiple pregnancy complications that are measurable in blood samples. Sera is currently developing a commercial test for biomarkers to predict preterm birth that were identified using this proteomic discovery technology. Sera and BYU believe this approach could be used to identify proteomic biomarkers for Endometriosis and would like to pursue a New Project to develop a commercially useful test that would be an alternative to laparoscopies.

SMEDiagnostics
CEO/Principal: Brad Bertoch **Univ.:** BYU
Affiliate/Licensee/Univ.: Licensee **Cluster:** IT

HSG allows a new venture's effectiveness at commercializing products to be graphically captured by integrating with a New Venture Template™ ("NVT") analysis of 15 quantifiable attributes and a database of hundreds of successful ventures. HSG statistically analyzes large amounts of industry/ performance data and a large number of variables (multi-variate analysis) and graphically represents all of the objects, data points and correlations on a single screen. The NVT determines the likelihood of venture success based on 15 specific business attributes and a comprehensive database of NAICS coded companies that have been analyzed for venture success. The output delivers a comprehensive analysis of clients' resource capacity and how they compare with success within their industry. Only large consulting firms use sophisticated analytical tools and manpower to generate the results of HSG, which brings the power of an Accenture-type analysis to SMEs at a fraction of the cost.

SpeakWorks
CEO/Principal: Ken Meyers **Univ.:** BYU
Affiliate/Licensee/Univ.: Licensee **Cluster:** IT

Web-based presentation feedback management software. In general, the software allows for live web recording of an oral presentation of any kind, and captures feedback synchronized to the video. The software also provides management for the recordings and feedback, including participants, groups, sessions, and feedback providers.

Synthetic Spider Silk Fibers
CEO/Principal: Randolph V. Lewis **Univ.:** USU
Affiliate/Licensee/Univ.: USU **Cluster:** LS

There are over 100,000 anterior cruciate ligament and 75,000 rotator cuff repair/replacements in the US costing over $3 billion. Hence, there is a critical need for new repair strategies that provide effective mechanical reinforcement of ligament tears and rotator cuff repair as well as to stimulate and enhance the patient's own intrinsic healing potential. Our goal is to develop spider silk protein fibers for the repair/ replacement of ligaments and tendons. The specific aim is to identify the best fiber processing methods to achieve the necessary mechanical properties. The innovation is the use of different "synthetic" spider silk proteins whose properties can be tuned to the planned biomedical application both by the sequence of the protein and the fiber processing methods. The expected outcome is developing materials with superior in vitro characteristics for use as tendon and ligament repair/replacement.

TheraTarget
CEO/Principal: Darwin L. Cheney **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS

Theratarget plans to develop a water-soluble, biodegradable co-polymer that combats cancer. The technology will target solid-cancer tumors (through antibody technology) and release anti-cancer drugs specifically to the cancer site. The attached drug is inert and non-toxic while it circulates through the blood stream, but once the polymer attaches to the solid tumor it becomes engulfed and the anti-cancer drugs become activated thus killing the tumor. The drug carrier when degraded is small enough to be cleared by the kidneys, yet large enough in a non-degraded form to remain in circulation for a sufficient time to be concentrated at the solid tumor site.

Thermal Management Technology
CEO/Principal: J. Clair Batty **Univ.:** USU
Affiliate/Licensee/Univ.: Affiliate **Cluster:** MMEE

Water flow metering is being mandated in more applications including secondary water use. Needed are low-cost/durable flow and "excessive-use" meters (as alarms for breakage) that tolerate sedimentary flow. Modern flow meters are expensive, complex, easily fouled, and impractical for silt-laden secondary water. The proposed non-obtrusive flow meter (NFM) is low cost, has no moving parts, no fowling potential. Small thermal/optical sensors strategically placed within the circumference of and nearly flush with the internal walls of NFM react to flow across and around their surfaces. Convective heat transfer and optical diffusion algorithms, combined with lab calibrations yield volumetric flow. Because NFM flow is determined from brief pulses of power without attaining steady state, a smaller power source—low voltage AC/DC—is required. Compact, solar and battery-assisted options exist. External logic modules provide continuous or intermittent data uploads to Bluetooth or wireless devices

ViroPan
CEO/Principal: Tyler McCabe **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** LS

Aqua-Ring is a novel medical grade polyurethane intravaginal ring (IVR) that steadily delivers ~5 mL of natural vaginal-like fluid over 5 days to treat vaginal dryness in peri- and post-menopausal women. It is a "smart" device that is self-inserted weekly and has the ability to sense the moisture need in the vagina and release fluid on-demand to supplement the lubricating fluids of the vaginal mucosa. Since women experience very different levels of vaginal dryness, Aqua-Ring has a truly unique design and is woman-specific personalized therapy that will not under treat or over treat the vaginal dryness symptoms. There is no other product that can provide this natural and personalized remedy. This product addresses all of the negatives of current estrogen replacement therapies, with their risk of cancer and heart disease, and OTC gels, with their messiness and short duration. The regulatory strategy is to seek market clearance through the Premarket Notification 510(k) pathway in 2013.

Vutara
CEO/Principal: Stan Kanarowski **Univ.:** UU
Affiliate/Licensee/Univ.: Licensee **Cluster:** IT/LS

Vutara has coupled cutting-edge breakthroughs in photophysics and computation to create a new super-resolution microscope, the SR-200. The SR-200 microscope is a super-resolution fluorescence microscope that combines new hardware (microscope and peripherals) and software (operational and analytical tools). Vutara SR-200 Bi-plane Technology - For over a century the work defining light microscopy resolution limits has stood to affirm that resolutions below the diffraction would be inherently out of reach, relegating science to postulate as to the localization of small objects. Today, however, we find ourselves in the midst of an optical revolution, with the introduction of several new lens based, light microscopes capable of smashing the diffraction limit, approaching single molecule resolutions. These systems have redefined light microscopy and been termed "Super-Resolution" or "Sub-diffraction" microscopes, with recent commercial introduction to the global scientific market.

Utah Centers of Excellence Program
Description of Centers Selected for Funding Fiscal 2005-2006

For information on a specific Center
Please contact the respective Technology Transfer Office

BRIGHAM YOUNG UNIVERSITY
Technology Transfer Office
3760 Harold B. Lee Library
Provo, UT 84602-6844
801-422-6266
801-422-0463 fax
www.byu.edu
www.techtransfer.byu.edu

Acoustics Research (BYU)
Commercializing active sound control technology with superior ability to both reduce noise in varied settings (vehicle cabins, computer fans and telecommunications, e.g.) and modify sounds for commercial benefit.

Advanced Communications Technology (BYU)
Improved wireless communications and data transmission for both military and commercial markets is achieved through the use of MIMO (multiple-input multiple-output) technology with multiple antenna elements.

Miniature Unmanned Air Vehicles (BYU)
Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies.

Direct Machining and Control (BYU) **Assigned a Business Team**
Developing programming that allows a manufacturer to automatically optimize part production by adjusting for the actual specifications and tolerances of each item.

Compliant Mechanisms (BYU) **Graduated**
Develops commercial versions of devices that obtain their motion from the deflection of flexible parts rather than from pin joints. A superior and cost-saving electrical switch marketed by a Utah firm is one good example.

UNIVERSITY OF UTAH
Technology Transfer Office
615 Arapeen Drive, Suite 310
Salt Lake City, UT 84108
801-581-7792
www.utah.edu
www.tto.utah.edu

Alternate Strategies of Parasite Removal (U/U)
Preparing to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers.

Biomedical Microfluidics (U/U)
Engineering technology that controls the movement of fluids in channels smaller than a human hair; micropumps that can deliver tiny quantities of drugs and improved devices for DNA screening are some product examples.

Computational Design & Testing of Novel Materials (U/U)
Commercializing powerful computational packages capable of designing novel materials and predicting the electrical, mechanical and structural characteristics of electromechanical devices, especially nanostructured materials and components.

Global Knowledge Management (U/U)
Developing Knowledge Fusion and Dynamic Knowledge Refreshing software to enable next-generation data mining technology.

Homogeneous DNA Analysis (U/U)
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office.

Interactive Ray-Tracing & Photo-Realistic Visualization (U/U)
Producing a commercial form of two programs that can process 3-D graphics based on large data sets found in CAD, film animation and scientific models, which existing GPUs cannot handle.

Magnetic Sensor & Actuator Materials (U/U)
Working to commercialize a novel magnetostrictive alloy exhibiting a large physical effect in response to small magnetic fields, which may find use in applications from antilock brakes to nanomachining and ultrasonic devices.

Microarray Technology (U/U)
Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Modified Activated Carbons Technology (U/U)
Developing improved products for gas and water treatment, as well as metal recovery or removal, based on modifications to granular activated carbon.

Nanosize Inorganic Material Powders (U/U)
Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

Therapeutic Biomaterials (U/U)
Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs.

Titanium Boride Surface Hardening (U/U)
Commercializing harder, longer-lived components and devices – ranging from armor to bearings and orthopedic implants - for the military, biomedical and industrial markets.

Acoustic Cooling Technology (U/U) **Assigned a Business Team**
Developing novel miniature acoustic power conversion devices without moving parts for energy recovery from waste heat.

CROMDI (U/U) **Graduated**
The Center for the Representation of Multi-Dimensional Information developed new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data, such as an anesthesiology product licensed to GE.

Petroleum Research (U/U) **Graduated**
Developed cost-effective solutions for liquid hydrocarbon production, handling and transportation that optimize petroleum recovery; process control and production automation in oil and gas fields.

UTAH STATE UNIVERSITY
Utah State University Research Foundation
570 Research Park Way, Suite 101
Logan, UT 84341
435-797-9607
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www.usu.edu/techcomm

Advanced Imaging LADAR (USU)
Commercializing land-based and airborne high-resolution, laser-based 3D color-imaging platforms for both military and civilian use.

Advanced Satellite Manufacturing (USU)
Leveraging the capabilities of Utah's Space Dynamics Laboratory to develop and commercialize a low cost, modular small satellite platform for commercial, research, and military missions.

High-Speed Information Processing (USU)
Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices.

Control of Flow in Manufacturing (USU) **(Pre-Center Candidate - Assigned a Business Team)**
Applying Computational Fluid Dynamics to improve manufacturing processes including particle sorting and Electrical Discharge Machining (EDM).

Profitable Uses of Agricultural Byproducts (USU) **Graduated**
Developed a cost-effective technology to treat animal wastes, generating both "Biogas" that can be used to produce energy, and nutrients to be used in soil amendments.

Smart Sensors (USU) **Graduated**
A Utah spinout company is now commercializing sensor-based products, including a device that can detect and localize faults in aircraft wiring from any accessible location.

Governor's Office of
Economic Development
Centers of Excellence

Funding Recipients for the Fall 2010-11 Solicitation of the Utah Centers of Excellence Program

Total proposals submitted: 45
Total awarded funding: 21
12 Licensees,
5 Affiliates,
2 UU Internal teams
2 USU internal teams

The technologies are emerging from the following universities:
5 from BYU
11 from UU
5 from USU

LICENSEES

Anaerobic Digestion Technologies, Inc.
CEO/Principal: Jason Miller
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 – Company

A patent-pending, low-cost, low-maintenance, scalable methane filtration solution. The system is comprised of multiple filter cylinders and gas routing hardware, with an automated electronic control system. The BCS is skid-mounted for easy delivery and installation. The System removes corrosive contaminants and impurities from well-produced and waste-generated methane gas streams at 1/10th to 1/15th the cost of currently marketed technologies. Hydrogen sulfide, water, and other destructive agents are extracted to negligible levels by the BCS, significantly prolonging the life of pipeline infrastructure and electrical generation equipment associated with gas resources. Ground-breaking innovation is manifest in the thermal management system of the BCS. Low levels of excess system heat are utilized to replenish the filter beds and release contaminants in a concentrated gas stream. Successful management of this process makes the system unique and industry-changing in character.

Aviradyne Technologies, Inc.
CEO/Principal: Ronald D. Jones
Univ.: USU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – Univ

Hybrid rockets are significantly safer than Liquid and Solid counterparts. Hybrid motors can be stored and operated without risk of explosion. This makes hybrids ideal for commercial spaceflight except for two significant short-comings attributable to current manufacturing processes: motor-to-motor variability that precludes motor clustering, and lack of a for volume production method to support the required flight rates for the growing commercial space launch industry. The proposed production method uses robotic manufacturing technologies to effectively remedy both of these deficiencies: Digital-Direct Manufacturing to fabricate hybrid rocket fuel grains that are uniformly produced, and Filament/Tape Winding systems to form the composite case and assemble the motor in a single process. Factory automation and application of advanced polymer materials will significantly reduce motor-to-motor performance variability, enable FAA certification, and cut production costs by more than 50%.

Black Box Engineering, Inc.
CEO/Principal: Zac Humes
Univ.: USU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – Company

Coanda Assisted Spray Manipulator (CSM) gives the user the ability to change the direction of the flow of flame and particles leaving existing flame spray guns. The CSM will be designed as an add-on to existing flame spray gun technology. These flame spray guns are used for coating the interior of pipes, cylinders, and other surfaces using different materials. The coatings are used to improve performance of the substrate and reduce maintenance costs. Current technology limits this process to being performed on large diameter pipes, usually greater than 48 inches in diameter, because it requires a person to be inside the pipe to control the direction of the flow. The CSM device will allow the process to be completed on smaller diameter pipes and surfaces without the need for human labor to control the direction of the flow. This process will also be completed more quickly, accurately, and affordably as it removes the need for such intensive manual labor as is currently necessary.

CAT-Credibility Assessment Technologies
CEO/Principal: Donald R. Sanborn
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT
Award Amt.: $40,000 – Company

Oculomotor Deception Detection© (ODD) holds significant promise for numerous security screening and intelligence applications. This revolutionary technology, based on five years of scientific research, provides a powerful new methodology for detecting deception. The ODD measures cognitive responses to deception as detected by a highly accurate eye tracking system that records eye movements and pupil diameter changes as a subject reads true/false questions presented by a computer. The current standard for lie detection technology is the polygraph which takes up to 3 hours to administer, requires a highly skilled examiner, costs about $970 and is 85% accurate. The ODD test takes only 25 minutes, is easily-administered by minimally trained examiners and costs a fraction of the polygraph with the same accuracy.

Crocker Spinal Technologies
CEO/Principal: David Hawkes
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 - University

The FlexSuRe™ is a spinal implant developed at BYU and licensed by Crocker Spinal Technologies, Inc. The FlexSuRe™ was designed to restore stability to the spine after surgeries such as discectomy or laminectomy. It shares load with other spinal structures, maintaining healthy motion while providing mechanical resistance to painful, nonphysiologic motion. The existing FlexSuRe™ is already market-separated due to its unique compliant-mechanism design. However, based on recommendations by the surgeon advisor board advising Crocker Spinal Technologies, the implant can be improved to increase its market acceptance. The COE award will be used to change the existing design to decrease size, modify orientation, and restore height to the segment. As a result, the device will restore nutrient flow to the disc while biomechanically mimicking the motion of a healthy segment. These characteristics make the device forward-looking to complementary technologies for spinal disc regeneration.

E-Sens
CEO/Principal: Jack Buchanan
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – Company

Sensicore has developed a silicon-based chemical sensing technology to address the world's water monitoring needs. The company's lab-on-a-chip sensors monitor multiple chemicals with an array of sensors selective to different analytes. The sensor array takes advantage of the mass fabrication manufacturing technology of the semiconductor industry to produce a low cost per test solution. The sensor array chip will be replaced periodically, eliminating the need for constant maintenance of the sensors. Its small size reduces the need for calibration solution, making it practical to produce small hand-held sensing systems, and to implement remote, unattended sensor network nodes.

Fusion Diagnostics
CEO/Principal: Ben Rollins
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 – Company

Developing glasses with a novel coating that blocks the light spectrum that triggers migraines and other neurological disorders such as blepharospasm. By wearing these coated glasses, migraine sufferers may experience significant reduction in the frequency and severity of their migraine attacks. These coatings can be applied to spectacle lenses, contact lenses, and various types of light sources.

HOT Water Global
CEO/Principal: Brandon Lloyd
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – University

This new technology involves repeated pressure cycles each consisting of a compression stage and a venting stage. The compression stage reaches 100-150 psi in the headspace of a closed vessel by use of a compressor, saturating the water being treated with an ozone/air mixture. The venting stage (to ambient pressure) produces rapidly expanding gas bubbles of all sizes from nano, micro, and centimeter sizes that provide abundant reactive interfacial ozone for ozone and contaminants. Repeated pressure cycles result in conversion of dispersed and

dissolved oil into forms that can be removed by conventional sand filtration or biodegradable products. This project will use a pilot reactor (200 L) to demonstrate treatment of produced water and flow-back water from the oil and gas industry. The process represents an application of University Technology (U-3996).

Microsurgical Innovations
CEO/Principal: Jay Agarwal
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $20,000 – Company; $20,000 – Univ.

An arterial anastomotic device, referred to as an arterial coupling device (ACD), which will replace the hand suturing technique currently used to connect arteries in microsurgery and macrovascular end-to-end arterial repair surgeries. This device would consist of a barbed cap that would be placed at the end of each artery and then connected together to attach the two arterial ends. This approach would reduce the time required in the surgery suite, reduce costs associated with surgery, and reduce the likelihood of failure of the anastomoses, by minimizing human error and stenting open the anastomosis. There are currently no arterial anastomotic devices available. This technology has the ability to simplify technically challenging microvascular repair and to expand the scope of microsurgery by facilitating these types of procedures in third world countries and in battlefield hospital settings.

Solan LLC
CEO/Principal: Brandon Lloyd
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE
Award Amt.: $40,000 – University

A technology that will fabricate solar cells based on lithographically defined graphite, so-called carbon nanoribbons (CNRs). The electronic properties of CNRs exhibit a dependence on the ribbon dimension. Reducing ribbon width to nanometer scale can turn graphite into a semiconductor, and with the proper selection of metal contacts with different work functions, one can form Schottky barrier solar cells. Upon excitation of the incident light, free electrons and holes will be generated within CNRs. Due to device building-in potential, which equals to the difference in between the two metal leads, free electrons and holes will be extracted to the electrodes, generating electricity. Due to the abundance of graphite material and convenience to tune the material bandgap, we expect to fabricate low-cost and high-efficiency solar cells. A patent, filed on this invention jointly by University of Utah and University of Wisconsin-Madison, has been allowed and licensed to Solan.

TranquilMed
CEO/Principal: Jared Edgel
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 - Company

RestEasy will be the only non-drug treatment for Restless Legs Syndrome (RLS) on the market. It uses patent pending treatment of near-infrared light that penetrates the skin deep into the tissue. Dr Mitchell's studies show 52% reduction in RLS symptoms in 12 treatments and give a p-value less than 0.001. Our device consists of a neoprene pad with adjustable straps. The back of the pad has an array of LEDs that when applied to the lower leg emits near-infrared light that penetrates the skin. This releases Nitric Oxide which then causes the blood vessels to dialate. Vasodilation in turn increases blood flow, satisfying the urge to move and mitigating RLS symptoms. Features for safe home-use and convenience include: a lithium-ion battery that allows free movement during treatment and a control interface that is simple to use. Additionally the device has thermocouples in place to shut the device down if the temperature of the leg gets too high.

Veritract, LLC
CEO/Principal: Arlo McGinn
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS
Award Amt.: $40,000 - Company

Nasogastric feeding tubes are the most commonly placed gastrointestinal devices in hospitals today. Over 80% of ICU patients and many more patients in general hospital floors (1.25 million total US patients) receive nutrition via these tubes. Because most of these feeding tubes are placed blindly, without any guidance, many thousands of these tubes are misplaced to the lung causing serious injury and even death. To verify proper placement, most hospitals require X-ray confirmation of tube placement but incur significant extra expense as a result. Veritract leverages the advancements made in endoscopic technology to allow these technologies to be built into an inexpensive disposable device. Our design integrates optics for vision, and steering for guidance, allowing feeding tubes to be guided and placed into the intestinal tract under direct visualization. This allows for a much quicker, safer, and economical placement and improves patient care while streamlining hospital procedures.

AFFILIATE COMPANIES

Cajun Archery
CEO/Principal: David White
Univ.: USU
Affiliate/Licensee/Univ.: Affiliate
Cluster: MMEE
Award Amt.: $12,500 – University.

Through a market analysis, Cajun Archery, a manufacturer and supplier of bowfishing equipment, has identified a need for a bowfishing reel. Currently, there are two bowfishing reels that dominate the bowfishing market. One of these reels releases line very efficiently, while the other retrieves line well. Neither reel excels at performing both of these tasks. This project is to design a bowfishing reel that is able to both release and retrieve line efficiently, is easy to operate, requires minimal maintenance, and is cost effective to manufacture. Through the use of computer-aided design (CAD) rapid prototyping, and computer numerical control (CNC) machining the Research Group for Product Engineering and Prototyping at USU is able to quickly design, test and develop products to meet market demands. Through the engineering design process we will be able to meet design criteria and reduce commercialization risks for Cajun Archery.

Domain Surgical, Inc.
CEO/Principal: David J. McNally
Univ.: UU
Affiliate/Licensee/Univ.: Affiliate
Cluster: LS
Award Amt.: $40,000 – University

Surgery requires the cutting and coagulation of bleeding tissues and vessels, as well as the re-attachment of tissues or their destruction. Because of this, a large market has evolved based upon the promise of improved outcomes related to the excision, dissection, hemostasis, and healing of tissue. Many innovations have been introduced in recent years, but many surgeons are still dissatisfied that there is not a tool that meets all the criteria. Our patent-pending ferromagnetic inductive heating technology holds the promise of producing surface-only tissue effects with energy that does not pass through the patient; frictionless cutting with elimination of tissue distortion and sticking; on-demand rapid onset and offset of effect as various tissues or bleeding are encountered; and easy cleaning and disposability. These attributes position our technology as an ideal energy modality for cardiothoracic surgical procedures.

Enerlyte, LLC
CEO/Principal: Seth M Phillips
Univ.: BYU
Affiliate/Licensee/Univ.: Affiliate
Cluster: MMEE / IT
Award Amt.: $40,000 - University

Enerlyte's intelligent, clean technology, energy conservation program is a revolutionary web-based software for tracking energy efficiency & conservation. The software tracks both user activity and results of utility conservation programs. Using system data, Enerlyte software makes recommendations to users and utilities for improving energy usage. Users get graphs and customized tips on their monthly utility bill. Utilities get an online dashboard providing usage analysis that maximizes utility ROI for each dollar spent on efficiency & conservation. Enerlyte groups users into peer groups (households with similar size/age of home, family size, location, etc.) and monitors changes in energy use when users take specific actions to conserve. Enerlyte's product uniquely addresses both user & utility demand for energy usage information that can lead to improved efficiencies in energy usage & conservation.

Euclid Timber Frames LLC
CEO/Principal: Kip Apostal
Univ.: UU
Affiliate/Licensee/Univ.: Affiliate
Cluster: MMEE
Award Amt.: $15,000 – University.

Interlocking Cross Laminated Timber (ICLT) is a prefabricated cross-laminated solid wood wall and roof panel fabricated from 2-5 layers of alternating direction 3" x 6" to 3" x 8" pine stock milled from beetle kill trees. ICLT utilizes no fasteners and no adhesives, removing the reliance on volatile organic compound (toxic) adhesives, allowing the panel to be disassembled at end of life to be repurposed in the building material supply chain. Layering gives the panel strength, allowing low-grade wood to be used in a high value structural situation, estimated to last upwards of 100 years. ICLT can be built up to nine stories in some cases, efficient in speed of construction, and given the availability of material, potentially affordable for both production home building and large commercial structures. This proposal is for ICLT commercialization research between university and industry in preparation for market acceptance in the next two years.

Linear Signal, LLC
CEO/Principal: Greg Mockett
Univ.: BYU
Affiliate/Licensee/Univ.: Affiliate
Cluster: IT
Award Amt.: $40,000 – University.

Traditional satellite dish antenna technology suffers from quality of service problems due to poor mount installation, wind loading, rain, roof sag, and satellite orbital wobble. Smart electronically steered phased array feed antennas adjust the antenna beam adaptively to maintain maximum signal quality. Linear Signal has developed a critical enabling part for smart antennas, an integrated beamformer chip, which will be combined with high efficiency, low noise phased array antenna technology developed for radio astronomy by Prof. Warnick at BYU to produce smart antenna feeds for commercial satellite antennas on buildings, aircraft, vehicles, and ships.

UNIVERSITIES

Large-Scale Semiconductor Nanocrystal Fabrication
CEO/Principal: Michael H. Bartl
Univ.: UU
Affiliate/Licensee/Univ.: UU
Cluster: MMEE / IT
Award Amt.: $40,000 – University

Nanocrystals (1 to 100 nm in size) are considered cornerstones of emerging energy, information, and biomedical technologies due to their unique size-dependent electronic and optical properties. However, their widespread use is severely limited by current high-cost and small-scale fabrication methods requiring high temperatures. In contrast to existing techniques, we have developed a novel synthesis method for high-quality nanocrystals that operates at low reaction temperatures (patents pending). Our method promises enormous impact for commercial applications, since low-temperature synthesis enables easier scale-up (high throughput fabrication) with reduced engineering requirements while keeping high product quality and reproducibility. Moreover, our method uses inexpensive, industry-tested and reusable reaction components (e.g. solvents) and therefore should not only result in significantly reduced manufacturing costs, but also in environmentally-friendlier "greener" fabrication.

Smart Antenna Technology
CEO/Principal: Bedri A. Cetiner
Univ.: USU
Affiliate/Licensee/Univ.: USU
Cluster: IT
Award Amt.: $40,000 – University

The technology developed at USU is an adaptive smart antenna technology that enables a single antenna element to dynamically change its properties such as operation frequency, beam direction, and polarization. An adaptive antenna is an indispensible part of the next generation wireless communications systems such as upcoming 4G systems in order to achieve targeted system performances, i.e., higher data rate, capacity, etc. With the existing technologies for a system to provide dynamically adaptive features, a large number of antennas in conjunction with ancillary electronic components need to be used. The existing technology, therefore, is cost and size prohibitive for commercial wireless systems. On the other hand, our technology provides a superior performance with a single antenna element which can be realized at low cost and size. The microfabrication technology developed by the PI's research group, which will be patented by the USU TCO, is based on a novel microfluidic technology

Smart Occupancy
CEO/Principal: Aravind Dasu
Univ.: USU
Affiliate/Licensee/Univ.: USU
Cluster: IT
Award Amt.: $40,000 – University

The Smart Occupancy Sensor is a dual mode hardware device (Passive IR + Video camera) that can be mounted on a ceiling in an office room, and expected to reliably and near-instantaneously turn lights on when occupied and turn them off when unoccupied. The unique features are: (a) Its response time is ~5 seconds compared to 15-20 minutes for motion sensors, (b) It can be configured and setup via software using a graphical user interface, (c) It does not suffer the infamous 'hand waving' problem that motion sensors do, and (d) It can be upgraded via software updates for daylight aware lighting control and task control.

Trace Explosives Detection
CEO/Principal: Ling Zang
Univ.: UU
Affiliate/Licensee/Univ.: UU
Cluster: MMEE
Award Amt.: $40,000 - University

Portable devices that are suited for infield explosives detection. The sensory materials are composed of well-defined nanofibers fabricated from different building-block molecules. As covered in our five IPs, the nanofibers are highly efficient for vapor detection of explosives, via optoelectronic modulation upon interaction with the targeted explosives. Upon integration into a small chip, the entangled nanofibers form a mesh-like, highly porous film, providing maximal sampling of explosives, enabling expedient vapor detection with unprecedented efficiency (down to ppt range). This is superior to the common solid film-based sensory materials, for which the sampling of trace analysts remains difficult due to the limited surface area. Compared to conventional electronic detection systems like those based on MS or IMS, the nanofibers represent a class of simple, small and adaptable detection system.

Governor's Office of Economic Development

Grant Recipients for the 2010-11 (R2) TCIP Solicitation

Total proposals reviewed: 42
Total recommended for funding: 22
- **Licensees: 14**
- **Affiliates: 5**
- **UU Internal teams: 2**
- **USU internal teams: 1**

The technologies are emerging from the following universities:
- **12 of 22 from UU**
- **5 of 7 from BYU**
- **3 of 9 from USU**
- **1 of 2 from SLCC**
- **1 of 1 from UVU**
- **0 of 1 from WSU**

FUNDED

Aciont
CEO/Principal: John Higuchi
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS

The project is a preclinical proof of concept research plan as a premise to create the ultimate achievement in ophthalmic therapy: to treat non-invasively, age related macular degeneration (AMD) and diabetic retinopathy. The project intends to develop a safe and an effective, an approximate 20 minute iontophoresis treatment for the delivery of macromolecules such as Avastin® to the posterior section of the eye, which can be administered by a nurse or paraprofessional or potentially, patients themselves. This Visulex® system is a combination novel ocular iontophoresis device - an eye applicator resembling a scleral lens - and enhancement formulation capable of delivering large, antibody agents to the posterior segment of the eye. Iontophoresis is a method of delivering drugs through body tissue using the aid of a mild electrical current. Visulex offers a customized, localized controlled release therapy designed to minimize unnecessary patient exposure to the drug.

Akadi Technologies
CEO/Principal: Wes Christiansen
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT

Akadi digital signage is unique in that it creates a network of displays, organized by time, geographic location and demographic audience which can be managed by any user from any web enabled device. Value in the network increases as the reach of the network grows, enabling advertisers and diverse interest groups to target unique audiences with specific and relevant information. For advertisers to be successful today they have to stand out! Success in business today is less about advertising and more about connecting through social media, viral messaging and other meaningful interactions. Targeted messaging and information that is personalized and relevant is the only way to reach through the clutter of messages we are bombarded with on a daily basis. Akadi Technologies is perfectly positioned to be able to leverage a number of technologies, existing and currently under development, to redefine digital signage and targeted and interactive messaging.

AnalySwift
CEO/Principal: Allan Wood
Univ.: USU
Affiliate/Licensee/Univ.: Licensee
Cluster: MMEE/IT

VABS is a unique technology capable of rigorously modeling 3D slender solids with complex microstructures, such as wind turbine blades, helicopter rotor blades, bridges, and other beam-shaped structures. VABS has been consistently demonstrated to be much better than other technologies regarding accuracy, efficiency, and versatility. This technology can save several orders of magnitude in computing time with little loss of accuracy and is gaining an international reputation in rotorcraft and wind power industries. Major companies such as Boeing, Siemens, AeroVironment have licensed VABS. All the other competitive technologies have a very limited set of capabilities and few of them can treat composites which are extensively used now. Furthermore, none of the existing tools have a strong endorsement from the research-oriented community as VABS has. We strongly believe that VABS will become a very competitive product and the tool of choice for modeling composite beam structures.

Credibility Assessment Technologies
CEO/Principal: Donald R. Sanborn
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT

Ocular-motor Deception Test (ODT) is the first major breakthrough in deception detection technology in 20 years, with numerous security screening and intelligence applications. This revolutionary technology provides a powerful new methodology for detecting deception. The ODT measures cognitive consequences of deception with a highly sensitive eye tracking system that records eye movements and pupil diameter changes as the subject reads true/false questions presented by a computer. The ODT compared with other technologies like the polygraph, it is more competitive: It is easily-administered, takes only 25 minutes, is cost effective, achieves the same accuracy (85%), can be administered in multiple languages and settings, facilitates high volume testing, and is customizable to different needs. In conclusion, the ODT reduces the need for time-consuming and expensive polygraph examinations and brings simplicity, speed, and convenience to screening process.

DBS Electrode Array
CEO/Principal: Alan Dale Dorval II
Univ.: UU
Affiliate/Licensee/Univ.: UU
Cluster: IT/LS

Massive-Multielectrode, Cross-Hatched Planar Arrays for Deep Brain Stimulation. This device will allow the user to control the direction and shape of the electric field.
The proposed device will allow for complete control over the electric field including its shape and direction. No longer will the field center be limited to the electrode contact, and no longer will it be limited to a spherical shape. By using a unique cross shaped electrode with approximately 10,000 contacts, this device will be able to shape the field to fit the particular region of the brain that requires stimulation, without crossing over into undesired regions. DBS treatment with this device will be more effective and safe, and more flexible, as different regions of the brain would not require specially shaped electrodes.

Distal Access
CEO/Principal: Shawn P. Fojtik
Univ.: UU
Affiliate/Licensee/Univ.: Affiliate
Cluster: LS/MMEE

Doctors spin needles, catheters, and wires to access deep inside organs or clear catheters and vessels. Spinning by hand gives surgeons feel & control but lack power & speed. Electrical powered 'drill-like' devices give power & speed, but are bulky, expensive, and lack feel & control. Clinicians need a device that combines power & speed with feel & control. The SPINR is a hand-held, mechanical, cost-effective device that spins needles, catheters, and wires when the doctor squeezes their hand. SPINR's simple 6-piece molded design includes a helical gear that coverts the squeeze of the handles into axial rotation. Gearing can be adjusted for high-rotation or high-torque applications. Connecting guidewires to the SPINR helps wires vibrate and advance through narrowings or blockages. Oscillating shaped wires and catheter with the SPINR creates a powerful device to macerate blockages in catheters and vessels. SPINR: the speed of a motor with the feel of the hand.

Domain Surgical
CEO/Principal: David J. McNally
Univ.: UU
Affiliate/Licensee/Univ.: Affiliate
Cluster: LS

Surgery often requires the cutting and coagulation of vascularized tissues and blood vessels, including the sealing of individual large arteries, veins, and lymphatics. A large market has evolved based upon the promise of improved outcomes related to the sealing and cutting of blood vessels. Innovations intended to improve the speed and integrity of sealing vessels have been introduced in recent years, but many surgeons are still dissatisfied with the performance and security of those devices. Our patent-pending ferromagnetic inductive heating technology holds the promise of producing surface-only tissue effects with energy that does not pass through the patient; uniform sealing with elimination of tissue distortion and sticking; minimizing of collateral or adjacent tissue injury or thermal damage; on-demand rapid onset and offset of effect

as various tissues or bleeding are encountered; and easy cleaning and disposability. These attributes position our technology as an ideal energy modality for surgical procedures requiring the sealing of blood vessels of a wide range of sizes.

Epitel
CEO/Principal: Mark Lehmkuhle
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT/LS

A small, user friendly, wireless device for human EEG monitoring is currently lacking. We propose an individual-use patch-type telemetry device for simplified EEG recording from human patients. This device will enable user-friendly application of the EEG electrode and real-time recording of the EEG signal either in the ICU, in an out-of-hospital setting (e.g., the home or work environment), or for research (e.g., antiepileptic drug testing). The device will consist of a small EEG electrode/transmitter unit that both wirelessly transmits EEG signals to a receiver and "logs" EEG data for later retrieval. The only component placed on the patient will be a small unit that is roughly the size of a Band-Aid™ and will have the look and feel of a "patch." Our primary objective is to create a user-friendly, unobtrusive device that can be used to reliably record acute and/or chronic electrographic seizures under conditions where traditional ambulatory EEG is not feasible or practical.

H2O TECH
CEO/Principal: Timothy Nelson
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS/MMEE

The Neptune Water Drill provides a scientifically engineered jet stream of water that is less than the thickness of a piece of paper, mixed with tiny particles of abrasive that removes dental caries. It is the most precise cutting device in the dental industry (the Neptune water drill stream diameter is 1/7 the thickness of the most used dental drill bits), which improves the art of dentistry and increases patient satisfaction.
It is a patented invention of Dr. Robert Todd, Professor of Mechanical Engineering at Brigham Young University and Scott C. Hansen. Major benefits include: (1) precision-cutting dentistry, (2) no heat from friction, (3) natural matte finish eliminates phosphoric acid etchings in the drilled out cavity, (4) no drilling sound or vibrations, (5) less irritation of the nerves, (6) reduced need for anesthesia, (7) less post operative pain, discomfort and chance for infection, (8) and lower risk of reoccurring dental caries.

Holorad
CEO/Principal: Stephen J Hart
Univ.: UVU
Affiliate/Licensee/Univ.: Affiliate
Cluster: IT

Holorad's technology prints animated interactive color holograms from Computer Graphics scenes designed in animation programs such as Autodesk Maya. This provides glasses-free 3D holograms for entertainment, advertising, and medical applications. These are holographic prints,

projecting out in front of the observer with true depth. No other technology provides this rich combination of visual stimuli, and the resulting holograms are very compelling. Hologram production and replay requires custom optical systems, and for cost-effective commercial applications these need to use highly-divergent beams which inherently produce highly distorted holograms. To correct this, Holorad pre-distorts the printed data so that the distortions cancel, producing an undistorted result. The general mathematical basis for this is known in the geometrical optics literature, but has not been extended to the required 3D formulation and implementation, so Holorad currently uses a slow iterative fine-tuning.

Knudra Transgenics
CEO/Principal: Chris Hopkins
Univ.: SLCC
Affiliate/Licensee/Univ.: Licensee
Cluster: LS

Knudra makes biosensors detecting toxicities in our environment, food, and medicines. The nematode worm's capacity to detect toxins is harnessed by genetic engineering the worm to turn green upon exposure to toxin. The observation of turning green is a biosensor of toxicity. We make many types of worm biosensors to detect different types of toxins. We arrange the worm biosensors into arrays where every array well contains a different type of biosensor. Different toxins create different patterns of biosensor activation. A digital readout of toxicity is achieved. This simplifies data interpretation. Data sets are inherently normalized allowing the most important toxic mechanism to be easily identified. Our competition has a wide variety of methods with very little standardization between tests, which leads to confusion in data interpretation. Our method is faster, cheaper, and more reliable than current methods and it uniquely reveals which toxicity mechanism is of highest concern.

Linear Signal
CEO/Principal: Greg Mockett
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT

Traditional satellite dish antenna technology suffers from quality of service problems due to poor mount installation, wind loading, rain, roof sag, and satellite orbital wobble. Smart electronically steered phased array feed antennas adjust the antenna beam adaptively to maintain maximum signal quality. Linear Signal has developed a critical enabling part for smart antennas, an integrated beamformer chip, which will be combined with high efficiency, low noise phased array antenna technology developed for radio astronomy by Prof. Warnick at BYU to produce smart antenna feeds for commercial satellite antennas on buildings, aircraft, vehicles, and ships.

Motion Sensor Suit
CEO/Principal: Carlos Mastrangelo
Univ.: UU
Affiliate/Licensee/Univ.: UU
Cluster: IT

We are developing a wireless sensor "suit" that measures the exact movement of the body. This is a superior method to the industry standard motion capture cameras and can be used in 3D

animation, life sciences, and sports science. Our sensor system is will be the first of its kind and will overcome the major drawbacks of cameras which require a direct line-of-site and a studio. It is based on state-of-the art MEMS inertial sensors and a local wireless network.

Natural Asphalt Solutions
CEO/Principal: Kimball Young
Univ.: UU
Affiliate/Licensee/Univ.: Affiliate
Cluster: MMEE

Today's commercial/conventional asphalt products represent the tail end of the crude oil refining process. Simply, they are what's left after the best parts of the crude are dedicated to other uses. Naturally occurring Utah oil sands are crude oil before refining. Utah oil sands, based on anecdotal and scientific review, are much better performing road surfacing material in durability and resilience. This technology replaces commercial/conventional asphalt in road surfacing hot mixes with oil sands based on a UDOT specification now in the final stages of development.

Sera Prognostics
CEO/Principal: Andrew Sauter
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS

Sera has licensed from BYU and UofU the development and commercial rights to newly discovered biomarkers for multiple pregnancy complications that are measurable in blood samples. Sera is currently developing a commercial test for biomarkers to predict preterm birth that were identified using this proteomic discovery technology. Sera and BYU believe this approach could be used to identify proteomic biomarkers for Endometriosis and would like to pursue a New Project to develop a commercially useful test that would be an alternative to laparoscapies.

SMEDiagnostics
CEO/Principal: Brad Bertoch
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT

HSG allows a new venture's effectiveness at commercializing products to be graphically captured by integrating with a New Venture Template™ ("NVT") analysis of 15 quantifiable attributes and a database of hundreds of successful ventures. HSG statistically analyzes large amounts of industry/performance data and a large number of variables (multi-variate analysis) and graphically represents all of the objects, data points and correlations on a single screen. The NVT determines the likelihood of venture success based on 15 specific business attributes and a comprehensive database of NAICS coded companies that have been analyzed for venture success. The output delivers a comprehensive analysis of clients' resource capacity and how they compare with success within their industry. Only large consulting firms use sophisticated analytical tools and manpower to generate the results of HSG, which brings the power of an Accenture-type analysis to SMEs at a fraction of the cost.

SpeakWorks
CEO/Principal: Ken Meyers
Univ.: BYU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT

Web-based presentation feedback management software. In general, the software allows for live web recording of an oral presentation of any kind, and captures feedback synchronized to the video. The software also provides management for the recordings and feedback, including participants, groups, sessions, and feedback providers.

Synthetic Spider Silk Fibers
CEO/Principal: Randolph V. Lewis
Univ.: USU
Affiliate/Licensee/Univ.: USU
Cluster: LS

There are over 100,000 anterior cruciate ligament and 75,000 rotator cuff repair/replacements in the US costing over $3 billion. Hence, there is a critical need for new repair strategies that provide effective mechanical reinforcement of ligament tears and rotator cuff repair as well as to stimulate and enhance the patient's own intrinsic healing potential. Our goal is to develop spider silk protein fibers for the repair/replacement of ligaments and tendons. The specific aim is to identify the best fiber processing methods to achieve the necessary mechanical properties. The innovation is the use of different "synthetic" spider silk proteins whose properties can be tuned to the planned biomedical application both by the sequence of the protein and the fiber processing methods. The expected outcome is developing materials with superior in vitro characteristics for use as tendon and ligament repair/replacement.

TheraTarget
CEO/Principal: Darwin L. Cheney
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS

Theratarget plans to develop a water-soluble, biodegradable co-polymer that combats cancer. The technology will target solid-cancer tumors (through antibody technology) and release anti-cancer drugs specifically to the cancer site. The attached drug is inert and non-toxic while it circulates through the blood stream, but once the polymer attaches to the solid tumor it becomes engulfed and the anti-cancer drugs become activated thus killing the tumor. The drug carrier when degraded is small enough to be cleared by the kidneys, yet large enough in a non-degraded form to remain in circulation for a sufficient time to be concentrated at the solid tumor site.

Thermal Management Technology
CEO/Principal: J. Clair Batty
Univ.: USU
Affiliate/Licensee/Univ.: Affiliate
Cluster: MMEE

Water flow metering is being mandated in more applications including secondary water use. Needed are low-cost/durable flow and "excessive-use" meters (as alarms for breakage) that tolerate sedimentary flow. Modern flow meters are expensive, complex, easily fouled, and impractical for silt-laden secondary water. The proposed non-obtrusive flow meter (NFM) is low cost, has no moving parts, no fowling potential. Small thermal/optical sensors strategically placed within the circumference of and nearly flush with the internal walls of NFM react to flow across and around their surfaces. Convective heat transfer and optical diffusion algorithms, combined with lab calibrations yield volumetric flow. Because NFM flow is determined from brief pulses of power without attaining steady state, a smaller power source—low voltage AC/DC—is required. Compact, solar and battery-assisted options exist. External logic modules provide continuous or intermittent data uploads to Bluetooth or wireless devices

ViroPan
CEO/Principal: Tyler McCabe
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: LS

Aqua-Ring is a novel medical grade polyurethane intravaginal ring (IVR) that steadily delivers ~5 mL of natural vaginal-like fluid over 5 days to treat vaginal dryness in peri- and post-menopausal women. It is a "smart" device that is self-inserted weekly and has the ability to sense the moisture need in the vagina and release fluid on-demand to supplement the lubricating fluids of the vaginal mucosa. Since women experience very different levels of vaginal dryness, Aqua-Ring has a truly unique design and is woman-specific personalized therapy that will not under treat or over treat the vaginal dryness symptoms. There is no other product that can provide this natural and personalized remedy. This product addresses all of the negatives of current estrogen replacement therapies, with their risk of cancer and heart disease, and OTC gels, with their messiness and short duration. The regulatory strategy is to seek market clearance through the Premarket Notification 510(k) pathway in 2013.

Vutara
CEO/Principal: Stan Kanarowski
Univ.: UU
Affiliate/Licensee/Univ.: Licensee
Cluster: IT/LS

Vutara has coupled cutting-edge breakthroughs in photophysics and computation to create a new super-resolution microscope, the SR-200. The SR-200 microscope is a super-resolution fluorescence microscope that combines new hardware (microscope and peripherals) and software (operational and analytical tools). Vutara SR-200 Bi-plane Technology - For over a century the work defining light microscopy resolution limits has stood to affirm that resolutions below the diffraction would be inherently out of reach, relegating science to postulate as to the localization of small objects. Today, however, we find ourselves in the midst of an optical revolution, with the introduction of several new lens based, light microscopes capable of smashing the diffraction limit, approaching single molecule resolutions. These systems have redefined light microscopy and been termed "Super-Resolution" or "Sub-diffraction" microscopes, with recent commercial introduction to the global scientific market.

Technology Commercialization & Innovation Program
2012-R1 Solicitation
G R A N T A W A R D E E S

Total applications reviewed: 35
Total recommended for funding: 16
Licensees: 12
University Teams: 4

The technologies are emerging from the following universities:
U of U : 22 (12 funded)
BYU: 7 (1 funded)
USU: 2 (0 funded)
UVU: 2 (1 funded
Weber: 2 (2 funded)

Economic Cluster Categories:
LS - Life Science: 15 (9 funded)
IT - Information Technology: 5 (2 funded)
MMEE - Manufacturing, Materials
Energy, Environmental: 15 (5 funded)

College /Univ	Status	Licensee Name or Univ. Technology name	Description of Technology
U of U	Licensee	Decipher GenX	Decipher GenX is developing the first objective diagnostic tests for Chronic Fatigue Syndrome (CFS),Fibromyalgia (FM) and Major Depression based on gene expression biomarkers that also discriminate these conditions from overlapping disorders. Decipher is also developing a gene expression panel that tests for athletic overtraining. A test for FM may be developed initially and offered separately from one for CFS since the FM patient population is reportedly two to three times larger. There are three current FDA-approved therapeutics to treat FM: Pfizer's Lyrica, Lilly's Cymbalta, Forest's Savella, and it may be possible to identify patient groups most responsive to a particular treatment using Decipher's biomarkers. This would avoid the enormous cost and delay of subjecting patients to multiple therapies until an appropriate therapy is identified.
U of U	Licensee	Elute, Inc.	Elute, Inc. has licensed the ElutiBone™ technology from the University of Utah. An antibiotic-releasing degradable polymer coated on widely-used natural or synthetic bone graft implants, ElutiBone seeks to prevent or reduce infections associated with orthopedic surgeries. ElutiBone's polymer-controlled release kinetics enable sustained antibiotic delivery to orthopedic surgical sites over the clinically relevant 6 to 8 week period. This represents a major advance over other commercially available bone grafts that release antibiotics for much shorter durations at sub-therapeutic levels, often promoting the growth of drug-resistant bacteria. ElutiBone will mitigate the increasing threat of costly infections related to joint replacement revision, open-fracture trauma and spinal fusion surgeries where $50,000 procedures can have up to 15% infection rates with infectious recurrence of 20 to 30%.
Weber	Licensee	Ferro, Gundy, & Thomas, INC.	SelectProHR is a software program designed specifically for Human Resource staffing and recruiting companies. The software utilizes a complex algorithm, developed at Weber State, to help find and place the most qualified candidate for a specific position. SelectProHR is easy to integrate into a company's existing hiring systems. It is also a cost-effective tool that becomes more useful and accurate over time. The staffing company or employer directs job applicants to answer a short web-based questionnaire. The software then applies adaptive statistical algorithms which locate the best employee for the position.
U of U	Univ.	Heparin Radiopharmaceutical Imaging for EoE	We seek support to develop radioimmunodiagnostics to image and improve diagnosis of eosinophilic esophagitis (EoE). EoE is an allergenic condition of the esophagus due to infiltration and activation of eosinophils (a white blood cell) in the esophageal lumen, leading to esophageal occlusion, unexpected emergency room visits, and multiple endoscopies. Our noninvasive radioimmunodiagnostic approach combines heparin (delivered orally), which binds preferentially to eosinophils and granule proteins, with radiolabels to create 3D molecular maps of the entire esophagus. Such maps are unavailable using current techniques. The use of radioactive labels provides high contrast and sensitivity as natural radioactivity is negligible at the energies associated with Tc-99m (140 keV), and the normal esophagus is devoid of both eosinophils and eosinophilic degranuation products. Drawing from immunoscintigraphic technology (70% currently focused on heart disease) minimizes product development risk.

U of U	Licensee	iVeena	Treatment success for the pervasive, chronic, and blinding disease glaucoma is greatly obstructed by poor patient compliance and adherence with topical eye drops. In response to the frequent requests by patients and clinicians for simpler treatment paradigms that result in more consistent intraocular pressure (IOP) control and improved patient outcomes, iVeena is developing a controlled-release IOP-lowering drug formulation for placement in the ocular subconjunctival space. This formulation uses Glycosil®; a hyaluronic acid derived polymer that is highly biocompatible with the eye and has favorable physical characteristics that support controlled drug delivery with a number of generic IOP-lowering drugs. This project aims to effectively replace the chronic application of daily topical eye drops with a minimally invasive in-office procedure that will provide clinically effective concentrations of an IOP lowering drug in a sustained manner for a period of 3 months.
U of U	Licensee	Lazarus Medical Technologies, LLC	Sationary chest tubes have been the norm since 1875 and remove only what is in their immediate vicinity. Frequently, additional tubes have to be placed to provide adequate drainage. The moving chest tube will traverse the thoracic cavity to improve evacuation of fluid. It is expected that a moving chest tube will speed resolution of the patient's problem allowing earlier patient discharge. A prototype built from available chest tubes to demonstrate feasibility is capable of moving in a 180-degree arc. The grant will be utilized to have dies created to have a custom tube extruded. The extruded tubes will have dedicated lumens to contain the actuation wires that enable the desired movement while preventing contact of lung tissue with the wires. An external actuation mechanism will effect movement within the thorax. The tube will be otherwise similar to currently used devices including common radiographic markings and drainage holes.
BYU	Licensee	MegaStir Technologies, LLC	The automotive industry and the U.S. Government are aggressively pursuing use of lightweight materials such as Al alloys and Mg alloys in auto body structures for improved vehicle fuel efficiency. The combination of lightweight materials with widely acceptable structural materials such as high-strength steels presents a number of technical challenges in auto body-in-white assembly. One of them is how to join these materials together to form an integrated structure that meets automotive or other performance requirements. An enabling technology called friction bit joining (FBJ), invented in collaboration between Brigham Young University and Megastir Technologies (Orem, UT), has been shown to produce high levels of joint strength in dissimilar combinations of steel and Al or Mg. This technology will allow for the fabrication of ultra-light automotive structures that are not currently possible because of the limitations of current joining methods.
Weber	Licensee	Precision Targets LLC	Weber State has developed a light weight, cost effective, hovercraft that is capable of traveling at speeds up to 60 MPH. The hovercraft will serve as a training tool for Navy/Marine/Airforce ground attack aircraft. It can travel over multiple terrains such as water, sand, light brush and unpaved roads. Additionally, the hovercraft has the potential to autonomously pilot itself with motion control software. Current mobile ground target solutions fail to meet one or more of the following criteria: speed, navigating uneven terrain, autonomous piloting, and economical unit cost. The hovercraft is a truly unique solution with the promise to meet all of the aforementioned criteria.
UVU	Univ.	Protein-Based Identification Technology	Hair is a common part of our environment, ubiquitous in our homes and workplaces. It is also common in crime scenes and can be used to link someone to a specific place. While it can supply important information there are tight limitations to this. Analysis of hair shape is difficult to use in court. The DNA in hair is very informative, but it is often absent or degraded. Hair however, has one major advantage: it is stable. The proteins in hair persist in the environment well after DNA is degraded. Proteins however, contain evidence of DNA variation, and therefore can be used to identify crime victims and / or suspects. We have established a proof-of-concept technology, that uses less than a mg of hair protein to identify individual peptide fingerprints with a 1 in 20,000 probability for an individual. We seek in this proposal to protect the intellectual property, facilitate analysis of each sample, and broaden the product base to the use of other relevant tissues.
U of U	Licensee	Salarius Pharmaceuticals, LLC	Lysine Specific Demethylase 1 (LSD1) is a histone demethylase that removes both repressive and permissive marks on histones. These marks are important in directing transcriptional regulatory proteins to either activate or repress expression of target genes. LSD1 is overexpressed in a number of human cancers as well as in tumor stem cells. We have discovered and developed a series of small molecule inhibitors that potently repress LSD1. We have optimized these compounds and are starting development in animal models as a first step toward clinical development. This is an important and novel cancer program that could treat cancers without option.

U of U	Licensee	Seismic Options Safety Systems (SOS Systems)	The SOS trapped miner technology uses seismic equipment and SOS Systems' software to locate miners that are trapped in an underground mine. Before a collapse the SOS team installs a system of sensors and seismographs on the surface of the mine and “thumpers,” like hammers, below ground. The system is calibrated and left almost dormant until an accident happens. The system is then activated to "listen" for miners who are trapped. It lets rescue crews know if miners are alive, where they are located, how many miners there are. The technology is innovative in that no physical connection to the surface of the mine is necessary. This is a key advantage over our competitors, who mainly use a system that requires electric cables installed between the surface and underground corridors. These cables are very likely to be cut in a collapse.
U of U	Univ.	Steerable Snare for Intravascular Retrieval	Vascular snares are simple devices that are frequently used during intravascular procedures. Typically placed through a guide catheter these devices are placed into the patient to retrieve IVC filters, PFO closure devices that have migrated, stents, and other devices. Often the target object is difficult to engage with currently available snares and procedure time and patient risk increase. In extreme cases, invasive surgery is required to remove the target object. We have developed a steerable snare, which is the only deflectable snare that allows for a higher degree of manipulation and therefore improved location and fixation or grasping of structures or devices. Our steerable snare incorporates both 90 degree deflection of the snare loop as well as torque translation through the length of the device. This design incorporates all of the basic elements required to allow for ensnaring an object in a 3 dimensional space around the tip of a guide catheter.
U of U	Univ.	Therapeutic drug for Down syndrome (DS)	Using new techniques to link genes to the brain, we have identified a specific receptor as a possible target for the treatment of the cognitive deficits in individuals with Down syndrome (DS). A number of pharma companies have made compounds in this class (antagonists of this target) as a possible therapy for learning/memory in Alzheimer's. We have tested one compound in this class, which resulted in the rescue of cognitive deficits. We now have a compound that was originally developed by a national pharma company for Alzheimer's, but was abandoned as the competition had become too established. We also have a Material Transfer Agreement to test it in mouse models of DS. We plan to licence this compound exclusively and establish a trial center out of this process to create a long term business, and a seed for increased Preclinical/Clinical trials in Utah. Funding: NIH grant "Down syndrome: Genes, Brain and Behavior"- PI J Korenberg, Co-PI G Gerig ($3,000,000 over 5 years)
U of U	Licensee	Vaporsens	Vaporsens is developing the first device to provide continuous, non-contact detection for all explosive threats. It’s a “smoke detector” for explosives. Despite billions in federal spending on airline passenger screening since 2001, the US cannot reliably detect explosives that could bring down a plane. According to the 9/11 Tenth Anniversary Report Card, "explosives detection technology lacks reliability and lags in its capability to automatically identify concealed weapons and explosives." Current scanners fall short because they can’t chemically detect actual explosives that terrorists use. Consequently, screening is insufficient in airports, and is non-existent in many public places such as stadiums and public buildings where a single lapse in security can lead to massive repercussions. In contrast, the Vaporsens detector can chemically detect a wide range of explosives on every single person and bag going through security without the need for contact.

U of U	Licensee	Veritract, Inc	Nasogastric feeding tubes are the most commonly placed gastrointestinal devices in hospitals today. Over 80% of ICU patients and many more patients in general hospital floors (1.25 million total US patients annually) receive nutrition via these tubes. Because most of these tubes are placed blindly, without guidance, thousands of tubes are misplaced to the lung, causing serious injury and even death. To verify proper placement, most hospitals require X-ray confirmation of placement but incur significant extra expense as a result. Using proprietary methods, Veritract leverages the advancements in endoscopic technology to allow these technologies to be built into an inexpensive disposable device. Our design integrates optics for vision, and steering for guidance, allowing feeding tubes to be guided and placed into the intestinal tract under direct visualization. This allows for quicker, safer, and more economical placement and improves patient care while streamlining hospital procedures.
U of U	Licensee	Xandem Technology	Xandem is offering a totally unique and cost-effective technology for detecting and locating people. Our technology can detect and locate people through walls and obstructions, and does not require the person being tracked to carry any form of device. It is valuable for locating people that cannot be expected to cooperate with a system. This may be the case either because they are intentionally evading it, because they are physically unable, or because they do not want to be inconvenienced by carrying an RFID tag.

FY 2013 Round 3 GRANT AWARDEES

Institution	Licensee / University	Cluster	Application Title	DESCRIPTION OF TECHNOLOGY
U of U	Licensee	LS	EEG Patch (Epitel)	A small, wireless device for human EEG monitoring is currently lacking. We propose an individual-use patch-type device for simplified EEG recording from human patients. This device will enable user-friendly application and real-time recording of the EEG signal either in the ICU, in an out-of-hospital setting (e.g., the home or work environment), or for research (e.g., antiepileptic drug testing). The device will consist of a small EEG electrode/transmitter unit that both wirelessly transmits EEG signals to a receiver and "logs" EEG data for later retrieval. Our primary objective is to create an unobtrusive device that can be used to reliably record wireless EEG under conditions where traditional EEG is not feasible or practical.
WSU	Licensee	MMEE	ENVE	ENVE Composites and UCAID will work in partnership to create state-of-the-art test fixture to conduct fatigue testing and data acquisition on components. The fixture will test products according to international EN standards and beyond. Unique differentiators include: Flexible to test 4 different product types (seat posts, forks, stems & handlebars): current testing requires 4 different fixtures at 2 different out of state labs. Test 3 samples concurrently: current test fixtures test 1-2 products at a time and takes 48 hours. Concurrent test is completed in 16 hours, and possibly 8 hours. [although please note that outside labs have taken as long as 3 months to perform test] Test to 3x industry standard load: Outside labs are limited to 1.5 loads. Capture relevant product performance and failure data: Currently not able to witness test and only receive a written report on pass/fail. This fixture will move test from attribute data to variables data. Test fixture has displacement and load fatigue data allowing ENVE to understand how parts are performing and includes mobile data acquisition to correlate lab results with real world use.
U of U	University	IT	Epinome	Epinome is a software suite developed to monitor disease outbreak information and provide users with the information they need to easily make decisions regarding policy and outbreak control. Dr. Livnat conducted in-depth study of data/user interaction to produce a best possible software and data visualization. This saves the users time and mental effort, as well as corrects for user error for optimal data use and decision making.
USU	Licensee	MMEE	FloMeter (Thermal Mngnt.)	The ClampOnFlowMeter (COFM) technology is a water flow meter that attaches to the outside surface of a metal pipe without cutting the pipe and may be installed by a typical homeowner. There is no residential or commercial clamp-on flow meter on the market. The technology uses low power input heaters and temperature sensors to measure water flow rate, total water flow, and detect leaks. Measurements may be instantaneously communicated to a homeowner or the municipality for water conservation and leak detection or alarms.

Institution	Licensee / University	Cluster	Application Title	DESCRIPTION OF TECHNOLOGY
U of U	University	MMEE	Graphene	Graphene is a new material made from 2-dimensional carbon. It has new and useful properties including excellent tensile strength and transparency to light. It is the best known conductor at room temperature, can be made into a semiconductor 1000x better than silicon, and is 40x stronger than steel. Its potential uses are extensive, including more efficient photodetectors, photovolteic cells, and eventually quantum computing. In order to incorporate it into microelectronics, its band gap must be broadened, which can accomplished by producing it in thin (
USU	Licensee	IT	ISQ	The Indicators of School Quality (ISQ) program was developed by USU's Center for the School of the Future and has been successfully used by over 430 schools to conduct over one million surveys of parents, teachers, administrators, and students and produce reports that guide school administrators on how to improve their schools. ISQ, Inc. will port the paper-based reporting to a scalable online real-time product, create an expert system for automated best practices solutions planning and execution, and set up a vendor marketplace to provide ready and available solutions to ISQ identified problems. There are currently no solutions with an expert engine or solutions marketplace.
BYU	Licensee	MMEE	Nanotube Filter	We use a process somewhat similar to the manufacturing of computer chips in order to create specialized filters that have exactly uniform and evenly spaced openings. These filters are useful because they clog less and have higher flow rates than normal and membrane filters. They are especially valuable for applications where there is a need to remove impurities above a certain size, but not have any product, which is below that size, trapped in the filter. We intend to market these filters to the pharmaceutical, biofuel, and processed food industries.
U of U	Licensee	LS	Novel Biosensor	This technology merges two highly established techniques (smart hydrogels and magnetic sensing) for the first time to create a novel microsensor that can continuously monitor almost any biomarker (e.g. glucose, pH, CO2, O2, trace metals, etc.) in liquid media. 'Smart hydrogels' are well known to reversibly swell in response to change in concentration of a selected biomarker in their environment. Smart hydrogels can be synthesized to respond to almost any biomarker (analyte) within almost any concentration range. Researchers have known for about a decade that smart-hydrogels are bound to revolutionize the sensing techniques and will (1) over come the limitations of current commercial continuous sensors in biomedical industry (e.g. Medtronic CGMS) (2) address the untouched market need in several industries such as bioprocess control, animal research, water quality management, etc. The biggest limitation has been in the methods to transduce the response of hydrogels into readable values. Groups around the world have used several transduction techniques like optical, pressure sensors, fluorescence, etc. without much success. We have successfully proven for the first time (and I.P. protected) that when smart hydrogels are embedded with magnetic nanoparticles, the response of the hydrogels can be accurately measured as a change in magnetic fields using low-cost ($1.50/unit), off-the-shelf magnetometers (e.g. Honeywell) creating a simple yet robust microsensor for continuous biomarker monitoring.

Institution	Licensee / University	Cluster	Application Title	DESCRIPTION OF TECHNOLOGY
BYU	Licensee	IT	Panx Solutions	The technology is a universal GPS that will not only enhance accuracy outdoors of traditional GPS, but it will uniquely work deep indoors and underground as well. This tech is one million times more accurate indoors than traditional GPS. Instead of satellites being used for the signal our technology uses free signals of opportunity to locate a person or items. These signals can be understood to be radio signals from radio towers. This technology is unique to anything on the market. The technology will be used in its early stages to assist existing devices with traditional GPS and also provide GPS to devices without GPS.
U of U	Licensee	MMEE	Qdots (Navillum)	Semiconductor nanocrystals such as quantum dots have relevant biological applications from medical diagnostics to cancer imaging. Quantum dots are nano-sized particles that can emit different wavelengths to track or destroy cancer cells. However, most quantum dots are not water soluble/aqueous, limiting its use for biological applications. With our recent success in large scale manufacturing of high quality non-water soluble quantum dots, we want to extend our expertise to manufacture water-soluble quantum dots.
UVU	University	MMEE (Energy)	RTMSR (Closed Loop)	The RTMSR is a Thorium reactor that produces high power output without the downside or radioactive byproducts of a Uranium reactor. It works by a blended mix of Thorium and flourides to produce an efficient source of power. This mixture operates without the water or pressures of the traditional Light Water Reactors so there is no danger of explosion or radioactive leakage. The RTMSR can us current spent fuel rod pellets as fuel, thus reducing a huge problem with current reactors. One ton of Thorium (a quite common element on earth) can produce as much power as 250 tons of enriched Uranium or 4 million tons of coal. The reactor is small enough to be portable which is a unique feature and can be used for electrical power or for heat to help in extraction of oil from Shale or Sands. Numerous safety features make this unique reactor the future source of green electrical power.
UVU	University	LS	SonoMargin	The Breast Cancer Research Laboratory (BCRL) at Utah Valley University (UVU) is seeking to significantly improve the quality of care for breast cancer patients by developing a surgical procedure for surgeons to look at the pathology of tissue while still in the operating room to ensure clean margins and reduce the number of repeat surgeries. The procedure is based on high-frequency ultrasonic technology that can recognize the difference between cancerous and non-cancerous tissue by how ultrasonic pulses are modified as they pass through the tissue.

Institution	Licensee / University	Cluster	Application Title	DESCRIPTION OF TECHNOLOGY
USU	University	IT	SwiftComp Micro (Analyswift)	SwiftComp Micromechanics, a dramatically different engineering software, accelerates time-to-market through an unprecedented combination of efficiency AND accuracy in improving structural designs, estimating a given structure or material's capabilities, or engineering a new material with desired properties. The first truly general-purpose micromechanics program, it is the world-class technology of its kind. SwiftComp handles both materials and structures with the accuracy of detailed finite element analysis (FEA), but in seconds, not hours. Users have analyzed composites; metal heat exchangers; ultralight, insulation, and construction materials; even biological tissue (bone). SwiftComp is the only tool that can handle very complex modeling.
U of U	Licensee	IT	TruClinic	The TruClinic™ portal enables healthcare providers to offer medical and behavioral health counseling sessions, health and wellness programs, disease management, follow up care, case management and other clinical services via a secure network. Practitioners benefit from a robust practice management solution that augments their on-site clinic. The portal includes a multi-tiered video communications platform, virtual reception area, appointment desk, personal health record, and a records management system. All this technology is consolidated in a proprietary, secure cloud based, user-friendly website accessible from any personal computing device.
U of U	Licensee	MMEE (Energy)	Water Sensor (E-Sens)	e-SENS has developed a direct reading, silicon-based chemical sensing technology to address the world's water monitoring needs. The company's lab-on-chip sensors monitor mulitple chemicals with an array of sensors selective to different analytes. The sensor array takes advantage of the mass fabrication manufacturing technology of the semiconductor industry to produce a low cost-per-test solution that is quantitative, accurate, and automatically records and transmits the data. Its use takes 1/10th the time of conventional methods, and avoids the use of reagents and the need for user-judgement in interpreting results. The sensor array chip will be replaced periodically, eliminating the need for constant maintenance of the sensors.
U of U	Licensee	IT	WIN	WIN is a peer-to-peer SaaS platform with a unique "no barriers" structure that allows users and resources to connect in a user-defined environment, either through member groups, by subscribing to specific labs, or by individual exploration of resources listed on the network. WIN is a closed network requiring a corporate or university membership for individuals to participate and paid subscription to offer resources for a fee. All network components, whether individuals, equipment, patents or tangible assets, are resources within the software structure, which allows users to create a unique structure of interaction. The company's greatest asset is the NSF research relationships and network of university collaborators.

Governor's Office of Economic Development

Centers of Excellence

Funding Recipients for the 2009-10 Centers of Excellence Program

Total Proposals – 28 Submitted – 13 Awarded Funding:
12 Second Year Submissions– 8 Awarded funding
16 First Year Submissions - 5 Awarded funding

BYU – 4 Awarded Funding (9 Submitted)
USU – 1 Awarded Funding (2 Submitted)
UU – 8 Awarded Funding (16 Submitted)
CEU – 0 Awarded Funding (1 Submitted)

8 Second Year Proposals Awarded Funding
5 First Year (New) Proposals Awarded Funding

Licensee / (Center -University) CEO or Principal	Years Funded to Date	Award Amount
COSMAS, Inc. (Center for Nanoparticle Production - BYU)		
Lynn Astle, CEO	**2nd Year**	**$200,000**

Cosmas, Inc. is involved in the development of a novel process for making nanoparticles which have a strong competitive advantage for the production of gamma-alumina supported platinum and palladium catalysts, the largest sector of the supported catalyst market.

GlycoMira, Inc. (SAGE - U/U)		
Tim Miller, CEO	**2nd Year**	**$325,000**

Glycomira is developing a new class of anti-inflammatory compounds and will be targeting skin diseases like rosacea and eczema followed by systemic diseases like osteo-arthritis and diabetic retinopathy.

Heavystone Laboratory, LLC (Center for Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials - U/U)		
Dr. Al Poskanzer, CEO	**2nd Year**	**$ 140,000**

Heavystone Laboratory have developed an innovative process and products of functionally graded cemented tungsten carbide material for manufacturing industrial applications including metalworking, oil and gas drilling, geothermal energy exploration, mining, construction, high-wear components, and many other industrial applications that requires extreme wear resistance and impact resistance.

iVeena, LLC. (Moran Eye Center- UU)
Dr. Balamurali Ambati, Pres and CMO; Greg Jones, Acting CEO
New **$100,000**

iVeena, LLC, is an early-stage biotechnology company with the mission of developing a novel proprietary drug delivery device, called the Capsule Drug Delivery Ring, for treatment of the leading blinding diseases. iVeena will fundamentally change the way eye diseases are treated and improve the quality of life of more than 1 million people/year in the United Sates and potentially 3 million/year worldwide by preserving their vision and simplifying treatment.

JSK Therapeutics, Inc (Division of Medical Oncology – UU)
Dr. Paul J. Shami, CMO **New** **$100,000**

The main focus of JSK Therapeutics (JSKT) is to develop novel anti- cancer drugs using a new cellular mechanism to inhibit the growth of malignant cells. This mechanism, called glutathionylation, involves triggering a chemical reaction between a naturally occurring molecule (glutathione) and cellular proteins. As a result, proteins that are key to cancer cell growth are inhibited, leading to death of the cancer cells. The scientific founders of JSKT have developed two different strategies to induced glutathionylation.

NanoInjection Technologies, LLC (Center for Compliant Mechanisms – BYU)
Gary Crocker, CEO **New** **$100,000**

NanoInjection Technologies LLC has the ability to restructure the rapidly growing biotech marketplace for the injection of DNA and RNA into targeted eggs and other cells with the commercial introduction of the first cellular nanoinjector that both reduces costs and yields a faster DNA implant with significantly higher post injection cell survival rates.

NeuroAdjuvants, Inc. (Dept of Pharmacology and Dept of Med. Chem. – UU)
Dr. Theodore Stanley, CEO **2nd Year** **$300,000**

NeuroAdjuvants develops stable, blood-brain-barrier permeable neuropeptide-based compounds for the treatment of nervous system disorders. The initial focus of the Company is to bring new therapies for pain and epilepsy. Pain and epilepsy are both multibillion dollar markets dominated by small molecule therapies with considerable safety concerns and/or suboptimal efficacy in many patient populations. NeuroAdjuvants aspires to address these large unmet medical needs by developing safe, efficacious therapies with novel modes of action.

Sera Prognostics, Inc. (Joint: BYU Chem/Bio; U/U Dept of OB/GYN)
Dennis Farrar, CEO **2nd Year** **$300,000**

Sera Prognostics is using a novel serum proteomics technology to identify and commercialize biomarkers from blood samples of pregnant women to predict those at risk for preterm birth, preeclampsia and other pregnancy complications.

Sparkle Cream, LLC. (Food Services Dept. – BYU)
Joel Clark, CEO **New** **$100,000**

Sparkle Cream's licensed, patented technology allows customers, such as frozen ice cream or frozen yogurt vendors, to carbonate soft serve products such as ice cream and frozen yogurt. The resulting product "sparkles" in the mouth resulting in a fun and novel taste experience.

Thermal Management Technologies, LLC. (Center for Thermal Management Technologies -USU)
Forrest Fackrell, CEO **2nd Year** **$95,000**

Following two years as a USU Center of Excellence, TMT is a 2008 start-up licensee poised to commercialize innovative thermal management solutions for a variety of markets including aerospace, IT infrastructure, and electric hybrid vehicles.

Thermimage, Inc. (Department of Surgery, Section of Pediatric Urology– U/U)
Douglas Turnquist, CEO **2nd Year** **$300,000**

Thermimage, Inc. is commercializing a non-invasive medical device technology that will replace the traumatic procedures currently used to detect pediatric Vesicoureteral Reflux (VUR), the effect of which will decrease the number of kidney infections and decrease the risk of permanent kidney damage in over 4 million children every year.

Wastewater Compliance Systems, Inc. (Center for Water Treatment Technology -U/U)
Fred Jaeger, CEO **2nd Year** **$300,000**

WCS, Inc provides proprietary products and services to enable wastewater lagoon operators to cost-effectively remain in regulatory compliance, to increase lagoon efficiency and capacity, and to avoid substantial capital costs by extending useful life of existing facilities. The solution is called the "poo gloo" and is simple to install and maintain.

ViroPan, Inc. (Dept of Bioengineering, Microbicide Delivery Lab - U/U)
Dr. Tyler McCabe, CEO **New** **$100,000**

ViroPan, Inc. is a company focused on women's health and the prevention of specific viral sexually transmitted infections (STIs) and together with the University of Utah, ViroPan is developing an important proprietary intravaginal ring (IVR) product that is self-inserted by the woman to release, for up to one month, a potent anti-Human Papillomavirus (HPV) agent for the prevention of cervical cancer and genital condylomas (warts).

Governor's Office of
Economic Development
Centers of Excellence

Jon M. Huntsman, Jr.
Governor

ANNUAL REPORT

Jason Perry ◆◆ EXECUTIVE DIRECTOR (From March 2006)
Governor's Office of Economic Development

Dick Bradford ◆◆ EXECUTIVE DIRECTOR (Through March 2006)
Governor's Office of Economic Development

Greg Jones, PhD ◆◆ MANAGING DIRECTOR (From May 2006)
Governor's Office of Economic Development

Martin Frey ◆◆ MANAGING DIRECTOR (Through May 2006)
Governor's Office of Economic Development

NICOLE TOOMEY DAVIS ◆◆ DIRECTOR
Centers of Excellence

DANICA Nelson ◆◆ Intern
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Fiscal Year July 2005—June 2006

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L-3 Communications
Salt Lake City, Utah

2005-2006
Centers of Excellence
Annual Report

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Executive Summary

Executive Summary
CENTERS OF EXCELLENCE
2005-06 ANNUAL REPORT

The Centers of Excellence program is now two decades old, having been authorized in 1986. Throughout this time, the program has spawned 126 verified spinouts, of which at least 60 are still active in 2006, employing over 2000 Utahans, as of a 2006 survey done for the Centers of Excellence 20th Anniversary Report. The average salary of employees in COE spinouts is over $65,000. The program's mission is to help technologies created in Utah's colleges and universities transition from research into industry to help grow Utah's economy.

Well-known firms that were assisted by the Centers of Excellence program include Myriad Genetics, Inc. (MYGN), Sonic Innovations, Inc. (SNCI), Cimetrix, Autonomous Solutions Inc., and Moxtek. Emerging successes include InfoWest, Live Wire, Andigen and Rocky Mountain Composites and startups just emerging from the Centers program in the past two years include Flying Sensors, Procerus Technologies, Wasatch Microfluidics Inc., and Glycosan Biosystems. These firms are among the many companies strengthening Utah's economy through technologies developed at Utah's colleges and universities.

For the 2005-06 year, 18 Centers of Excellence received funding totaling nearly $2.5 million in direct grants through the universities. This total included five new Centers and 13 Centers receiving renewal. In addition, three teams received business team support only, to assist them in aligning or preparing a full Center proposal. Universities represented in the program this year included Brigham Young University, the University of Utah and Utah State University.

The Centers of Excellence program implemented a dramatic overhaul of its "consultant program", replacing it with the Business Team Program, which is emerging as an exciting and successful element of the program. Over $550,000 was earmarked to be spent directly with these experienced technology business executives and technology entrepreneurs to assist the Centers in the process of transitioning technologies into the marketplace. These individuals help develop "go to market" strategies, identify and work with potential licensees or customers of the technologies, and in the case of spinouts, assist in the work of getting a new startup off the ground.

Updated policies and procedures were put in place in February, 2006 that helped correct or clarify elements of the program, all designed to improve the success of this challenging transition from university to industry. In addition, during the 2006 Legislative session, changes to the COE statute were implemented to provide for a "return of grant" when a COE supported technology is licensed or moved out of state.

2005-2006 Funded Centers

Acoustics Research

BRIGHAM YOUNG UNIVERSITY

CENTER

This new Center is focused on commercializing active sound control technology with superior ability to both reduce noise in varied settings such as vehicle cabins, computer fans and telecommunications and to modify sounds for commercial benefit, such as enhanced home theater acoustics.

TECHNOLOGY

The Center is developing several technologies aimed at improving noise control, including: active noise control in vehicle cabins, active noise cancellation of high speed fans, the application of energy density sensors to simplify sound control in complex environments, sound quality analysis. This group of technologies is known as noise-cancellation because, in its simplest form, it makes use of a speaker which produces a sound that opposes the noise one is attempting to eliminate, thereby "canceling" the noise.

For this first year, the Center focused its active noise control technology on the application of noise in small aircraft, including helicopters. Early results with helicopter noise show a possible attenuation level of 9dB. With increasing noise regulations, this area of research looks to have great potential.

ACCOMPLISHMENTS

Sound field equalization technology has already generated interest from a Japanese audio company which has led to discussion of a possible Utah spinout that will manufacture the technology. This technology has a variety of applications in the pro-audio market in which sound qualities of an auditorium or recording studio can be more effectively equalized.

In its first year, the Center has been awarded $99,863 in private funding and $137,513 in federal funding. The Center has also worked on securing its intellectual property position and has three patent applications that will be filed next year..

THINK TANK

What if there was...

A way to reduce the noise inside an aircraft or the sound of a computer fan or automatically equalize the speakers in your home theater system?

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Advanced Communications Technology

BRIGHAM YOUNG UNIVERSITY

CENTER

The Center for Advanced Communications Technology was formed to commercialize multi-antennae air-to-ground communication systems. The Center's main focus is using advanced digital signal processing for reliable communication to maneuvering air vehicles (tactical aircraft and UAV's). A secondary focus is using multi-antenna technology to improve commercial wireless communications.

TECHNOLOGY

The Center's technology uses multiple antennae in combination with advanced signal processing to provide a solution to current communication technology, which loses contact with an aircraft during maneuvering such as rolling. The technology may also be applied to unmanned air-vehicles as well as other wireless communications such as mobile phones. Advantages of the Center's technology include its low power consumption, bandwidth efficiency, and small size.

ACCOMPLISHMENTS

After successful architectural design and software simulation of the prototype air-to-ground communication system, the Center is now working on developing the hardware. New developments have also been made in the multi-antennae military communications system. This includes repeaters placed on unmanned air-vehicles that may be reconfigured on command. This technology is being proposed to DARPA.

A license agreement has been negotiated with the university for a spinout which will be incorporated after successful test-flights in the next year.

THINK TANK

What if there was...

A way to always maintain communication with an aircraft during aerial maneuvers ?

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Advanced Imaging LADAR

UTAH STATE UNIVERSITY

CENTER

The Center for Advanced Imaging LADAR (CAIL) focuses on commercializing three dimensional camera products and software based on laser radar and digital camera technology. CAIL's technology has already been used in Japan, and various states in the U.S. In addition to generating interest from NASA for space applications, the technology may revolutionize architecture, engineering, motion pictures, gaming and many other industries.

TECHNOLOGY

CAIL's core technology is the 3D Texel camera, which uniquely combines three-dimensional Laser Detection and Ranging (3D LADAR) technology with two-dimensional digital photography to form a complex 3D image in the same time it takes to snap a photo. 3D LADAR measures the precise distance to, and shape of, objects or terrain while 2D imagery takes a normal digital photograph. The Texel camera merges the information in real-time and, when multiple images are combined, an entire 3D scene is formed that can be viewed from any position instantly.

This year, two new generations of tripod based cameras were developed for a Utah company, InteliSum. In addition, a prototype handheld flash-type lidar camera was developed.

ACCOMPLISHMENTS

CAIL has, in the past year, its third as a Center, successfully commercialized the tripod-based Texel camera for InteliSum (formerly RapidMapper) which is currently in use for mapping and engineering services. Work is continuing on a handheld model, which is half-way to completion.

Markets being investigated include architectural and construction 3D modeling of building interiors, software gaming, movies and electronic entertainment.

The technology is garnering significant interest from military organizations. In January, CAIL was awarded several Federal contracts to develop airborne versions of their technology.

THINK TANK

What if there was...

A way to take a 3D photograph and rotate the image immediately, without ever leaving the field?

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Advanced Satellite Manufacturing

UTAH STATE UNIVERSITY

CENTER

The Center for Advanced Satellite Manufacturing (CASM) is working to create a viable Utah-based satellite manufacturing enterprise based upon years of expertise and projects within Utah State University and its Space Dynamics Laboratory. CASM's approach involves using novel advanced manufacturing and design techniques to reduce the cost and time involved with satellite manufacturing while improving quality and performance.

TECHNOLOGY

CASM's core manufacturing technology is being employed to develop a satellite platform, which can then be specialized to suit the needs of the customer through direct additive manufacturing. This manufacturing technique, referred to as Ultrasonic Consolidation, yields highly modular and easy to build, reliable satellites incorporating a honeycomb-type construction that allows the addition of circuitry, sensors, antennae, and other devices without adhesives.

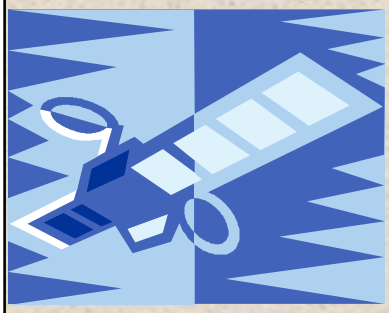
This year, CASM made significant progress with its technology and successfully demonstrated the capabilities of Ultrasonic Consolidation for satellite manufacturing. The Center also began development of a materials property database for structures developed using Ultrasonic Consolidation.

ACCOMPLISHMENTS

CASM has formed a relationship with SDL and has secured additional funding to further their research. The Center has also developed a business model and has a business team in place for commercialization.

THINK TANK

What if there was...



A modular satellite that could be easily customized for a variety of applications without the need for difficult assembly?

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Biomedical Microfluidics

U N I V E R S I T Y O F U T A H

BIOMEDICAL MICROFLUIDICS

The Center for Biomedical Microfluidics focuses on development of miniaturized fluidic systems that are capable of measuring, actuating, or separating biological materials. The Continuous Flow Microspotter (CFM) is one such device that operates like an inkjet printer. A solution composed of proteins, nucleic acids, cells, lipids, or other material flows through miniature channels and is spotted onto a substrate such as a microarray chip. This system allows highly accurate arrays to be developed inexpensively and accommodates the small sample sizes which are commonly encountered in biomedical applications. Expanded applications of the technology include point-of-care diagnostics. The scale and ease of use give the CFM a significant advantage in assays of patient samples performed by a physician or lab technician.

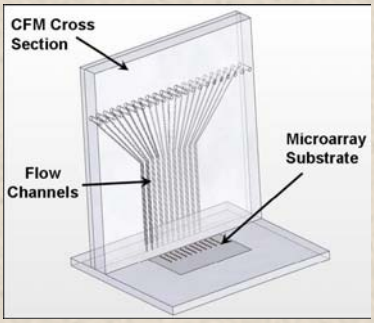
TECHNOLOGY

This year, the Center has further expanded the capabilities of the CFM to include ELISA assays and lipid bilayers. The Center has also continued its collaboration with the Center for Homogenous DNA in the areas of DNA extraction, amplification and melting, and is now working on continuous flow DNA amplification.

ACCOMPLISHMENTS

Over the past year, the Center generated its first external revenue for the microspotter technology, and has filed four patent applications. Negotiations are also underway between the Center's spinout, Wasatch Microfluidics, and several industrial partners for development funding and marketing agreements.

The quality of the microspotter has been demonstrated with a full suite of biological samples, including proteins, DNA, lipids, and cells. This led to a highlight of the technology in the publication *Nature Methods*. The ability to produce continuous flow DNA amplification has also been demonstrated as well as DNA melting in a 5x5 array. Significant strides have been made in the manufacturing of the spotter; preliminary high volume manufacturing is able to reliably produce a 12-spot system. In addition, an automated instrument has been developed for the CFM which is being tested by multiple labs.



THINK TANK

What if there was...

A printer for biological samples that creates inexpensive, highly consistent micro-arrays?

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CASPeR

UNIVERSITY OF UTAH

CENTER

The Center for Alternate Strategies of Parasite Removal (CASPeR), in its second and last year of funding, has developed a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multi-billion dollar, increasingly resistant problem afflicting some 25% of children by the time they are teenagers.

TECHNOLOGY

CASPeR has developed a device, the LouseBuster™, which is a revolutionary new approach for eradicating head lice. By rapidly desiccating (drying) the lice out with blasts of warm air applied to the scalp, the Lousebuster kills lice and their nits (eggs) without using powerful chemicals. The LouseBuster™ blows more than twice as much air as a standard blow dryer, but at a slightly cooler temperature. The person administering the treatment uses a fine tooth comb to lift the hair so that the air can reach the lice and nits, which usually die in less than 30 seconds. Notably, the LouseBuster™ also kills the nits, which shampoos have never been able to do. A successful whole-head treatment usually takes less than 30 minutes and has been shown to be effective in Florida, a humid environment as well as the dry Utah environment.

ACCOMPLISHMENTS

CASPeR completed the development of the beta prototype and has tested a hand-held prototype of the LouseBuster™ that may be available in the future for serial treatments. In addition, consumable treatment kits have been developed.

The LouseBuster™ technology has been licensed to a Center spinout company, Larada Sciences Inc, and relationships have been built with 5 school districts encompassing 205 elementary schools. CASPeR also filed a new patent application and received $300,000 in funding from the NSF.

The Center's technology has received worldwide recognition, and has been featured on all major network news programs, as well as in major publications such as the New York Times, London Times, LA Times, Pediatrics Journal, and WebMD.com.

THINK TANK

What if there was...

A one-step treatment that completely eradicates head lice and their eggs without chemicals?

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Computational Design and Testing

U N I V E R S I T Y O F U T A H

CENTER

The Center for Computational Design and Testing (CCDT) is focused on the commercialization of computational engines that facilitate and accelerate the design and testing of novel materials and devices, particularly those in semiconductors and nanotechnology.

TECHNOLOGY

The CCDT's core technology includes two computational engines: the Materials Designer (MaDes) and Device Simulator (DeSim). MaDes predicts the structural and mechanical properties of new materials based on first principles analysis (without assumptions) at the level of atomic forces, while DeSim models the electrical properties and performance of components constructed with novel materials.

New materials are typically designed and tested in a laboratory, costing up to a million dollars and taking years to develop. Computational design and testing significantly reduces the costs and time, permitting design and testing with a few thousand dollars and a couple of months. The need for this technology is increasing as devices are miniaturized and new materials invented.

ACCOMPLISHMENTS

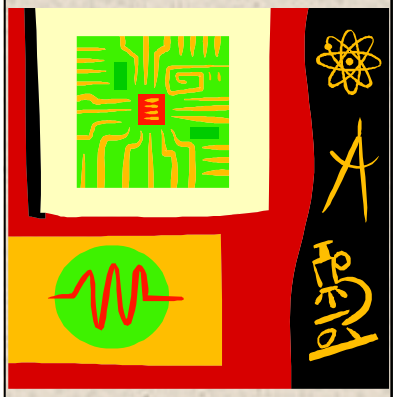
In its third and final year of funding, the CCDT continues to finalize the development of its two computational engines and was awarded $30,000 from a Utah company to characterize properties of a silicon wafer using MaDes. The CCDT's other technology, DeSim, also has many applications in the electronics industry, such as in nano-electro-mechanical systems (NEMSs).

The Center has also developed several web-based computational applications for prediction of crystal properties and simulating the growth of a thin film.

THINK TANK

What if there was...

A way to determine the properties of a new component, such as a semiconductor, before it is even built?



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Global Knowledge Management

U N I V E R S I T Y O F U T A H

CENTER

The Global Knowledge Management Center (GKMC) was formed in 2003 to create products and services based on data mining and optimization methods that enhance and sustain customer service and satisfaction. GKMC's main focus is web optimization, but the technology may be expanded to include homeland security, bio-medical, financial and marketing applications.

TECHNOLOGY

The core technology of GKMC is based on pattern recognition and in the web optimization arena, these algorithms are capable of analyzing data contained in web logs. From the patterns recognized, specific business recommendations may be made to improve the design and usability of the website.

As companies grow and their websites expand, customers have a more difficult time trying to access the information they need quickly. GKMC's technology has been demonstrated to improve a company's website by 600– 800%. The Center's technology is the first to specifically address portal link selection, providing solutions that allow a customer to minimize the amount of links needed to click through to get to the desired information.

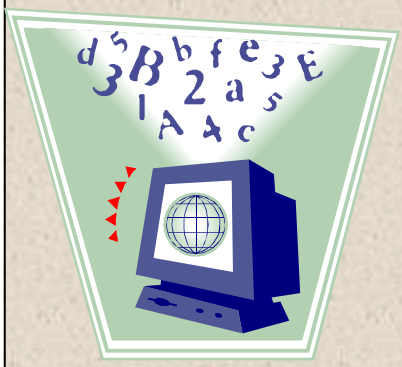
ACCOMPLISHMENTS

In its third and final year, the Center has created a spinout based on the Aculink software, Aculus, LLC. GKMC has also successfully validated the Aculink software with several industry partners and is working with large web companies to evaluate potential web-optimization.

Ongoing technology developments include behavioral profiling and user identification algorithms, as well as voice pattern recognition. The potential for voice pattern recognition lies in web-based customer service that incorporates voice technology, enhancing the customer's experience.

THINK TANK

What if there was...



A way for companies to optimize their websites so that customers may find what they need in only 2 clicks?

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High-Speed Information Processing

U T A H S T A T E U N I V E R S I T Y

CENTER

The Center for High-Speed Information Processing (CHIP) bridges the gap between university research in fast signal processing algorithms and industrial applications through software and hardware design and prototyping. CHIP's demonstrable prototypes provide companies the proof-of-concept they often require before licensing a signal processing algorithm. Applications of this technology include high definition television, hearing aids, mobile phones, image processing, space craft instrumentation, and digital receivers and transmitters.

TECHNOLOGY

CHIP's emphasis in signal processing has been the implementation of FPGA (Field Programmable Gate Array) chips. Integrated circuits (IC), or chips, function by performing many additions, subtractions, and multiplications. The Center's algorithms relieve the bottleneck in the computational speed of ICs by eliminating multipliers. This results in less power consumption, smaller chip areas, less logic gates, and faster speeds.

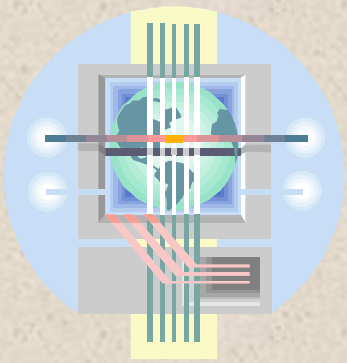
The multiplier-free algorithms have been implemented in the compression and restoration of hyperspectral images. These images are commonly taken by airborne or space imagers at multiple frequencies which results in noise and lost samples that need to be restored as well as very large files that need to be compressed. CHIP's fast algorithms have also been implemented in FPGA chips for the use of feedback cancellation technology in digital hearing aids as well as echo cancellation technology in telephones.

ACCOMPLISHMENTS

CHIP has been issued two patents for its echo cancellation technology and has licensed the technology to Sonic Innovations (SLC, Utah) for use in digital hearing aids and SP Communications (Logan, Utah) for use in speaker phones. The Center has also completed contract work with two other companies. In its final year, CHIP secured $678,000 in external funding to continue its research.

THINK TANK

What if there was...



A way to eliminate echoes in hearing aids and telephones simply by using a fast signal processing algorithm?

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Homogeneous DNA Analysis

U N I V E R S I T Y O F U T A H

CENTER

The focus of this Center continues to be commercialization of rapid and cost-effective DNA-testing. Their technology is based on the Nobel-prize winning technique, polymerase chain reaction (PCR), which has been modified to be ten times faster. The technology takes advantage of the fact that different types of DNA (from different individuals) melt differently. The Center's technology simplifies the whole analysis by allowing for PCR and typing (DNA melting) to be performed in the same test tube, reducing the cost and risk of contamination.

TECHNOLOGY

The core technology of this Center is based on high resolution DNA melting. Just as high definition television presents such detail that it is possible to see the pores on a person's face, high resolution DNA melting provides great detail, enabling one to see the smallest difference in DNA, the base. The technology also allows for this analysis in just a few minutes, providing potential in-office clinical applications such as identifying a patient's risk for drug reactions or what microorganism is causing an infection. The process is "real-time" when a fluorescent dye is added, allowing one to watch the DNA as it melts and is amplified.

After successful commercialization of one product, the Center is working to develop advanced methods of homogenous DNA analysis in addition to software and hardware complimentary technologies. Future developments will include a real-time PCR chip and related instruments.

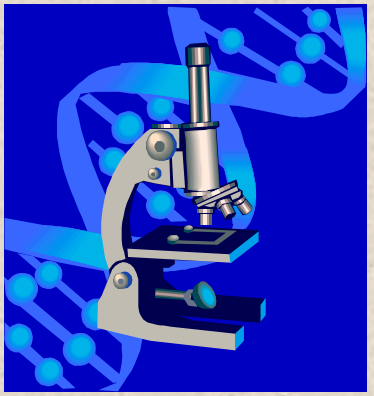
ACCOMPLISHMENTS

This year, the Center demonstrated the feasibility of sequencing and repeat typing by melting and completed a blind clinical trial of transplant matching. Software tools for assay design and analysis have also been developed which will be available on the Center's website to increase visibility of the technology.

An additional patent has been issued and was licensed to the Center's main benefiting company, Idaho Technology. Additional genotyping and allele fractions technology have also been successfully licensed.

THINK TANK

What if there was a way to...



Find out how a patient's body will react to a drug in just a few minutes, right in the doctor's office?

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Interactive Ray-Tracing & Photo-Realistic Visualization

U N I V E R S I T Y O F U T A H

CENTER

This new Center is developing technology for interactively visualizing 3D graphics based on large-scale models and datasets such as those in computer-aided design (CAD) and film animation that current graphics processing units (GPUs) cannot display. The Center plans on improving and integrating their ray tracing programs for commercial use, which are better suited than current GPUs for large-scale applications.

TECHNOLOGY

Two primary software packages are the focus of the Center's commercialization efforts: Manta Interactive Ray-Tracing and Galileo High Quality Batch Rendering. Manta allows interactivity for large datasets with high image quality and Galileo creates high fidelity images such as those used in virtual prototypes or motion pictures.

Complex geometric models such as airplane designs are typically rendered on a screen by projecting each of the billions of 3D objects, a slow process. Ray tracing reverses the process by determining what is seen through each pixel on the screen, thereby dramatically increasing the speed of visualization. By creating better algorithms, modern hardware can still be used to produce highly realistic rendering. The technology may be applied in CAD areas such as automobile and aircraft design as well as the computer animation industry.

ACCOMPLISHMENTS

The Center generated interest in the Manta system after its demonstration at the 2005 SuperComputing conference in which a large aircraft model was presented as remote engineers collaborated on the model. In addition, the Manta software publication in an international conference was selected as one of the four best from the conference.

During this past year, the Center was awarded an $810,000 federal grant and began work on its intellectual property portfolio. Currently, the Center is working on securing a relationship with an auto designer and will also pursue relationships with major film studios.

THINK TANK

What if there was a way to...

Visualize highly detailed 3D graphics on current hardware systems with the use of better algorithms?

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Magnetic Sensor & Actuator Materials

U N I V E R S I T Y O F U T A H

CENTER

The focus of this Center is the development and commercialization of products and processing techniques based on novel magnetic materials for sensors and actuators. The Center is located in a state of the art research and development laboratory responsible for the major discovery of magnetostriction in iron-gallium alloys.

TECHNOLOGY

The cornerstone of the Center's technology is the magnetostrictive iron-gallium (FeGa) alloy. Magnetostrictive materials are used as sensors and actuators because of their ability to change shape and elasticity in response to a magnetic field. Current magnetostrictive materials such as Terfenol-D are expensive, brittle and have a narrow operating temperature. The Center's technology improves upon these areas with FeGa, which is inexpensive, rugged and deformable, and has a wide range of operating temperatures.

Applications of the technology include high power ultrasonic and sonic devices, nano-positioners, sonar and acoustic devices, anti-lock braking systems, position and level sensors, and strain/load sensors. The applications cover many industries, such as medical, instrumentation, automotive, and aerospace.

ACCOMPLISHMENTS

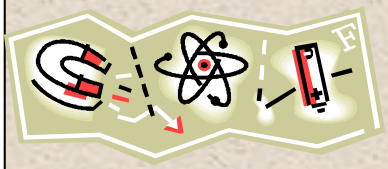
The Center has made progress building a prototype of an industrial ultrasonic cleaner and is testing the prototype of a nano-positioning/actuating device.

In its first year, the Center received $142,370 in funding from the NSF as well as $68,928 in private funding. The Center also filed two patent applications. Their technology was recognized as a finalist for the Stoel Rives Innovation awards for 2006.

Multiple companies have expressed interest in licensing the technology, which was developed in conjunction with Naval contracts. There are currently no manufacturers of FeGa.

THINK TANK

What if there was...



A material that could be used in sonar, positioners, and sensors that resists corrosion and can operate at nearly any temperature?

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Microarray Technology

UNIVERSITY OF UTAH

CENTER

The Center for Microarray Technology (CMT), a new Center this year, is developing technology related to real-time microarrays. This technology includes a metallic microarray substrate in which the probe molecules are bound in nanocavities. The cavities serve as detection sites providing improved sensitivity and increased fluorescence yield. Target application areas include discovery and clinical diagnostics. The goals of the Center are to improve the speed and data quality over traditional microarray technologies and methodologies by increasing sensitivity and selectivity, and through the development of sophisticated analysis methods.

TECHNOLOGY

In its first year of Centers of Excellence funding, CMT's technology developments include DNA amplification and detection on a microarray surface, a method for detection of unlabeled molecules on microarrays, the use of nanocavities to improve nucleic acid or peptide synthesis, and the use of localized temperature control on a microarray surface to selectively immobilize nucleic acids.

ACCOMPLISHMENTS

In the past year, the Center has received over $207,000 in external funds, has filed one patent application, and is in the process of creating a spinout, Philotek. The Center has developed a method of rapid prototyping for the fabrication of its nanocavity microarrays. Optimization of the nanocavity shape is ongoing but current geometries more than double the enhancement over preliminary results. In combination with nanocavity design, the related surface chemistry for molecule attachment has been characterized into an industry-standard and adapted to the nanocavity arrays. The Center is discussing a manufacturing partnership with another Centers of Excellence spinout, MOXTEK, to produce the nanocavity substrate.

In addition, new real-time analysis methods of microarrays are being developed to improve data quality and the range of data capture. The Center is also now using the microheater chips that it designed to control the surface temperature on microarrays.

THINK TANK

What if there was a way to...

Detect molecules with better sensitivity on a microarray in real-time?

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Miniature Unmanned Air Vehicles

BRIGHAM YOUNG UNIVERSITY

CENTER

The main focus of the Center is the development of technologies to extend the capabilities of autonomous miniature air vehicles (AMAVs, also referred to as UAVs) and to license those technologies which are commercially viable. Current UAV technology is large, expensive, hard to fly, and can only be produced in small quantities. The Center's technology provides great improvement with small, inexpensive, easy to fly UAVs that can be mass produced. The vision of the Center is to enable AMAV's to realize their potential in a wide array of commercial markets due to their ease of deployment, flight and cost advantages.

TECHNOLOGY

The Center is advancing a variety of technologies centered on the AMAV. They have extended the capabilities of their previously developed autopilot technology to include auto-takeoff and auto-land, enabling each AMAV to be completely autonomous, eliminating the need for radio control.

In addition to new technologies such as a pan and tilt camera and hand-held user interface, the Center is developing vector field-precision path following capabilities as well as vertical take-off flight control for rotorcraft and tail sitter vehicles. New airframes have also been developed that are inexpensive and include an integrated camera.

ACCOMPLISHMENTS

This year, the Center spun out a second company, Flying Sensors (Bountiful, UT), and filed two additional patent applications for their video stabilization and target location software. Flying Sensors develops commercial applications for small UAVs in areas such as real estate and facility monitoring. Additional technology has been licensed to the Center's first spinout, Procerus Technologies, and the pan-tilt camera system and hand-held user interface are now ready for licensing.

The Center continues to receive recognition for its work and co-directors, Randy Beard and Tim McLain, were awarded the Brigham Young University Technology Transfer Award.

THINK TANK

What if there was...

A miniature plane that could be flown to monitor traffic without the need to leave the office?

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Modified Activated Carbon

UNIVERSITY OF UTAH

CENTER

The Center for Modified and Activated Carbons Technology (MAC) focuses on modifications to existing activated carbon products and expanding into new products. Through chemical or biological modifications, activated carbon is modified at the molecular or surface level to enhance its sorption properties for treatment and purification of water or other liquids.

TECHNOLOGY

MAC's technology is centered around modified activated carbon which provides faster sorption, longer life, higher loading capacity, and better contamination removal for less cost than typical technologies. Compared with water treatment technologies such as reverse osmosis or activated alumina, modified activated carbon has a smaller treatment time, can operate over a larger pH range, is less expensive, and is able to remove more arsenic.

MAC's technology has applications such as mining, and water treatment in a broad range of industries including chemical plants, refineries, agriculture, medical, food and beverage, and analysis.

In its first year, the Center tested the use of the carbons in arsenic removal as well as zinc, cadmium, and copper removal. A number of metal binding proteins were also successfully tested with activated carbons.

ACCOMPLISHMENTS

MAC has already spun out a new company, INOTEC, with four products that it is marketing. Discussions are underway with major mining companies and prototype materials for arsenic removal are being tested. Pre-prototype materials and services have been requested by five different mining companies who are now customers of INOTEC. In addition, pilot-scale testing of MAC materials for removal of arsenic from drinking water is scheduled for New Mexico and is pending approval in Park City.

The Center received $465,349 in funding and has two patent applications filed.

THINK TANK

What if there was...

A material that could completely remove contaminants from water in just a couple of hours for a tenth of the cost that current treatments require?

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Nanosize Inorganic Material Powders

UNIVERSITY OF UTAH

CENTER

The main focus of this Center is to synthesize nanosize oxide powders by a low-cost, commercially scalable process using inexpensive precursors. There are numerous applications for these powders, including fuel cells, catalysts, and sensors.

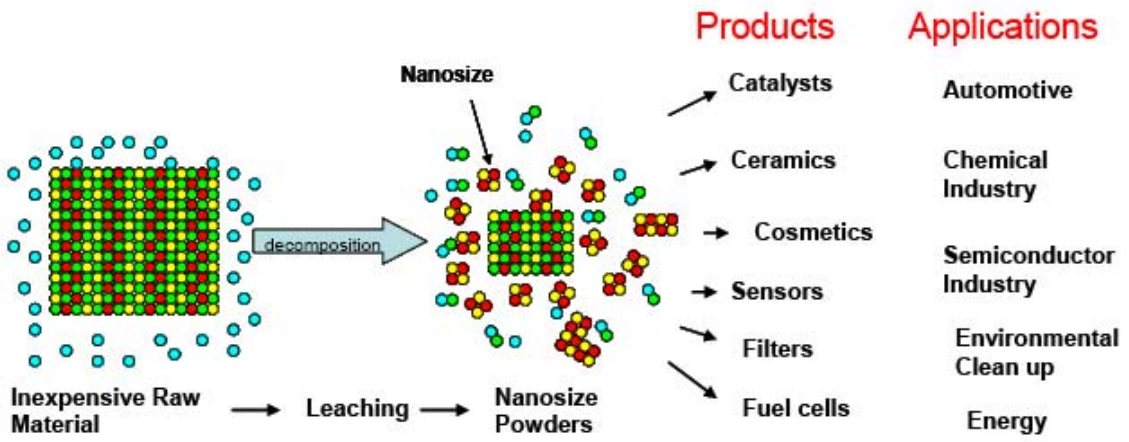
TECHNOLOGY

The Center's core technology is based on molecular decomposition to create nanosize powders, which creates a uniform size of various composition and is less expensive than conventional molecular addition techniques. This allows the technology to be used in the application of sensors, which competitors have not yet been able to accomplish.

THINK TANK

What if there was...

A way to make highly responsive sensors from inexpensive nanosize powders?



ACCOMPLISHMENTS

The Center has synthesized several new nanosize powders, including CSZ, YSZ, SnO_2, Fe_2O_3, Fe_3O_4, and In_2O_3. In addition, the Center has successfully fabricated sintered parts of selected nano materials, metallic and ceramic membranes, and nanoporous sensors.

This year, the Center's Director received the Governor's Medal of Science and Technology and a new spinout was created, Nano-Oxides, Inc.

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Therapeutic Biomaterials

U N I V E R S I T Y O F U T A H

Center

The Center for Therapeutic Biomaterials (CTB) prepares and uses new biomaterials for reparative medicine and the 3-D culture of human cells. Applications include clinical use in wound repair, prevention of post-surgical adhesions, and extending the life of donated organs as well as evaluation of cell response to various compounds. The biomaterials also have many non-medical applications, such as cosmetics.

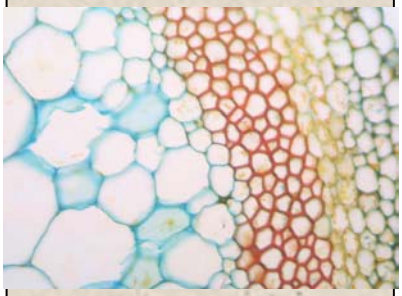
TECHNOLOGY

The CTB continues to build upon its core technology – synthetic extracellular matrix (sECM). In healthy tissue, the extracellular matrix (ECM) provides support for cells and regulates intercellular communication. After an injury, the repair process often leads to the formation of scar tissue rather than the appropriate new ECM. The sECM aids the repair process, leading to new healthy tissue. This technology has been licensed to three companies in three different fields (human, veterinary, and research). New applications include tympanic membrane repair, controlled release of steroids for reduction of inflammation, and the growth of stem cells. In addition, sECM is being used to grow "personalized" tumors for testing anti-cancer drugs that are optimized for the patient. The Center is also developing hybrid materials that combine demineralized bone matrix with sECM for repair of large bone defects.

ACCOMPLISHMENTS

In its second year, the CTB now has three spinouts (Sentrx Animal Care, Carbylan BioSurgery, and Glycosan Biosystems) and is working on additional new technologies including opportunities for human drug toxicology and improved bioprocessing protocols. Two new patent applications have also been filed. The CTB received $1,606,000 in funding from the NIH.

The Center's director, Dr. Prestwich, was selected as one of vSpring's v100: Top 100 Entrepreneurs, Utah Business Magazines "Health Care Heroes," and received the TIAA-CREF Greater Good Award. The sECM technology has been featured by KSL News, Science News, and Discover magazine.



THINK TANK

What if there was...

A material that mimics natural tissue that can be used to treat chronic wounds and repair bone defects?

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Titanium Boride Surface Hardening

U N I V E R S I T Y O F U T A H

CENTER

The focus of this Center is commercialization of a variety of materials using titanium monoboride (TiB) in applications requiring excellent corrosion and wear resistance. Traditionally, titanium diboride has been used in these applications, but the high cost and manufacturing difficulty have been limiting. Titanium monoboride has the unique advantage of combining similar corrosion and wear resistance in addition to electrical conductivity with less expensive manufacturing techniques. The nanostructured bulk titanium boride and the functionally graded titanium boride are novel material technologies for innovative applications such as armor, medical devices, electrodes, gun barrels and die inserts.

TECHNOLOGY

The Center has three major technologies involving its novel TiB: the incorporation of TiB crystals to harden the surfaces of titanium; creation of nanostructured titanium boride bulk material; and functionally graded titanium boride materials for high performance components and devices.

TiB-hardened surfaces provide great advantages over current materials in biomedical implant devices and bearings and gears, reducing contamination problems and increasing the stiffness-to-weight ratio. The functionally graded TiB provides advantages in armor and gun barrel systems, offering a fracture-resistant, highly-graded material.

ACCOMPLISHMENTS

Now in its third year, the Center is continuing to improve the nanostructured titanium boride material and expects approval of its patent in early 2007. The Center also continues to work with its benefiting company, Ortho Development Corporation, and is now pursuing non-medical applications for its technology. With successful development of a ballistic test apparatus and armor plates now complete, the Center is looking into the establishment of a spinout for manufacturing and consulting services.

THINK TANK

What if there was...

An inexpensive material with superior corrosion resistance that could be used in armor and medical devices?

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2005-2006 Business Team Recipients

Acoustic Cooling

U N I V E R S I T Y O F U T A H

CENTER

The Center for Acoustic Cooling Technology was originally established to commercialize novel high frequency thermoacoustic engines for cooling applications. One important application for this technology is in the heat management of computers and other devices employing dense arrays of microcircuits. Subsequent work has resulted in the demonstration of a prototype device capable of converting waste heat into electricity at high efficiency.

TECHNOLOGY

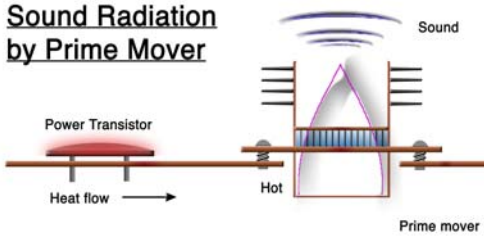
The Center's technology is based on two effects in thermo- acoustics: first, that heat generates sound that can be converted into electricity and second, that sound can pump heat. These effects have been employed in development of thermoacoustic engines which have no moving parts, are environmentally safe, and efficient. Both acoustic coolers and prime movers (energy converters) have been developed with dimensions ranging from 4 cm to 0.8 cm. Technology improvements have increased the power of the acoustic cooler 10 times.

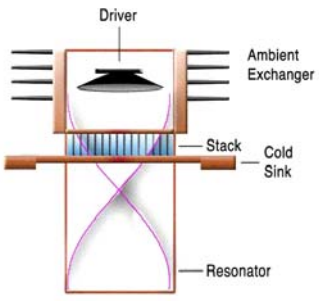
The Center is working to expand the capabilities of the thermoacoustic engines to a larger scale by developing arrays.

ACCOMPLISHMENTS

This year, the Center has expanded the energy conversion efforts. Prototype device power has been increased by a factor of 20. The success of these prototypes is leading to promising applications in renewable energy from waste heat. A prototype of an ultrasonic cooler was also developed.

The Center holds two patents for its technology and has filed an additional patent application. During the past year, the Center received $1.2 million in federal funding.





THINK TANK

What if there was...

A miniature device that could fit inside a computer and convert heat into energy?

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CONTROL OF FLOW IN MANUFACTURING

UTAH STATE UNIVERSITY

CENTER

This new Center is focused on the application of flow control technologies, commonly studied for aerospace applications, to manufacturing processes. Controlling flows in manufacturing leads to higher throughput and improved accuracy, speed, and product quality.

TECHNOLOGY

The Center has two core technologies in development: a particle sorting technology called Aerodynamic Vectoring Particle Sorting (AVPS), and a method to improve spray processes called Coanda-assisted Spray Manipulation (CSM).

AVPS is able to sort different-sized particles without contact by taking advantage of the different forces applied to the particles when the direction of flow is changed. This technology has many applications including biotechnology, cement industry, cosmetics, environmental, and the aerospace industry.

CSM allows control of the direction and profile of high-speed jets or sprays with high precision and frequency. This technology makes use of an enhanced Coanda effect (the tendency of jets to adhere to nearby surfaces) and makes it possible to apply films on large surfaces at precisely controllable thicknesses with only a single nozzle and no moving parts in or near the jet flow. When used in flame spray processes, the technology mitigates the intense heating of the surface that is typical of flame sprays.

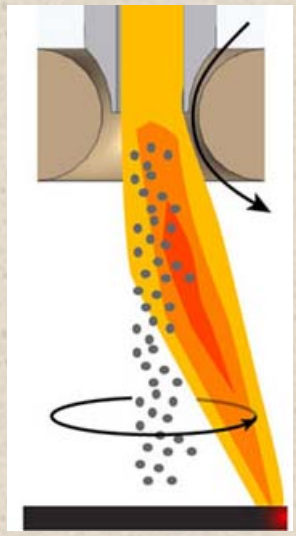
ACCOMPLISHMENTS

In 2005, the Center was awarded a business team to assist in preparation for a full Center proposal. Through that collaboration, the Center was successful and awarded full Center status for the 2006-07 year. In its first year, the Center has secured commitments from two companies, to assist in testing of future CSM devices applied to paint sprayers. The Center has 2 patents and 4 invention disclosures. A small business company, CastleRock Engineering, has spun out from the Center and is partnered in STTR/SBIR proposals submitted by the Center. One such proposal that is soon to be submitted will bring $500,000 in funding if successful.

THINK TANK

What if there was...

A way to separate particles just by spraying them or reducing the heat of surfaces that are coated with flame sprays?



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Direct Machining and Control

BRIGHAM YOUNG UNIVERSITY

CENTER

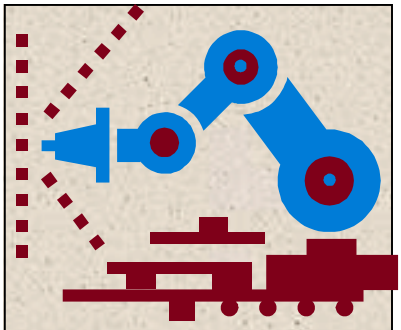
The Center for Direct Machining and Control (DMAC) was funded by the COEP from 2002 to 2005 to develop a centralized, PC-based, direct-control manufacturing system enabling multiple machine tools to be run by one operator through a network, rather than individual operators, delivering dramatic cost savings. The technology has applications in multiple manufacturing and automation industries.

TECHNOLOGY

The DMAC technology is based on an open architecture controller and supporting algorithms for general control of mechanisms such as 5-axis machine tools. The primary focus in the Center is software development, including object oriented libraries that integrate motion planning, trajectory generation, servo-control, communication and user interfaces, with some supporting hardware. Hardware includes dual CPU control processors, machine tool enabled Coordinate Measurement wireless hardware, and Ethernet enabled sensor boards and motor control boards. The advantage of this new distributed approach to control is reduced hardware and control costs, control of distributed rather than collected devices, and greater flexibility through modern control methods that cannot be enabled under the current restrictions of modern controllers.

ACCOMPLISHMENTS

DMAC has developed a number of technologies including direct control architecture and a closed-loop machining scheme. Direct Controls, Inc., a spin-off company in Orem, Utah, has released the first direct controlled machining robot. The Center is working with a business team on continuing commercialization work.



THINK TANK

What if there was...

A way for one person to operate multiple machines for the control of manufacturing with a single computer?

Ed Red
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Program Description

PROGRAM DESCRIPTION

BACKGROUND

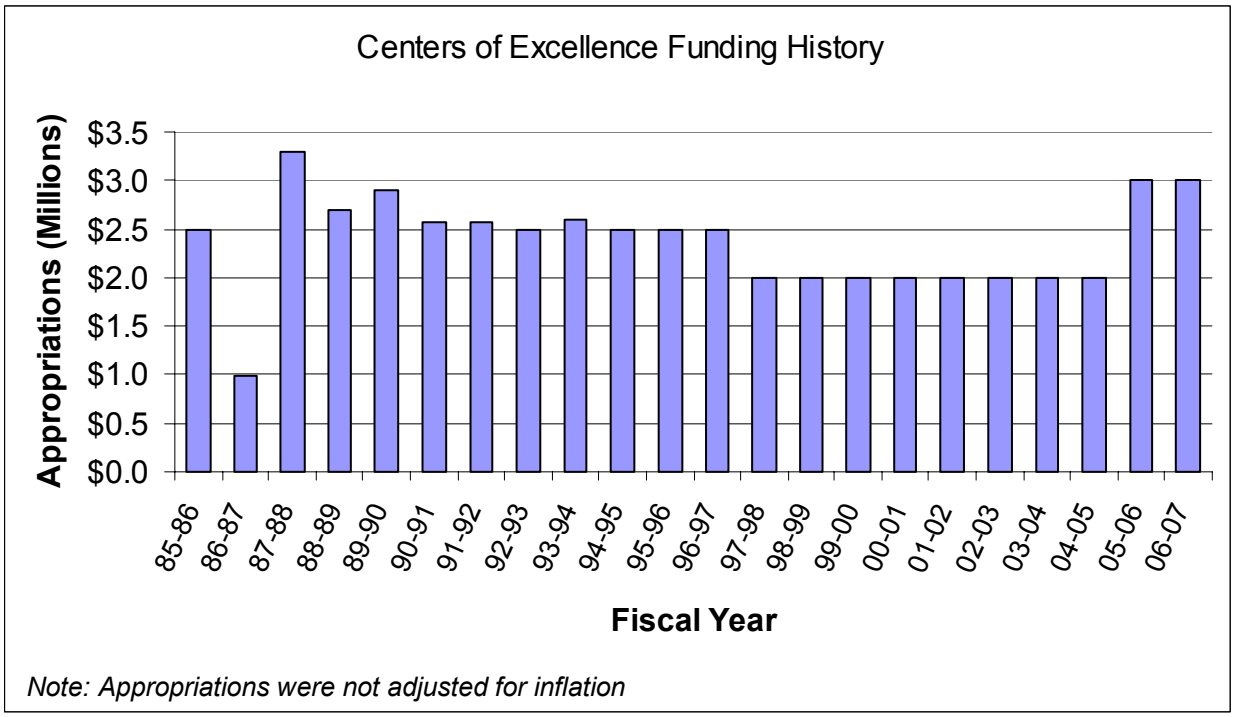
Twenty years ago, in 1986, the Utah State Legislature recognized the importance of a technology based economy and created the Centers of Excellence program to assist the transition of technologies out of Utah's Colleges and Universities and into industry. The Legislature has recommended the allocation of economic development funds annually to the COEP, to be awarded to college and university faculty on a competitive basis. The COE Program has two key functions: first to help technically mature university developed technology and second to help transition those mature technologies into industry.

The COE program is a direct granting program, and the state does not take or hold an equity position in the licenses. The return on investment to the state comes solely from the success of helping to convert university developed technologies into jobs and wealth-creating products and services in successful businesses. This feature is of tremendous benefit to the universities, which retain title to the technologies, and the licensees, such as startups or existing Utah companies, which reap the benefits of these funds. However, because of this feature, during the 2006 Legislative session, the Legislature passed a bill, Senate Bill 112, which adds a "return of grant" feature to the COE statute, to help strengthen the program and assist the state in receiving a return on its investment.

Over the years, the funding for the COE program has varied, beginning at $2.5million in 1986, increasing to $3.3 million for 1987-88 and declining to between $2 and $2.5 million for most of the program's history. For the 2005-06 fiscal year, funding was increased significantly from $2million to $3million, and during the 2006 Legislative session, COE funding was set to $3million per year on an ongoing basis.

This level of funding permitted the program to fund 18 full Centers and to provide business team assistance to 3 other teams during the 2005-06 fiscal year. The same level of funding will support 16 full Centers and 5 business teams for 2006-07, with additional funding available for emerging teams to apply for first time business team assistance in the fall of 2006.

If funding for the Centers of Excellence program had kept pace with inflation (see bls.gov/cpi) since its inception in the 1985-86 fiscal year, the funding level for 2006 would be nearly $4.6 million. The chart below shows the history of funding for the COE program through fiscal 2006-07 allocated funds.



Note: Appropriations were not adjusted for inflation

HISTORICAL SUCCESS

The Centers of Excellence program has been a part of the university/industry technology landscape in Utah for 20 years. One way to measure the success and impact of the program is to look at the economic impact of spinouts which are startups emerging from a Center.

It is very difficult to track the jobs that have derived from over 100 Centers of Excellence over nearly 20 years, but in 2003, under the Leavitt administration, the Centers of Excellence program conducted a small survey to attempt to quantify jobs resulting from the program with a particular emphasis on spinouts from the various Centers. This survey focused on companies linked to about 45 Centers and showed a count of 2,008 jobs stemming from spinouts and licensees of Centers of Excellence.

To update this data and make it current and more complete, during the Summer of 2006, the COE program conducted an extensive survey of the past Center participants, eventually reaching over 80 of the 111 Centers who participated in the program over the past 2 decades. Details of this study can be found in the "Centers of Excellence 20th Anniversary Report".

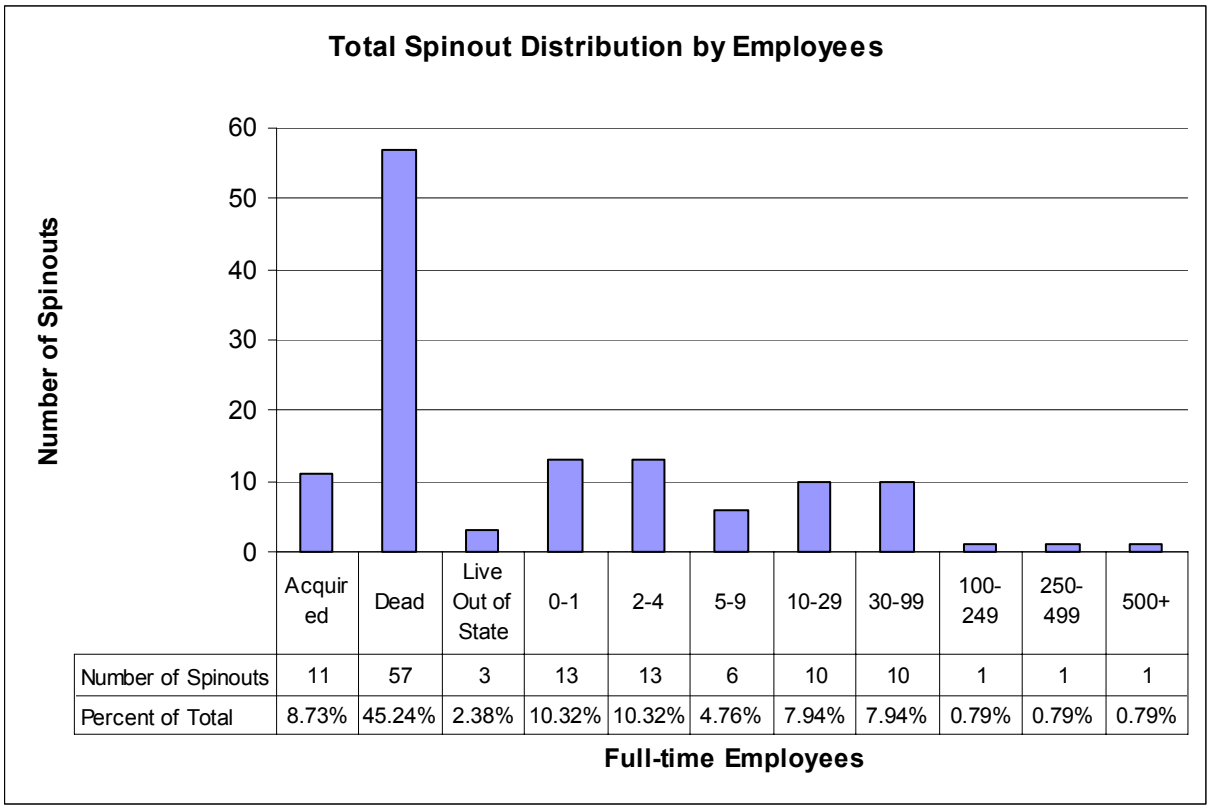
The depth of this research revealed some important information. The thoroughness of the 20th Anniversary survey permits this 2006 data to serve as an excellent baseline for the COE program and its long term performance.

As part of this survey, detailed data was gathered on the number of employees of these spinouts, as well as, where obtainable, average salary of employees and revenues of the company. The 2006 data revealed that over 2000 jobs are currently in Utah based at companies that have emerged from the Centers of Excellence program and, based on reported data, the average salary at reporting spinouts is over $65,000 per year, more than double the current Salt Lake County median salary.

In addition, errors in the 2003 data were identified and adjusted for. During the 2003 survey, several companies were included as "spinouts" which were actually not spinouts of the Centers program, but were "benefiting companies." A benefiting company is a firm which already existed when during the life of the Center and in some way partnered with the Center such as sponsoring research, using consulting services etc.

Based on the 2006 survey, data adjustments were made to correct the 2003 totals and therefore the adjusted 2003 number is 1071 jobs created by confirmed Centers of Excellence spinouts by 2003.

A graph of the data of the employees of spinouts as collected in the 2006 20th Anniversary report is enlightening and is shown below.



	Acquired	Dead	Live Out of State	0-1	2-4	5-9	10-29	30-99	100-249	250-499	500+
Number of Spinouts	11	57	3	13	13	6	10	10	1	1	1
Percent of Total	8.73%	45.24%	2.38%	10.32%	10.32%	4.76%	7.94%	7.94%	0.79%	0.79%	0.79%

The companies listed as "Acquired" are those that were acquired and their jobs essentially eliminated in Utah. Acquired firms which are still active employers in Utah are included in the categories by number of Utah employees in the appropriate category. The 57 firms assigned to the "Dead" category are those which are no longer active or viable based on feedback from both the Center Directors and company participants. IN addition, another 32 companies have less than 10 employees, many of which have become "stuck" at this level. However a healthy 23 out of the 60 active spinouts have between 10 and 99 employees, and one company falls into each of the categories of 100-249, 250-299, and 500+ employees. Obviously the hope of the state is that an increasing percentage of our COE spinouts could grow to be included in the category of 500+ employees.

Changes made during the 2005-06 fiscal year are designed to help emerging COE spinouts gain the momentum needed to achieve this type of long term success. In particular these changes (described in the section on new policies), permit the Center to continue to be eligible for COE funding even if it has a companion spinout or licensee, until an arms length transaction of at least $500,000 is completed. This transaction can be an investment or contracts/sales. These changes permit a "parallel" structure to the program so that a spinout can operate in parallel with the university work to gain momentum for the commercial efforts.

Crucially, an enhanced business team program, which recruits seasoned business executives and serial entrepreneurs to help the Centers on a consulting basis, was incorporated into the Centers of Excellence program and is more fully described in the Commercialization section.

OPERATIONS AND OBJECTIVES — "OUR JOB IS JOBS"

The Centers of Excellence program is an economic development program, designed to help enhance the growth of Utah's technology based economy. Technology that is matured with Centers of Excellence funds is hoped to be licensed to either an existing Utah business or a startup or a new company (often called a spinout), specifically to take a new technology to market. The program continues to mentor Centers who have graduated, where possible, to help foster success, introduce them to sources of funding, and identify management and other talent that might be of help to the Center.

Under the statute governing the 2005-06 funding year, Centers are required to have 2:1 matching funds. These funds are reported and reviewed on a regular basis. A key element of the program is the emphasis during the renewal and selection process of achievement of milestones and commitment to commercialization. During the 2006 Legislative session, modifications were made to the statute to permit colleges or universities in Utah that do not grant doctoral degrees to use a 1:1 matching ratio. More details about this can be found in the section on the new Legislation.

Center directors are required to submit annual reports to the COEP director. This Centers of Excellence Program Annual Report begins with a summary of the reports prepared by each Center Director and is supplemented, as appropriate, by information gathered from site visits, meetings, and other sources.

Prior to the 2005-06 fiscal year, Centers were eligible for funding for up to 5 year, but for the first time in 2005-06, were eligible for a maximum of 4 years. The goal of this change was to deploy approximately the same total amount of funds, typically between $500,000 and $750,000 per Center, while accelerating the commercialization of the technology.

CENTER SELECTION PROCESS

The Center selection process is one of the great strengths of this program. Each year, in late December, the COE Director issues the new solicitation for the upcoming fiscal year. This opportunity is communicated to the State's colleges and universities, including the relevant technology commercialization offices, existing and past Center Directors, various department heads, industry contacts and on the Centers of Excellence Website.

For the 2005-06 fiscal year, one type of proposal was available, however, once the proposals were received, several were recommended for a new type of support, called a "Business Team Grant". This grant does not award money to the university team directly, but instead uses state funds to recruit seasoned business team members who are serial entrepreneurs and seasoned technology executives, to assist the university team in preparing a compelling, market focused proposal.

This was so successful during the 2005-06 year, that for the 2006-07 solicitation, three types of proposal options were created. First, a renewal proposal, second a proposal for a new Center, and third, a proposal for a business team grant.

Once the proposal deadline has passed, the review process begins. The Center Director recruits experienced executives in Utah's technology community to serve as reviewers, often referred to as a group as the "Centers of Excellence Advisory Council." Barring any unusual circumstances, the proposing teams has an in-person meeting with two or more reviewers and a member of the GOED team, usually the COE Director. During these review meetings, which usually last 1.5 to 2 hours, the team explains their technology and research to date, and outlines how these innovations might apply to one or more markets. The reviewers, who are chosen based on their relevant market and technology expertise, are able to interact with the proposing team, ask questions and evaluate the commercial potential of the proposal.

For 2005-06, once all of the reviews were complete, all of the members of the Advisory Council were invited to a 1 1/2 day offsite meeting to do the hard work of selecting those proposals which best fit the funding criteria. This is a lengthy and intellectually demanding process and every member of the Council is keenly aware that these funds are taxpayer funds and they are careful to select only those Centers with demonstrable market potential.

The State Advisory Council for Science and Technology (SAC) is specified in statute to have advisory responsibility for the Centers of Excellence Program. SAC members participate on the Centers Advisory Council, reviewing proposals and conducting site visits, thus gaining detailed knowledge of the quality of the proposals as well as the process itself. This oversight is an important mechanism for ensuring quality decisions. In statute the SAC is also charged with helping to prepare the COE annual report.

Also in statute, the GOED Board is chartered with oversight of the program and GOED Board members also participate as reviewers and/or in the COE Advisory council process. They are then able to represent to their colleagues on the Board that the process is appropriately conducted and that the recommendations for funding are appropriate. The summary of statistics from the 2005-06 Solicitation process is listed below.

Proposal Review and Award Summary

Total Number of Proposals to COEP for 2005-2006	**34**
Existing Centers Seeking Renewal	17
Proposals for New Centers	17
Centers Funded	18
Existing Centers Renewed	13
New Centers Funded	5
Centers with Business Team Grants	3
Graduating Centers from 2004-2005 year	5
Centers at the University of Utah	12
Centers at Utah State University	3
Centers at Brigham Young University	3

Funding Summary

Funding for the Centers of Excellent Program	
Estimated Program Overhead (Paid by GOED)	$170,000
Funds Allocated by the Legislature	$3,000,000
Direct Center Funding (Technical Funding to Centers)	$2,446,800
Business Team Funding*	$553,200
* Average estimated funding of approx. $25,000 per Center customized based on Center needs. Paid and Managed by COEP	

COMMERCIALIZATION PROCESS

For many years, the Centers of Excellence program has paid for consultants to assist each Center with business planning and strategy and this has always been a strength of the Centers program. Approximately 80 hours per year of consulting assistance was available to each Center and these funds were administered by each university's Technology Commercialization Office, which received a block grant of funds for each of their Centers. These funds were to be expended on "COE approved" consultants, of which there was a pool of approximately 20. These individuals ranged from general business consultants to some market-specific consultants.

Under the Huntsman administration, for the 2005-06 fiscal year, the consulting program was replaced with the COE Business Team program. This program builds on the concept of business consulting that the program has had but focuses on recruiting industry focused, seasoned technology executives, serial entrepreneurs and market experts who are recruited through a state– and nation-wide RFP to meet the specific needs of each Center. Under the Business Team program, funding has been increased to provide approximately 250 hours of assistance each year to help transfer the technologies out of the university setting and into industry.

The COE Business Team Program has been very successful, with professors, university representative and the business team members themselves frequently commenting on the exciting opportunities available in collaboration between top notch research teams and top notch business people. This program has become a mainstay of the COE program.

2005-2006 Financial Summary

The Financial Summary is a summary of the information provided by each Center in their annual report to the program and the funding summary is based on the funds granted during the fiscal year. For reference, "Total Funding" means COE funding since starting with the program, "Patents Pend. 05-06" means patents newly filed during the fiscal year, "New Patents (Issued)" refers to those issued during the fiscal year and "Spin-Offs/ Licensees" refers to companies which have been formed to "spin-off" technology from the Center while "Licensees" refers to companies which already existed which have licensed the technology.

University	Center	05-06 Funding	Total Funding	05-06 Matching	Patents Pend. 05-06	New Patents (Issued)	Spin-Offs/ Licensees
UU	Acoustic Cooling Technology	25,000	314,000	1,150,000	1	0	0
BYU	Acoustics Research	115,000	115,000	237,376	0	0	0
BYU	Advanced Communications Technology	120,203	230,203	766,211	4	0	0
USU	Advanced Imaging LADAR	143,824	413,724	144,497	1	0	2
USU	Advanced Satellite Manufacturing	139,784	164,784	285,001	2	0	0
UU	Alternate Strategies for Parasite Removal	150,000	285,000	300,000	3	0	1
UU	Biomedical Microfluidics	135,000	255,000	421,000	6	0	1
UU	Computational Design and Testing of Novel Materials	123,500	165,000	325,000	0	0	0
BYU	Control of Flow in Manufacturing	25,000	25,000	0	0	0	0
BYU	Direct Machining & Control	25,000	342,000	0	0	0	0
UU	Global Knowledge Mgmt.	165,000	398,000	330.000	0	0	1
USU	High-Speed Information Processing	139,200	548,700	678,000	0	2	3
UU	Homogeneous DNA Analysis	176,000	470,000	643,750	1	1	1
UU	Interactive Ray-Tracing & Photo-Realistic Visualization	143,700	143,700	809,978	0	0	0
UU	Magnetic Sensor & Acuator Materials	114,000	114,000	211,299	2	0	0
UU	Microarray Technology	100,000	100,000	207,487	0	0	0

University	Center	05-06 Funding	Total Funding	05-06 Matching	Patents Pend. 05-06	New Patents (Issued)	Spin-Offs/ Licensees
BYU	Miniature Unmanned Air Vehicles	130,000	240,000	767,036	1	0	2
UU	Modified Activated Carbons Technology	140,000	140,000	465,355	0	0	0
UU	Nanosize Inorganic Material Powders	106,700	196,700	720,000	1	2	1
UU	Novel TiB Surface Hardening	115,000	272,000	169,000	2	0	1
UU	Therapeutic Biomaterials	160,000	290,000	1,757,000	2	0	3

2006-2007 Funded Centers

Utah Centers of Excellence Program
Description of Centers Selected for Funding in Fiscal 2006-2007
(Dollar amounts subject to minor revision)
List of recommendations for all proposals

Proposals Selected for Funding for the 2006-07 Centers of Excellence Program

Center (University) **Years Funded to Date**

Acoustics Research (BYU) **1**
Commercializing active sound control technology with superior ability to both reduce noise in varied settings (vehicle cabins, computer fans and telecommunications, e.g.) and modify sounds for commercial benefit.

Advanced Communications Technology (BYU) **2**
Improved wireless communications and data transmission for both military and commercial markets is achieved through the use of MIMO (multiple-input multiple-output) technology with multiple antenna elements.

Advanced Imaging LADAR (USU) **3**
Commercializing land-based and airborne high-resolution, laser-based 3D color-imaging platforms for both military and civilian use. One license to RapidMapper, Inc. (now InteliSum), a Utah company.

Advanced Thermal Management Technologies (USU) **NEW**
Developing technologies for extremely high performance thermal management in the context of physical and vibration isolation, in part from collaboration with Utah State University's Space Dynamics Lab.

Biomedical Microfluidics (U/U) **2**
Engineering technology that controls the movement of fluids in channels smaller than a human hair, micropumps that can deliver tiny quantities of drugs, and improved devices for DNA screening are some product examples. Wasatch Microfluidics, Inc., is being spun out. Companion Spinout funding was proposed but was not funded.

Control of Flows in Manufacturing (USU) **New**
Applying Computational Fluid Dynamics to improve manufacturing processes including particle sorting and Electrical Discharge Machining (EDM). This Center was assigned a business team in 2005-06.

Center (University) **Years Funded to Date**

Functionally Graded…Cemented Tungsten Carbide **New**
(Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials) Advanced composite materials with predictable wear and failure characteristics are being designed for demanding applications such as mining, drilling, and grinding.

Homogeneous DNA Analysis (U/U) **3**
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office. One application licensed to Idaho Technologies, Inc. (a Utah company).

Interactive Ray-Tracing & Photo-Realistic Visualization (U/U) **1**
Producing a commercial form of two programs that can process 3-D graphics based on large data sets found in CAD, film animation and scientific models, which existing GPUs cannot handle.

Microarray Technology (U/U) **1**
Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Miniature Unmanned Air Vehicles (BYU) **2**
Conducting rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies. An autopilot design has been licensed to Procerus, Inc. in Utah. A new Companion Spinout, Flying Sensors, is recommended for a Companion Grant.

Companion Spinout – Flying Sensors **New**
Developing commercial (non-military) applications for miniature unmanned air vehicles (UAVs) including real estate, insurance industry, EPA - multi-source air quality sampling, random testing, pipeline/remote facility surveillance and emergency response/fire monitoring – forest & commercial.

Modified Activated Carbons Technology (U/U) **1**
Developing improved products for gas and water treatment, as well as metal recovery or removal, based on modifications to granular activated carbon. This also was a Super Center proposal in combination with SLCC/Innovabio and SUU. The concept was well received, but was not ultimately approved.

Nanosize Inorganic Material Powders (U/U) **3**
Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

Center (University) **Years Funded to Date**

Organic Electronics (U/U) **New**

Developing new polymers for the creation of OLEDs (Organic Light Emitting Diodes) resulting in the commercialization of organic semiconductors with superior luminescence efficiency and color spread, for multicolor displays and white light illumination.

Therapeutic Biomaterials (U/U) **2**

Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs. Three companies, 1 in California (Carbylan) and 2 in Utah (Sentrx Animal Care and Glycosan Biosciences) have been spun out of the Center to date.

Companion Spinout – Glycosan Biosciences **New**

Commercializing the compounds from Therapeutic Biomaterials for 3-D Cell Culture, Tissue Engineering, Drug Toxicity Testing, & Skin Care.

Titanium Boride Surface Hardening (U/U) **3**

Commercializing harder, longer-lived components and devices – ranging from armor to bearings and orthopedic implants - for the military, biomedical and industrial markets.

Pre-Center Candidates (Assigned a Business Team) for 2006-07 (New Applicants to the COE program)

Cell Therapy (UU)

This Center has capabilities to build a "bank" for stem cells derived from umbilical cord blood (so-called "cord blood") which can be used for many clinical applications in Regenerative Medicine and tissue engineering. Providing GMP and regulatory support for processing, development and commercialization of cord-derived stem cells, biologics and combinational products.

Electronic Mathematics Education (eMath@USU)

Working on the creation and world-wide dissemination of dynamic, computer-based instruction software for K-16 mathematics, including the award winning National Library of Virtual Manipulatives.

MIMO Communications System (UU)

Technologies include new algorithms for signal detection and reception that significantly improve the performance and throughput of MIMO (Multiple-Input Multiple-Output) wireless communication systems. The developed algorithms offer low complexity and near optimal performance, and are adaptable to any standard.

Solar Biofuels Technology (USU)

Developing a solar powered photobioreactor using minimal land and water resources to efficiently grow high-oil-content microalgae as a feedstock for biofuels such as biodiesel.

Universal Application System (USU)

Commercializing a web-based system that processes applications for multiple agencies in the government services industry. This technology is at the basis of "UtahClicks" and is also in production in Oregon and Indiana. Plans to adapt this software for other industries are underway.

Graduating Centers as of June 30, 2006

Alternate Strategies of Parasite Removal (U/U) — 2 years completed

Preparing to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers.

High-Speed Information Processing (USU) — 4 years completed

Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices. An echo cancellation application enabled the creation of SP Communications, Inc. to make improved speaker phones in Logan, Utah.

Legislation Governing 2005-06

Part 6
Centers of Excellence

9-2-601. Purpose.

9-2-602. Short title - Definitions.

9-2-603. Administration - Grants.

9-2-601. Purpose.
(1) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. These generally come from strong research colleges and universities. Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development. Most states are enhancing their research base by direct funding, usually on a matching basis. The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas. The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.
(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis.
(3) The Legislature recommends that such funds be allocated on a competitive basis to the various colleges and universities in the state. The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.
History: C. 1953, 63-62-1, enacted by L. 1985, ch. 103, § 1; 1986, ch. 109, § 1; renumbered by L. 1992, ch. 241, § 60.

9-2-602. Short title - Definitions.
(1) This part is known as the "Centers of Excellence Act."
(2) As used in this part, "Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.
History: C. 1953, 63-62-2, enacted by L. 1985, ch. 103, § 2; 1986, ch. 109, § 2; renumbered by L. 1992, ch. 241, § 61.

9-2-603. Administration - Grants.
(1) This part shall be administered by the Division of Business and Economic Development.
(2) The department may award grants to the various colleges and universities in the state for the purposes of this part.
(3) Recommendations for funding shall be made by the division with the advice of the State Advisory Council for Science and Technology, with the approval of the board. Each proposal shall receive the best available outside review.
(4) In considering each proposal, the division shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development. Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.
(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the division in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.
History: C. 1953, 63-62-3, enacted by L. 1986, ch. 109, § 3; renumbered by L. 1992, ch. 241, § 62.
Repeals and Reenactments. - Laws 1986, ch. 109, § 3 repealed former § 63-62-3, as enacted by L. 1953, ch. 103, § 3, relating to creation of a committee for technology excellence in engineering research, and enacted the above section.
[92603].
6338f704.

Legislation Passed in 2006 Session (Effective July 1, 2006)

Centers of Excellence Legislation Passed in 2006 Session-Effective July 1, 2006

During the 2006 Legislative session, the Legislature passed a bill known as SB 112, sponsored by Senator Thomas V. Hatch and co-sponsored in the House by Representative Peggy Wallace. This bill was designed to enhance the strength and value of the Centers of Excellence program by demonstrating the accountability of the program and its participants to the Legislature and the taxpayers of Utah and by making the Centers of Excellence program more accessible to universities that do not grant doctoral degrees (referred to as "non-doctoral granting institutions).

This legislation has two main sections. The first section modifies the matching funds requirements so that Utah institutions that do not issue doctoral degrees, the "non-doctoral granting schools" would no longer have to meet the 2:1 matching funds requirement. This was intended to enable schools that did not have doctoral programs, and therefore were less frequently involved in ongoing Federal research, to have the opportunity to participate in the Centers of Excellence program.

Instead of the 2:1 matching funds requirement, non-doctoral schools are required, through policy (see section on new Policies) to meet a 1:1 matching funds requirement. This change was greeted with great enthusiasm by the relevant schools and was supported by the doctoral granting institutions as well.

The concept of greater accountability to the Legislature in the COE program was added in the second section of the bill by introducing a concept called the "return of grant". This provision asks the universities to track licensees of those technologies which have been supported by Centers of Excellence program funds as part of the licensing process. If such licensees are either out of state firms or leave the state within five years of the issuance of the License, the statute asks that the affected college or university will share back with the Centers of Excellence program a portion of the proceeds of the license.

This proposal was presented to the Senate Workforce Services and Community and Economic Development Committee, chaired by Senator Carlene Walker, and passed out of committee with 5 Yea votes, 0 Nay Votes, and 2 absences. The bill was subsequently presented to the full Senate, and passed the Senate with 24 Yeas, 0 Nays with 5 Absent. From the Senate, the bill went to the House Workforce Services and Community and Economic Development Committee, where it was unanimously supported by a vote of 7 yea votes, 0 nay votes and no absences. The bill then went to the House of Representatives and passed with 69 yea votes, 0 nay votes and 6 absences.

More details about how this is administered are to be developed by the Governor's Office of Economic Development as part of the program's policies and procedures.

S.B. 112 Enrolled

CENTERS OF EXCELLENCE AMENDMENTS

2006 GENERAL SESSION

STATE OF UTAH

Chief Sponsor: Thomas V. Hatch

House Sponsor: Peggy Wallace

LONG TITLE

General Description:

This bill modifies provisions related to the Centers of Excellence Act.

Highlighted Provisions:

This bill:

. recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis for colleges and universities in the state that offer any doctoral degrees;

. requires the Governor's Office of Economic Development to develop a process to determine whether to require the return of economic development Centers of Excellence grant moneys from a higher education institution if the technology that is developed from grant proceeds is licensed to a licensee that does not maintain a manufacturing or service location in the state from which the technology is exploited or transfers the manufacturing or service location out of state within a five-year period after the issuance of the license; and

. makes certain technical changes.

Monies Appropriated in this Bill:

None

Other Special Clauses:

None

Utah Code Sections Affected:

AMENDS:

63-38f-701, as renumbered and amended by Chapter 148, Laws of Utah 2005

63-38f-704, as renumbered and amended by Chapter 148, Laws of Utah 2005

Be it enacted by the Legislature of the state of Utah:

Section 1. Section **63-38f-701** is amended to read:

63-38f-701. Purpose.

(1) (a) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes.

(b) These generally come from strong research colleges and universities.

(c) Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development.

(d) Most states are enhancing their research base by direct funding, usually on a matching basis.

(e) The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas.

(f) The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.

(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis *for colleges and universities in the state that offer any doctoral degrees*.

(3) (a) The Legislature recommends that the funds be allocated on a competitive basis to the various colleges and universities in the state.

(b) The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.

Section 2. Section **63-38f-704** is amended to read:

63-38f-704. Administration -- Grants.

(1) [This part shall be administered by the] *The* Governor's Office of Economic Development *shall administer this part*.

(2) *(a)* The office may award grants to the various colleges and universities in the state for the purposes of this part.

(b) The governor's Office of Economic Development shall develop a process to determine whether a college or university that receives a grant under this part must return the grant proceeds if the technology that is developed with the grant proceeds is licensed to a licensee that:

(i) does not maintain a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology; or

(ii) initially maintains a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology, but within five years after issuance of the license the licensee or sublicensee transfers the manufacturing or service location for the technology to a location out of the state.

(3) (a) Funding allocations shall be made by the office with the advice of the State

Advisory Council for Science and Technology and the board.

(b) Each proposal shall receive the best available outside review.

(4) (a) In considering each proposal, the office shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development.

(b) Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.

(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the office in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

Updated Policies Implemented Feb 13, 2006

The following Centers of Excellence Program Guideline Changes and Updates were Implemented
Feb 13, 2006
Director Nicole Toomey Davis

Centers support for licensed technologies

Past: once a technology was licensed to a company, the Center could no longer be funded or support the technology.

Opportunity:
Permit a Center to continue to support a licensed technology for a certain period of time or under certain conditions in order to better support the transition from university to industry.

New Guideline:
When a Center-supported technology is licensed to an existing established firm, the Center can use the COE funding to support that technology through the end of the current fiscal year (i.e. current contract).
When a Center-supported technology is licensed to a startup/spinout, the Center can use the COE funding to support that technology through the end of the current fiscal year (i.e. current contract).
In addition, the Center may apply for renewal of funding from the COE program (subject to the normal term of up to 4 years), to enable the Center and Business Team to continue to support the technology AND those commercial applications UNTIL a) the startup/spinout completes an arms-length financing transaction with a value equal to or greater than $500,000 or b) the startup/spinout is awarded one or more contracts with a value equal to or greater than $500,000.
In all situations, if there are still significant applications of the technology available for licensing (other vertical markets) the Center may apply for renewal of funding from the COE program on a competitive basis.

Ability to Start the COE Funding Clock over for new Opportunities

Past: Once a Center was "done" with one round of funding, they could not really "come back" into the program unless it was a "new Center" (with new PI)

Opportunity:
Proposed: Dynamic Centers teams and PIs have many areas of research that can provide new Market Opportunities

COE should encourage them to continue to bring new technologies to the program for new Market Opportunities

New Guideline:
A former Center of Excellence (one that has "graduated"), may return to the program and request a new series of funding years, typically up to 4 years, as long as the technology that is being proposed for commercialization is different enough from the original Center to create new market, business and licensing opportunities. However, it should NOT be used to extend the life of a Center that failed to achieve their commercialization goals. The Center may either keep its same name with a differentiating designation (example "Center II"), OR may propose under a new name. The PI may be the same PI or may be a different PI (but there is no requirement to make a change).

Additional Item of Clarification from the Feb 13, 2006 Meeting of the SAC

The council concurs with the Director that PI's/Researchers do NOT have to be tenured to be considered as a Director for a Center of Excellence.

Matching Requirements for schools that do not offer Doctoral degrees

During the 2006 legislative session, the Utah State Legislature passed, with no dissenting votes, SB 112, Centers of Excellence Amendments. One of amendments included in this bill narrowed the requirement of the 2:1 match to schools that offer Doctoral degrees (language listed below). This statutory change also required match guidelines for schools that do not offer doctoral degrees. The new guidelines are listed below.

Statutory Change
"The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis for colleges and universities in the state that offer any doctoral degrees"

New Guidelines:
- For a non-doctoral-degree granting school, a stand-alone Center will be required to have its Centers of Excellence funds to be matched by industry and federal grants on at least a 1:1 basis.

When a non-doctoral-degree granting school partners with a school that does grant doctoral degrees, the non-doctoral-degree granting school will not be required to have a match for their portion of the COE funding. The doctoral-granting school will be required to meet their 2:1 match as per statute.
Note: The COE Statute specifies that, "Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged."

Center Designation – Funding + 3 years

Past: Conflicting interpretations of use of "Utah Center of Excellence" Title

New Guideline:
A Center can use the "Utah Center of Excellence Designation" (and logo) for the term of funding plus 3 years. After that they can refer to being a "former Utah Center of Excellence". If, after 3 years, a Center is still actively supporting the commercialization of the technology which was funded through the Center, they may apply to the Director for an extension of the use of the title.

Clarification: The name of the Center ("Center for New Technology") is not covered by this guideline and it is up to the college/university, PI and team to determine its appropriate use.

Accountability of Licensing Decisions in Centers of Excellence

During the 2006 legislative session, the Utah State Legislature passed, with no dissenting votes, SB 112, Centers of Excellence Amendments. The Second Statutory Change in SB 112 is detailed below.

"The Governor's Office of Economic Development shall develop a process to determine whether a college or university that receives a grant under this part must return the grant proceeds if the technology that is developed with the grant proceeds is licensed to a licensee that:

(i) does not maintain a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology; or

(ii) initially maintains a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology, but within five years after issuance of the license the licensee or sublicensee transfers the manufacturing or service location for the technology to a location out of the state."

The Governor's Office of Economic Development is currently in the process of establishing the process specified in the statute. The State Advisory Council on Science and Technology, as requested by the Office, has convened a task force to make recommendations to GOED on this process. In addition, the Governor's Office of Economic Development Board will provide final review and approval of the process.

Governor's Office of
Economic Development
Centers of Excellence

Funding Recipients for the 2008-09 Centers of Excellence Program

Licensee / (Center -University)
CEO or Principal **Years Funded to Date** **Award Amount**

Advanced Composite Solutions (Licensee of Center for Advanced Structural Composites – BYU) Jonathan Adams, Founder/CEO New as company $100,000

Taking to market a premier composite 3D structural technology, IsoTruss® that delivers extremely high strength, very light structures. ACS has successfully introduced the IsoTruss® technology through our Delta 7 subsidiary (www.delta7sports.com) by producing high-end hand-crafted bicycles. The company's long term strategy includes Recreation, Aviation & Manufacturing. New innovations include new tooling and manufacturing techniques permitting cost reduction while maintaining performance.

CastleRock Engineering, Inc (Licensee of Center for Control of Flows in Manufacturing -USU) Angela Minichiello, President 1st year as Licensee $ 75,000

CastleRock Engineering Inc. will commercialize two technologies developed at Utah State University (USU): Aerodynamic Vectoring Particle Sorting (AVPS) and Coanda-assisted Spray Manipulation (CSM). Each technology applies flow control techniques to particle laden flow streams to improve current, and enable new, more efficient particulate-based manufacturing processes.

ContraDyn, Inc. (Licensee of Center for Nanomedicine Applications in Cancer - U/U) Dennis Farrar, CEO 1st as Licensee $100,000

"ContraDyn is a startup focused on commercializing targeted nanoglobular drug delivery systems, which the Center has developed. These novel three-dimensional globular structures can carry multiple compounds including small molecule drugs, imaging agents and targeting peptides directly to cancer tumor sites at lower doses, reduced systemic toxicity, and much greater therapeutic efficacy than other delivery technologies. Delivery of off-patent or well-studied but unapproved drugs should substantially abbreviate FDA approval requirements."

COSMAS, Inc. (Licensee of Center for The Production of Nanometer Sized Metals, Alloys, Metal Oxides & Mixed-Metal Oxide Powders - BYU)
Lynn Astle, CEO **New as company** **$100,000**

Cosmas, Inc. will commercialize a solid state process to produce a nearly unlimited array of high-quality, well-defined metal oxide, mixed metal oxide, metal and metal alloy nanoparticles. The process is simple, requires comparatively little energy (i.e., low cost) and is easily scalable for production. It produces products up to 99.999% pure, as small as 1 nm, with size distributions of typically ±10%. Applications include protective coatings, catalysts, batteries & fuel cells, electronics and ceramics.

CRE Energy, Inc **(New License – BYU)**
Dr. Ralph L. Coates, President **New as company** **$100,000**

The central mission of CRE is to demonstrate and commercialize the Clean Shale Oil Surface Process (C-SOS), incorporating patent-pending CRE technology, and sub-licensed BYU technology for CO2 management. Demonstrated technology for significant production of gasoline and diesel with no CO2 emissions; compliant with UT/Federal emissions regulations.

GlycoMira, Inc. **(New Licensee – U/U)**
Thomas P. Kennedy, MD and Glenn D. Prestwich, PhD, Co-founders and Co-inventors
New as company **$100,000**

GlycoMira ("Amazing Sugars") is a development stage pharmaceutical company targeting the topical treatment of inflammatory skin diseases affecting over 100 million Americans. GlycoMira's motto is "From Life. For Life." Our proprietary sulfated compounds are derived from the natural sugar hyaluronic acid to make remarkably potent drugs that block inflammation. Our topical therapeutics have the potential to restore health and quality of life to those suffering from disfiguring diseases such as rosacea, psoriasis, eczema, acne, and actinic keratosis.

Heavystone Laboratory, LLC (Licensee of Center for Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials - U/U)
Dr. Zak Fang, Principle & CTO, Dr. Al Poskanzer, CEO
1st year as Licensee $ 120,000

Developing advanced composite materials with predictable wear and failure characteristics designed for demanding applications such as mining, drilling, and grinding. These new materials developed at the University of Utah are designed to extend the life of tools and bits used in oil and gas drilling, metal cutting, milling, drilling, mining, construction, and other wear resistant tools.

International Reservoir Simulation Research Institute, Inc. (New License – BYU)
Hugh B. Hales (Key contact/PI) New as company $50,000

International Reservoir Simulation Research Institute, Inc. (IRSRI) will employ new technologies developed at Brigham Young University's International Reservoir Simulation Research Institute, particularly a high performance, high speed Pressure Solver, to revolutionize the reservoir simulation industry. Reservoir simulation is the use of computer programs to model the production of oil and gas from oil fields allowing optimization of actual production, helping to increase the world's oil supply.

Larada Sciences, Inc. (Licensee of Center for Alternate Strategies of Parasite Removal - (U/U) Larry Rigby, CEO 2nd year as Licensee $80,000

Larada Sciences Inc. is a University of Utah spin-out company formed in 2006 to deliver medical products and services based on breakthrough technology for the safe and effective non-chemical treatment of head lice. Pediculosis (head lice) is a multi-billion dollar problem that afflicts about 25% of children by the time they're teenagers and the problem is growing rapidly because head lice are evolving resistance to many of the currently used lice pesticides. Larada's first product, the "LouseBusterT", is a medical device that uses air to kill head lice and their eggs, in a way that is completely chemical-free, safe, effective, inexpensive, and requires only one treatment lasting about 30 minutes.

Millenniata, Inc. **(New License – BYU)**
Henry J. O'Connell, Pres./ CEO/Founder **New as company** **$85,000**

Millenniata has licensed optical data storage technology from BYU that is the first permanent, backwards-compatible archiving solution for the digital age. Millenniata's new Write Once Read Forever ™ DVD technology will provide secure, accessible, permanent data storage in excess of 1000 years for all types of digital records, data, and media. The patented Milliennial Disc™ is made from materials known to endure for centuries, yet is readable in any standard DVD drive so it can easily be used by business, institutions, and families.

NeuroAdjuvants, Inc. **(New License – U/U)**
Theodore Stanley, M.D., Pres. & CEO **New as company** **$100,000**

NeuroAdjuvants, Inc. will develop and commercialize a proprietary platform technology enabling multiple "first-in-class" neuropeptide-based therapeutics for a wide variety of neurologic and psychiatric disorders. This platform provides a breakthrough ability to harness therapeutic potential of neuropeptides and provides both stability & blood-brain-barrier permeability. The initial focus is to identify novel therapies for pain and epilepsy with future potential applications to other neurologic and psychiatric disorders.

RUReady, Inc. **(New License – U/U)**
Charles Wight, Managing Director **New as company** **$100,000**

RUReady is a company that provides an interactive and self-paced online learning program for mathematics that bridges the academic gap between high school curriculum and college requirements. Using RUReady instead of college-based remedial classes reduces institutional costs of remedial instruction and provides curriculum-based, open-ended questions, creativity assessment, hints, instant error feedback, and partial credit scoring, providing a "teacher-like" experience online, at a fraction of the cost of traditional instruction.

Sera Prognostics, Inc. **(New License – BYU and U/U Joint Biomarker Center)**
Dennis Farrar, President & CEO **New as company** **$100,000**

Sera Prognostics will identify and commercialize peptide biomarkers that are predictive of preterm birth (13% of pregnancies), preeclampsia (5%) and other pregnancy complications. These biomarkers have emerged from the Joint Biomarker Center, a collaboration between BYU and the University of Utah with blood samples provided by the U of U and serum proteomics performed at BYU. So far, Sera has identified 5 biomarkers for PTB and 2 for PE. Both conditions can be treated, with outcomes significantly improved by early detection.

STEDI, LLC **(New License – USU)**

Geoffrey G. Smith (Key contact) **New as company** **$100,000**

STEDI is licensing from Utah State University's Substitute Teaching Institute a training solution and materials to train substitute teachers. 70% of substitutes in the U.S. are not trained and STEDI provides the only university-based training program for Substitutes. Via the university, STI/USU has sold materials for 13 years, and sales last year were $900,000. The system currently reaches 900 of the nation's 16,000 school districts, but only 38 have sales of $5,000 or more. STEDI, LLC will allow significant expansion of the reach for this system to help train America's substitute teachers.

T-Splines, Inc. **(New License – BYU)**
Matt Sederberg, CEO **New as company** **$100,000**

T-Splines, Inc. has licensed from BYU a revolutionary new technology, T-Splines, that solves significant modeling problems in computer-aided design (CAD). This new technology, which is compatible with NURBS (non-uniform rational B-splines—the industry-standard technology), creates analysis-ready CAD models by default, and also introduces timesaving animation modeling workflows to CAD, two breakthroughs which significantly reduce the design time of product development. Current company products focus on industrial design and architecture, and COE funding will help the firm expand into aerospace, automotive and analysis.

Thermimage, Inc. **(New License – U/U)**
Douglas Turnquist, President & CEO **New as company** **$100,000**

Thermimage, Inc. has invented a non-invasive, painless and less costly way to produce deep-tissue temperature measurements. The device will first be used to diagnose Vesicoureteral Reflux (VUR) in children, a dangerous condition that allows urine to backflow into the kidneys of young children. The current procedure is painful and requires the use of catheters and ionizing radiation, where this new technique will heat the bladder contents and then detect any increase in temperature in the kidneys signaling reflux.

TMT, Inc. (Licensee of Center for Thermal Management Technologies -USU)
Forrest Fackrell & Clair Batty **1st year as Licensee** **$100,000**

Thermal Management Technologies, L.L.C. is a new spin-out of the Center of the same name at Utah State University. The company will create solutions for high performance thermal management challenges. Products include flexible thermal links for thermal connection and mechanical isolation used in imaging satellites with commercial applicability to aircraft, automobiles, and communications systems; and channeled cooling panels for rapid response spacecraft with commercial applicability to computer and electronics cooling.

Torion Technologies, Inc. **(New License – BYU)**
Dr. Douglas Later, President and CEO **New as company** **$100,000**

Torion Technologies, Inc. is commercializing the GUARDION™-7 chemical detector using technology developed at BYU. The GUARDION-7 is a hand-portable, sensitive, selective, and rapid instrument for detecting chemical threats. The GUARDION-7 is light-weight, reliable, and easy-to-use and detects hazardous compounds in as little as 30 seconds. Key markets for the gas chromatograph-toroidal ion trap mass spectrometer (GC-TMS) include the defense-military, first responders, security, environmental, and forensics.

VisTrails, Inc. (Licensee of Center for Management of Provenance & Exploratory Workflows - U/U) Greg M. Jones, PhD, CEO **1st as Licensee** **$200,000**

VisTrails' goal is to "Provenance Enable the World" and become the leading provider of software solutions for the provenance of computational tasks. Based on our patent-pending technology, VisTrails is developing provenance-enabled management solutions for complex software applications, offering new functionality that will revolutionize the way people explore, analyze, and create data. This technology dramatically improves such tasks as: improving animation and graphics consistency and speed, calibrating simulations for hedge funds, for locating oil wells, and review and analysis of medical images.

Wasatch Nanopore Sensors, LLC (Licensee of Center for Nanopore Sensor Technologies -UU) William Pagels, PhD CEO 1st Year as Licensee $100,000

Wasatch Nanopore Sensors (WNS) is a recently formed spinoff from the Center for Nanopore Sensor Technology (CNST) to commercialize nanopore sensor technology fabricated from glass, quartz and other materials. A nanopore sensor relies on molecule and particle transport through a single conical-shaped pore that can be modified by chemical methods to design sensors for different applications. These extremely sensitive sensors are useful in key applications such as DNA sequencing and particle size analysis.

Wastewater Compliance Systems, Inc. (Licensee of Center for Water Treatment Technology -U/U) Fred Jaeger, President 1st Year as Licensee $100,000

The company addresses the need of wastewater lagoon operators, generally municipalities, who seek to comply with state and federal environmental regulations by improving efficiency and capacity of existing systems without dramatically increasing capital or operating costs. The company provides robust, low cost ways to remove common pollutants such as nitrogen compounds from lagoon systems with a submergible, domed-shaped aeration device that resembles an igloo. The patented "poo-gloo" is simple and inexpensive to build and easy to install and maintain.

University Center of Excellence

Center (University)	Years Funded to Date	Award Amount
Center for Clean Coke Technology (CEU)	**1**	**$275,000**

Dr. Robert Topping, PI

This team, led by the College of Eastern Utah's Western Energy Training Center, aims to commercialize research to create Clean Coke from coke fines and waste products and to develop process control expertise by developing a pilot scale facility. The pilot scale facility will demonstrate the upgrading of carbonaceous feedstocks by calcining and briquetting into Clean Coke products.. This Center also intends to use the pilot plant and related expertise to enhance the training and expertise of employees throughout the area served by CEU.

Graduating Centers June 30, 2008 (Completed)

Flying Sensors (Licensee of Miniature Unmanned Air Vehicles) (BYU)

Developing commercial (non-military) applications for miniature unmanned air vehicles (UAVs) including Real Estate, Insurance Industry, EPA - Multi-Source Air Quality Sampling, Random Testing, Pipeline/Remote Facility Surveillance and Emergency Response/Fire Monitoring – Forest & Commercial.

Center for Miniature Unmanned Air Vehicles (BYU)
Companion Licensee Flying Sensors also funded

Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies. An autopilot design has been licensed to Procerus, Inc. in Utah.

Glycosan BioSystems, Inc. (Licensee of Therapeutic Biomaterials) (U/U)

Commercializing the compounds from Therapeutic Biomaterials for 3-D Cell Culture, Tissue Engineering, Drug Toxicity Testing, & Skin Care.

Center for Therapeutic Biomaterials (U/U)

Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs. Three companies, 1 in California (Carbylan) and 2 in Utah (Sentrx Animal Care and Glycosan Biosciences) have been spun out of the Center to date.

Center for Hybrid & Adaptive Multimedia Processors (CHAMP) (USU)

Commercializing tools and software systems to accelerate time to market of new features for multimedia consumer devices.

Center for Microarray Technology (U/U)
Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Navigen, Inc. (Licensee of Center For Vascular Biotherapeutics) (U/U)

Proof of concept in animal models of stabilizing vasculature in macular degeneration and acute lung injury based on a new signaling pathway that regulates the balance between vascular regeneration and stabilization.

Nano-Oxides (Licensee of Nanosize Inorganic Material Powders By Molecular Decomposition) (UU)
Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

State of RT (Licensee of Interactive Ray-Tracing & Photo-Realistic Visualization) (U/U)

Commercializing a software module to deliver real time ray tracing to existing graphics modeling tools and to deliver next generation game development tools based on ray tracing to the market.

VisualShare (Licensee of Center of Excellence for Electronic Medical Education (CEME) (U/U)

Commercializing multi-user real-time image conferencing using the Software as a Service (SaaS) Model. This technology provides the remote convergence of images & text for distributed user populations and permits knowledge capture for legal and compliance purposes. First application is for child abuse situations in rural/remote areas to involve specialists in diagnosis of consequences.

Center for High End Pharmaceutical and Biomedical Process Optimization (SUU)

Southern Utah University has established a high performance supercomputing facility to enable high fidelity computer modeling of topics of importance to regional industry. The goal of this Center is to partner with a regional pharmaceutical business to develop a 3-dimensional model of a fluidized bed reactor to help optimize their multiphase production processes using computational fluid dynamics. Obviously of interest is to determine if such modeling could be expanded from a single partner to broader applications.

Governor's Office of
Economic Development

Centers of Excellence

Jon M. Huntsman, Jr.
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ANNUAL REPORT

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Fiscal Year July 2008—June 2009

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2008-2009
Centers of Excellence
Annual Report

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Executive Summary

Executive Summary

During the 2007 Legislative Session the Legislature passed, and the Governor signed into law, changes to the COE statute that permitted ongoing support of grants to companies which are Licensees of technologies developed at Utah's colleges and universities. 2008-09 was the first year that focused the program's funding on Licensee Grants and allowed the State to see this implementation more clearly.

For the 2008-09 selection process, there were two categories of eligible applicants. First were 5 University Centers which had received their first year of funding in 2007-08 and which were eligible for a second year of funding as a university Center. The second group was any company, an existing firm or a startup, which was newly licensing a university developed technology

For the 2008-09 Solicitation, 3 of 5 eligible University Centers and 36 Licensees submitted proposals for a total of 39 proposals received with total funding requests exceeding $4.5million. Of the 36 Licensee proposals, 20 of them had never received any type of Centers of Excellence funding. Of these new proposals, 11 received funding, accounting for fully half of the grants awarded. The high number of new proposals coming into the program reinforced a theory of the program; that many professors with technology that has commercial value did not want to personally perform the work of commercialization as a COE Center Director and therefore their technologies did not participate in the program, and frequently, did not therefore emerge into the marketplace.

The 13 remaining Licensee proposals were former COE university teams which were seeking Licensee Funding. These included teams which had been full Centers, and also teams which had received only Business Team funding in the past. Of these 13 proposals, 9 received funding

Of the 26 Licensee proposals, 21 Licensees were recommended for funding and 1 University Center was recommended for a second year of funding, bringing the total to 22 proposals recommended for a COE grant during the 2008-09 fiscal year.

Of the budget, $1,869,250 was allocated to direct Licensee grant funding. Another $515,750 was allocated for the one University Center as well as for funds requested to be contracted back to a companion University team by Licensees. Another $25,000 was allocated for a Business Team for the University Center. The remaining $340,000 was held back to be distributed mid-year during a "Part B" solicitation.

The largest single grant was for $275,000 to the College of Eastern Utah for their Clean Coke University Center, a second year proposal, with the remaining grants ranging down in size to $50,000. All Licensees are required to provide a 1:1 match from either industry or Federal funding, and teams from universities that grant doctoral degrees must provide 2:1 matching funds. A 1:1 match is required for all other institutions.

Of the 22 teams awarded funding, 21 signed contracts to receive their funding during the year - 20 Licensees and 1 University Center because one company awarded funding did not move for-

ward at all. Of the 20 Licensees, 15 received their entire grant award during the year by providing evidence of appropriate matching funds. 2 additional teams received partial funding during the year, but had their contracts extended to complete bringing in additional funds, such as SBIR contracts, which come in over an extended period of time, one of these received its entire funding, and the 17th company's contract expired after receiving only partial funding. The final 3 licensees had their contracts expire without receiving any funding, generally due to changes in corporate direction or structure.

The intent of this grant funding is to help accelerate the process of taking these leading edge technologies to market. Companies of any size are eligible to apply, including startups as well as existing companies that are planning to create a new product or product line from the licensed technology. The goal of these funds is to help defray the risk in taking these innovative new technologies to market in order to encourage more such licensing and the accompanying job creation that comes from exciting new market opportunities.

Part B Funding Summary 2008-09

As noted, $340,000 was held back from the initial solicitation to be distributed in a Part B solicitation mid-year. This was unusual for the program but, because of the large number of "first year" grant awardees, which were capped at $100,000 during the initial solicitation , this was deemed prudent. In April, existing Licensee Grant recipients were invited to apply for additional funds. In addition to the $340,000, carry-in funds from previous years were combined together for $500,000 available to be allocated during the part B solicitation. 6 of the 2008-09 Licensees which had shown significant progress were awarded additional funding, with three of them receiving $100,000, 2 receiving $75,000 and the sixth receiving $50,000.

2008-2009
Funded Centers

Clean Coke Technology

COLLEGE OF EASTERN UTAH

DEFINITION OF CENTER

The Center of Excellence for Clean Coke Technology at the College of Eastern Utah's (CEU) Western Energy Training Center (WETC) worked in conjunction with Terra Systems, Inc. (Terra) to continue the design, construction and operation of a modular pilot-scale facility to manufacture high-grade carbon (coke) briquettes developed from coal fines and other low-quality mining by-products. The briquetted product can be used by metallurgical and specialty carbon-reductant fuel users.

TECHNOLOGY

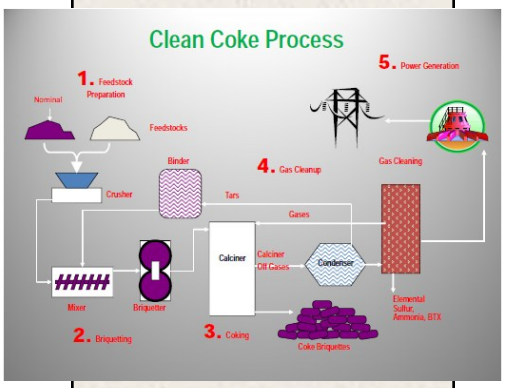
The team has made great progress during the first and second years of funding and produced green briquettes for testing by end users. The results are promising and product should be delivered to industrial users for evaluation. Design of process control systems and algorithms for the Clean Coke process has been developed. Additional IP has been developed around establishing a site-based mobile learning and training simulator which would provide the training necessary to produce the required skilled labor force. This simulator can be used by industry to advance the development of labor pools of rural applied technicians for energy processing applications.

PROGRESS

Strong partnerships were established between CEU, WETC and industry partners to complete the funded year's objectives ahead of schedule. A consortium of key companies from all industry segments has been assembled. The involvement of energy companies, investment groups, business analysts and end users provides a positive input into the direction of the technology. Members of the Center and business team are:

College of Eastern Utah – Price, UT
Western Energy Training Center (WETC) – Helper, UT
Terra Systems, Inc. – Midvale, UT
Mountain Island Energy, LLC – Soda Springs, ID
Utah Valley University – Orem, Utah
State of Utah, Manufacturing Extension Partnership - Orem, UT
WestCAMP Inc. – Salt Lake City, Utah
Utah Centers of Excellence – Salt Lake City, Utah

Imagine...



Lower the cost of current coke fuels and create a cleaner more efficient use of waste coal fines

Robert Topping
Western Energy Training Center
College of Eastern Utah
PO Box 300
Helper, Utah 84526
435-472-4700
Bob.topping@ceu.edu

2008-2009 Funded Licensees (Companies)

Advanced Composite Solutions, LLC

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

Advanced Composite Solutions (ACS), a Licensee of the Center for Advanced Structural Composites, was established to develop and manufacture products out of advanced composite technology. ACS obtained a worldwide license agreement to Brigham Young University to commercialize and manufacture the IsoTruss technology developed at the university. ACS obtained Centers Of Excellence (COE) funding and has made great advancements with effective IsoTruss manufacturing technology.

TECHNOLOGY

Advanced Composite Solutions has taken to market a premier composite 3D structural technology, IsoTruss®, that delivers extremely high strength, very light structures. ACS has successfully introduced the IsoTruss® technology through their delta 7 subsidiary by producing high-end handcrafted bicycles. The Company's long term strategy includes recreation, aviation, & manufacturing. New innovations include new tooling and manufacturing techniques permitting cost reduction while maintaining performance.

PROGRESS

Advanced Composite Solutions has used COE funding to develop advanced manufacturing technology for producing products out of the IsoTruss technology. Advanced Composite Solutions has also developed advanced manufacturing technology for lugs used to assemble IsoTruss rods/tubes together.

Imagine...

Advanced, high end road and mountain bikes created with structural IsoTruss technology.

Jonathan W. Adams
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jon@delta7sports.com

ContraDyn, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

ContraDyn, Inc. (CDI), is a Licensee of the Center for Nanomedicine Applications in Cancer and was incorporated in 2006. Its primary focus is the development of novel targeted nanoscale drug delivery systems for diagnostic and therapeutic purposes. The proprietary technology consists of a nanoglobular delivery system capable of transporting more than one agent at a time to solid tumors in the body; e.g., contrast agents for imaging and detecting tumors, peptides for targeting tumors and chemotherapeutic agents for treating tumors without invasive surgery. CDI believes its nanoglobules are the first and only rigid, three-dimensional synthetic biomaterials developed for biomedical applications. The water-soluble drug carrier is capable of orally delivering anti-cancer drugs directly to targeted organs and tumors in unmodified forms and rapidly eliminating the drug from the normal tissues of the body.

TECHNOLOGY

CDI's initial product is a biodegradable macromolecular MRI contrast agent that can be attached to the nanoglobular delivery system and transported to solid tumors for imaging and detection. The Company's longer-term strategy is to non-invasively treat solid tumors by using its nanoglobular system to deliver therapeutic agents directly into cancerous tumor cells via targeting peptides. Features of CDI's nanoglobular technology include oral administration, specific delivery of drug to targeted sites, and rapid clearance from the normal tissues of the body. The benefits include safer and more accurate cancer detection and more effective treatment than currently available procedures.

PROGRESS

In addition to COE funds, ContraDyn received an STTR award in July 2008 from the National Institutes of Health. These combined funds have enabled ContraDyn to expand its research in polymer-based drug delivery in conjunction with the University of Utah, which has pioneered the development of polymer-based drug delivery for more than 40 years and is recognized worldwide as the pre-eminent research institution in this field.

Imagine...

Taking an oral medication to help "image" or treat tumors

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Cosmas, Inc.

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

Cosmas, Inc., a Licensee of the Center for the Production of Nanometer Sized Metals, Alloys, Metal Oxides and Mixed Metal Oxide Powders, is commercializing a very simple process to custom produce a nearly unlimited array of high quality nanoparticles by simply varying the starting materials, not the process. Production costs will be substantially less than the competition because of the simplicity of the process. For initial market entry, Cosmas will focus on the use of its nanoparticles for production of ceramic catalyst support materials, where its unusually small particles enable unique competitive advantages. It will then expand its offerings to include nanoparticle catalysts such as 1 nm platinum or palladium particles immobilized on their support materials. And, finally, it will expand into the general catalyst market by producing nanocatalysts of various compositions for a variety of applications.

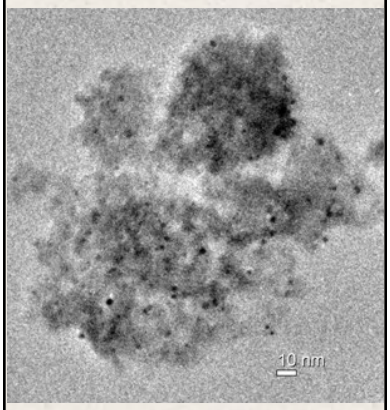
TECHNOLOGY

Cosmas, Inc.'s basic nanoparticle production process is very simple and energy conservative. It involves two simple steps: 1) mixing a common metal salt(s) powder with a base powder at room temperature to form an intermediate, and 2) heating the intermediate to a modest temperature. The nanoparticles crystallize and all of the byproducts escape as simple, common gases that can be easily trapped. Any of the metals or rare earths (about 75 chemical elements) may be used, and any number of these metals may be mixed in desired ratios to produce mixed metal oxides or metal alloys. This ability to easily vary the composition of the nanoparticles is particularly useful for customizing the nanomaterials for specific applications.

PROGRESS

Cosmas has very recently identified its initial product. They can make extremely small (2 nm), uniform sized alumina nanoparticles which can then be fused together at elevated temperatures to form a sintered, ceramic γ-alumina catalyst support material. Because they start with their preformed nanoparticles, the support characteristics are approximately twice as good as the nearest commercially available product for all of the critical product specifications.

Imagine...



A very simple process to custom produce a nearly unlimited array of high quality nanoparticles.

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CRE Energy, Inc.

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

CRE Energy, Inc. is a spin-off company from Combustion Resources, Inc. (CR) and has maintained a close relationship with CR. The central mission of CRE has been to demonstrate and commercialize the Clean Shale Oil Surface Process (C-SOS), incorporating patent-pending CRE technology, and sub-licensed BYU technology for CO2 management. This surface process was designed to make use of commercially available components with high oil shale processing capacity, and elimination of carbon dioxide emissions. The process provides for on-site upgrading of shale oil to motor fuels.

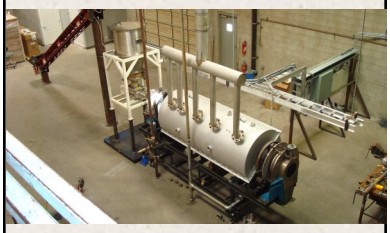
TECHNOLOGY

During the C-SOS Shale Oil Process, oil shale is liberated in an innovative, indirect-fired, rotary kiln that is simple in design with most components available from commercial sources, and capable of being fired in a way that offers high capacity and significantly lower environmental impact than existing kiln technologies. CRE Energy, working with BYU under subcontract, evaluated the BYU Baxter CO2 Removal process for cryogenic removal of carbon dioxide from the C-SOS oil shale process streams for use of sequestration. Specifically, the technical and financial merits of this BYU technology were investigated to separate CO2 from H2 in the gasification producer gas.

PROGRESS

CRE Energy, Inc. successfully completed all of the work in the four tasks for Phase I with significant achievements and results in demonstrated kiln performance, modeling of kiln processes, design of kiln oil seals, design of oil recovery and oil upgrading processes and reduction in projected water use. A new, efficient, clean surface oil shale process (C-SOS) was conceived, evaluated, and documented and a patent application was submitted.
A new indirect-fired kiln was conceived, designed, constructed, and successfully operated with demonstrated capacity and temperature control advantages and a patent application was submitted. CRE Energy presented four technical presentations at symposiums, forums, and technical conferences. CRE Energy, Inc. has completed Phase I (COE) engineering work.

Imagine...



A process that provides on-site upgrading of shale oil to motor fuels.

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GlycoMira, LLC

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

GlycoMira, LLC, is a development stage company that produces semi-synthetic glycosaminoglycan ethers (SAGEs) which exhibit potent anti-inflammatory activity with broad applications in human disease. GlycoMira seeks to maximize its value by increasing the breadth and depth of topical treatments for inflammatory skin disorders including the treatment of rosacea, psoriasis, eczema, actinic keratosis and acne as well as by selectively validating the therapeutic uses of SAGEs for the systemic treatment of inflammation in arthritis, diabetes, interstitial cystitis, age-related macular degeneration (AMD), and cancer metastasis.

TECHNOLOGY

The SAGE technology is a unique chemical process that converts a non-animal derived polysaccharide into soluble sulfated carbohydrate-like drugs that mimic the natural anti-inflammatory agent heparin. The SAGEs appear to be safer and to have longer biological half-lives than anti-inflammatory heparin derivatives. SAGEs block activation of the Receptor for Advanced Glycation Endproducts (RAGE) which when activated mediates inflammation. As inhibitors of RAGE, a staggeringly large number of potential uses exist for using SAGES to treat human diseases, including diabetic retinopathy and nephropathy, cancer metastasis, multiple sclerosis, sickle cell anemia, osteoarthritis, rheumatoid arthritis, cystic fibrosis, Alzheimer's, and cardiovascular and pulmonary inflammatory disorders.

PROGRESS

GlycoMira has already conducted pre-clinical animal studies that have validated efficacy and safety for the topical treatment of skin inflammation and rosacea. They have also demonstrated intravenous systemic safety as high as 100 mg/kg for one SAGE. Many of the SAGEs are active in the 2-300 ng/mL range, making them highly competitive or superior to other heparin derived materials sourced from porcine intestine. They have identified rosacea as an initial therapeutic target and are developing a first-in-class topical anti-inflammatory treatment for rosacea called Rosinex™.

Imagine...

A unique chemical process that yields drugs, that mimic the natural anti-inflammatory agent heparin, that are used in the treatment for inflammatory skin disorders.

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Heavystone Laboratory, LLC

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Heavystone Laboratory, LLC, a Licensee of the Center for Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composites, is a "technology company" founded upon breakthrough technology that dramatically improves the wear resistance of materials without sacrificing its impact resistance, and vice versa. This is achieved by using functionally graded cemented tungsten carbide patented by the University of Utah and licensed exclusively to Heavystone Laboratory. These materials have a multitude of applications in many manufacturing sectors including metal machining, mining, oil, gas, and geothermal energy explorations, and other industrial applications.

TECHNOLOGY

Cemented tungsten carbide is indispensable materials for many manufacturing sectors of our economy. Compared to conventional homogeneous cemented tungsten carbide, functionally graded cemented tungsten carbide made by Heavystone Laboratory's technology offers superior combinations of wear resistance, fracture toughness, and strength, and provides superior engineering performance. Therefore, these materials have the potential to drastically improve the durability and reliability of industrial tools that are currently made using conventional tungsten carbide materials and designed for metal machining, mining, oil, gas, and geothermal energy explorations, and other industrial applications where extreme wear resistance is required. A wide range of industries will see significant productivity improvements by employing the proposed process technology and the products developed using this process.

PROGRESS

Heavystone Laboratory has developed processes of manufacturing for commercial production of these products. They have formulated a Go-To market strategy and negotiated and signed a license with the University of Utah. Heavystone Laboratory has nearly completed a licensing and supply agreement with an industrial partner. The Company has formed industrial alliance and cooperative relationship with four international leading manufacturers of drilling tools, two of them headquartered in Utah.

Imagine...

A breakthrough technology that dramatically improves the wear resistance of materials without sacrificing its impact resistance.

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International Reservoir Simulation Research Institute, Inc.

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

The International Reservoir Simulation Research Institute, Inc. was formed as a Utah C-Corporation on February 22, 2008. The sole purpose of this new company was the commercialization of the research done at Brigham Young University's International Reservoir Simulation Research Institute. The principle task of the new IRSRI, Inc. is to extend BYU's technologies to all plausible types of reservoir conditions. The BYU research work considered only idealized conditions.

TECHNOLOGY

Reservoir simulators employ computers to forecast the production rates of oil, gas, and water from oil fields. Repeated simulations, using varied production schemes, allow petroleum companies to optimize production of oil and gas from their fields. However, reservoir simulation, using current technologies, requires vast amounts of computer resources. Hence, it is both costly and time consuming. IRSRI's technologies are much faster than these conventional methods, perhaps as much as a thousand times faster than traditional methods. These new technologies may revolutionize reservoir simulation through a more widespread use of simulation for planning and field development, as well as by enabling new technologies such as geostatistical reservoir descriptions, automatic history matching, and automated optimization reservoir development.

PROGRESS

Upon receipt of funds from the State of Utah's Centers of Excellence Grant of February 6, 2009, Professor Hales was released from his teaching and research responsibilities at BYU, allowing him to pursue IRSRI Inc.'s development efforts full time. Two part-time, student employees were also hired, and a Board of Directors was established. An informal relationship with Saudi Aramco, the world's largest oil company, was established whereby advice on the design of IRSRI's products can be obtained, particularly the first product, a high speed pressure solver. Talks with ExxonMobil, the largest publicly-owned oil company and Schlumberger, the largest oil service company, are underway, which may lead to similar relationships.

Imagine...

BYU ChE

New technologies that forecast the production rates of oil, gas, and water from oil fields that are as much as a thousand times faster than traditional methods

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84120
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hbhales@byu.edu

Larada Sciences, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Larada Sciences, a Licensee of the Center for Alternate Strategies of Parasite Removal ("**CASPeR**"), develops, manufactures and markets medical products and services based on a heated-air treatment for head-lice infestations – the core technology generated from the original Center of Excellence. Key products include a durable medical device (the LouseBuster™) and associated single-use disposable kits marketed primarily for institutional sale to healthcare professionals. Lice eradication treatment services using the LouseBuster products will also be marketed via licensed service providers. The company will sell these products and services through established medical product distributors and through a small inside direct sales force.

TECHNOLOGY

The principal company technology encompasses a new medical device and procedure to provide a breakthrough, non-chemical solution for eliminating head lice infestations. The primary product (the LouseBuster™ device), kills lice and their eggs with a large volume of heated air; no pesticides or chemicals are used. The controlled air is delivered to the patient through a special applicator that exposes lice and eggs clinging at the base of hair shafts to the air. Clinical research has demonstrated the device is very safe and effective, killing virtually all eggs and a majority of hatched lice.

PROGRESS

With the help of COE funding, the Company has accomplished two complete product design cycles and is now completing the final design revisions and testing to enable full-scale manufacturing for market entry. The team greatly improved the original University device concept and the disposable applicator for improved performance, reduced manufacturing cost, and power efficiency, and integrated many new design improvements, including, a rugged, molded plastic housing and simple electronic interfaces for users. As of the close of FY 08-09, the team has also completed all of the clinical investigations necessary to submit a 510(k) pre-market notification to the FDA, and received the first 510(k) clearance from the FDA in March of 2009. In addition, the company completed additional rounds of follow-on equity funding from accredited private investors to continue to fund the company's progress.

Imagine...

A very effective non-chemical solution for eliminating head lice and other parasites.

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801-533-5423
randall@laradasciences.com

NeuroAdjuvants, Inc

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

NeuroAdjuvants, Inc. (NAI) was formed to develop and commercialize novel therapeutics for the treatment of neurological disorders. The initial focus of NAI is to identify novel therapies for pain and epilepsy. NAI's proprietary technologies were developed at the University of Utah. These technologies have been exclusively licensed from the University of Utah by NAI.

TECHNOLOGY

NAI has invented novel technologies that facilitate the movement of neuropeptides across the blood-brain-barrier (BBB) when administered systemically. Enhancing the pharmacological and pharmaceutical properties of peptide analogs to enable them to penetrate the BBB has been long sought by drug developers. The Company has initially focused on modifying neuropeptides that have anticonvulsant activity when administered directly into the brain, but lack such properties following systemic delivery. The first neuropeptide that the Company has targeted is galanin, an endogenous neuropeptide in the central nervous system that has been recognized as a potential anticonvulsant agent but is limited by its marginal metabolic stability and inability to cross the BBB.

PROGRESS

NAI has advanced its galanin analog platform into lead optimization in models of pain and epilepsy and completed initial in vivo toxicity studies. These studies provided early indications of potentially dose-limiting side effects. NAI isolated the toxic moiety and began generating and testing an improved library of compounds. NAI also showed the depth of the technology platform by advancing an additional neuropeptide, Neuropeptide Y, into lead optimization in both pain and epilepsy. The data provide NeuroAdjuvants, Inc. with 4 publications in peer reviewed journals.

Imagine...

NeuroAdjuvants

Novel technologies that facilitate the movement of neuropeptides across the blood-brain-barrier.

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teds@neuroadjuvants.com

Sera Prognostics, Inc.

BRIGHAM YOUNG UNIVERSITY/UNIVERSITY OF UTAH

DEFINITION OF COMPANY

Sera Prognostics, Inc. is using a novel serum proteomics technology to identify and commercialize biomarkers from blood samples of pregnant women to predict those at risk for preterm birth (PTB), preeclampsia (PE) and other pregnancy complications. Adequate advance warning of women at risk for these complications would permit clinicians to administer a number of medical interventions to treat the mother and improve the outcome of the baby.

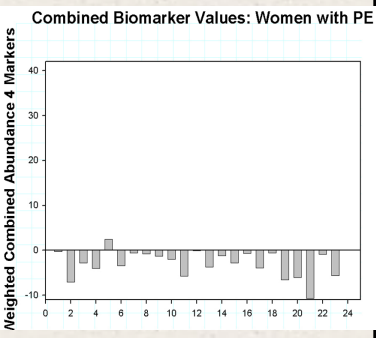
TECHNOLOGY

Sera's first-of-kind serum proteomics approach couples capillary liquid chromatography (cLC) separation technology with electrospray ionization time-of-flight mass spectrometry (MS) to measure molecular mass. High abundance, non-informative proteins are removed by a precipitation process to allow cLC separation and to make available small protein-bound peptides. The proteomics platform can observe 4,000 to 5,000 different peptides, small proteins and other molecular species in a single blood specimen in real time. These molecules may be identified by their amino acid sequences through an additional more sensitive two-sector mass spec sequencing process. Using this powerful proteomics platform, the Company is able to identify biological molecules that differ quantitatively between patients with a disease and those who have no medical complication.

PROGRESS

Sera Prognostics, Inc. has completed analysis of its mass spectroscopy data base for PTB and PE, identifying additional biomarkers that elevate the predictive level of PTB to 90% sensitivity (% of patients with disease who test positive) and 81% specificity (% without disease who test negative), and raise the predictive value of PE to 96% sensitivity and 100% specificity. The Company entered into collaborative discussions with three of the four largest CLIA references lab companies in the U.S.: ARUP in Salt Lake City, LabCorp in North Carolina, and Quest Diagnostics in New Jersey. The Company has presented, published and submitted scientific publications and conducted physician market research.

Imagine...



A novel technology that identifies biomarkers from blood samples of pregnant women to predict those at risk for preterm birth and other pregnancy complications.

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STEDI, LLC

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF COMPANY

STEDI, LLC works with school districts across the country to recruit, train, and retain substitute teachers. STEDI is the leader in training school districts on the management of substitute teaching. There is no other university based training program available across the country, in England, or Canada.

TECHNOLOGY

The Substitute Teaching Institute at Utah State University developed research-based training materials to help school districts train and retain their substitute teachers. The training materials provide practical and effective skills for individuals to become successful and effective substitute teachers in the classroom. STEDI implements these university-developed strategies by marketing them to school districts.

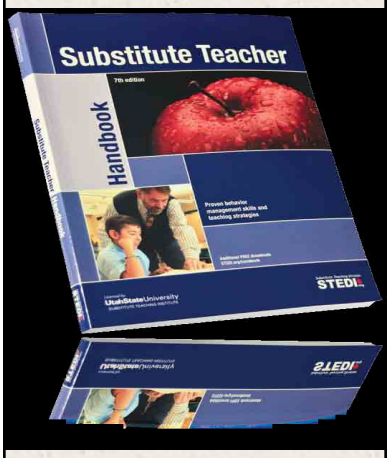
PROGRESS

STEDI worked with over 1,000 school districts from August 1, 2008 and June 30, 2009 in setting up training for their substitute teachers using the training programs developed at USU. STEDI has also updated and adapted the materials to produce the following:

- A new seventh edition of the Substitute Teacher Handbook
- Revamped the online courses
- Created two additional online courses

Derivative work was also developed by STEDI based on the research conducted at the Substitute Teaching Institute at Utah State University

Imagine...



Research-based training materials that provide effective skills for individuals to become successful substitute teachers.

Geoffrey G. Smith
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T-Splines, Inc.

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

T-Splines, Inc. develops surface modeling software with optimal control and full industry standard compatibility for industrial designers and computer-aided design (CAD) professionals. The Company develops and markets end-user applications and software development libraries. T-Splines is used throughout CAD, especially in architectural, marine, jewelry, and consumer products design. The Company is dedicated to establishing T-Splines as a new industry standard in industrial design and CAD/CAM/CAE applications.

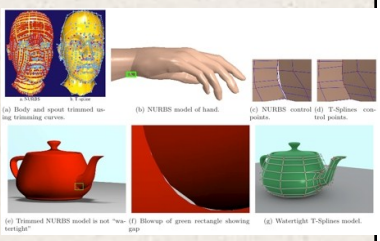
TECHNOLOGY

T-Splines' innovative software is based on the patented T–Splines technology, a new way of representing geometry that allows designers and engineers to add detail and control 3D models in ways that were previously impossible. T-Splines allows designers to add detail only where necessary, create non-rectangular topology, easily edit complex freeform models, and maintain compatibility with other industry standard technologies. T-Spline technology currently in development called Trimless T-Splines Intersection (TTI), provides for the first time a solution to a decades-old problem of interoperability between CAD packages, providing a single CAD model that can be compatible with all parts of the design, analysis, and manufacturing processes. This interoperability problem is costly in many industries, and has been estimated to cost the US automotive industry alone over a billion dollars annually in lost productivity.

PROGRESS

T-Splines, Inc. recently released version 2 of its T-Splines for Rhino plugin. This plugin was named the "Pick of the Week" by prominent industry publication Desktop Engineering shortly after its release and has helped increase the revenue of the company nearly 100%. In addition to continuing to sell, market, and improve the T-Splines for Rhino plugin, the company also is continuing basic research on further applications of the T-Spline technology.

Imagine...



Software that allows designers and engineers to add detail and control 3D models in ways that were previously impossible.

Matt Sederberg
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801-841-1234
matt@tsplines.com

Thermal Management Technologies, Inc.

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF COMPANY

Thermal Management Technologies Inc. (TMT), a Licensee of the Center for Thermal Management Technologies, is fundamentally an innovative R&D operation focused on commercializing certain technologies originating with USU's Space Dynamics Laboratory in addition to new technologies all related to thermal management. The business plan is to keep the core company largely undiluted by investment capital while creating separate companies each based on a particular TMT technology.

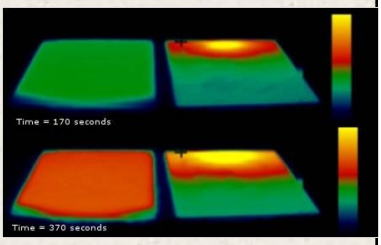
TECHNOLOGY

Channel Panel is the name of a technology that incorporates very robust heat spreading capability into structural panels. This technology, licensed to TMT by USU Research Foundation, will probably find primary application in the micro gravity environment of space with other terrestrial specialized applications. The Isothermal Condensation and Evaporation (ICE) technology, currently under development at TMT, is targeted at a number of applications including cooling of large battery packs, electric motors, controllers, data centers, and printed circuit boards. The Flexible Thermal Link, another TMT technology, has primarily found specialized application in satellites but other commercial markets are also being considered.

PROGRESS

TMT was formed as a new for-profit company and as the first "spin-out" in 50 years from USU's Space Dynamics Laboratory. They have successfully drafted a license and cooperative agreement with USU Research Foundation. TMT was granted an SBIR Phase I award from the U.S. Air Force Research Laboratory to develop modular isothermal panels for rapid response spacecraft based on the Channel Panel technology in the amount of $100,000. They have also secured a contract for $75,000 from EcoAirtec, accepted a $20,000 contract from USURF to further develop a thermal pulse flow meter with no moving parts, and awarded $100,000 from the COE as a licensee of university developed technology. The COE award was essential to TMT survival and enabled the assembly of a capable technical and business team.

Imagine...



A technology that incorporates very robust heat spreading capability into structural panels.

Forrest N. Fackrell
1695 North Research Park Way
North Logan, Utah 84341
435-797-4642
Forrest.fackrell@sdl.usu.edu

Thermimage, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Thermimage, Inc. has developed an innovative medical device that provides a safe and noninvasive way to detect pediatric vesicoureteral reflux or VUR (urinary reflux), a common and under-diagnosed condition where urine flows back up into the kidneys from the bladder, exposing them to infection. Early diagnosis prevents kidney damage and lowers the risk of long term complications. Thermimage has raised $1.5MM to date for technology development and is on track for US/EU market launch in 2011.

TECHNOLOGY

Thermimage has invented a noninvasive replacement for the current traumatic procedure used to detect VUR and prevent kidney damage in 4MM children annually. Twelve patents on the technology have either been issued or are pending, with many more in process.

PROGRESS

The company remains on track to fully commercialize the "Thermaflux Scanner" technology by mid 2011. To achieve this goal, a specific project plan is in place that includes the following milestones:

- Phase II—Animal Testing—Q4 2009 (November)
- Phase III—Animal Testing—Q2 2010 (April)
- Phase IV—Human Testing Grade 3-5 reflux Q2 2010 (June)
- Phase V—Human Trials to demonstrate sensitivity and specificity Q3 2010 (September)
- File 510k with FDA Q3/4 2010

Imagine...

An innovative medical device that provides a safe and noninvasive way to detect pediatric VUR.

Douglas G. Turnquist
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84127
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Torion Technologies, Inc.

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF COMPANY

Torion Technologies is a privately held company and is the technology leader in miniaturization of gas chromatography and mass spectrometry instrumentation, as well as complimentary accessories. Torion offers a unique blend of technical services and product commercialization. More broadly, Torion's purpose is the development of miniaturized, hand-portable measurement instrumentation for chemical and biological analysis in the field. Specific areas of expertise include all forms of mass spectrometry and ion mobility spectrometry, all forms of chromatography and microseparations, solid phase microextraction and sample preparation, statistics-based analyses and data processing algorithms, rapid detection of chemical threat agents, and thermolytic catalysis for biomarker identification of biological threat agents.

TECHNOLOGY

Torion's product line includes the world's smallest and most portable gas chromatograph-toroidal ion trap mass spectrometer (GC-TMS) instrument, the GUARDION®-7, and its companion CHROMION™ operating software. Torion also developed the CUSTODIAN® line of novel solid phase microextraction (SPME) fiber-based custody sampling syringes used as a sample preparation and sample introduction technique for the GUARDION®-7.

PROGRESS

Torion Technologies Inc. finalized an exclusive technology license agreement for more than 10 patents and patent applications with Brigham Young University in March 2008. Torion originally had been operating for the past several years as a contract research and development company, and is now rapidly moving into a product commercialization phase that includes manufacturing, marketing, and sales activities for GC-TMS based chemical and biological compound detectors. During the Utah COE contract period, Torion initiated commercial sales of the GUARDION-7 GC-TMS, CHROMION software and the CUSTODION line of SPME sampling syringes to strategic markets including national defense and security, forensics, environmental, petroleum, and foods/flavors. Torion is working to develop new commercial applications of the GC-TMS technology.

Imagine...

Miniaturized, hand-portable measurement instrumentation for chemical and biological analyses.

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VisTrails, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

VisTrails, Inc. is a Licensee of the Center for the Management of Provenance and Exploratory Workflows.

VisTrails Inc specializes in developing state-of-the-art technology to capture and manage provenance information. It provides software and services to support the provenance enabling of complex applications used in a wide-range of industries.

TECHNOLOGY

The company has developed a provenance management infrastructure that can be combined with and extend existing applications. Using this patent-pending technology, the team has developed provenance plug-ins for a number of software tools including industry leading creation software such as Autodesk's Maya, Kitware's ParaView, and VisIt.

PROGRESS

In 2009, the company released its first commercial product, the Provenance Explorer for Maya, which was launched during SIGGRAPH. In addition, Kitware is planning to release Provenance Explorer for ParaView bundled with ParaView 3.6.2.

VisTrails has also received an SBIR Phase II award from the Department of Energy to develop a provenance SDK. Using this SDK, users/companies will be able to develop their own provenance plug-ins.

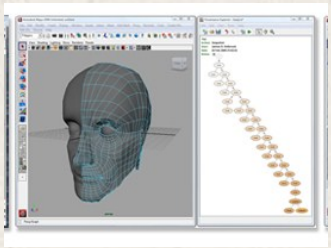
Besides work on the SDK, in 2010 the team will focus on disseminating the technology and in particular, perform a targeted marketing campaign aimed at popularizing the Provenance Explorer for Maya in the education community.

The Board of Directors is currently managing the company and is searching for an experienced CEO.

Receiving the remaining COE funds has been critical for VisTrails because SBIR funds cannot be used for marketing but COE funds can be used for this critical function.

Imagine...

If you could "reverse" changes you had made to a picture or game and go "back" to any point in time...



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Wastewater Compliance Systems, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Wastewater Compliance Systems, Inc. (WCS), a Licensee of the Center for Water Treatment Technology, sells a patented, submergible, igloo-shaped aeration product called Poo-Gloo that dramatically enhances the efficiency of wastewater lagoons. Our economical product is an easy-to-install retrofit solution for lagoon operators faced with compliance, cost, and capacity issues.

TECHNOLOGY

Poo-Gloos increase efficiency and capacity of wastewater lagoons by providing a large surface area of aerated bio-film in a dark, warm environment. Biological conditions created within each Poo-Gloo promote growth of beneficial microbes that accelerate nutrient removal and enhance remediation. Although seemingly simple, Poo-Gloos are a disruptive and energy efficient solution to a difficult problem in small and medium size cities and towns, as well as globally in developing countries and other areas where expensive, complex, hard to maintain conventional sewage treatment plants are not feasible. WCS, Inc. conducts scaled technology and product evaluations in test beds. The tests are conducted in large tanks under controlled conditions using live municipal waste streams to evaluate product performance and to develop protocols to support commercial field activities.

PROGRESS

WCS is currently collecting and analyzing operating data from Utah beta sites to document product performance to fulfill regulatory requirements for new equipment to support future sales. The Company is also expanding its sales base to neighboring states to build sustainable core operations, and to comply with regulatory requirements in other states. The Company outsources pure R&D activities to the University of Utah via sponsored projects to investigate new scientific discoveries in lagoon wastewater treatment technology. Their UU sponsored research created two new patent applications in late 2008, and will provide at least two additional patent filings during 2009. WCS also contracts with UU to provide ongoing analytical lab testing and support services for their municipal test beds and commercial field sites.

Imagine...

An aeration product that increases the efficiency and capacity of wastewater lagoons.

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801-647-0068
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2008-2009 Awardees Which Did Not Receive Funding

2008-2009 Awardees Which Did Not Receive Funding

Under some circumstances, Licensees which are awarded funding under the COE selection process do not end up receiving that funding. Being awarded funding means that a licensee or university Center is approved to receive funding, pending compliance with the terms of the contract and program. There are a number of reasons why a firm may be receive an award, but not subsequently comply with program requirements and therefore not receive the funding. In some cases, the Licensee is unable to secure adequate matching funding (one dollar in outside funding for each dollar of COE grant funding) or their funding sources are not eligible to count as matching funds. Sometimes firms change strategies and sometimes, as happens with startups, they simply exit the business. Below is a list of awardees which were offered awards but did not receive funding during 2008-09.

1. **CastleRock Engineering, Inc.,**
   (Licensee of the Center for Control of Flows in Manufacturing)
2. **Millenniata, Inc.**
3. **RUReady, Inc.**
4. **Wasatch Nanopore Sensors, LLC**
   (Licensee of the Center for Nanopore Sensor Technologies)

Program Description

PROGRAM DESCRIPTION

Utah Centers of Excellence Program

Description of Centers Recommended for Funding in Fiscal 2008-2009

The purpose of the Centers of Excellence Program is to accelerate the commercialization of promising technologies that have strategic value for Utah. The end goal of the COE Program is to help drive economic development and job creation.

"Our Job is Jobs"

2008-09 Licensee Grants

The Centers of Excellence program has, for over 20 years, provided grant funding to professors in our colleges and universities to help them take their technologies to market to drive job creating products and businesses in our economy. Historically, the COE statute only permitted grants to Utah universities, however, in 2007 the Legislature passed and the Governor signed into law, changes to the COE statute that permits grants to companies who license technology developed at Utah's colleges and universities, including startups as well as existing companies who plan to create a new product or product line from the licensed technology. After these legislative changes in 2007, Licensees were solicited from all existing Centers to broadly evaluate the potential of grants to Licensees.

During the 2007-08 fiscal year, approximately half of the grants and funding went to Licensees. The excellent progress made by these companies in creating jobs and expanding the success of their businesses and strengthening Utah's economy led to this year's program. The program has been refocused to help provide funding to the Licensee, the company that is licensing a university-developed technology. For the 2008-09 selection process, there were two categories of eligible applicants. First were 5 University Centers which had received their first year of funding in 2007-08 and who were eligible for a second year of funding as a university Center. The second group was any company, an existing firm or a startup, which was newly licensing a university developed technology

For the 2008-09 Solicitation, 3 of the 5 eligible University Centers and 36 Licensees submitted proposals for a total of 39 proposals received, of which 21 Licensees were recommended for funding and 1 University Center recommended for a second year of funding, bringing the total to 22 proposals recommended for a COE grant this year.

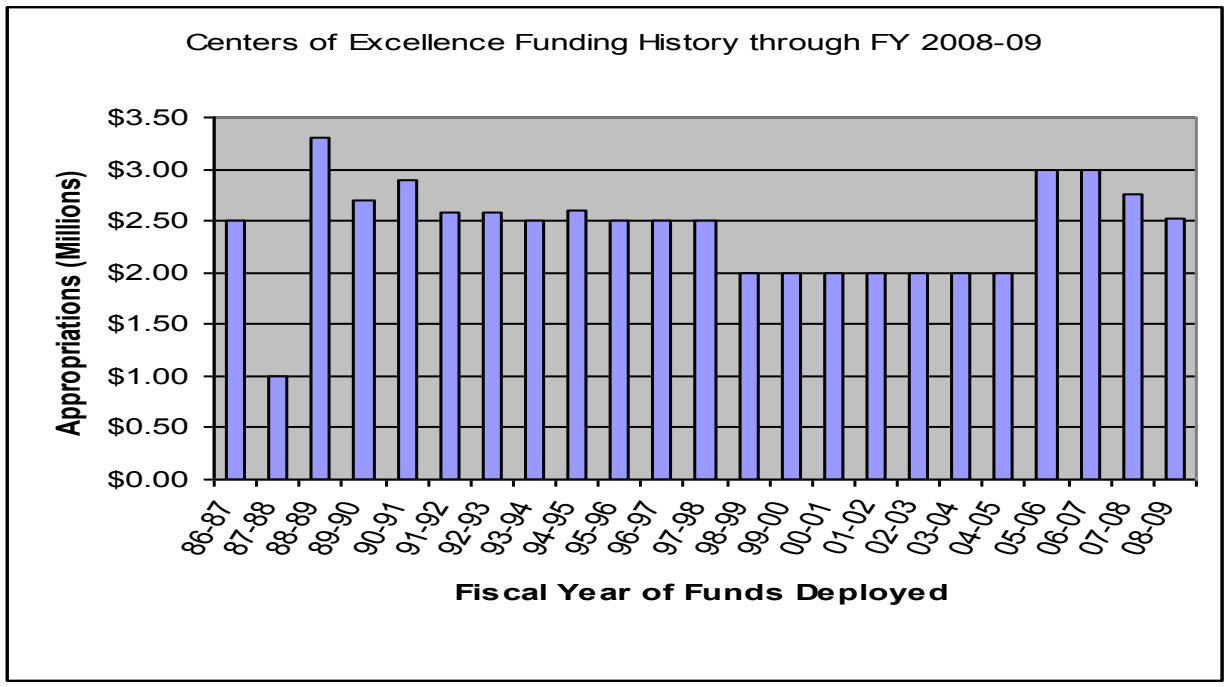
The intent of this grant funding is to help accelerate the process of taking these leading edge technologies to market. Companies of any size are eligible to apply, including startups as well as existing companies that are planning to create a new product or product line from the licensed technology. The goal of these funds is to help defray the risk in taking these innovative new technologies to market in order to encourage more such licensing and the accompanying job creation that comes from exciting new market opportunities.

Following the continued encouragement of the Legislature and reflecting the ongoing challenges of transitioning university developed technologies out of the lab and into industry, for the 2008-09 fiscal year and later, the COE program will follow the Licensee Grant provisions of the COE legislation and continue as a grant program but will focus the program only on Licensee (company) grant funding.

Beginning in 2008-09, any company which is headquartered in Utah or has a significant divisional headquarters in Utah is eligible for the Centers of Excellence grant and is the focus of the program. A startup company or an existing, ongoing concern, which decides to newly license a technology developed at, and licensed from, one of Utah's colleges or universities and which will create jobs for Utah citizens, is eligible to apply for a grant. The competitive process for Centers of Excellence Grants is intended to encourage and develop technologies that create Utah jobs from the commercialization of the technology.

In addition, because the emphasis going forward is to fund the Licensees, there will no longer be a need for a Business Team Program. For 2008-09 one Business Team Member will continue to support the one University Center.

HISTORICAL FUNDING



This graph shows the history of funding for the COE program

2008-09 CENTER SELECTION PROCESS

The Centers of Excellence program issued a solicitation in early 2008 with a proposal deadline of March 10, 2008 and the selection review process taking place in April and May. The review process includes an in-person presentation by the proposing team in front of members of the Centers of Excellence Advisory Council, who are volunteer experts from Utah's technology business community. Final selections are made in late May, presented to the GOED Board in June and funds are available beginning in July. For the 2008-09 fiscal year funding recommendation, the Centers of Excellence Program continued to refine the selection process.

The COE Advisory Council is a group of seasoned technology industry executives, CEOs and CTOs, VPs and Senior Directors, who are interested in helping Utah and the Centers of Excellence Program succeed. This year there were 28 volunteer reviewers on the Advisory Council, 5 of them new to the program for 2008-09. For the 2008-09 selection year, the COE Advisory Council conducted 39 reviews of 3 University Center proposals and 36 Licensee Grant proposals. The funding requests this year were in excess of $4.5million.

To enhance the selection process and position the selection process for scalability, the program modified the selection process. This year each proposal was divided into one of three categories matched by 3 sub-committees of the Advisory Council. These sub-committees are:

- Materials / Manufacturing / Environmental / Energy
- Information Technology / Communications / Aerospace/Defense / Electronics/Electrical Devices
- Life Sciences

Each category was assigned a day of meetings for our Reviewers. Each proposing team was then assigned a 30 minutes time slot in the morning. For the first half of the day, the sub-committee members of the Advisory Council listened to back-to-back proposal presentations by the proposing teams. After all of the teams had presented to at least 2-4 Advisory Council members, the sub-committee as a whole sat down together for the first phase review and prioritization.

During this process, the sub-committee members discussed each proposal, evaluated the proposed funding request, and made the initial recommendations for funding and amount of funding. Each proposal that was recommended for funding also received a score on a scale of 0-5 (5 is high score). The average of the reviewers' score was assigned to the proposal, and then each sub-committee's selections were ranked by score. This process narrowed the field of proposals from 39 down to 26 which were considered by the full Advisory Council. 10 proposals from the MMEE sub-committee, 8 proposals from the IT sub-committee and 8 from the Life Sciences sub-committee were forwarded to the full committee for review.

On May 15, 2008, the COE Advisory Council met as a group to review the 26 proposals forwarded from the sub-committees. The Council reviewed the "top 6" recommendations from the sub-committees, 2 from each group and voted to accept 4of these as a group, with the remaining 2 selected for further discussion on the amount of funding and ultimately selected for funding. After recommending the top 6, the Council worked its way in priority order through

the list of sub-committee recommendations. Of the 26 considered, 22 were recommended for funding for 2008-09.

During this process, the members of the Advisory Council in attendance either accepted the committee's recommendation, or modified the recommendation. Each of these Council recommendations was accepted by a majority vote, and the process of discussion and recommendation continued until a majority vote was reached for each proposal. Each proposal included whether or not the proposed application was recommended for funding, and the amount of funding recommended for the Licensee and, if requested by the proposing team, the amount of funding recommended to be contracted back to the university team.

Finally, the Council also reviewed the list of 13 proposals which had been recommended NOT to be funded by the sub-committees and accepted that list as not recommended for funding. After the recommendations for funding for all of the selected teams and their associated university contracts plus $25,000 for one business team for the one University Center which was recommended for funding, $340,000 was remaining. The Council proposed that these funds should be distributed after a mid-year convening of the Council, probably by conference call or short meeting, to those teams receiving grants for the 2008-09 fiscal year which show significant progress or specific needs/milestones.

This was the first year that this so-called "speedpitch" process was used, combined with the ongoing sub-committee approach. All feedback on this updated approach was that it was very successful. It provided enough time for the proposing teams to communicate their technology and their business plan and strategy, while allowing the Council members to see a wider array of the proposing teams and also to prioritize them within areas of expertise before the final Council meeting.

The key requirements for funding this year included: The potential for a technology to create a significant Utah employer, whether the proposing team or management team was credible to accomplish the needed commercialization activities, and for teams already in the program, whether the program was "on track" and meeting key milestones.

Funding Summary

For the 2008-09 selection process, the Program received a total of 39 proposals with a total of 39 reviews. There were 36 Licensee proposals and 3 University Center proposals and total funding requests exceeding $4.5million.

The final recommendations for funding include 21 licensees, and 1 university Center. This totals 22 teams selected for support. Of the 5 University Teams which were eligible to apply for second year funding this year, 3 applied for funding, one was not yet ready and one chose to have their Licensee apply instead. Of these 3 which applied, one was selected for renewal for 2008-09. In addition, another 3 proposals were from Licensees which had received previous funding from the COE program, and of these, one received funding.

Of the 36 Licensee proposals, 20 of them had never received any type of Centers of Excellence funding. Of these new proposals, 11 received funding, accounting for fully half of the grants awarded. The high number of new proposals coming into the program reinforces a hypothesis of the program; that many professors with technology that has commercial value did not want to personally perform the work of commercialization as a COE Center Director and therefore their technologies did not participate in the program, and frequently, did not therefore emerge into the marketplace.

The 13 remaining Licensee proposals were former COE university teams which were seeking Licensee Funding. These included teams which had been full Centers, and also teams which had received only Business team funding in the past. Of these 13 proposals, 9 received funding

Of the budget, $1,869,250 was allocated to direct Licensee grant funding. Another $ 515,750 was allocated for the one University Center plus for funds requested to be contracted back to a companion University team by Licensees. Another $25,000 was allocated for a business team for the University Center. The remaining $340,000 is to be distributed mid-year as previously described.

The largest single grant was for $275,000 to the College of Eastern Utah for their Clean Coke University Center, a second year proposal, with the remaining grants ranging down in size to $50,000. All Licensees are required to provide a 1:1 match from either industry or Federal funding, and any university team which receives funding which also grants doctoral degrees must also provide 2:1 matching funds, with all other institutions responsible for a 1:1 matching requirement.

Fund Allocation

Funds Allocated by the Legislature	$2,750,000
Amount to Direct University Center Funding	$ 515,750.00
Licensee Funding	$1,869,250
Business Team Funding for Centers	$ 25,000.00
Funding to be allocated mid-year to teams with exceptional progress and special situations	$ 340,000.00

Distribution of Grants by University

	Centers	Licensees	Total
BYU	**0**	**8**	**8**
USU	**0**	**3**	**3**
UU	**0**	**10**	**10**
CEU	**1**	**0**	**1**
Total Supported Teams	**1**	**21**	**22**

Summary Statistics on Applicants and Awardees

Total Number of University Proposals for 2008-2009	**3**
Total Number of Licensee Proposals	**36**
Total Number of Funding Opportunities	**39**
Existing University Centers Seeking Renewal	**3**
Existing University Centers Renewed	**1**
Existing Licensees Seeking Renewal	**3**
Existing Licensees Renewed	**1**
Former University Teams seeking Licensee support	**13**
Former University Teams with Licensees Funded	**9**
Proposals from Licensees new to COE	**20**
New Licensees Funded	**11**
Proposals based on BYU technology	**10**
Centers + Licensees funded from BYU	**8**
Proposals based on U of U technology	**18**
Centers + Licensees funded from U of U	**10**
Proposals based on USU technology	**9**
Centers + Licensees funded from USU	**3**
Proposals from SUU	**1**
Centers funded from SUU	**0**
Proposals from CEU	**1**
Centers funded from CEU	**1**
Centers + Licensees Funded	**22**
Existing University Centers Renewed	**1**
Licensees Funded	**21**
Total of Centers + Licensees Supported for 2008-09	**22**
Total of Technologies support for 2008-09	**22**
Graduating Centers at end of 2007-2008year	**9**
Existing (07-08) Recipients not renewed for 08-09	**5**
2007-08 Teams that did not apply for 08-09	**4**
Licensees and Centers by Technology Area	
Mat./Mfg./Energy/Environment Total	**10**
Inf. Tech / Aerospace/ Defense/ Electronics Total	**5**
Life Sciences	**7**
Total Recommended for Funding	**22**

Part B 2008-09 Grant Description

After the primary 2008-09 solicitation was over, the COE program still had $340,000 in funds that were uncommitted. This funding, combined with one contract that was awarded, but not signed by the grant recipient, plus a small amount of funding that was carried in from previous years, a total of $500,000, was designated to be put to work in a 2008-09 Part B solicitation. This solicitation was limited only to existing 2008-09 Licensee grant recipients, and was designed to help accelerate the progress of the most promising teams.

Of the 22 original teams which were granted awards in 2008-09, one was a university team, which was not eligible for the Part B funding, one declined their contract, and three others were not eligible either due to the total amount of funding they had received from the Centers of Excellence program (in excess of $500,000 per technology), or had received equity funding in excess of $2 million. Of the remaining 17, 10 submitted a proposal for the Part B solicitations. Others who did not propose generally did not have sufficient matching funds in place to be received on or before June 30, 2009, a requirement of the Part B solicitation.

2008-09 Part B Selection Process

For the 2008-09 Part B solicitation, the majority of the Members of the COE Advisory Council who participated in the primary 2008-09 solicitation also participated in reviewing the Part B teams. Teams were asked to submit a 2 page proposal demonstrating their progress to date, as well as various letters of support and a summary of key items such as equity and grant funding received to date.

The COE team conducted sub-committee reviews by conference call due to the relatively small number of proposals to review: 2 in Information Technology, 3 in Life Sciences and 5 in Materials/ Manufacturing/Energy/Environment. After each proposal was reviewed by the sub-committee, on Thursday April 16, 2009, the group met in person at the Capitol to do a final review and prioritization.

Of the 10 proposing teams, 6 teams were recommended to receive awards ranging from $50,000 to $100,000 and totaling $500,000. Four other proposing teams were not recommended for additional funding. In one case this was because the company already had significant revenue from the licensed technology, in the other cases, the Council members were concerned that the companies had not made enough significant commercial progress to warrant further funding. All licensees are required to provide a 1:1 match in funds from non-loan sources.

Distribution of Party B Grants by University

	Licensees
BYU	**1**
USU	**1**
UU	**4**
Total Supported Teams	**6**

Funding Recipients for the 2008-09 Part B Solicitation Centers of Excellence Program

Licensee **(Center -University)**
CEO or Principal **Years Funded to Date** **Initial Award Amount**
2008-09 Part B Award Amount:

COSMAS, Inc. (Licensee of Center for the Production of Nanometer Sized Metals, Alloys, Metal Oxides & Mixed-Metal Oxide Powders - BYU)
Lynn Astle, CEO **New as company** **$100,000**
$75,000

GlycoMira, LLC. **(New Licensee – U/U)**
Tim Miller, CEO and Thomas P. Kennedy, MD and Glenn D. Prestwich, PhD, Co-founders and Co-inventors **New as company** **$100,000**
$75,000

NeuroAdjuvants, Inc. **(New License – U/U)**
Theodore Stanley, M.D., Pres. & CEO **New as company** **$100,000**
$100,000

STEDI, LLC **(New License – USU)**
Geoffrey G. Smith (Key contact) **New as company** **$100,000**
$50,000

Thermimage, Inc. **(New License – U/U)**
Douglas Turnquist, President & CEO **New as company** **$100,000**
$100,000

Wastewater Compliance Systems, Inc. (Licensee of Center for Water Treatment Technology -U/U) Fred Jaeger, President **1st Year as Licensee** **$100,000**
$100,000

The Part B additional funding is included in the overall Funding Summary for the 2008-09 Fiscal Year.

2008-2009 Financial Summary

The Financial Summary is a summary of the information provided by each Center in their annual report to the program and the funding summary is based on the funds granted during the fiscal year. For reference, "Total Funding" means COE funding awarded since starting with the program, "Patents Pend...." means patents newly filed during the fiscal year, "New Patents (Issued)" refers to those issued during the fiscal year and "Licensees" refers to companies which licensed the technology from a former Center of Excellence, while those marked "N" are Licensees of other university developed technology..

University	Funded University Centers	08-09 Funding	Total Funding	Total Disbursed	08-09 Matching	Patents Pend. 08-09	New Patents (Issued)	Spin-Offs/ Licensees
CEU	Clean Coke Technology	275,000	400,000	400,000	550,000	NA	NA	1
University	**Funded Companies**	**08-09 Funding**	**Total Funding**	**Total Disbursed**	**08-09 Matching**	**Patents Pend. 08-09**	**New Patents (Issued)**	**Spin-Offs/ Licensees**
BYU	Advanced Composite Solutions, LLC	100,000	100,000	100,000	1,985,000	NA	NA	Y
UU	ContraDyn, Inc.	100,000	100,000	100,000	100,000	NA	NA	Y
BYU	Cosmas, Inc.	175000	175000	175,000	312,500	NA	NA	Y
BYU	CRE Energy, Inc.	100,000	100,000	100,000	100,000	NA	NA	NA
UU	GlycoMira, LLC	175000	175000	175000	293,500	NA	NA	N
UU	Heavystone Laboratory, LLC	120,000	120,000	120,000	90,000	NA	NA	Y
BYU	International Reservoir Simulation Research Institute	50,000	50,000	50,000	50,000	NA	NA	N
UU	Larada Sciences, Inc.	80,000	250,000	250,000	80,000	NA	NA	Y
UU	NeuroAdjuvants, Inc.	100,000	100,000	100,000	662,200	NA	NA	N
BYU/UU	Sera Prognostics, Inc.	100,000	100,000	100,000	540,000	NA	NA	N
USU	STEDI, LLC	100,000	100,000	100,000	100,000	NA	NA	N
BYU	T-Splines, Inc.	100,000	100,000	100,000	100,000	NA	NA	N
USU	Thermal Management Technologies, Inc.	100,000	100,000	100,000	135,300	NA	NA	Y
UU	Thermimage, Inc.	100,000	100,000	100,000	1,508,000	NA	NA	N
BYU	Torion Technologies, Inc.	100,000	100,000	100,000	2,336,020	NA	NA	N
UU	VisTrails, Inc.	200,000	200,000	137,500	137,500	NA	NA	Y
UU	Wastewater Compliance Systems, Inc.	100,000	100,000	100,000	356,618	NA	NA	Y

If a company which received funding is a spin-off or licensee of a former University Center of Excellence, then it is marked as "Yes". If the company is a university licensee of a technology that was not supported by the COE program in previous years, it is marked as "No".

2008-2009 Awardees Which Did Not Receive Funding

University	Funded Companies (cont.)	08-09 Funding	Total Funding	Total Disburse-ment	08-09 Matching	Patents Pend. 08-09	New Patents (Issued)	Spin-Offs/ Licensees
USU	CastleRock Engineering, Inc.	75,000	75,000	0	NA	NA	NA	NA
BYU	Millenniata, Inc.	85,000	85,000	0	NA	NA	NA	NA
UU	RUReady, Inc.	100,000	100,000	0	NA	NA	NA	NA
UU	Wasatch Nanopore Sensors, LLC	100,000	100,000	0	NA	NA	NA	NA

2009-2010
Funded Centers

Funding Recipients for the 2009-10 Centers of Excellence Program

Funding Recipients which are Licensees (Companies) of Center Supported, University Developed Technologies

Total Proposals – 28 Submitted – 13 Awarded funding:
12 Second Year Submissions– 8 Awarded funding:
16 First Year Submissions-5Awarded funding:

BYU – 4 Awarded Funding (9 Submitted)
USU – 1 Awarded Funding (2 Submitted)
UU – 8 Awarded Funding (16 Submitted)
CEU – 0 Awarded Funding (1 Submitted)

8 Second Year Proposals Awarded Funding
5 First Year (New) Proposals Awarded Funding

Licensee / (Center University) CEO or Principal	Years Funded to Date	Award Amount
COSMAS, Inc. (Center for Nanoparticle Production—BYU) Lynn Astle, CEO	**2nd Year**	**$200,000**

Cosmas, Inc. is involved in the development of a novel process for making nanoparticles which have a strong competitive advantage for the production of gamma-alumina supported platinum and palladium catalysts, the largest sector of the supported catalyst market.

GlycoMira, LLC. (SAGE—U/U) Tim Miller, CEO	**2nd Year**	**$325,000**

GlycoMira is developing a new class of anti-inflammatory compounds and will be targeting skin diseases like rosacea and eczema followed by systemic diseases like osteo-arthritis and diabetic retinopathy.

Heavystone Laboratory, LLC (Center for Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials—U/U) Dr. Al Poskanzer, CEO	**2nd Year**	**$140,000**

Heavystone Laboratory have developed an innovative process and products of functionally graded cemented tungsten carbide material for manufacturing industrial applications including metalworking, oil and gas drilling, geothermal energy exploration, mining, construction, high-wear components, and many other industrial applications that requires extreme wear resistance and impact resistance.

Licensee / (Center University)
CEO or Principal **Years Funded to Date** **Award Amount (cont.)**

iVeena, LLC. (Moran Eye Center—U/U)
Dr. Balamurali Ambati, Pres and CMO; Greg Jones, Acting CEO
New **$100,000**

iVeena, LLC, is an early-stage biotechnology company with the mission of developing a novel proprietary drug delivery device, called the Capsule Drug Delivery Ring, for treatment of the leading blinding diseases. iVeena will fundamentally change the way eye diseases are treated and improve the quality of life of more than 1 million people/year in the United Sates and potentially 3 million/year worldwide by preserving their vision and simplifying treatment.

JSK Therapeutics, Inc (Division of Medical Oncology—U/U)
Dr. Paul J. Shami, CMO **New** **$100,000**

The main focus of JSK Therapeutics (JSKT) is to develop novel anti-cancer drugs using a new cellular mechanism to inhibit the growth of malignant cells. This mechanism, called glutathionylation, involves triggering a chemical reaction between a naturally occurring molecule (glutathione) and cellular proteins. As a result, proteins that are key to cancer cell growth are inhibited, leading to death of the cancer cells. The scientific founders of JSKT have developed two different strategies to induce glutathionylation.

NanoInjection Technologies, LLC (Center for Compliant Mechanisms—BYU)
Gary Crocker, CEO **New** **$100,000**

NanoInjection Technologies LLC has the ability to restructure the rapidly growing biotech marketplace for the injection of DNA and RNA into targeted eggs and other cells with the commercial introduction of the first cellular nanoinjector that both reduces costs and yields a faster DNA implant with significantly higher post injection cell survival rates.

NeuroAdjuvants, Inc. (Dept of Pharmacology and Dept of Med. Chem.—U/U)
Dr. Theodore Stanley, CEO **2nd Year** **$300,000**

NeuroAdjuvants develops stable, blood-brain-barrier permeable neuropeptide-based compounds for the treatment of nervous system disorders. The initial focus of the Company is to bring new therapies for pain and epilepsy. Pain and epilepsy are both multibillion dollar markets dominated by small molecule therapies with considerable safety concerns and/or suboptimal efficacy in many patient populations. NeuroAdjuvants aspires to address these large unmet medical needs by developing safe, efficacious therapies with novel modes of action.

Licensee / (Center University)
CEO or Principal **Years Funded to Date** **Award Amount (cont.)**

Sera Prognostics, Inc. (Joint: Chem/Bio—BYU; Dept of OB/GYN—U/U)
Dennis Farrar, CEO **2nd Year** **$300,000**

Sera Prognostics is using a novel serum proteomics technology to identify and commercialize biomarkers from blood samples of pregnant women to predict those at risk for preterm birth, preeclampsia and other pregnancy complications.

Sparkle Cream, LLC. (Food Services Dept.—BYU)
Joel Clark, CEO **New** **$100,000**

Sparkle Cream's licensed, patented technology allows customers, such as frozen ice cream or frozen yogurt vendors, to carbonate soft serve products such as ice cream and frozen yogurt. The resulting product "sparkles" in the mouth resulting in a fun and novel taste experience.

Thermal Management Technologies, LLC. (Center for Thermal Management Technologies—USU)
Forrest Fackrell, CEO **2nd Year** **$95,000**

Following two years as a USU Center of Excellence, TMT is a 2008 startup licensee poised to commercialize innovative thermal management solutions for a variety of markets including aerospace, IT infrastructure, and electric hybrid vehicles.

Thermimage, Inc. (Department of Surgery, Section of Pediatric Urology—U/U)
Douglas Turnquist, CEO **2nd Year** **$300,000**

Thermimage, Inc. is commercializing a non-invasive medical device technology that will replace the traumatic procedures currently used to detect pediatric Vesicoureteral Reflux (VUR), the effect of which will decrease the number of kidney infections and decrease the risk of permanent kidney damage in over 4 million children every year.

Wastewater Compliance Systems, Inc. (Center for Water Treatment Technology—U/U)
Fred Jaeger, CEO **2nd Year** **$300,000**

WCS, Inc provides proprietary products and services to enable wastewater lagoon operators to cost-effectively remain in regulatory compliance, to increase lagoon efficiency and capacity, and to avoid substantial capital costs by extending useful life of existing facilities. The solution is called the "poo gloo" and is simple to install and maintain.

Licensee / (Center University) CEO or Principal	Years Funded to Date	Award Amount (cont.)
ViroPan, Inc. (Dept of Bioengineering, Microbicide Delivery Lab—U/U) **Dr. Tyler McCabe, CEO**	**New**	**$100,000**

ViroPan, Inc. is a company focused on women's health and the prevention of specific viral sexually transmitted infections (STIs) and together with the University of Utah, ViroPan is developing an important proprietary intravaginal ring (IVR) product that is self-inserted by the woman to release, for up to one month, a potent anti-Human Papillomavirus (HPV) agent for the prevention of cervical cancer and genital condylomas (warts).

Governor's Office of
Economic Development
Centers of Excellence

Jon M. Huntsman, Jr.
Governor

ANNUAL REPORT

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Sharon Cox ◆◆ Program Coordinator
Centers of Excellence

Fiscal Year July 2006—June 2007

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2006-2007
Centers of Excellence
Annual Report

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Executive Summary

Executive Summary

The 2006-07 year was an excellent year for the Centers of Excellence Program. The highlight of the year included 8 companies (spinouts) started this year which licensed technology from Centers supported by this program. These spinouts include 6 companies emerging from the University of Utah and one each from Utah State University and Brigham Young University. In the Life Sciences sector, Larada Sciences, Navigen, and Philotek are all new companies in our landscape. Nano-Oxides is a startup in the material sciences industry, with an obvious emphasis in nanomaterials, and in the IT sector, Vistrails, Dynamic Screening Solutions, Apollo Acoustics and State of RT are all companies that are licensing technologies supported by Centers of Excellence funding.

An important element of all of these emerging companies is the key role that the Centers of Excellence Business Teams played in their formation and early accomplishments. This pairing of seasoned technology business executives and serial entrepreneurs with some of the best university developed technology in the State has proven very effective in enhancing the success of the early stage company development. Our professors frequently mention the high caliber of individuals that we have attracted and the tremendous value that these business team members contribute to the success of the program.

The Centers of Excellence Program celebrated two decades of supporting economic growth in Utah with the publication of a 20th Anniversary report, available online. Over the first 20 years of the program, technologies supported by the Centers of Excellence Program have resulted in more than 200 license agreements, and at least 126 Utah-based companies have been created to license and market technology fostered by the program. 55 of these spinouts are still "alive" in Utah, three are alive out of State, and another 11 have been acquired and moved out of state. As of February 2007, these Utah companies directly employed over 2035 persons in the state, at an average salary of over $65,000. Some well-known firms that have been assisted by the Centers of Excellence Program include Myriad Genetics, Inc. (MYGN), Sonic Innovations, Inc. (SNCI), Moxtek, Cimetrix, and Autonomous Solutions Emerging successes include InfoWest, Live Wire, Andigen and Rocky Mountain Composites. Startups just emerging from the Centers program in the past two years include Flying Sensors, Wasatch Microfluidics, and Glycosan BioSystems. These firms are among the many companies strengthening Utah's economy through technologies developed at Utah's colleges and universities.

The Centers of Excellence Program has undergone significant enhancements in the 2006-07 fiscal year to prepare it for the next two decades of success. During the past year, the program evaluated the feasibility of the concept of making grants to Licensees in order to make the transition out of the lab and into a successful venture more likely. A Licensee is a company which licenses a university developed technology in

order to take it to market. The program provided small grants to two licensees, Flying Sensors and Glycosan BioSystems on an evaluation basis for 2006-07. During the 2007 Legislative session, GOED approached the Legislature to make permanent changes to the COE statute in order to permit this type of program on an ongoing basis based on the tremendous success that these funds supported at both companies. Both CEOs testified to the legislature of the value of these grants to their businesses, which allowed them to quickly secure additional capital and sales and to move their businesses rapidly forward. Their success helped the Legislature support these statutory changes.

Because of these excellent results, House Bill 125 was sponsored by Rep. Bradley Daw, with Senate sponsor Senator Sheldon Killpack, to permit grants to licensees of University developed technologies. In addition, the statute was clarified to more fully instantiate the Business Team program, which has proven so important to the success of the process of launching these technologies into the marketplace.

Also new this year, based on changes to statute in the 2005-06 Legislative session (SB 112), which permitted more flexible matching funds requirements for non-doctoral granting schools, the program received proposals from 3 non-doctoral granting institutions and two proposals received funding, Southern Utah University and the College of Eastern Utah.

With these changes in hand, the annual selection process for the 2007-08 fiscal year was expanded to include Licensees. There were 41 university proposals, and 23 Licensee proposals, including the 9 "companion" Licensees, where both the university team and the Licensee were requesting funds as part of the bridge between university and company. The funding requests of proposals received this year totaled $10,050,656. This is more than 3 times the COE budget of approximately $3 million.

After completing 55 separate review meetings, the final recommendations for funding include 9 Licensees, 3 of which had companion Centers which were also recommended for funding. Another 8 standalone University Centers were recommended for funding, for a total of 11 university Centers, and a final 8 university teams were recommended to receive Business Team support, which is intended to develop a better understanding of the market before further grants are made. This totals 28 teams, and 25 different technologies, selected from the Centers of Excellence Program, with 20 selected for significant development funding.

2006-2007 Funded Centers

Acoustics Research

BRIGHAM YOUNG UNIVERSITY

DEFINITION OF CENTER

The Center for Acoustics Research works with Utah industry partners to commercialize audio technologies. Applications for active sound control systems include active noise cancellation, which relies on the Center's specialized advanced adaptive digital signal processing.

TECHNOLOGY

The Center is developing several technologies aimed at improving noise control, including: active noise control in helicopter cabins and electronic fan noise cancellation.

The Center's unique signal processing systems can self detect frequencies and amplitudes of a particular noise and produce a counter signal to cancel the amplitude of the noise. The Center shows effective results up to 9dB. The Center still continues its research in the development of energy-based technologies for equalization of audio systems.

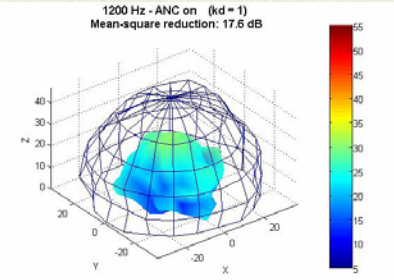
PROGRESS

Recent accomplishments and advancements of technology related to energy-based equalization of audio systems have led this Center to establish ties with an early-stage Utah Company, Apollo Acoustics. Apollo Acoustics has teamed with TechnoFirst, a French active noise control company, to establish Techno-First America, headquartered in Utah. Together they plan to create sophisticated audio equalization technologies.

During this year they created an effective 1-D equalization demonstration using simulations and live systems. The team's future plans moves towards making these systems automatic along with expanding the equalization to higher frequency and more complicated sounds.

Currently the 3-D probe is being tested and validated which is a step towards cancelling these more complicated sounds.

Imagine...



Technology that could cancel noise at specific frequencies creating safer more productive work environments around machinery or equipment.

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Advanced Communications Technology

BRIGHAM YOUNG UNIVERSITY

DEFINITION OF CENTER

The Center for Advanced Communications develops multi-antenna technologies for air-to-ground communication systems. The Center specifically has produced unique technology applicable to air-to-ground wireless links.

TECHNOLOGY

Multi-antenna technology for air-to-ground wireless links have application on airplanes and unmanned aerial vehicles (UAV's).

The technology places several antennas on the airframe and uses advanced signal processing to coordinate communications for any aircraft at any altitude. Aircraft performing complex maneuvers, helicopters communicating with satellites and UAV's are ideal candidates for this technology because of the ability for the multi antenna technology to enable a low-power, energy efficient communication system during these maneuvers.

Traditional wireless communications links often lose communications during these maneuvers, or, in the case of helicopters, when the blades pass between the transmitter and the satellite. Using the Center's sophisticated algorithms, multiple antennas compensate for these interruptions, with the algorithms reassembling the information automatically.

PROGRESS

The prototype air-to-ground communications system is currently scheduled for testing in a flight at Edwards Air Force Base. The technology has been successfully extended to all sizes of UAV's, including small wing span UAV's which are well known for having complications with communication.

Along with UAV's the Center has found implementations in terrestrial wireless communications such as cellular communications or local area networks. The US Department of Defense along with other commercial partners are evaluating the Center's technology for use in their communication systems.

Imagine...

A way to always maintain communication with an aircraft during aerial maneuvers.

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Advanced Imaging LADAR

UTAH STATE UNIVERSITY

DEFINITION OF CENTER

The Center for Advanced Imaging LADAR works to commercialize its development of a patented camera. This camera combines laser distance measurement with digital color imagery.

TECHNOLOGY

The technology allows the ability to capture detailed, three dimensional images of scenes in real-time. Its use of digital imagery results in full color high definition digital formats. The color and global positioning data can be manipulated and stored for analysis. Users can view replicas in virtual reality environments which apply to various military and commercial uses in surveying and imagery.

PROGRESS

In 2006-2007 The Center developed a brand new patent application for rendering Texel Imagery Data. The vehicle mounted versions of this technology are being used by Intelisum, while web-centric applications are being licensed to S2, Inc.

The Texel camera is crucial to these companies which specialize in 3-D mapping and imagery. 3-D imagery is key in the problem of being able to characterize natural objects. With the ability to capture and store digitally real life structures it has made analyzing simpler.

The camera has three basic technologies "Ladar", Digital Photography, and GPS. The camera uses all three in sync to produce computer environments. Technology like this could revolutionize the 3-D imaging market with its immense applications such as Criminal Forensics, Space Exploration, and Military. For example, the imaging system could be used to survey a battlefield and discern artillery beneath trees in hiding or possibly even ease many tasks for the entertainment industry by having its computer animators simply import real life sets into digital graphics for its animations.

Imagine...

Be able to map any environment in 3D and view it later on a computer from any location.

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Advanced Thermal Management Technologies

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER

The Center is commercializing selected space-based thermal technologies for high-value civilian markets such as remote sensing, homeland security, national defense, classified surveillance, computers, electronics, transportation, communication, and the aerospace industry.

TECHNOLOGY

Flexible Thermal Links provide an effective heat path between two components while minimizing any mechanical interaction. This technology is used in applications wherever critical components require both extreme thermal isolation and mechanical stability as in a broad array of commercial imaging systems. Other applications include technologies suited for cooling electronics systems with fluid based channelization techniques.

PROGRESS

The Center has completed a significant milestone in the development of Chanel-Panels. Channel-Panels are a hermetically sealed, light-weight, sandwich-type panel. As the power density of electronic circuits increases, cooling problems are intensified. Computer designers must often rely on cooling fans that, in addition to being noisy, add to the heat load that must be dissipated. These panels have been demonstrated to transport heat orders of magnitude more effectively than much heavier solid metal plates of similar dimensions.

Imagine...

Thermally connect devices that cannot transmit motion to each other.

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Biomedical Microfluidics

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

This Center works to commercialize a bio-molecular printing system based on a micro-spotter. The continuous flow micro-spotter is a patent-pending device which uses flow to deposit bio-molecules on sensor surfaces. In contrast to other systems which only deposit droplets of materials en masse onto a surface, this Centers technology allow the flow to uniformly deposit bio-molecules on an array surface.

TECHNOLOGY

The main features of this development include prints of bio-molecules in isolated micro-environments, massively parallel fluid delivery, and flow deposition. These key attributes give advantages by eliminating cross contamination as well as depositing high concentrations of bio-molecules. Their novel process works with large or small input volumes of samples.

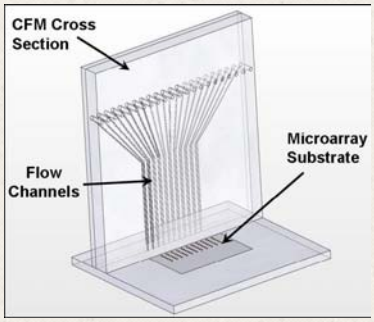
PROGRESS

This Center has successfully managed to create continuous micro fluidic spotters for proteins, nucleic acids, cells, lipids, and lipid bilayers. With technology licensing to Wasatch Microfluidics, work towards volume manufacturing is progressing with the goal of producing spot systems regularly.

With the capability of demonstrating a high quality of system spotting use, the Center has received publicity in *Nature Methods*. The team met key milestones including many application successes such as spot screening with crude hybridoma samples, drug screening, sugars, and cystic fibrosis genotyping.

With DNA melting license negotiations under way the Center will soon start DNA melting research with its technology.

Imagine...



A printer for biological samples that creates inexpensive, highly consistent micro-arrays.

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Control of Flows in Manufacturing

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER

The Center for the Control of Flows in Manufacturing develops processes which implement flow-control methodologies applicable across a wide array of industries for both sorting and coating applications.

TECHNOLOGY

The aerospace industry has manufacturing techniques which solve many production line problems. The Center focuses on two specific technologies which they call (AVPS) and CSM.

AVPS is Aerodynamic Vectoring Particle Sorting which sorts different sized particles automatically based on different flow characteristics. This allows the AVPS system to never come in contact with the particles. This system has applications to the manufacturing behind many industries such as biotech, environmental, materials and cement. The Center has successfully made AVSP applicable to the manufacturing of inhaled drug powders as it can now assist with pathogen detection.

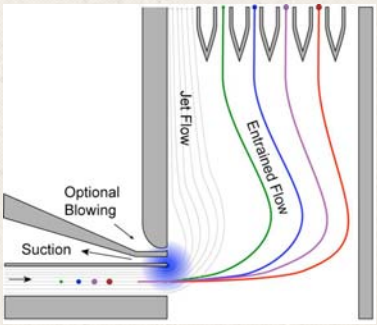
CSM which is the Coanda-assisted Spray Manipulation allows complete control and dexterity of the high precision jets and sprays used in manufacturing. The technology allows manufacturers to have complete control over thicknesses on large surfaces or mitigate the intensity of heat from flame sprays.

PROGRESS

The Center has improved the AVSP system by extending the vector angle to 90 degree. This will have a significant impact on sorting done in manufacturing. Along with this addition the Center has achieved sorting accuracy of two microns all demonstrated with no particle contact.

There have been three new patents filed and one issued for the AVSP and CSM techniques. License agreements have begun with CastleRock Engineering.

Imagine...



Successfully sort tiny, fragile particles, without deforming them, or easily coat the inside of a pipe with an even coating.

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Flying Sensors

BRIGHAM YOUNG UNIVERSITY

DEFINITION OF COMPANION LICENSEE

Flying Sensors, a licensee of the Center for Miniature Unmanned Air Vehicles provides industry and government agencies cost-effective, fully-integrated, unmanned aerial sensing solutions for commercial applications. Integrated sensors include photograph, video, infrared, chemical, meteorological, and particulate. The business model includes manufacturing, marketing and distribution of fully equipped planes, sensors and data acquisition software. Flying Sensors also maintains and provides a national full-service aerial sensing service, to customers that don't want to purchase and own their own equipment. Flying Sensors has customers currently utilizing both product sales and service revenue models.

TECHNOLOGY

Flying sensors technology is focused on autonomous planes that don't need human intervention to fly. Other areas of focus are on remote control helicopters and various integrated sensors. The aircraft also hosts many different Integrated Sensors such as cameras, videos, IR, meteorological, and chemical. This allows for the collection multiple streams of data for analysis and studies. Some other technologies being developed are disposable balloons sensors, real-time air to ground sensor data, and low altitude & high maneuverability capabilities.

PROGRESS

Higher quality aircraft at lower costs is the goal of Flying Sensors. Flying Sensors has successfully grown since their inception. They look to continue to expand and increase their revenue and also expect to achieve annual profitability crossover in 2007/2008 from their funding. They are in the process of finalizing an international product and service distribution agreement into Africa. Flying Sensors has many different customers that are helping them expand and grow including real estate and construction companies, golf courses, as well as local mining companies, military divisions, and the Utah Division of Wildlife Resources.

Imagine...

A miniature plane that could be flown to gather data and information without the need to leave the office.

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Functionally Graded... Cemented Tungsten Carbide...

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials aims to develop advanced composite hard materials for applications in manufacturing tool materials. The composite materials are based on cemented tungsten carbide and polycrystalline diamond compounds.

TECHNOLOGY

The Center technologies are used to custom design microstructures of cemented tungsten carbide and polycrystalline diamond and achieve optimum performance of tools using these materials. Specifically, the composite is designed to improve impact resistance without sacrificing wear resistance of these materials. It is the uniquely designed microstructure of the composites that makes the improvement possible, which would not have been possible with homogeneous materials of the same composition.

The Center technology promises to improve the mechanical properties of materials and the performance of manufacturing tools, hence improve productivity and competitiveness of industries such as mining and tooling.

PROGRESS

The Center has identified a specific industrial product that can benefit from the Center technology, specifically the shear cutters on a petroleum drill bit. The goals of the Center for the first year are to identify an industrial product and develop specific processing techniques for fabricating the product. These goals for the first project year have been achieved.

Producing graded Tungsten Carbide components via the proprietary sintering process has also been achieved.

Imagine...

A composite material that won't degrade and remains sharp over a much longer period of time under intense conditions such as mining.

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Glycosan BioSystems

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANION LICENSEE

Glycosan BioSystems, a privately held life-sciences technology company, based in Salt Lake City, Utah, and is a Licensee of the Center for Therapeutic Biomaterials. Glycosan manufactures sells synthetic, defined, biodegradable hydrogels for biomedical research. The company was founded by Glenn Prestwich, William Tew, and Anna Scott in January 2006.

TECHNOLOGY

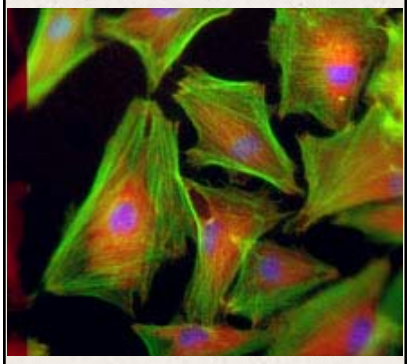
Glycosan is an early stage Utah-based company focused on the development, manufacture, and commercialization of Extracel, a patent pending biomaterial licensed from the University of Utah. Extracel is a synthetic extracellular matrix that has been extensively validated in laboratory and animal testing and is the subject of numerous published research papers. Extracel can be used for 3-D cell culture, tissue engineering, and human and animal therapeutics. This technology has been endorsed by the investment community with a $7.75 million investment in Carbylan BioSurgery, Inc. for human therapeutic uses, and by the founding of Sentrx Animal Care, Inc. for veterinary applications.

PROGRESS

Since its incorporation in January of 2006, Glycosan has successfully negotiated an exclusive license for the non-therapeutic uses of the Extracel technology from the University of Utah and completed the transfer of the technology from the University to the Company's research labs. Glycosan has completed the first phase of product development for the basic Extracel products and established standard operating procedures for manufacturing and quality control.

Glycosan has been in serious negotiations with two global cell culture companies. They anticipate obtaining a license to sell and market Glycosan's Extracel line of products in the field of general 3-D cell culture. In addition, Glycosan Biosystems has raised funding from a group of private investors. Also sales are steadily growing from website and distributor sales worldwide.

Imagine...



A way to plate cells in 3D so their growth will model more closely human growth.

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Homogeneous DNA Analysis

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

Analyzing DNA is increasingly important in medicine. The Center moves to commercialize its DNA Melting technologies and make them more specific to genotyping, mutation scanning, sequence matching, infectious disease testing, biothreat detection, genetics, oncology, and forensics.

TECHNOLOGY

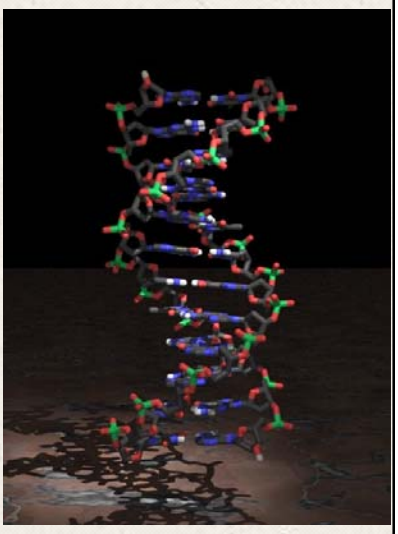
Simple DNA melting is the best technology for both mutation scanning and genotyping, together sometimes referred to as "resequencing". Instead of global sequencing (for example, sequencing the human genome), resequencing focuses on specific sequence changes of importance. Mutation scanning screens large stretches of DNA for any sequence change. Genotyping specifically identifies what change is present. Both are necessary for complete gene analysis and avoid the time, costs and special equipment required for sequencing.

The Technology focuses on resequencing which effectively eliminates 95-99% of high-cost conventional DNA sequencing. Melting analysis is a disruptive technology because of its simplicity and power. It is displacing older methods of DNA analysis that require separations, including sequencing, DHPLC and TGCE. The Center continues to find new applications and markets as news of the technology spreads.

PROGRESS

Many of The Center's innovations have already reached Product status through licensing and successful commercialization with Utah companies. One licensee has launched two instrument platforms for high-resolution melting which are finding success in the marketplace. Four prototypes of an additional instrument for 32 samples (the HR-AMP) that amplifies and melts at high-resolution have just been completed.

Imagine...



Being able to create a simple DNA assay to quickly analyze a particular disease or detect a possible threat.

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Interactive Ray-Tracing

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

This new Center for Interactive Ray-Tracing & Photo-Realistic Visualization is developing technology for interactively visualizing 3D graphics based on large-scale models and datasets such as those in computer-aided design (CAD) and film animation that current graphics processing units (GPUs) cannot display in real time. The Center plans on improving and integrating their ray tracing programs for commercial use, which are better suited than current GPUs for large-scale applications.

TECHNOLOGY

Two primary software packages are the focus of the Center's commercialization efforts: Manta Interactive Ray-Tracing and Galileo High Quality Batch Rendering. Manta allows interactivity for large datasets with high image quality and Galileo creates high fidelity images such as those used in virtual prototypes or motion pictures.

Complex geometric models such as airplane designs are typically rendered on a screen by projecting each of the billions of 3D objects, a slow process. Ray tracing reverses the process by determining what is seen through each pixel on the screen, thereby dramatically increasing the speed of visualization. Essentially the technology "traces" each ray of light. By creating better algorithms, modern hardware can still be used to produce highly realistic rendering. The technology may be applied in CAD areas such as automobile and aircraft design as well as the computer animation industry.

PROGRESS

The Center generated interest in the Manta system after its demonstration at the 2005 SuperComputing conference in which a large aircraft model was presented as remote engineers collaborated on the model. In addition, the Manta software publication in an international conference was selected as one of the four best from the conference.

Currently, the Center is working on securing a relationship with an auto designer and will also pursue relationships with major film studios.

Imagine...

Visualize highly detailed 3D graphics on current hardware systems with the use of better algorithms.

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Microarray Technology

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Microarray Technology (CMT) is developing technology related to real-time microarrays. This technology includes a metallic microarray substrate in which the probe molecules are bound in nanocavities. The cavities serve as detection sites providing improved sensitivity and increased fluorescence yield. Target application areas include discovery and clinical diagnostics. The goals of the Center are to improve the speed and data quality over traditional microarray technologies and methodologies by increasing sensitivity and selectivity, and through the development of sophisticated analysis methods.

TECHNOLOGY

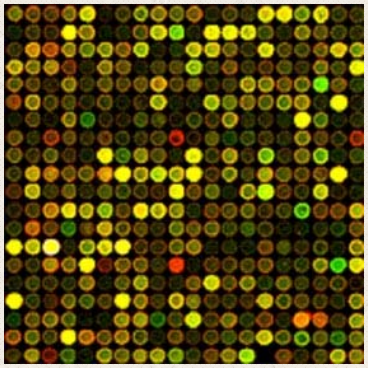
CMT is working on new methods and systems for acquiring real-time quantitative melt data by measuring temperature differences to signal when the melt occurs. They are also looking for new methods for nucleic acid amplification on a surface, nucleic acid detection, and methylation assessment. CMT is also developing a new photo-induced method to immobilize nucleic acids on solid supports. This is a method of photo-assistant attachment of DNA to microarray surfaces, allowing for precise addressability of different sequences.

PROGRESS

CMT has performed studies which have given insight into optimized nanocavity shape, size, and spacings. These results have been verified by experimental studies using single molecule detection methods. Using a real-time platform, CMT has preformed studies that show how single nucleotide polymorphisms interfere with nucleic acid surfaces and disrupt microarray analysis. One provisional patent has been filed based upon these studies.

CMT has also developed a number of microfluidic circuit designs and methods for rapid fabrication and rapid assembly. Also CMT has looked at various high temperature double-sided tape that would allow for a better seal. Along with this an apparatus for mounting has also been developed.

Imagine...



A more efficient way to detect gene regulation on a larger scale and with better technology.

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Miniature Unmanned Air Vehicles

BRIGHAM YOUNG UNIVERSITY

DEFINITION OF CENTER

The central focus of the Center for Miniature Unmanned Air Vehicles is the development of technologies to further the efficiency and capabilities of autonomous miniature air vehicles (AMAV's). Additional focus targets the commercialization of its novel software and technical devices.

TECHNOLOGY

The technologies developed through this Center enhance AMAV's used by military and commercial clients with Easy-to-use interfaces, vision controlled devices, chemical sensing MAV platform, unique vision processing algorithms, and on-board digital video storage.

PROGRESS

This Center has developed working prototypes for video stabilization, video mosaics, target tracking, target localization, and a state of the art precision landing/targeting prosecution which is all based on machine vision, essentially "auto-pilot". With Procerus Inc. and it's new companion spinout, Flying Sensors, licensing its technologies, two new Utah companies have emerged as leaders in the vision based control aspect of this field.

The Center has integrated over a half dozen very intricate systems such as the MAV/SAR system which resolves very specific geometric and dynamic constraints to allow solid communication between the auto-pilot and the unit. The Center's video sensor system has provided videography for 10 clients to date.

One of the most insightful developments is the innovation of "corridor-following methods". By using miniature optic-flow sensors small AMAV's can navigate through very complex terrains such as canyons and cities. These technology advancements to AMAV's will, hopefully, soon be seen in forest fire monitoring, surveillance, border patrol and an array of commercial applications.

Imagine...

A miniature plane that could be flown to monitor traffic, the border, or a forest fire without the need to leave the office.

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Modified Activated Carbons Technology

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Modified and Activated Carbons Technology (MAC) specializes in modifying existing activated carbon products to produce new, better quality environmental restoration solutions.

TECHNOLOGY

Using chemical and biological modification at a molecular level, MAC's unique processes enhances the sorption properties of activated carbon. MAC's technology results in activated carbon which has longer life, higher loading capacity, and faster sorption than traditional versions.

Activated carbons used in water treatment technologies are quicker, cheaper, and operate over a larger pH range when compared with alternative technologies such as osmosis methods or activated alumina.

These decontamination applications are crucial in many industries including mining, agriculture, and medicine.

PROGRESS

The Center's spin out company INOTEC has developed new coating materials for proteins that show promising contaminant removal applications.

An entirely new electrochemical wastewater treatment method is being prototyped. This would prove to be more reliable in arsenic removal.

INOTEC has exceeded its revenue goals of generating roughly $85k in revenue. The company has initiated discussions of licensing technology from the University of Utah and has completed one new patent.

The 2006-2007 was successful in reaching benchmarks such as marketing MAC products and negotiating licenses. The company will focus on marketing its novel As, Se, and NO3 removal technologies in several industries.

Imagine...

A material that could completely remove contaminants from water in just a couple of hours for a tenth of the cost that current treatments require.

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Nanosize Inorganic Material Powders

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

This Center synthesizes nanosize powders by a patented process, which then are incorporated into value added products such as coatings and membranes. The Center's novelty comes from the uniqueness and relatively low cost of its fabrication process.

TECHNOLOGY

While other nano powder producing faculties can become expensive and yield less product, the processes developed at this Centers uses a patented molecular decomposition process to save cost on both product costs and equipment.

PROGRESS

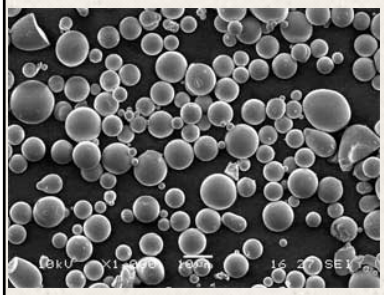
The Center's 2006-2007 accomplishments included a spin out business named Nano-Oxides Inc. which has an exclusive license with the University of Utah covering a number of its nanosize inorganic material powders.

It successfully obtained its 2006-2007 milestone of synthesizing Fe_2O_3, Fe_3O_4, metallic Fe, yttria-stabilized and unstabilized zirconia.

Progress now moves to fabrication of high temperature proton exchange fuel cells using these nano-size powders.

Nano-Oxides Inc. has already started marketing its powders via brochures as a direct customer contact. It's fully running website www.Nano-Oxides.com has already received orders through its purchasing applet and local companies have shown investment interest.

Imagine...



A way to make highly responsive sensors from inexpensive nanosize powders.

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Organic Electronics

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

COLAP (Center for Organic Lighting Applications) focuses on commercializing organic semiconductors in the form of polymers and oligomers that promise to significantly reduce manufacturing and operating costs, improve organic LED light quality, and open several new market applications for LED technology.

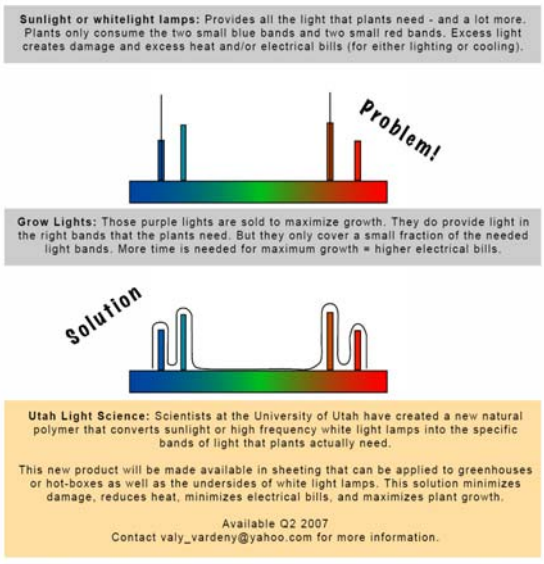
TECHNOLOGY

The COLAP laboratory is unique in fabrication, synthesizing its polymers with heavy atoms such as platinum. This enables high quality LED sources by efficiently shifting narrow LED emission bands. This technology allows COLAP to produce an array of colors from a simple two-colored LED source.

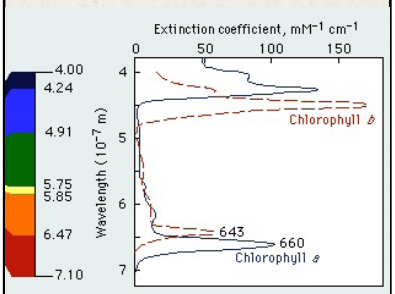
PROGRESS

COLAP has developed prototypes of its BROLED or Blue-Red LED. The expectation is that, as a manufactured product, the BROLED will provide lower cost products when compared to currently available inorganic LED solutions.

The few manufacturers which are in the market today only provide expensive products. COLAP's products serve as an inexpensive alternative in a market which has little economies of scale. Application of COLAP's solutions will benefit industries ranging from aerospace companies to crop farmers and hobbyists who need specific light frequencies for growing crops.



Imagine...



Significantly changing the framework of specialized lighting and opening the door to new markets.

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Therapeutic Biomaterials

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Therapeutic Biomaterials specializes in providing biomaterials for reparative medicine. The materials invented by the Center are also used to culture cells for toxicology models and veterinary care.

TECHNOLOGY

The Center has established three companies based on its synthetic extracellular matrix or sECM technology for research and application in toxicology, human device applications and veterinary sciences.

The Center for Therapeutic Biomaterials has an array of innovations which range from Chemical modifications of the sECM to provide specific products targeted to biomed research and human application, to 3-D cell cultures which have improved organ printing and centrifugal casting techniques, to tumor engineering based on research to provide further insights on side effects of cancer treatment and reparative sciences.

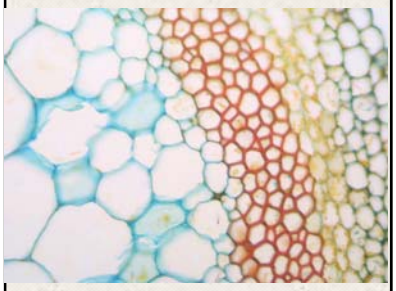
PROGRESS

The Center has progressed substantially in Bioprocessing and Biohybrid materials. New modified polymers were created and are being evaluated in cell culture applications and in animals for large protein production and tissue preservation. The Biohybrid research has led the Center to demonstrate liver regeneration in mice using human hepatocytes.

The significant milestone reached in the Center's Cancer drug screening branch was the furthering of personalized medicines and its approach to cancer chemotherapy. The technology uses a metastatic pancreatic cancer model to evaluate the efficiency and toxicity of new anti-cancer drugs.

With the spin-off of three companies Glycosan BioSystems, Inc., Sentrx Animal Care, Inc., and Carbylan BioSurgery, Inc., this Center is well on its way to commercialization of novel biomedical products.

Imagine...



A material that mimics natural tissue that can be used to treat chronic wounds and repair bone defects.

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Titanium Boride Surface Hardening

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Titanium Boride Surface Hardening focuses on three principal technologies utilizing boride for hardening titanium materials: 1. incorporation of titanium monoboride (TiB) crystals to harden the surfaces of titanium, 2. creation of nano-structured titanium boride bulk material and 3. functionally graded titanium boride materials for high performance components and devices.

TECHNOLOGY

The unique advantages of the TiB surface hardening technology include a stable surface layer, hardness and wear resistance coupled with electrical conductivity. The nano-structured bulk titanium boride and the functionally graded titanium boride are novel material technologies for innovative applications. The nano-structured titanium boride materials is a very high strength material that has higher reliability and lower cost of manufacturing compared to most conventional ceramics. Possible applications include armor and biomedical inserts.

PROGRESS

A major accomplishment in the report period is the successful manufacture of bearing balls out of nanostructured titanium boride material. The nanostructured TiB material was machined into blanks for ball manufacturing. An industrial partner manufactured Grade 25 balls out of these blanks based on the Center's guidelines. This is a major manufacturing accomplishment and provides strong proof for potential licensees.

The US patent application for titanium boride surface hardening technology has been approved and the patent has been issued. An option to license the technology has been signed by University of Utah Technology Commercialization Office with Ortho Development Corporation, Draper, UT, to develop prototypical biomedical devices in the orthopedic field of use that includes hip, knee and spine implants. Licensing of other applications of these technologies is still pending.

Imagine...

An inexpensive material with superior corrosion resistance that could be used in armor and medical devices.

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2006-2007 Business Team Recipients

Cellular Therapy

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Cellular Therapy and Regenerative Medicine aims at creating new technology and commercialization in the field of stem cell and progenitor cell application by serving as a source of high quality human stem cells and new innovative technology.

TECHNOLOGY

Cellular Therapy using stem cells and progenitor cells respectively is envisioned to be used to regenerate, replace, and even repair damages and injury to organs and tissue caused by aging and sickness. The Center helps researchers overcome barriers which prevent cellular therapy from becoming a mainstay of modern medicine by providing a unique research facility and a dependable source of cellular material. The Center works with identifying and maintaining stem cell sources with therapeutic potential, refining biopolymers, hydrogels and other scaffolds and matrices designed to support cellular activity.

The Center's existence is to serve as a superior bio-repository of stem cells and progenitor cells for research which will deliver biologics for diagnosis and therapy.

PROGRESS

This year, the Center focuses on commercialization of its cell product referred to as LineaCells. Ultimately, the Center will produce a unique high quality cell therapy product which can be licensed and/or sold in the public market. Behind this commercialization required the meeting of major milestones in harvest, manufacturing, processing, FDA approval for human use and storing of cellular materials. The Center has established the University Cord Blood Program and alliances with The University Department of OB/GYN and The Huntsman Cancer Institute to provide a source of high quality stem cells and an efficient interface for Bio-Sample tracking.

Imagine...

Harvesting umbilical cord blood stem cells and creating a repository of a variety of stem cells for researchers to access.

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Electronic Mathematics Education

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER

This Center has developed a number of mathematical applications and software for teaching environments. Research suggests mathematics content knowledge of teachers is among the most predictive factors in student achievement and current legislative mandates have focused on increasing teacher content knowledge. The Center has developed and disseminated a collection of innovative mathematics educational software products to provide new technologies to enable teachers and students to model and apply mathematics concepts in ways never before possible with text-based or physical manipulatives and tools.

TECHNOLOGY

Utah State University has developed and distributed a collection of innovative mathematics educational software applications compiled into what is called the National Library of Virtual Manipulatives (NLVM). The NLVM currently comprises over 100 Java applications used in teaching K-12 mathematics. The software is currently targeted to math educators. MATTI Math, a Utah-based company founded by members of eMath@USU, plans to license the NLVM materials created at Utah State University. This stand-alone version of the NLVM website offers additional benefits including a non-Internet based access to the NLVM applications, printing and saving application capabilities. NLVM is available in English, Spanish, and French, additional versions are in development.

PROGRESS

The Center has developed a multi-tiered marketing plan that will help them to effectively distribute an existing CD-based product to teachers and students nationwide. In addition, they have obtained contacts with international distributors to market their materials in foreign countries, especially where Spanish or French is the national language.

Since USU's initial launch of NLVM online in 2000, this product has become the most widely recognized and used online set of resources for K-12 mathematics in the world. In addition the website records over 4 million hits every school day.

Imagine...

Have teachers instruct difficult subjects to younger aged children more effectively and with better success.

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MIMO Communications System

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

Multiple-Input Multiple-Output communication systems (MIMO), focuses on detection algorithms and antenna designs that lead to feasible data transfer through multiple antennas while simplifying chip design. The developed algorithms offer low complexity and near optimal performance, and are adaptable to any wireless standard. The MIMO Center is located at the University of Utah wireless communications lab.

TECHNOLOGY

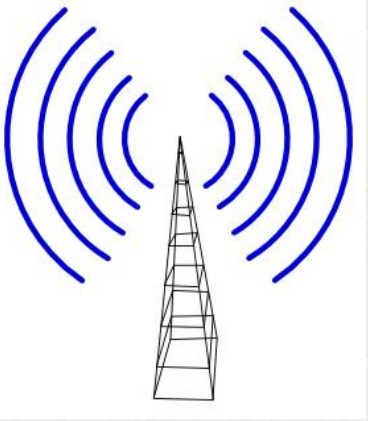
MIMO is the latest in wireless communications technology. The technology is able to increase transmission rates without any additional bandwidth and power. Currently multiple streams of data are transmitted concurrently through a number of antennas over the same frequency band. The MIMO Center has developed a system and method that reduces the complexity of the MIMO receiver. Current methods increase the receiver complexity exponentially with the number of antennas, while the MIMO method increases only linearly with the number of antennas. This is a dramatic reduction in complexity and a crucial element of bringing large number of antennas to bear in the MIMO world.

MIMO technology is ideal for WiFi and WiMax systems. This technology outperforms the existing low complexity detectors such as Bell Lab Space-Time (BLAST) detector, by as much as 10 to 20 dB. The new technology uses low transmission power, a wider range, and less battery power for wireless devices making it ideal for the current growth of wireless technology.

PROGRESS

The MIMO team is currently working on a solid business plan for a full Center in 2008. The current PI has been able to structure his contacts to create a successful team for the development of the technology. The team has been able to file 2 patents based on the developed algorithms.

Imagine...



Send and receive ten or a hundred times more data through a multiple antenna system that uses the same power as a conventional antenna.

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Solar Biofuels Technology

UTAH STATE UNIVERSITY

DEFINITION OF CENTER

This Center promotes achievement of domestic energy independence and rural economic development. They do this by efficiently utilizing abundant western sunshine and low valued land to produce ecologically viable and renewable biofuels such as methane, hydrogen and biodiesel.

TECHNOLOGY

The Center has developed a photo-bioreactor using light sheets and vertical algae films. This has been operational in the USU Engineering Lab Building since February 2007. The Center has also designed and constructed an anaerobic digester, which is scheduled for completion in September 2007.

Three new technologies are integrated to produce oil from microalgae in a unique bioreactor system using renewable resources. The design includes a two-axis tracking solar collector which concentrates visible sunlight and transports it via polymer fiber optics to provide the requisite solar energy throughout a bioreactor to grow microalgae on vertical membranes. An induced blanket reactor produces biogas from animal waste. Its byproducts are CO2 and a nutrient rich effluent sufficient to feed the microalgae which grow to create the biofuels. This enclosed system can yield a net 300-fold advantage of algae oil production per acre over soybean crops while consuming significantly less labor, capital equipment, water, pesticide, and fertilizer.

PROGRESS

The Center for Solar Biofuels Technology was leveraged into the USTAR Biofuels Initiative. The two business consultants were instrumental in helping the research team develop a strategic research plan that culminated in a proposal submitted to the USTAR Governing Authority that was funded beginning January 2007. Recent research goals are to design, optimize, and operate a total system that can readily be implemented in a broad variety of rural settings. Also the Center looks to demonstrate using the algal solar bioreactor, the production of biodiesel at market competitive prices by March 2009.

Imagine...

Reduce our dependence on foreign oil through biofuels that are produced from algae right here in the US.

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Universal Application System

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER

Universal Application System (UAS) was born out of the Early Intervention Research Institute at Utah State University. This Institute specializes in investigating and improving policies and practices that support the well-being of at-risk children as well as those with special needs and their families.

The Center is moving forward the commercialization of a web-based system that processes applications for multiple agencies in the government services industry. This technology is at the basis of "UtahClicks", currently an application deployed by the State of Utah, and which is also in production in Oregon and Indiana. Plans to adapt this software for other industries are underway.

TECHNOLOGY

The UAS was originally developed for the Utah Department of Health, who is also the Center's largest customer. In Utah, the UAS – branded Utah Clicks – processes over 1,000 application submissions a month, and 10% of the state's Medicaid applications are submitted through Utah Clicks. Since launching Utah Clicks, other organizations who have installed the UAS include the State of Indiana as well as the Oregon Health Services University.

The UAS streamlines the paperwork process for organizations. It asks a series of questions that allows an applicant to fill out multiple applications without actually being asked the same question more than once. UAS then consolidates the information into clear reports for each program that the applicant applies for. This saves time and helps speed up the application process.

PROGRESS

In 2006, Utah Clicks/Universal Application System received an Innovation Award by the Council of State Governments. The project team intends to expand the core UAS question and document processing technology and adapt it, as requested by current clients for the following applications: human resources; online applications/renewals, tax forms and business materials; emergency preparedness/service acceleration.

Imagine...

Consolidate the application process for multiple state programs into one easy to access online form.

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2006-2007 Pre-Proposal Business Team

Biomolecular Nanophotonics

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

Biomolecular Nanophotonics develops chemically engineered micro/nanosystems to dramatically improve the performance of Nucleic Acid Amplification and Detection. This is one of the key processes used in genetic engineering. The team expects that these improvements can radically improve diagnosis of gene disorders and development of gene therapies, including ribonucleic acid interference. This would allow for more efficient and quicker diagnosis and treatment of human diseases. The team includes chemical and electrical engineering professors, bioengineers and materials scientists collaborating with physicists, chemists and mechanical engineers.

TECHNOLOGY

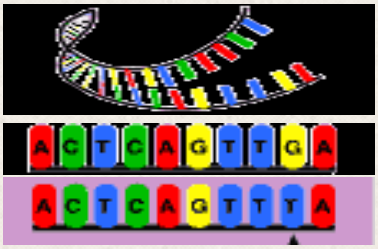
The Center for Nanophotonics in Biotechnology is based upon developing solutions for biomedical problems through the use of functional optical nanostructures and nanoparticles. The main project involves the use of metallic nanocavity structures as the basis for a new class of highly-sensitive and low-cost DNA hybridization arrays for rapid genetic analysis. The second project involves the use of functional metallic nanoparticles to increase detection sensitivity in real-time polymerase chain reaction and intracellular imaging. Both of these projects will result in unique and marketable solutions to a number of problems in molecular diagnostics, genomic analysis, and targeted therapies.

PROGRESS

Since its creation, the Center has been able to organize its business structure by identifying lead technologies and performing market analyses. The Center has also been able to increase pre-Center funding by several hundred thousand dollars. The Center has also completed two publications and 3 manuscripts.

Other milestones that the Center has been able to accomplish are; coupling electrons to visible light in a new way to destroy bacteria, and indentifying new ways to catalyze protein interactions faster and to detect viruses more sensitively using 3-D nano-antennae. The Center has also has been able to measure interaction rates of intact, infectious viruses.

Imagine...



Improving the detection and relative time of detection of specific genes with greater sensitivity and accuracy than current methods.

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Clean Coke Technology

COLLEGE OF EASTERN UTAH

DEFINITION OF CENTER

The Center for Clean Coke Technology at the College of Eastern Utah is working in conjunction with Combustion Resources to design, build, and operate a modular pilot-scale facility to manufacture high-grade carbon (coke) briquettes developed from coal fines and other low-quality mining by-products. The briquetted product can be used by metallurgical and specialty carbon-reductant fuel users.

TECHNOLOGY

The technology that this Center has focused on is the development of component processes that upgrade low quality, carbon-based feedstock to produce carbon-containing clean coke solid products for industrial use in Utah and surrounding states. This technology development has been based on a solid fundamental research foundation from the Advanced Combustion Engineering Research Center.

The technology is very specific to the upgrading of carbonaceous feedstocks by calcining and briquetting into clean coke products. Coke is used all over the world in a wide variety of applications and commercial uses. Current supplies of high quality coke are being consumed by developing nations, making a U.S.-based source of quality coke a valuable proposition. The Clean Coke technology allows for the utilization of the raw materials often left at mining sites.

PROGRESS

Work has resulted in a Patent-Pending Application for the technology. Over 38 different carbon-based feedstocks have been evaluated and over 30 qualified formulations for prospective industrial uses have been developed. The feedstocks have come from all across the United States.

The Center is working with Combustion Resources, Inc, an ACERC spin-off and Provo-based high-tech company, for the commercialization of this technology. The emphasis of the Center is to build and operate a pilot plant facility to validate the process and quality, further developing process control systems. Eventually the Center plans to build a Large Scale Facility which will open as many as 70-150 jobs in rural Utah.

Imagine...

Lower the cost of current coke fuels and create a cleaner more efficient use of current coke.

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High End Pharmaceutical and Biomedical Process Optimization

SOUTHERN UTAH UNIVERSITY

DEFINITION OF CENTER

The purpose this Center is to provide high end computational fluid dynamics (CFD) models to new and existing small companies who do not have this expertise or hardware available in-house. These models are essential for surmounting complex technical problems that may slow or even obstruct product development. Design optimization through high end CFD simulations also results in enhanced competitiveness in market share and reduced time for product development.

TECHNOLOGY

Southern Utah University has recently acquired a 128-processor high performance supercomputing facility to enable high fidelity computer modeling of topics of importance to regional industry. This computing facility enables the innovative optimization of multiphase chemical production processes and collaterally fuel efficient combustion through computational fluid dynamics models that will be of significant potential benefit to Utah's chemical industry.

The Center is partnering with Deseret Laboratories, based in Southern Utah to develop a 3 dimensional model of a fluidized bed reactor to help optimize their multiphase production processes using CFD. Part of their research is to determine if such modeling could be expanded from a single partner to broader applications. It is anticipated that commercial applications will focus on topics related to the manufacturing of pharmaceuticals and bio-medical devices that involve fluid flow and heat/mass transport in the body. A study involving a novel fluidized bed (gas-solid) granulator for pharmaceuticals is currently underway. Anticipated studies involve devices used in angioplasty, thrombolytic catheters and in vitro drug dispensing systems.

PROGRESS

The Centers focus on computational product development services for local bio-tech firm DxNA is progressing well and will complete its sponsored work before July 2008. Initial partner Deseret Labs worked closely with affiliate DxNA to smoothly transfer SUU Center of Excellence focus from the original granulator modeling project to DxNA pathogen analysis product and related development challenges.

Imagine...

Use the accuracy and speed of fluid flow and 3D modeling to help businesses in rural Utah enhance their competitiveness.

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High-Speed Machining

UTAH STATE UNIVERSITY

DEFINITION OF CENTER

This Center specializes in developing software applications which assist manufacturers in their use of high speed machinery. The application is based on a 15 year research effort by the Center's technical team to characterize various materials and the interaction of material characteristics with machine characteristics.

TECHNOLOGY

This Center's innovation relies on two novel technologies. The first is a U.S. Patent which is a method for modeling material behavior. It is a specific technique in material testing which is faster and more economical, allowing manufacturers to test for a suitable high strain rate material to match their applications.

The second is computer software the Center has named Vmachining. This development is capable of simulating the machining process and identify matching parameters among various materials to produce high-quality products and high yield, which is particularly valuable for expensive, high performance materials.

PROGRESS

The Center now moves towards commercialization hoping to soon to be seeing Vmachining in the manufacturing industry. The Center has also found an application in education resulting in a simple efficiency estimator for various training programs.

The Center's commercialization will potentially have positive affect in high speed machining companies, colleges and universities, computer aided design institutions, computer aided manufacturing, and software developers, all as stand-alone and internet based programs.

Imagine...

Model sophisticated high performance materials to improve machining performance.

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Intelligent Service Coordination

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER
This Center develops techniques and architectures for intelligent on-demand coordination of service delivering and service receiving entities in assorted networks. The Center consists of sensing and communication technology deployed in wired and wireless configurations such as personal computing, telephony, internet controlled appliances, process controllers, security, and defense and space systems. Some of the Center's technologies will make their way to market in the agricultural segment under the name MorpH2O.

TECHNOLOGY
Several technologies highlight this Center's abilities including Pearl ™ Shell, Cognitive Antenna, and Fermentation/ Bioreactor Control. The Center's primary focus is in Water and soil management in agriculture.

The Pearl™ Shell technology will provide the customer with the most advanced solutions to irrigation problems at a lower cost of entry. It will also enable them to save in operating costs, reduce the requirements for the scarce resource of water, and realize improved yields from their crops.

PROGRESS
The Center plans to work with MorpH2O to deliver its technology in conjunction with MorpH2O's current products and channels.

Imagine...

Manage irrigation and water flow more efficiently and at a lower cost than ever before.

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Management of Exploratory Workflows

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for the Management of Exploratory Workflows provides a user interface which tracks the history of exploratory computational functions such as data mining, simulations and visual computer constructions. By tracking the provenance of these activities, the Center helps improve the performance of all of these industries, allowing new practitioners to learn from experience talent, and experienced workers to perfectly repeat past successes. The Center plans to commercialize its technologies as high quality licensable software libraries and plug in systems, which it calls VisTrails.

TECHNOLOGY

By automatically filtering and manipulating provenance information of all the data involved in the exploratory process, VisTrails will allow users to avoid time consuming and tedious tasks involved in assembling complicated computational tasks and organizing data.

PROGRESS

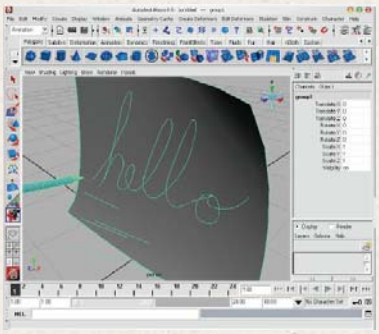
This Center has created a spin-off company VisTrails, Inc., based in Salt Lake City. VisTrails Inc. plans to move all innovations created and produced at the Center into the market.

The biggest step has been taken as VisTrails Inc. has reached its last points of progress towards completion of its software version 1.0 which has been debugged and tested extensively.

VisTrails had received an NSF SBIR phase-I grant and three new patents have been filed during the 06-07 fiscal year. Much publicity has come from its selection to be an NSF CISE highlight showcasing its innovations at Conferences and Workshops across the U.S.

In addition to ongoing Federal funding, VisTrails Inc. expects to generate substantial revenue with several data provenance plug-ins. The company is in early negotiations with the key design software providers in the industry.

Imagine...



Being able to track the creative process of a digital artist and use the software-based history to both replicate their work quickly and precisely and to train new artists.

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Nanopore Sensor Technologies

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Nanopore Sensor Technology is based on a discovery at the University of Utah called glass nanopore sensors (GNP). Commercializing of the technology would have great applications to DNA sequencing in biomedical and forensics, clinical chemistry, nano-particle analysis (viral diagnostics for homeland security), and pharmaceutical drug screening in blood analysis. The technology has been developed exclusively at University of Utah.

TECHNOLOGY

The Center has focused on DNA sequencing technology using glass nanopores as supports for ion channel recordings. They have greatly improved this technology by chemical means, resulting in the filing of a new provisional patent. The technology focuses on prototype devices for ion channels, particle counting, and ion selective electrode measurements which have all been developed.

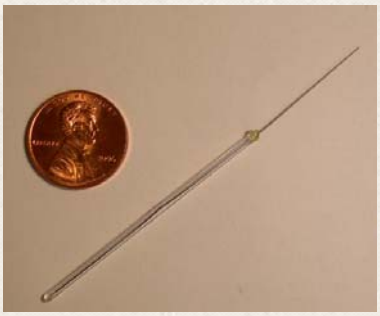
The Center has also developed methods of fabricating nanopores from diamond thin films, which allows scale up for mass production. A provisional patent was filed to protect this technology.

PROGRESS

The center has been able to acquire many different sources of funding and hopes to be able to form partnerships and research relationships with current corporate collaborators and establishing relationships with new companies. The center's plan focuses on our ability to produce high quality, reproducible, nanopore sensors for a variety of commercial applications.

GNP proposes the establishment of a family of products based on nanopore sensor technology. The manufacture and sale of nanopore sensors and instrumentation for collecting and analyzing data for academic and industrial uses is to be the first product from our center. The second product will be a nanoparticle analyzer for counting and shape analyses.

Imagine...



Detect and classify a virus or pathogen before it spreads on a large scale.

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Program Description

PROGRAM DESCRIPTION

BACKGROUND - "OUR JOB IS JOBS"

The Centers of Excellence Program is a grant program designed to stimulate Economic development by helping to transition technologies developed at Utah's colleges and universities out of the lab and into industry to create great jobs for Utah's citizens.

The program was created in 1986 by the Utah State Legislature, which recognized the challenges in the transition from the university lab to product. Up until 2006, the COE program directed its funding to university and college professors who were performing development work after the end of their research grants, which were primarily Federal grants. During the 2006-07 fiscal year, the COE program, under an evaluation program, funded two companion Licensees (spinouts) as well as the traditional university-based Centers of Excellence.

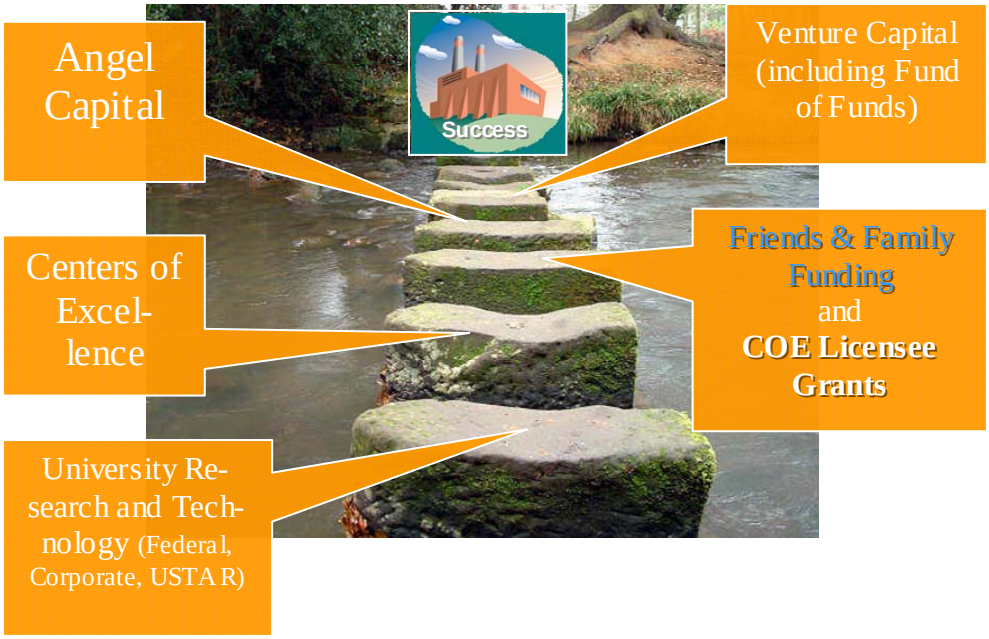
A challenge facing the vast majority of university developed technologies is that, when the Federal or other research funding runs out, what is left is a lump of technology, not a finished product. Because these technologies have been developed to solve high profile and high impact problems, they also have complex markets and large potential competitors. Traditional investors, such as venture and angel investors, see both high market risk and high technology risk in these technologies. Many in the industry call this the "valley of death".

The COE program funded the two companion spinouts, which were licensees of a current or former Center of Excellence, in order to evaluate whether it is possible for the COE program to help fill this funding gap and to encourage private sector investors to invest alongside the state's funding. These spinouts were required to provide 1:1 matching funds, one dollar in private sector non-loan funds, for each dollar of Centers of Excellence grant funding. Both companies had exceptional years and were able to attract investment capital as well as clients in their first year of operation. Both quickly began employing Utah residents in their companies and both continue to grow.

This evaluation process led the COE Director to work with the Utah State Legislature

to make changes to the Centers of Excellence statute to specify this process of making grants to Licensees, to help them cross this valley of death, mobilize private sector investment, and improve the transition of university developed technologies into industry. The Legislature passed House Bill 125, sponsored by Rep. Bradley Daw and sponsored in the Senate by Senator Sheldon Killpack, which specifies the program's involvement in granting funds to companies which are licensees of college or university developed technologies.

The COE program is a state grant program, and the state does not take or hold an equity position in the licensees, nor require any return of the grant, unless the recipient does not stay in the state for a minimum of 5 years. The state's return on investment comes when promising technologies become great products which create high quality jobs here in Utah.

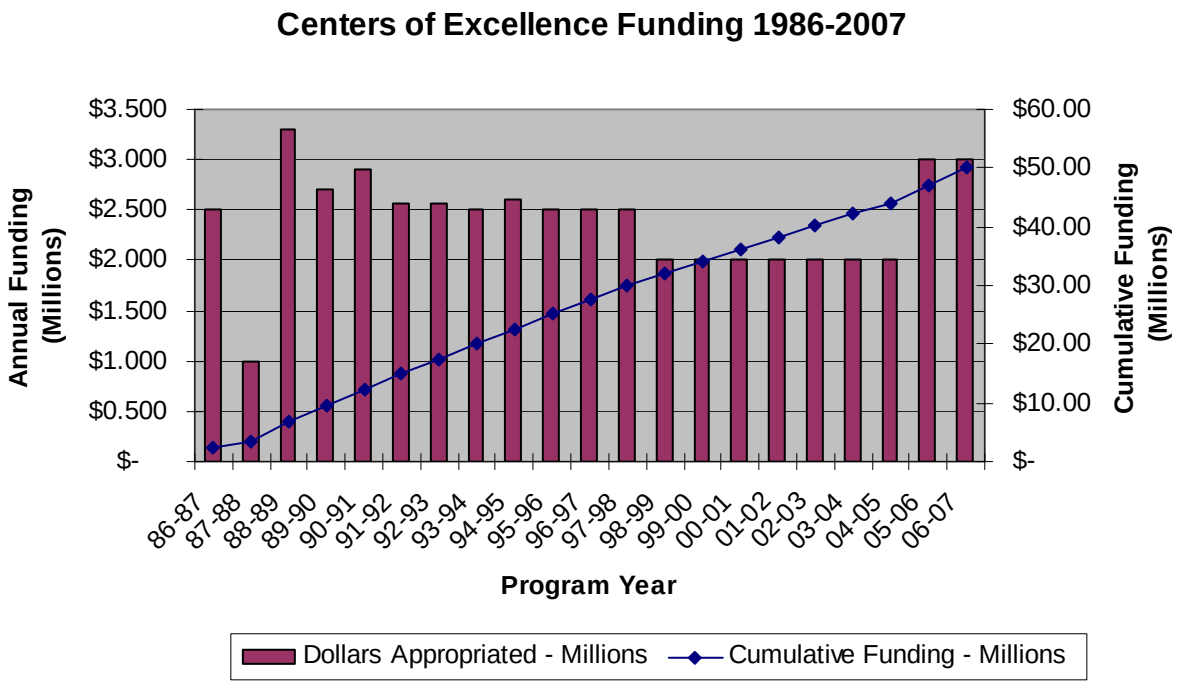


The Stepping Stones to Job - Creating Companies

This is a graphic that demonstrates the appropriate role of the COE Licensee grants. These are not intended to replace private capital, but to augment it and to fill the gap in the so-called "valley of death" between leaving the university and receiving significant private investment capital.

HISTORICAL SUCCESS AND FUNDING

Funding for the Centers of Excellence Program is granted on an annual basis by the Utah State Legislature and has varied over the past two-plus decades from year to year. Initial funding, granted in 1986 for the 1986-87 fiscal year was $2.5 million, increasing to $3.3 million to be granted during the 88-89 fiscal year and declining to between $2 and $2.5 million for much of the program's history. Funds budgeted during the 2005 legislative session for the 2005-06 fiscal year were increased from $2 million to $3 million, and during the 2006 Legislative session, COE funding was set to $3 million. However, during the 2007 Legislative session, funding for COE declined for the 2007-08 fiscal year to $2.75 million. The historical annual and cumulative totals, standing at just over $50 million at the end of the 2006-07 fiscal year, are shown in the graph below.



FUNDING ONGOING SUCCESS

The Centers of Excellence Program plays a unique role in helping to grow sophisticated technology based companies in our state. By filling funding gaps and providing experienced business team success, this program is crucial to effectively commercialize technology from these institutions. Two CEOs of Licensees are quoted below and provide insights into the benefits provided to our economy by the Centers of Excellence program.

MedQuest/Worldheart

"I recently sold the company that I co-founded (MedQuest Products Inc.) to a publicly-traded company, WorldHeart. My company was a spin-off of the Center for Artificial Hearts at the University of Utah, which is a Distinguished Center of Excellence and has obtained COE funding/support since 1988 for both Artificial Hearts ('88-'92) and Ventricular Assist Devices (1 yr in the mid-90s). This early support has played a role in our success so far: from Mar-June 2006 we had our first successful patient experience with our revolutionary VAD…"

-- Pratap Khanwilkar, PhD, MBA, VP: Rotary Systems & Business Development
Worldheart, Inc.

Flying Sensors

"The Centers of Excellence (COE) Program has been one of the key stepping stones to launching Flying Sensors... Most UAV work was focused on the military and this left a great opportunity to integrate existing technology into a new vertical market. …I have been an entrepreneur of many different startups. I see COE providing the essential bridge to motivate people to take the necessary risk to spin research technologies out into industry. I am proud to be associated with this program and lead the way for other future companies. "

--Bob Carter, CEO, Flying Sensors

CENTER SELECTION PROCESS

The purpose of the Centers of Excellence Program is to accelerate the commercialization of promising technologies that have strategic value for Utah. The end goal of the COE Program is to help drive economic development and job creation.

"Our Job is Jobs"

For 2006-07 selection year, the COE Program updated our selection process in order to be able to scale the Program while maintaining the high quality that has characterized the review process.

The COE Advisory Council is a group of experienced, seasoned technology industry executives, CEOs and CTOs, VPs and Senior Directors, who are interested in helping Utah and the Centers of Excellence Program. This year there were 31 reviewers, 18 of them new to the Program this year. Together the Advisory Council contributed over 800 hours of volunteer time to the selection process. After completing reviews of 35 proposing teams, the reviewers met in 3 sub-committees. These are:

- Materials / Manufacturing / Environmental / Energy
- Information Technology/Software / IT/Hardware / Communications / Aerospace/Defense / Electronics/Electrical Devices
- Life Sciences / Other

Each sub-committee met to review those Centers in their collective area of expertise, in a 5-6 hour meeting. Long-time Council members told me this was an excellent process and allowed them to go even more deeply into the review for each Center.

Each sub-committee reviewed their Centers and then ranked them. The top 3 in each group were identified as "strongly recommended for funding", some were identified as "not recommended for funding", and then there was the middle "should be considered for funding". With these three categories in hand, the full Council met on May 12th offsite for the final review and selection process.

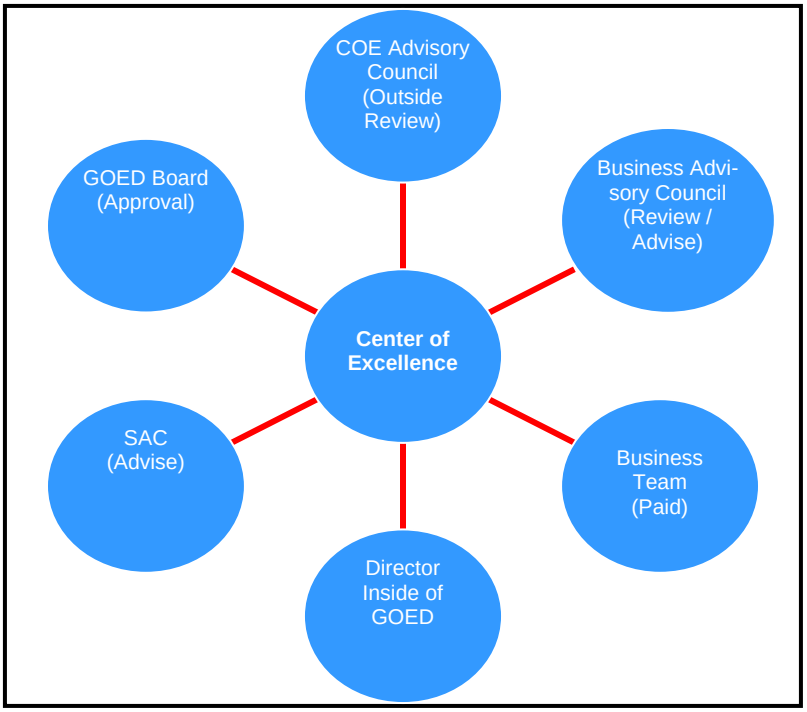
At this point, the COE Advisory Council met as a group to review the entire slate of potential Centers and make the final funding recommendations. The Council reviewed the "top 9" recommendations from the sub-committees, 3 from each group. This also included the 2 companion licensees which were selected for funding. Next the Council reviewed the recommendations for Business Teams and selected 3 of the 5 put forward by the sub-committees. Next, the Council reviewed, in detail, each of the remaining proposals that had been recommended for consideration by the sub-

committees. This is one of the most difficult decisions to make as the Council has to weigh many good choices and select among them.

Finally, the Council reviewed those which had not been recommended for funding. For one of these proposals, the reviewers requested that it be reconsidered for a business team, which was accepted by the Council. The others were not recommended for funding.

This process was widely approved by our experienced Advisory Council members as very effective and successful. It allowed reviewers to go deep on technical and market issues within the sub-committee, while still allowing the entire Council to provide the "give and take" of the collective perspective for all recommendations.

The bar was high for any Center to receive a recommendation for funding, and difficult decisions were made, including 6 existing Centers that did not receive renewal of their funding, generally because it was felt that additional funding would not significantly change the economic impact of the Center, or because it was felt that they had reached maturity as a Center and were ready to "be graduated".



The diagram above summarizes the COE community – the web of influencers committed to assisting in accomplishing the mission of the COEP. It is this rich resource of people that is so valuable to this Program.

Companion Licensees

During the 06-07 year, one of the questions being evaluated within the program is how to improve the program's support during the delicate phase of getting into the marketplace. In particular, when a spinout is the best vehicle for a Center-supported technology to go to market, how do we help launch spinouts successfully? Currently in Utah, we still have a very challenging "seed" and "very early stage" capital environment. The State has seen progress with the work of the Fund of Funds as well as a number of Angel investment groups springing up and organizing around the State. However, for a Utah technology company, we still estimate that raising outside funding will take approximately 1 year, whereas in other, larger, markets, it might only take 3-6 months. Centers spinouts are not immune to these market dynamics and yet the State has already spent hundreds of thousands of dollars and several years supporting the technology. To have this technology stall during fundraising does not accelerate job creation. And so a crucial question was posed this year:

CAN THE CENTERS OF EXCELLENCE PROGRAM HELP?

During the past year, one of the ideas that has emerged as a way that the COE Program could help would be to provide a specific grant to a "Companion Spinout" or Companion Licensee. After extensive conversations inside of GOED, with interested members of the legislature and various members of the university community, it seemed appropriate this year to evaluate whether such a "Spinout Grant" or "Licensee Grant" could be feasible under the Centers of Excellence Program.

Some questions that need to be answered, and that will be shared with the Legislature, include: Whether the current review process could accommodate such grants (Yes, quite readily) and whether this is an appropriate use of taxpayer funds (again, Yes). Of the 7 spinouts evaluated, the Council felt that, in two cases, it was a very appropriate use of funds, and that these modest grants, $60,000 and $75,000 respectively, could definitely significantly accelerate job creation in these spinouts.

New Concept for Next Year - Pre-Proposal Business Teams

After reviewing 35 proposals, it was felt by the COE Advisory that every New Center Proposal could have benefited from a business team in advance of the proposal process. Some seasoned business advice could have helped clarify the business strategy and well as the job creation potential. In addition, the best use of the volunteer time of our reviewers is in reviewing proposals that were well thought out and have a sound commercial strategy. A "Pre-Proposal Business Team" Concept, was proposed that would permit teams to apply for a limited amount of business team funding to help prepare for their COE proposal. For 2006-07, 7 teams were selected for $10,000 of business team support to assist them in developing their proposal for the 2007-08 fiscal year.

2006-2007 Selection Process

Some statistics on the applicants and awardees for funding during the 2006-07 fiscal year.

Total Number of Proposals to COEP for 2006-2007 **Total Number of REVIEWS for 06-07**	**38** **35**
Existing Centers Seeking Renewal Proposals for New Centers	**18** **17**
Proposals from BYU Funded from BYU Proposals from U of U Funded from U of U Proposals from USU Funded from USU	**4** **3** **22** **10** **9** **3**
Centers Funded	**16**
Existing Centers Renewed	**12**
New Centers Funded Companion Spinouts Funded	**4** **2**
Centers with Business Team Grants	**5**
Total of Centers Supported for 2006-07	**21**
Graduating Centers from 2005-2006 year Existing (05-06) Centers not renewed for 06-07	**2** **6**
Centers by Technology Area	
Materials	3
Manufacturing	1
Environmental	1
Energy	1
Total of MMEE Sub-Committee	**6**
IT/Software	1
IT/Hardware/Communications	2
Aerospace/Defense	1
Electronics/Electrical Devices	2
Total of IT Sub-Committee	**6**
Life Sciences	4
Total of Life Sciences/Other Sub-Committee	**4**
Total Recommended for Funding	**16**

Business Team Enhancement to Accelerate Time to Market
The first year of the COE Program's Business Team concept has been very successful. Last July, the Program issued an RFP (request for proposal) to identify seasoned entrepreneurs and technology executives to consult with the Centers and to help them in developing sound "go to market" strategies and to begin execution on those strategies.

In particular, where it is an appropriate strategy for a spinout to result from a Center, it is hoped that business team members may choose to participate in the spinout, or to help identify teams of high quality individuals who can participate in the startup process. Seasoned entrepreneurs and those who have already been the startup route are most likely able to foster this process.

Of the spinouts this year, 3 were in process at the beginning of this fiscal year, and of the 4 that are currently spinning out, 2 are being led by business team members recruited through the RFP process and one is being led by a seasoned entrepreneur who is being significantly helped by the business team member recruited through the RFP process. This year the Program budgeted, on average, $25,000 per Center and this additional funding (compared with roughly $8000 in previous years) has had a very positive impact on the ability of the business teams to create and execute on actionable business strategies.

Current Commercialization Status of 2005-06 Centers (18 Total)	**Number**
Spinouts (established)	3
Spinout (in process)	4

During last year's approval process, the Program listed the following goals of the Centers of Excellence Program for 2005-2006:

> Successful spinout of 3 current "in process" companies with seasoned management
> Additional 10 spinouts or licenses (to Utah companies) by end of fiscal year.

The new Business Team program was able to strongly assist 2 of the emerging startups (the 3rd was for a graduated Center that was not eligible for a business team, although the Director worked with the team to provide assistance). This has been very successful for these emerging companies. In addition, it is exciting to note that, although we did not reach the lofty goal of 10 spinouts, we are on track for at least 7 this year, with a few more which should emerge in the near future and the Business Team program has significantly assisted these Centers and spinouts.

FUNDING SUMMARY

For the 2006-07 fiscal year, of the funds allocated by the legislature, 12 existing Centers and 4 new Centers received Direct Center Funding, which went to make technical progress in moving technology from the lab into products that can go to market. These Centers also received a Business Team. In addition, two spinouts were recommended to receive an additional combined $135,000 in funding (but Centers with a licensee grant will NOT receive a business team). Five (5) Proposing teams were selected to be assigned a Business Team to help further refine the "go to market" strategies for their technologies. Therefore, there will be 19 business teams this year (16 Centers + 5 Business Team Grants– 2 Companion Spinouts) at an average budget of 25,000 each, with one Center recommended to receive $40k in Business Team funding, for a total of $490,000. The remaining funds, just under $75,000 went to fund the "pre-proposal business teams" which were designed to feed into the selection process for the 07-08 fiscal year.

Funds Allocated by the Legislature	$3,000,000
Direct Center Funding (Technical Funding to Centers)	$2,300,069
Companion Licensee (Spinout) Funding	$135,000
Business Team Funding*	$490,000
Funding for 2007-08 pre-proposal Business Teams	$74,931
* Average estimated funding of approx. $25,000 per Center customized based on Center needs. Paid and Managed by COEP	

COMMERCIALIZATION PROCESS

During the 2006-07 Fiscal year, the COE Business Team program continued, with a wealth of experienced executives and entrepreneurs consulting for the various Centers and assisting them in establishing management teams, developing business plans and navigating the startup process. The depth of expertise available to our Centers of Excellence was of significant value, as many COE professors had lamented in the past that they just didn't know the kind of people on the business side who had the experience that they needed. In particular the CEOs of both Flying Sensors and Glycosan had come to the Centers of Excellence Program as business team members, and, as envisioned, had partnered with the professors to launch successful spinout companies. This program will continue during the 2007-08 program.

2006-2007 Financial Summary

The Financial Summary is a summary of the information provided by each Center in their annual report to the program and the funding summary is based on the funds granted during the fiscal year. For reference, “Total Funding” means COE funding since starting with the program, “Patents Pend. 06-07” means patents newly filed during the fiscal year, “New Patents (Issued)” refers to those issued during the fiscal year and “Spin-Offs/ Licensees” refers to companies which have been formed to “spin-off” technology from the Center while “Licensees” refers to companies which already existed which have licensed the technology.

University	Center	06-07 Funding	Total Funding	06-07 Matching	Patents Pend. 06-07	New Patents (Issued)	Spin-Offs/ Licensees
BYU	Acoustics Research	25,000	140,000	312,368	4	0	2
BYU	Advanced Communications Technology	150,000	380,203	557,796	1	0	0
USU	Advanced Imaging LADAR	180,000	593,724	1,300,000	1	1	2
USU	Advanced Thermal Management Technologies	150,392	150,392	309,655	3	0	0
UU	Biomedical Microfluidics	200,000	455,000	415,700	2	0	1
USU	Control of Flow in Manufacturing	155,308	155,308	476,344	2	1	1
BYU	Companion Licensee — Flying Sensors	75,000	75,000	250,000	0	0	0
UU	Cemented Tungsten Carbide	125,000	125,000	336,803	2	0	0
UU	Companion Licensee — Glyco-san BioSystems	60,000	60,000	316,945	0	0	0
UU	Homogeneous DNA Analysis	150,000	620,000	775,000	2	3	1
UU	Interactive Ray-Tracing & Photo-Realistic Visualization	145,000	288,700	1,322,695	2	0	1
UU	Microarray Technology	100,000	200,000	256,975	4	0	1
BYU	Miniature Unmanned Air Vehicles	166,385	406,385	729,930	1	0	2
UU	Modified Activated Carbons Technology	140,000	280,000	444,000	1	1	0
UU	Nanosize Inorganic Material Powders	152,984	349,684	650,000	1	1	1
UU	Organic Electronics	150,000	150,000	320,000	0	0	0
UU	Therapeutic Biomaterials	210,000	500,000	892,107	2	0	0
UU	Titanium Boride Surface Hardening	100,000	372,000	304,000	1	1	0

University	Business Team Recipients	06-07 Funding	Total Funding	06-07 Matching	Patents Pend. 06-07	New Patents (Issued)	Spin-Offs/ Licensees
UU	Cellular Therapy	Business team N/A	N/A	N/A	0	0	0
USU	Electronic Mathematics Education	Business team N/A	N/A	N/A	0	0	1
UU	MIMO Communications Systems	Business team N/A	N/A	N/A	2	0	0
USU	Solar Biofuels Technology	Business team N/A	N/A	N/A	2	0	0
USU	Universal Application System	Business team N/A	N/A	N/A	0	0	1
University	**Pre-Proposal Business Team Recipients**	**06-07 Funding**	**Total Funding**	**06-07 Matching**	**Patents Pend. 06-07**	**New Patents (Issued)**	**Spin-Offs/ Licensees**
UU	Bimolecular Nanophotonics	Business team N/A	N/A	N/A	2	0	0
CEU	Clean Coke Technology	Business team N/A	N/A	N/A	0	0	0
SUU	High End Pharmaceutical and Biomedical Process Optimization	Business team N/A	N/A	N/A	0	0	0
USU	High-Speed Machining	Business team N/A	N/A	N/A	0	1	0
USU	Intelligent Service Coordination	Business team N/A	N/A	N/A	1	0	1
UU	Management of Exploratory Workflows	Business team N/A	N/A	N/A	3	0	1
UU	Nanopore Sensor Technologies	Business team N/A	N/A	N/A	4	0	0

2007-2008 Funded Centers

Funding Recipients for the 2007-08 Centers of Excellence Program

Funding Recipients which are Licensees (Companies) of Center Supported, University Developed Technologies

Licensee / Center (University)	Years Funded to Date	Award Amount

Dynamic Screening Solutions (Formerly Universal Application System) (USU)
NEW **$150,000**

Commercialization of a web-based system that processes applications for multiple agencies in the government services industry. This technology is at the basis of "UtahClicks" and is also in production in Oregon and Indiana. Plans to adapt this software for other industries are underway.

Flying Sensors (Licensee of Miniature Unmanned Air Vehicles) (BYU)
1 **$125,000**

Developing commercial (non-military) applications for miniature unmanned air vehicles (UAVs) including Real Estate, Insurance Industry, EPA - Multi-Source Air Quality Sampling, Random Testing, Pipeline/Remote Facility Surveillance and Emergency Response/Fire Monitoring – Forest & Commercial.

Glycosan BioSystems, Inc. (Licensee of Therapeutic Biomaterials) (U/U)
1 **$75,000**

Commercializing the compounds from Therapeutic Biomaterials for 3-D Cell Culture, Tissue Engineering, Drug Toxicity Testing, & Skin Care.

Larada Sciences (Licensee of Alternate Strategies of Parasite Removal) (U/U)
NEW **$170,000**

Preparing to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers.

Philotek (Licensee of Microarray Technology) (U/U) **NEW** **$100,000**

Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Navigen, Inc. (Licensee of Center For Vascular Biotherapeutics) (U/U)
NEW **$190,000**

Proof of concept in animal models of stabilizing vasculature in macular degeneration and acute lung injury based on a new signaling pathway that regulates the balance between vascular regeneration and stabilization.

Licensee / Center (University) **Years Funded to Date** **Award Amount** **(cont.)**

Nano-Oxides (Licensee of Nanosize Inorganic Material Powders By Molecular Decomposition) (UU) **NEW** **$150,000**

Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

State of RT (Licensee of Interactive Ray-Tracing & Photo-Realistic Visualization) (U/U) **NEW** **$175,000**

Commercializing a software module to deliver real time ray tracing to existing graphics modeling tools and to deliver next generation game development tools based on ray tracing to the market.

VisualShare (Licensee of Center of Excellence for Electronic Medical Education (CEME) (U/U) **NEW** **$150,000**

Commercializing multi-user real-time image conferencing using the Software as a Service (SaaS) Model. This technology provides the remote convergence of images & text for distributed user populations and permits knowledge capture for legal and compliance purposes. First application is for child abuse situations in rural/remote areas to involve specialists in diagnosis of consequences.

University Centers of Excellence

Center (University) **Years Funded to Date** **Award Amount**

Center for Cellular Therapy and Regenerative Medicine (UU) **NEW** **$100,000**

Capabilities to build a "bank" for stem cells derived from umbilical cord blood (so-called "cord blood") which can be used for many clinical applications in regenerative medicine and tissue engineering. Providing GMP and regulatory support for processing, development and commercialization of cord-derived stem cells, biologics and combinational products.

Center for Clean Coke Technology (CEU) **NEW** **$125,000**

This team, led by the College of Eastern Utah's Western Energy Training Center, aims to commercialize research to create Clean Coke from coke fines and waste products and to develop process control expertise by developing a pilot scale facility. This Center also intends to use the pilot plant and related expertise to enhance the training and expertise of employees throughout the area served by CEU.

Center for Control of Flows in Manufacturing (USU) **1** **$ 175,182**

Applying Computational Fluid Dynamics to improve manufacturing processes including particle sorting and Electrical Discharge Machining (EDM). This Center was assigned a business team in 2005-06.

Center (University) **Years Funded to Date** **Award Amount** **(cont.)**

Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials (U/U) **1** **$125,000**
Developing advanced composite materials with predictable wear and failure characteristics designed for demanding applications such as mining, drilling, and grinding.

Center for High End Pharmaceutical and Biomedical Process Optimization (SUU)
NEW **$ 59,760**
Southern Utah University has established a high performance supercomputing facility to enable high fidelity computer modeling of topics of importance to regional industry. The goal of this Center is to partner with a regional pharmaceutical business to develop a 3-dimensional model of a fluidized bed reactor to help optimize their multiphase production processes using computational fluid dynamics. Obviously of interest is to determine if such modeling could be expanded from a single partner to broader applications.

Center for Hybrid & Adaptive Multimedia Processors (CHAMP) (USU)
NEW **$50,000**
Commercializing tools and software systems to accelerate time to market of new features for multimedia consumer devices.

Center for Microarray Technology (U/U) **2** **$50,000**
Companion Licensee Philotek also Funded
Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Center for Miniature Unmanned Air Vehicles (BYU) **3** **$75,000**
Companion Licensee Flying Sensors also Funded
Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies. An autopilot design has been licensed to Procerus, Inc. in Utah.

Center for Nanopore Sensor Technologies (UU) **NEW** **$125,000**
A nanopore sensor relies on molecule and particle transport through a single conical-shaped pore that is synthesized in glass. The glass surfaces of the pore interior and exterior can be modified by numerous chemical methods to impart molecular selectivity and high sensitivity in designing sensors for different applications. These tiny sensors can detect extremely small numbers of molecules of specific compounds which is extremely useful in such applications as DNA sequencing, drug screening, nanoparticle counting and sizing.

Center for Therapeutic Biomaterials (U/U) **3** **$70,000**
Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs. Three companies, 1 in California (Carbylan) and 2 in Utah (Sentrx Animal Care and Glycosan BioSystems) have been spun out of the Center to date.

Center (University)	Years Funded to Date	Award Amount (cont.)
Center for Thermal Management Technologies (USU)	**1**	**$154,376**

Technologies for extremely high performance thermal management in the context of physical and vibration isolation, in collaboration with Utah State University's Space Dynamics Lab.

Business Team Centers (Assigned a Business Team Only) for 2007-08

A Business Team is an investment of approximately $25k each unless otherwise noted

Biomolecular Nanophotonics (U/U)

Develops chemically engineered micro/nanosystems to dramatically improve the performance of Nucleic Acid Amplification and Detection, one of the key processes used in genetic engineering. The team expects that these improvements can radically improve diagnosis of gene disorders and development of gene therapies, including ribonucleic acid interference (RNAi).

Center for Management of Provenance & Exploratory Workflows (U/U) ($50k)

VisTrails is a new "workflow management system" that provides support for data exploration and visualization for tasks that have very little repetition. Some example tasks that are suitable for this new system include: calibrating simulations for hedge funds, for locating oil wells and radiation treatment planning.

MIMO Communication System (U/U)

New algorithms for signal detection and reception that significantly improve the performance and throughput of MIMO (Multiple-Input Multiple-Output) wireless communication systems. The developed algorithms offer low complexity and near optimal performance, and are adaptable to any standard.

Center for Nanomedicine Applications in Cancer (U/U)

The Center has designed and developed novel biomaterials with precisely defined molecular architecture for targeted delivery of image probes and therapeutics. These novel nanomaterials based imaging agents and therapeutics have many advantages as compared to other available drug delivery technologies because of their well-defined structure.

Center for The Production of Nanometer Sized Metals, Alloys, Metal Oxides & Mixed-Metal Oxide Powders (BYU)

A unique solid-state method of synthesizing metal oxide and metal nanoparticles has been discovered which is simple, requires comparatively little energy and is easily scalable for production. It produces products up to 99.9999% pure, as small as 1 nm, with size distributions of typically ±10% and can be used for particle or coating production.

Center for Resveratrol Technology (BYU)

Resveratrol is a compound that occurs in red wine, leading to the "French Paradox" where moderate alcohol consumption has been consistently associated with 20-30% reductions in coronary heart disease. The compound is well-absorbed in humans when taken orally, but it is not very stable. The Center proposes to commercialize stable analogs of resveratrol in order to commercialize novel applications such as topical (skin and hair), nutritional supplements and pharmaceutical products.

Business Team Centers (Assigned a Business Team Only) for 2007-08 (Cont.)

Center for Water Treatment Technology (U/U) (formerly Tero Technologies)
Developing robust, low cost ways to remove common pollutants such as nitrates from lagoon wastewater treatment systems. The core prototype product, the "poo-gloo" is simple to build, easy to install and maintain and very effective. This may dramatically enhance the effectiveness of lagoon systems around the world.

Web IDEA*SIS (USU)
The web-based solution will assist educators in tracking, serving, organizing, and evaluating children with disabilities while being compliant with state and federal regulations. The system will include: WYSIWYG web pages; content wizards; legal compliance review tools; customized organizational, procedural, and student progress reports; tools for tracking and allocating resources; communication tools for parents and educators; and tools for technical and content support.

Graduating Centers June 30, 2007 (Completed)

Advanced Imaging LADAR (USU) **4**
Commercializing land-based and airborne high-resolution, laser-based 3D color-imaging platforms for both military and civilian use. One license to RappidMapper, Inc. (now Intelisum), a Utah company.

Homogeneous DNA Analysis (U/U) **4**
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office. One application licensed to Idaho Technologies, Inc. (a Utah company).

Titanium Boride Surface Hardening (U/U) **4**
Commercializing harder, longer-lived components and devices – ranging from armor to bearings and orthopedic implants - for the military, biomedical and industrial markets.

Legislation Governing 2006-07 Effective July 1, 2006

Centers of Excellence Legislation Passed in 2006 Session-Effective July 1, 2006

During the 2006 Legislative session, the Legislature passed a bill known as SB 112, sponsored by Senator Thomas V. Hatch and co-sponsored in the House by Representative Peggy Wallace. This bill was designed to enhance the strength and value of the Centers of Excellence Program by demonstrating the accountability of the program and its participants to the Legislature and to the taxpayers of Utah and by making the Centers of Excellence Program more accessible to universities which do not grant doctoral degrees (referred to as "non-doctoral granting institutions").

This legislation has two main sections. The first section modifies the matching funds requirements so that Utah institutions that do not issue doctoral degrees, the "non-doctoral granting schools" would no longer have to meet the 2:1 matching funds requirement. This was intended to enable schools that did not have doctoral programs, and therefore were less frequently involved in ongoing Federal research, to have the opportunity to participate in the Centers of Excellence Program.

Instead of the 2:1 matching funds requirement, non-doctoral schools are required, through policy (see section on new Policies) to meet a 1:1 matching funds requirement. This change was greeted with great enthusiasm by the relevant schools and was supported by the doctoral granting institutions as well.

The concept of greater accountability to the Legislature in the COE program was added in the second section of the bill by introducing a concept called the "return of grant". This provision asks the universities to track licensees of those technologies which have been supported by Centers of Excellence Program funds as part of the licensing process. If such licensees are either out of state firms or leave the state within five years of the issuance of the License, the statute asks that the affected college or university will share back with the Centers of Excellence Program a portion of the proceeds of the license.

This proposal was presented to the Senate Workforce Services and Community and Economic Development Committee, chaired by Senator Carlene Walker, and passed out of committee with 5 Yea votes, 0 Nay Votes, and 2 absences. The bill was subsequently presented to the full Senate, and passed the Senate with 24 Yeas, 0 Nays with 5 Absent. From the Senate, the bill went to the House Workforce Services and Community and Economic Development Committee, where it was unanimously supported by a vote of 7 yea votes, 0 nay votes and no absences. The bill then went to the House of Representatives and passed with 69 yea votes, 0 nay votes and 6 absences.

More details about how this is administered were developed by the Governor's Office of Economic Development as part of the program's policies and procedures.

S.B. 112 Enrolled

CENTERS OF EXCELLENCE AMENDMENTS

2006 GENERAL SESSION

STATE OF UTAH

Chief Sponsor: Thomas V. Hatch

House Sponsor: Peggy Wallace

LONG TITLE

General Description:

This bill modifies provisions related to the Centers of Excellence Act.

Highlighted Provisions:

This bill:

. recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis for colleges and universities in the state that offer any doctoral degrees;

. requires the Governor's Office of Economic Development to develop a process to determine whether to require the return of economic development Centers of Excellence grant moneys from a higher education institution if the technology that is developed from grant proceeds is licensed to a licensee that does not maintain a manufacturing or service location in the state from which the technology is exploited or transfers the manufacturing or service location out of state within a five-year period after the issuance of the license; and

. makes certain technical changes.

Monies Appropriated in this Bill:

None

Other Special Clauses:

None

Utah Code Sections Affected:

AMENDS:

63-38f-701, as renumbered and amended by Chapter 148, Laws of Utah 2005

63-38f-704, as renumbered and amended by Chapter 148, Laws of Utah 2005

Be it enacted by the Legislature of the state of Utah:

Section 1. Section **63-38f-701** is amended to read:

63-38f-701. Purpose.

(1) (a) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes.

(b) These generally come from strong research colleges and universities.

(c) Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development.

(d) Most states are enhancing their research base by direct funding, usually on a matching basis.

(e) The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas.

(f) The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.

(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis *for colleges and universities in the state that offer any doctoral degrees*.

(3) (a) The Legislature recommends that the funds be allocated on a competitive basis to the various colleges and universities in the state.

(b) The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.

Section 2. Section **63-38f-704** is amended to read:

63-38f-704. Administration -- Grants.

(1) [This part shall be administered by the] *The* Governor's Office of Economic Development *shall administer this part*.

(2) *(a)* The office may award grants to the various colleges and universities in the state for the purposes of this part.

(b) The governor's Office of Economic Development shall develop a process to determine whether a college or university that receives a grant under this part must return the grant proceeds if the technology that is developed with the grant proceeds is licensed to a licensee that:

(i) does not maintain a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology; or

(ii) initially maintains a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology, but within five years after issuance of the license the licensee or sublicensee transfers the manufacturing or service location for the technology to a location out of the state.

(3) (a) Funding allocations shall be made by the office with the advice of the State Advisory Council for Science and Technology and the board.

(b) Each proposal shall receive the best available outside review.

(4) (a) In considering each proposal, the office shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development.

(b) Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.

(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the office in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

Policies relating to SB 112 Implemented December, 2006

Policies and Procedures Update for the Centers of Excellence Program
Addressing Changes to Statute from Senate Bill 112
during the 2006 Legislative Session

The 2006 legislature passed a bill updating the Centers of Excellence Statute (SB 112) which called for GOED (The Governor's Office of Economic Development) to develop policies and procedures to determine whether a return of grant would be required under certain circumstances. This document excerpts the relevant statutory language and the policies and procedures called for.

Background and Statute Excerpts

Below is cited the section of the statute most impacted by the 2006 SB 112.

63-38f-704.

58 63-38f-704. Administration -- Grants.

59 (1) The Governor's Office of Economic

60 Development shall administer this part.

61 (2) (a) The office may award grants to the various colleges and universities in the state

62 for the purposes of this part.

63 (b) The governor's Office of Economic Development shall develop a process to

64 determine whether a college or university that receives a grant under this part must return the

65 grant proceeds if the technology that is developed with the grant proceeds is licensed to a

66 licensee that:

67 (i) does not maintain a manufacturing or service location in the state from which the

68 licensee or a sublicensee exploits the technology; or

69 (ii) initially maintains a manufacturing or service location in the state from which the

70 licensee or a sublicensee exploits the technology, but within five years after issuance of the

71 license the licensee or sublicensee transfers the manufacturing or service location for the

72 technology to a location out of the state.

The process referred to in 63-38f-704 part 2(b), outlined in this document, will apply to all colleges and universities that receive a grant for the commercialization of a specific technology through the Centers of Excellence program **and** that receive proceeds from the licensing of that same technology supported by the Centers of Excellence program. Proceeds include royalties, proceeds from equity participation in the spinout/licensee, milestone payments and other proceeds as a result of the license.

Should a company or business receive a direct grant to advance the commercialization of a technology developed at a Utah college or university, the same policies of pro-rata payback based on time in the state will apply, but there will be no other deductions. The company will be solely responsible for the grant funds they received directly.

The intent of the legislature in passing SB 112 in the 2006 legislative session and thereby authorizing these policies and procedures is to reinforce the Centers of Excellence's objective to strengthen Utah's economy. These changes intend to accomplish this by recycling back into economic development those revenues that stem from licenses of technologies supported by the Centers of Excellence program and, by extension, the taxpayer, when, for whatever reason, those licenses do not result in meaningful job creation and economic development in the state of Utah.

It is important to note that the "return of grant" from Universities is not intended to come directly from the University's existing budget or resources, nor directly from the licensee (company), nor to interfere in business decisions of either the university or licensee, but will be paid by the licensing university out of licensing proceeds received from the licensee over the course of the term of the license. It is also important to note that the intention is for the State to receive a share of these proceeds over time, after certain expenses incurred by the university are reimbursed.

Policies and Procedures for the Centers of Excellence Program when a COE supported technology is licensed or moved out of state and a "return of grant" is to be evaluated.

Definitions

1. Business Team and Business Team Member Consultants– Seasoned business executives and entrepreneurs who are recruited by the Centers of Excellence program on a program-wide basis to provide insight and business assistance to a Center under direct contract from the COE program.
2. Center (or Center of Excellence) – a university team including a Center Director (the "P.I." or "Principal Investigator") and other researchers and students as appropriate, which has applied to the state Centers of Excellence program and has received outside funding, such as corporate or Federal funding, for specific research deemed to be of commercial value and which is undergoing the transition from university research towards commercially viable product with the support of the Centers of Excellence program.
3. COE Contract – The contract that is enacted between the Centers of Excellence program of Utah's Governor's office of Economic Development and the university for the purpose of advancing the technical maturity of the technology proposed by a Center of Excellence

team.

4. COE Review Committee – A committee consisting of a quorum of the non-University affiliated members of the State Advisory Council on Science and Technology (SAC) and a quorum of the non-University affiliated members of the GOED Board convened for the purpose of reviewing any questions or concerns related to these policies and procedures.
5. Certain Direct Costs of the Universities – Costs which are specific to the commercialization Center in question and which include: Patent development and prosecution costs for the Center in question – but will not include costs of the TCO itself, but will include payments to outside law firms to conduct this work and other direct investments into developing the technology in question such as the direct cash costs, but not in-kind expenses, of a VIP or Technology commercialization grant or similar program.
6. Exclusive license – a License to a university-developed technology that IS exclusive to one licensee and is NOT available other potential licensees.
7. GOED Board – Governor's Office of Economic Development Board – a group of appointed volunteer Utah citizens who advise the Governor and GOED on economic development issues.
8. Grant – funds allocated to a Center, under a contract with the university that houses that Center, to mature technology invented in the Center and help it prepare to go to market.
9. Licensing Proceeds – the proceeds that are paid to the university as a result of the license and which includes, but is not limited to: royalties and other ongoing licensing fees, milestone fees paid by the licensee, value of any equity stake in the licensee that is held by the university as a result of the license and related licensing activities.
10. Manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology – This includes any facility, office or group of employees (example, telecommuters) in the state with the objective of developing, using, selling or otherwise "exploiting" the technology. The intent of this description is that the technology is generating a substantial portion of the overall jobs within Utah. A company that is acquired but maintains a substantive manufacturing or service location in Utah will not be deemed to have moved out of state.
11. NON-exclusive license – a license to a university-developed technology that is not exclusive to one licensee and is also available on fair terms to other potential licensees.
12. State Advisory Council on Science and Technology (SAC) – A group of appointed volunteer citizens who advise the Governor and the State Science Advisor on matters of science and technology in the State of Utah.

Return of Grant Conditions if the Technology is licensed out of state OR if the licensee is moving the technology and jobs out of state less than 5 years from the license issuance.

A. No Grant Return is Required - Conditions under which NO return of the grant is required even if the technology is moved out of state in less than 5 years.

- The licensee that is located out of state or is moving out of state has a NON-exclusive license to the technologies from the Center because a Utah-based company could have the opportunity to license the technology.
- The Technology from the Center was licensed in multiple fields of use and at least a "substantive" portion of the value of the Center's technology was licensed in Utah. If there

is a disagreement about "substantive", then the Director, in partnership with the University, will review this with the COE Review Committee and make a determination.

B. Pro-Rata Return of the Grant out of License Proceeds:

Conditions under which only a portion of the grant may be required to be returned.

- The licensee that is located out of state or is moving out of state has an exclusive license, but has operated in good faith with genuine positive economic impact in Utah for at least 12 months based on the criteria below.
    - The Grant return by the university should be pro-rated based on the number of years in state. The percentage of the Grant to be returned would be calculated as follows: Subtract the "number of years in state" from 5 years and then divide by 5 = pro-rata percentage.
    - In addition, if the licensee had created a high number of "quality jobs" during the preceding year(s) in the state, the Review Committee can further reduce the required pro-rata payback at their discretion. The Review Committee should assume that if the company had created approx 140 job-years (1 employee for 1 year), they will have approximately returned "dollar for dollar" back to the state on a $500,000 investment from the COE program. Quality jobs are those that, on average, pay at least double the average county annual wage (approximately $65k/year in Salt Lake County for 2006 which is approximately the current average of a COE job).

Calculation of Grant Return

C. The method for calculating the grant return, for ANY grant repayment or pro-rata repayment, will proceed as follows

- The COE program will determine the total amount of funding allocated to the Center in question, which will include the total of
    - Funding granted and paid directly to the University for the Center under a COE contract
    - The pro-rata calculations set forth in B. will be applied to determine the total grant or pro-rata grant repayment.
- The University will identify the total licensing revenue stream for the Center in question, separately identifying "past, current and expected future licensing proceeds". These streams will include the total of:
    - Up front fees paid by the licensee and expected to be paid by the licensee
    - Milestone fees paid by the licensee and expected to be paid by the licensee
    - Royalties and other ongoing and future licensing fees paid by the licensee and expected to be paid by the licensee
    - Value of any equity at liquidation or exit (note that if the grant repayment begins before equity liquidation or exit, then the equity will be identified, but the value will be confirmed for the purposes of grant repayment only at liquidation or exit)
- The University will identify certain "current and past direct costs" that are specific to the

Center in question which include:

- Patent development and prosecution costs for the Center in question – these will not include costs of the TCO itself, but do include payments to outside law firms to conduct this work.
- Other direct investments into developing the technology in question such as the direct cash costs of a VIP or Technology commercialization grant or similar university grant program

- The return of the grant or a portion of the grant will be based on the following formula:
  - The university will keep all proceeds of the license until the current and past direct costs are repaid
  - Once the current and past direct costs have been repaid by the proceeds of the license, then the university will "share back" with the State Centers of Excellence Program, as a default rate, 50% of the licensing proceeds received by the university, as they are delivered to the university.
    - If, however, a university has invested substantially more funds in the development of the technology than the COE grant has contributed, the university can present information documenting this investment to the Review Committee, which will then adjust the state's repayment share commensurate with the relative investment size.
    - As an example: If the university, out of university assets, non-State contributions and resources, had invested $4 million in the development of the technology, and the COE Grant was $450,000, then the State's "share-back" of the ongoing licensing proceeds would be approximately 10% of the proceeds as they are received by the university..
    - Items that are appropriate to include in evaluating the university's investment in the technology include:
      - Deferred overhead charges, where overhead is permitted to be charged, but is voluntarily waived when participating in the COE program.
      - Physical space, lab space and equipment and other Property Plant and equipment that contributed to the development of the technology that are developed solely by the university (such as through capital campaigns, donations, tuition etc).
      - P.I. Salary that is paid by the university that is not covered by a grant or contract.
      - Compensation to other team members that is paid by the university that is not covered by a grant or contract.
      - Industry or Corporate grants and contracts that are sponsored research contracts that fund in whole or in part the development of the technology subject to these provisions.
    - Items that are not appropriate to include in evaluating the university's investment in the technology include :
      - Federal grants and contracts that help pay for the development of the technology (this is Federal investment, not university nor state investment).

        - No payment will be required if the university does not actually receive the expected proceeds. These repayments to the state are due annually.
        - The repayment is only for future received payments after the move that triggers these procedures. Any previously received payments are not considered in the repayment process.
    - These payments to the state will continue until the earlier of:
        - The total of the COE funding into the technology from part C.1. has been repaid OR
        - The Total of the pro-rated portion of the COE investment in the technology from part C.1. has been repaid (if applicable) OR
        - The payments to the University have been exhausted and no more licensing proceeds will be received by the university AND the university's equity position has been liquidated and the appropriate percentage of the proceeds has been paid to the State.
- If a license is terminated by the University, such as for default or violation of other license terms, then no future repayment of grant proceeds to the State is required. If the technology is then licensed to another out of state licensee, that license is subject to the return of grant terms that had been approved under these policies and procedures.
- Review Committee Function:
    - The COE Review Committee's responsibility is to verify the accuracy of the information that they evaluate under these policies and procedures, to interview relevant individuals as needed and to otherwise independently calculate and determine the elements of the return of grant, in conjunction with the Center Director and the university.

Contract Administration

D. Policies and Procedures become part of University/State Contract: When a new Center is approved and a new contract is created, a copy of the then-approved policies and procedures shall be included in the contract in an appendix (or shall be deemed to have been so included). The policies and procedures governing that Center of Excellence will be those approved and included at the time of the initial Center grant. If policies and procedures of the program change during the life of a Center (often up to 4 years in length), only those at the initial grant will be in effect for that Center and its technologies.

E. "Grandfathering of Existing Centers of Excellence" - Centers of Excellence whose contracts were initially executed on or before the 2005-06 fiscal year (that is, before the 2006 Legislative session that passed the statutory changes calling for these policies and procedures), will not be subject to the return of grant provisions, as these provisions were not in statute when the contracts for the 2005-06 fiscal year (or earlier) were executed.

1. Centers which are ongoing in the program have their contracts amended only for contract duration and total value and the terms of the contract are not generally changed during the life of the Center, up to 4 years.

2. This provision provides consistency for all universities so that they know the terms and conditions under which they apply to and enter into the Centers of Excellence program.

F. Return of Grant Mechanism: If a repayment under these policies and procedures is made, it will be deemed a refund of grant proceeds under the contract originally executed between the COE program and the university. Funds so received will be then managed by the COE program under then current policies and procedures.

Legislation Passed in 2007 Session (Effective July 1, 2007)

Centers of Excellence Legislation Passed in 2007 Session-Effective July 1, 2007

During the 2007 Legislative session, the COE Director worked with Rep. Bradley Daw to incorporate into the Centers of Excellence statute, changes that would encourage the granting of funds to Licensees of technologies developed at Utah's Colleges and Universities. The goal of these changes was to help such licensees cross the so-called "Valley of Death" that often faces companies starting up with a technology from a university in hand. These companies face significant funding hurdles, the and goal of the COE program is to help mobilize private sector investment in these technologies.

Representative Daw sponsored House Bill 125 with Senate sponsor Senator Sheldon Killpack, to permit grants to licensees of University developed technologies. In addition, the statute was clarified to more fully instantiate the Business Team program.

The selection process for the 2007-08 fiscal year included grants to "companion licensees", based on these statutory changes.

Enrolled Copy H.B. 125

CENTERS OF EXCELLENCE AMENDMENTS

2007 GENERAL SESSION

STATE OF UTAH

Chief Sponsor: Bradley M. Daw

Senate Sponsor: Sheldon L. Killpack

LONG TITLE

General Description:

This bill modifies the Centers of Excellence Act by creating a commercialization grant component to more readily link companies with college and university researchers in transitioning their research developed technologies into industry.

Highlighted Provisions:

This bill:

< modifies the recognized purposes of the Centers of Excellence Act to include facilitating the transition of research generated technologies from the state's colleges and universities into industry to grow and expand the state's economy;

< provides that, in addition to state colleges and universities, Centers of Excellence grants may be awarded to companies that are working in partnership with colleges and universities and their researchers to transition their research generated technologies into industry for economic development;

< provides that a repayment by a college or university of grant proceeds or a portion of grant proceeds shall come only from the proceeds of a license established between the company and the college or university, or in the case of a company that receives a grant, from the proceeds of the license to that company; and

< provides that the Governor's Office of Economic Development may enter into work agreements with business team consultants, who would assist colleges and universities in facilitating the transition of technology into industry.

Monies Appropriated in this Bill:

None

H.B. 125 Enrolled Copy

Other Special Clauses:

None

Utah Code Sections Affected:

AMENDS:

63-38f-701, as last amended by Chapter 356, Laws of Utah 2006

63-38f-703, as enacted by Chapter 148, Laws of Utah 2005
63-38f-704, as last amended by Chapter 356, Laws of Utah 2006
ENACTS:
63-38f-705, Utah Code Annotated 1953

Be it enacted by the Legislature of the state of Utah:
Section 1. Section **63-38f-701** is amended to read:
63-38f-701. Purpose.
(1) (a) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes.
(b) These generally come from strong research colleges and universities.
(c) Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development.
(d) Most states are enhancing their research base by direct funding, usually on a matching basis.
(e) The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas and by facilitating the transition of these technologies out of the university environment into industry where the technologies can be used to enhance job creation.
(f) The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.
(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis for colleges and universities in the state that offer any doctoral degrees.
(3) (a) The Legislature recommends that the funds be allocated on a competitive basis to the various colleges and universities in the state[.] and to companies working in partnership with colleges and universities to commercialize their technologies.
(b) The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state and to help transition these technologies out of the colleges and universities into industry.

Section 2. Section **63-38f-703** is amended to read:

63-38f-703. Definitions.
As used in this part[, "centers]:
(1) "Business team consultant" means an experienced technology executive, entrepreneur, or business person who:
(a) is recruited by the office through a request for proposal process to work directly with a college or university in the Centers for Excellence program; and
(b) works with the institution to facilitate the transition of its technology into industry by assisting the institution in developing strategies, including spin out strategies when appropriate, and go-to-market plans, and identifying and working with potential customers and partners.
(2) "Centers of excellence" means university-based, federal and industry-supported, cooperative research and development programs.
(3) "Direct license" means the licensing between a company and a Utah college or university of technology developed at the college or university for the intent of commercializing the technology or facilitating its transition into industry.
(4) "Licensee" means:
(a) a company that executes or is in the process of executing a direct license; or
(b) a sublicensee of the technology from a direct license.
Section 3. Section **63-38f-704** is amended to read:

63-38f-704. Administration -- Grants.
(1) The Governor's Office of Economic Development shall administer this part.
(2) (a) The office may award Centers of Excellence grants to the various colleges [and], universities, and licensees in the state for the purposes of this part.
(b) The governor's Office of Economic Development shall develop a process to determine whether a college or university that receives a grant under this part must return the grant proceeds or a portion of the grant proceeds if the technology that is developed with the grant proceeds is licensed to a licensee that:
(i) does not maintain a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology; or
(ii) initially maintains a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology, but within five years after issuance of the license the licensee or sublicensee transfers the manufacturing or service location for the

technology to a location out of the state.
(c) A repayment by a college or university of grant proceeds or a portion of the grant

proceeds shall come only from the proceeds of the license established between the licensee and
the college or university.
(d) (i) A licensee that receives a grant under this part shall return the grant proceeds or
a portion of the grant proceeds to the office if the licensee:
(A) does not maintain a manufacturing or service location in the state from which the
licensee exploits the technology; or
(B) initially maintains a manufacturing or service location in the state from which the
licensee exploits the technology, but within five years after issuance of the grant the licensee
transfers the manufacturing or service location for the technology to an out of state location.
(ii) A repayment by a licensee that receives a grant shall come only from the proceeds
of the license to that licensee.
(iii) A repayment by a licensee shall be prorated based only on the number of full years
the licensee operated in the state from the date of the awarded grant.
(3) (a) Funding allocations shall be made by the office with the advice of the State
Advisory Council for Science and Technology and the board.
(b) Each proposal shall receive the best available outside review.
(4) (a) In considering each proposal, the office shall weigh technical merit, the level of
matching funds from private and federal sources, and the potential for job creation and
economic development.
(b) Proposals or consortia that combine and coordinate related research at two or more
colleges and universities shall be encouraged.
(5) The State Advisory Council on Science and Technology shall review the activities
and progress of [individual centers] grant recipients on a regular basis and assist the office in

126 preparing an annual report on the accomplishments and direction of the Centers of Excellence
127 Program.
128 Section 4. Section **63-38f-705** is enacted to read:

129 **63-38f-705. Business team consultants.**
130 (1) The office may enter into work agreements with business team consultants through
131 a request for proposal process to participate in the Centers for Excellence program.
132 (2) Under a work agreement, a business team consultant shall assist a college or
133 university in facilitating the transition of its technology into industry.

Governor's Office of
Economic Development

Centers of Excellence

Jon M. Huntsman, Jr.
Governor

ANNUAL REPORT

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Fiscal Year July 2007—June 2008

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2007-2008
Centers of Excellence
Annual Report

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Executive Summary

Executive Summary

The 2007-08 year was an excellent year for the Centers of Excellence Program. The highlight of the year included 8 companies (spinouts) started this year which licensed technology from Centers supported by this program. These spinouts include 6 companies emerging from the University of Utah and one each from Utah State University and Brigham Young University. In the Life Sciences sector, Larada Sciences, Navigen, and Philotek are all new companies in our landscape. Nano-Oxides is a startup in the material sciences industry, with an obvious emphasis in nanomaterials, and in the IT sector, Vistrails, Dynamic Screening Solutions, Apollo Acoustics and State of RT are all companies that are licensing technologies supported by Centers of Excellence funding.

An important element of all of these emerging companies is the key role that the Centers of Excellence Business Teams played in their formation and early accomplishments. This pairing of seasoned technology business executives and serial entrepreneurs with some of the best university developed technology in the State has proven very effective in enhancing the success of the early stage company development. Our professors frequently mention the high caliber of individuals that we have attracted and the tremendous value that these business team members contribute to the success of the program.

The Centers of Excellence Program celebrated two decades of supporting economic growth in Utah with the publication of a 20th Anniversary report, available online. Over the first 20 years of the program, technologies supported by the Centers of Excellence Program have resulted in more than 200 license agreements, and at least 126 Utah-based companies have been created to license and market technology fostered by the program. Fifty-five of these spinouts are still "alive" in Utah, three are alive out of state, and another eleven have been acquired and moved out of state. As of February 2007, these Utah companies directly employed over 2035 persons in the state, at an average salary of over $65,000. Some well-known firms that have been assisted by the Centers of Excellence Program include Myriad Genetics, Inc. (MYGN), Sonic Innovations, Inc. (SNCI), Moxtek, Cimetrix, and Autonomous Solutions. Emerging successes include InfoWest, Live Wire, Andigen and Rocky Mountain Composites. Startups just emerging from the Centers program in the past two years include Flying Sensors, Wasatch Microfluidics, and Glycosan BioSystems. These firms are among the many companies strengthening Utah's economy through technologies developed at Utah's colleges and universities.

The Centers of Excellence Program has undergone significant enhancements in the 2006-07 fiscal year to prepare for the next two decades of success. During the past year, the program evaluated the feasibility of the concept of making grants directly to Licensees. The goal of such a change would be to make the transition out of the lab and into a successful venture more likely. A Licensee is a company which licenses a

university developed technology in order to take it to market. The program provided small grants to two licensees, Flying Sensors and Glycosan BioSystems on an evaluation basis for 2006-07. During the 2007 Legislative session, GOED approached the Legislature to make permanent changes to the COE statute in order to permit this type of program on an ongoing basis based on the tremendous success that these funds supported at both companies. Both CEO's testified to the Legislature of the value of these grants to their businesses, which allowed them to quickly secure additional capital and sales and to move their businesses rapidly forward. Their success helped the Legislature support these statutory changes.

Because of these excellent results, House Bill 125 was sponsored by Rep. Bradley Daw, with Senate sponsor Senator Sheldon Killpack, to permit grants to licensees of University developed technologies. In addition, the statute was clarified to more fully instantiate the Business Team program, which has proven to be important to the success of the process of launching these technologies into the marketplace.

Also new this year, based on changes to statute in the 2005-06 Legislative session (SB 112), which permitted more flexible matching funds requirements for non-doctoral granting schools, the program received proposals from 3 non-doctoral granting institutions and two proposals received funding, Southern Utah University and the College of Eastern Utah.

With these changes in hand, the annual selection process for the 2007-08 fiscal year was expanded to include Licensees. There were 41 university proposals, and 23 Licensee proposals, including the 9 "companion" Licensees, where both the university team and the Licensee were requesting funds as part of the bridge between university and company. The funding requests for proposals received this year totaled $10,050,656. This is more than 3 times the COE budget of approximately $3 million.

After completing 55 separate review meetings, the final recommendations for funding include 9 Licensees, 3 of which had companion Centers which were also recommended for funding. Another 8 standalone University Centers were recommended for funding, for a total of 11 university Centers, and a final 8 university teams were recommended to receive Business Team support, which is intended to develop a better understanding of the market before further grants are made. This totals 28 teams, and 25 different technologies, selected from the Centers of Excellence Program, with 20 selected for significant development funding.

2007-2008 Funded Centers

Cellular Therapy and Regenerative Medicine

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Cell Therapy and Regenerative Medicine (CCTRM) proposes to collect, manufacture, characterize, store, catalog and distribute stem and progenitor cells for research and therapeutic purposes with a particular emphasis on umbilical cord blood stem cells. Performing research on stem cells that can be linked to records of medical, demographic, epidemiologic and genetic information through several Utah-centric databases will greatly facilitate medical discovery. The Center has begun development on a unique method in which biosamples can be linked to such records for the purpose of providing extensive background screening. Using this method, the Center has focused on generating an algorithm for defining a "confidence interval" or index of suspicion for the presence or absence of a particular disease state in any given biosample. Such biosamples, LineaCells, will be marketed for sale and distribution to parties interested in studying a particular disease or developing a therapeutic cellular product with no genetic predisposition to a particular disease. It is anticipated that the CCTRM will be able to secure exclusive rights to these databases for specific fields of use in order to generate a de facto standard index for rating the likelihood that specific stem and progenitor cells will be useful for specific research and therapy.

TECHNOLOGY

The CCTRM Stem Cell Repository will be a unique resource for researchers in both academics and industry. As it appears, Utah is the only place simultaneously possessing vast, accessible medical and lineage data, and cGMP facilities, with supporting regulatory expertise, for the creation of such a resource, giving us a timely competitive advantage in the marketplace.

PROGRESS

The Center is currently funded as a no-cost extension of the grant awarded originally in July 2007. The collaboration with the original business team is now complete. The company is in the process of being established.

Imagine...

Harvesting umbilical cord blood stem cells and creating a repository of a variety of stem cells for researchers to access.

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Clean Coke Technology

COLLEGE OF EASTERN UTAH

DEFINITION OF CENTER

The Center for Clean Coke Technology at the College of Eastern Utah's (CEU) Western Energy Training Center (WETC) is working in conjunction with Combustion Resources (CR) and Terra Systems, Inc. (Terra) to design, build and operate a modular pilot-scale facility to manufacture high-grade carbon (coke) briquettes developed from coal fines and other low-quality mining by-products. The briquetted product can be used by metallurgical and specialty carbon-reductant fuel users.

TECHNOLOGY

The Center made great progress during this first year of funding and produced green briquettes for testing by end users. The results are promising and product should be delivered to industrial users for evaluation this quarter. Design of process control systems and algorithms for the Clean Coke process has been developed and will be patented by CEU in conjunction with their COE Business Team. Additional IP is being developed by CEU around establishing a site-based mobile learning and training simulator which would provide the training necessary to produce the required skilled labor force. This simulator can be used by industry to advance the development of labor pools of rural applied technicians for energy processing applications.

PROGRESS

Strong partnerships were established between CEU, WETC and industry partners to complete the funded year's objectives ahead of schedule. A consortium of key companies from all industry segments has been assembled. The involvement of energy companies, investment groups, business analysts and end users provides a positive input into the direction of the technology. Members of the Center and business team are: College of Eastern Utah, Western Energy Training Center, Combustion Resources, Inc., Terra Systems, Inc., Mountain Island Energy, LLC, Utah Valley State College, State of Utah, Manufacturing Extension Partnership, WestCAMP Inc., National Centers of Excellence, and Excellence to Market.

Imagine...

Lower the cost of current coke fuels and create a cleaner more efficient use of current coke.

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Control of Flows in Manufacturing

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER

The Center for Control of Flows in Manufacturing is focused on using flow control technologies to improve manufacturing processes. They are working on two technologies. The first, Aerodynamic Vectoring Particle Sorting (AVPS), classifies fine powders (near 10 microns) by size. The second, Coanda-assisted Spray Manipulation (CSM) provides direction and profile control to thermal spray devices.

TECHNOLOGY

During the past year, the aerodynamic vectoring particle sorting device was scaled to a larger size and modified to operate at much higher flow speeds. As a result, the throughput of the device was improved by two orders of magnitude without loss in accuracy. This system has applications to the manufacturing processes of many industries such as biotech, environmental, materials and cement. The Center has successfully made AVSP applicable to the manufacturing of inhaled drug powders as it can now assist with pathogen detection.

Coanda-assisted spray manipulation is well suited for spray coating the inside of pipes, among other applications. This method uses a new pneumatically-controlled device which was constructed and tested on a flame spray gun. This allowed arbitrary programming of the flame direction and spreading which will lead to improved control over the coating process. The technology allows complete control over thicknesses on large surfaces or to mitigate the intensity of heat from flame sprays.

PROGRESS

The Center has non-disclosure agreements in place with several companies, including Sulzer and Praxair. They are looking forward to an upcoming contract to provide a plasma spray nozzle and to test it in one partner's facilities. Meanwhile, other manufacturers attended a demonstration recently and one is considering a license of the technology.

Imagine...

Successfully sort tiny, fragile particles, without deforming them, or easily coat the inside of a pipe with an even coating.

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Tungsten Carbide and Diamond Composite Materials

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials is engaged in commercialization of technologies related to new super-hard composite materials for use in industrial tools including drill bits and machining tools. The Center has developed new materials as well as processes for making these tools commercially. The composite materials are based on cemented tungsten carbide and polycrystalline diamond.

TECHNOLOGY

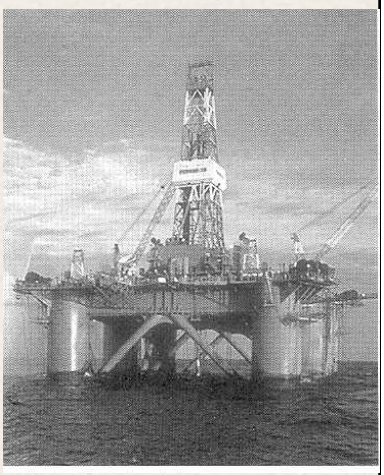
Compared to conventional cemented tungsten carbide or polycrystalline tools, the new technologies developed by the Center allow custom designs of the microstructure of these materials. The functionally designed materials will maximize its fracture toughness with minimum sacrifice of wear resistance. It is the unique and custom designed microstructure of the composites that makes the improvement possible, which would not have been possible with homogeneous materials of the same composition.

The Center's technology promises to improve the mechanical properties of materials and the performance of manufacturing tools, hence improve productivity and competitiveness of manufacturing industries

PROGRESS

The Center has now completed the successful spin off of a start up technology company. The business team has continued with the company and is playing very critical roles in guiding the company toward commercialization.

Imagine...



A composite material that won't degrade and remains sharp over a much longer period of time under intense conditions.

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High End Pharmaceutical & Biomedical Process Optimization

SOUTHERN UTAH UNIVERSITY

DEFINITION OF CENTER

The Center for High End Pharmaceutical and Biomedical Process Optimization aims to assist small to medium sized companies that may experience arrested development for lack of product or process innovation by helping to model highly complex technical problems. The Center provides modern, high end computational models to assist small companies in overcoming technical challenges obstructing design optimization and commercialization. The evolution of this Center led to an expanded scope that includes technologies related to renewable energy including biomass gasification and wind turbines.

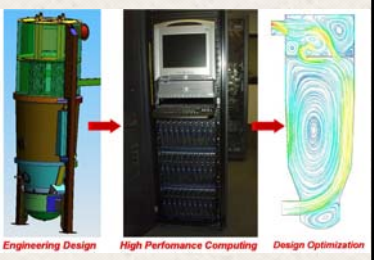
TECHNOLOGY

During the first fiscal year, the Center performed high end CFD modeling for three corporate partners that resulted in technology advances in three separate areas. The first project for Deseret Laboratories Inc. (DLI) resulted in the design optimization of the bed screen for DLI's BGP-7 granulator, a key component in DLI's process for the production of pharmaceuticals and nutraceuticals. A second project involved the thermal optimization of the DxNA GeneSTAT, a portable device for the rapid identification of the DNA of unknown, potentially infectious, biological pathogens. A third major project was initiated with Emery Energy Co., related to a novel biomass gasification process.

PROGRESS

The Business Team partnership was instrumental to the diversification of the Center to broader applications and partnerships. The Team initiated an important exploration with Ceramatec Corporation that eventually evolved into a joint collaborative project with Emery Energy Co. and Idaho National Laboratory on the development of novel technology for biomass gasification. Subsequently the Team has expanded and been linked with the Southern Utah Business Resource Center (SUBRC). The SUBRC is a business assistance and support center, with proactive regional outreach giving particular emphasis to assisting rural entrepreneurs.

Imagine...



Use the accuracy and speed of fluid flow and 3D modeling to help businesses in rural Utah enhance their competitiveness.

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Hybrid & Adaptive Multimedia Processors

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER

The Center for Hybrid & Adaptive Multimedia Processors (CHAMP) has been working on algorithms to automate the design of circuits on field-programmable gate array (FPGA) chips for video processing. The Center has spun out an initial concept for a company (HiDASoC) and has registered it in Utah. They are focused on creating both software tools based on these algorithms as well as packaging the circuits obtained using these algorithms as intellectual property.

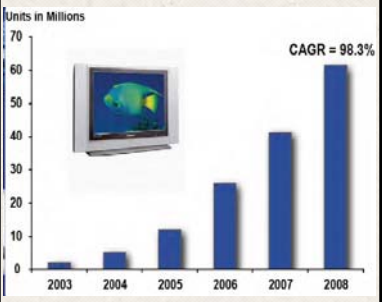
TECHNOLOGY

Video compression on embedded platforms is a promising technology in the area of security and surveillance. The most computationally intensive part of such applications is a process called Motion Estimation. The key to designing a powerful, low power and adaptable or responsive circuit to process these motion estimation techniques is the judicious allocation of video pixels onto on-chip embedded memory. This is a complex problem and CHAMP has created a set of algorithms that can automatically search the complex and vast set of design options and provide the user with the best possible pixel mapping strategy and associated circuits on an FPGA to solve the motion estimation processes.

PROGRESS

The Center is working on raising more funding to commercialize the technology. One of the current sponsors is Mathstar which is a chip manufacture that has given funding for one of the software tools that the Center has developed. The Center has also filed 2 patents during the year.

Imagine...



Being able to store a hundred times more video surveillance data through advanced compression based software using the same hardware.

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Microarray Technology

UNIVERSITY OF UTAH

DEFINITION OF CENTER

The Center for Microarray Technology (CMT) is developing highly parallel microarray technologies with applications in genomics, pharmacogenomics, molecular diagnostics, and proteomics. The Center's research suggests practical ways to improve current microarray-based technologies in several critical areas, namely sensitivity of detection, specificity of molecular target recognition, and significantly higher throughput capabilities. Philotek, LLC was spun out of CMT for the purposes of developing and commercializing the novel microarray technologies. To date, Philotek and CMT have successfully secured a NIH grant and a funded technology development partnership with MOXTEK.

TECHNOLOGY

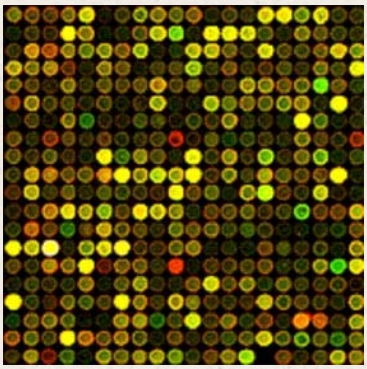
The core technologies from CMT include a consumable, next-generation microarray substrate that provides significantly higher sensitivity and shorter assay time than current products, a real-time instrument for performing microarray experiments, and associated novel assay technologies including kinetics analysis.

In conjunction with their development partner MOXTEK, the Center has taken key steps towards commercialization of the microarray substrate technology. They have also further improved their real-time microarray platforms to include higher-resolution imaging, better signal-to-background, and more robust microfluidics handling.

PROGRESS

CMT has been able to successfully form the spin-off company, Philotek, LLC, which is also a COE 2007-08 Licensee Grant recipient. They have also been able to secure a comprehensive license of all of CMT's intellectual property disclosures. The Center has collaborated to secure a three-year NIH grant for technology development, and also filing two other NIH grant applications. CMT is also solidifying the competitive position of the Company's technologies through multiple inputs from the field – potential customer interviews, competitive product assessment, pricing, and market research reports.

Imagine...



A more efficient way to detect gene regulation on a larger scale and with better technology.

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Nanopore Sensor Technologies

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Nanopore Sensor Technologies (CNST) was established to create new Utah industries based on a novel sensor paradigm invented at the University of Utah: glass nanopore sensors (GNP). This sensor technology offers commercial opportunities in the areas of biomedical and forensic DNA sequencing and pharmaceutical drug screening. The technology also covers one-at-a-time nanoparticle analysis for manufacturing and viral diagnostics for homeland security and national defense and clinical chemistry, e.g. chemical panel screening in blood analysis. The patented nanopore platform technology was developed by the PI and his research collaborators.

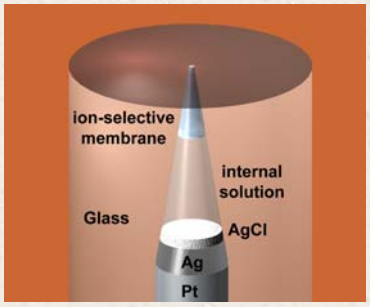
TECHNOLOGY

The overall goal of this Center in year one was to develop a broad range of chemical and biochemical sensor products based on the glass nanopore platform. The core technologies are the GNP electrode and GNP membrane — inexpensive sensor platforms based on single molecule and particle transport through a conical pore fabricated in glass. Prior to the Center, the members of the Director's laboratory at the UofU demonstrated prototype sensors for DNA sequencing, single nanoparticle detection, and blood ion analysis. In the first, year the core technology was extended to preparing nanopores from fused silica, which has significant advantages in broadening the range of applications of the nanopore concept, especially in rapid DNA analysis. Initial efforts were begun to develop manufacturing methods in order to allow sufficient quantity of devices for sale to other universities and companies for research evaluation. Research on nanoparticle analysis was scaled up by funding the research of two new graduate students.

PROGRESS

During the first year, the Center resulted in the formation of a spin-off company with its first-year goals being the acquisition of the long-term manufacturing rights for all glass nanopore devices, and developing a commercial product based on the nanoparticle sensor.

Imagine...



Detect and classify a virus or pathogen using advanced screening methods before it spreads on a large scale.

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Therapeutic Biomaterials

UNIVERSITY OF UTAH

DEFINITION OF CENTER

The Center for Therapeutic Biomaterials (CTB) prepares and uses new biomaterials for reparative medicine, for the 3-D culture of primary cells and human stem cells, for toxicology models, and for veterinary care. In addition, the CTB developed novel anti-inflammatory sulfated and alkylated carbohydrates for dermatological and ophthalmic diseases.

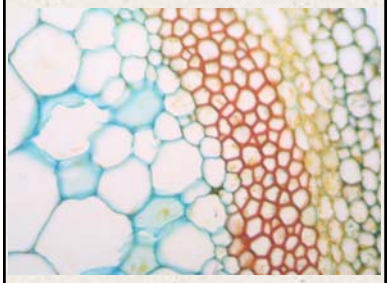
TECHNOLOGY

The CTB has established three companies based on its synthetic extracellular matrix (sECM) technology for veterinary, research/toxicology, and human device applications. In Year 3, the CTB filed two full utility and PCT patent applications (based on Year 2 provisional patents) for novel biomaterials and polymer modifications, both of which were licensed to CTB spin-out companies. In Year 4, the CTB developed, disclosed, filed patents on, and licensed a new "fall-apart" crosslinker technology which was licensed to Glycosan for its 3D cell culture products for stem cells. New nanoparticle crosslinking and oxygen-releasing technologies were reduced to practice, disclosed, and filed as patent applications. Also in Year 4, CTB developed the new sulfated and alkylated hyaluronan technology as anti-inflammatories for skin diseases. This technology, jointly disclosed and patent applied for in April 2008 with Dr. Thomas Kennedy, MD, led to the launch of CTB's fourth company, GlycoMira LLC, a development stage pharmaceutical company in Salt Lake.

PROGRESS

The Center for Therapeutic Biomaterials has been able to successfully sell their 3-D cell cultures through Glycosan Biosciences, which is also a COE 2007-08 Licensee Grant Recipient. The Center has also been able to evaluate trials through in vivo and 2-D cell cultures. CTB and Glycosan have developed coated beads and microsponges for large scale 3-D protein production. The Center has successfully accomplished and developed mice with human livers as toxicology models.

Imagine...



A material that mimics natural tissue that can be used to treat chronic wounds and repair bone defects.

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Thermal Management Technologies

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER

The Center for Thermal Management Technologies is commercializing selected space-based thermal technologies that present the highest opportunities for scaled, high-value civilian and military markets. Such arenas include remote sensing, homeland security, national defense, classified surveillance, computers, electronics, transportation, communication, the broader aerospace industry, and wherever improved thermal management is critical to system performance.

TECHNOLOGY

The first of TMT's technologies is the *Flexible Thermal Link* which provides an effective heat path between two components while minimizing any mechanical interaction. Flexible link applications include infrared (IR) imaging in satellites, military vehicles, aircraft, missiles, and security and night vision systems.

Channel-Panel, a second TMT technology, is a hermetically sealed, light-weight, sandwich-type panel with a two-dimensional grid of channels inscribed on the inner surface of the outer skin and containing a two-phase working fluid. These panels have been demonstrated to transport heat orders of magnitude more effectively than much heavier solid metal plates of similar dimensions.

Fiber Support Technology provides an orders-of-magnitude better way of mechanically supporting and thermally isolating a component than competing technologies. This technology is used in applications wherever critical components require both extreme thermal isolation and mechanical stability as in a broad array of commercial imaging systems. *Thermal Switches* are among the other TMT technologies in the commercialization pipeline. High volume applications include transient cooling of electronics in missile deployment.

PROGRESS

A deployable space radiator panel was designed, fabricated, and delivered to SpaceDev for further evaluation. Contact with PCB manufacturer is ongoing. Concept designs for reconfigurable thermal panels has been submitted to DARPA. Laser cutting, welding, and powder deposition techniques have been extensively researched. A break through in molding techniques was achieved, potentially enabling lower cost manufacturing. Plans for a spin-out company have been further evaluated, refined, and implemented. A new company, Thermal Management Technologies, LLC has been organized and launched.

Imagine...

A thermal link that can provide heat flow ten times better than the leading products in the market today.

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Unmanned Air Vehicles

BRIGHAM YOUNG UNIVERSITY

DEFINITION OF CENTER

The Center for Miniature Unmanned Air Vehicles is focused on the development of technologies that extend the capabilities of autonomous miniature air vehicles (AMAVs) and to license those technologies which are commercially viable.

TECHNOLOGY

The technologies developed through this program will significantly enhance autonomous miniature aerial vehicle capabilities for commercial and military applications. Research continues on a broad array of enhanced operational features including:

- Easy-to-use operator interfaces
- Vision-based control technologies
- Integrated MAV/SAR system
- Chemical sensing from a MAV platform
- Point source localization
- Tailsitter MAV with hover/perch-and-stare capability
- Integrating onboard vision processing hardware (Helios) into ground station & autopilot
- Vision-based control using Helios
- Vision-based obstacle avoidance

The Center's research in these technology areas has been driven primarily by military needs, but as civil and commercial opportunities develop, these technologies will have application to all markets. These technologies will be licensed to companies like Flying Sensors for commercial applications and Procerus for military use. These components will be packaged into product and service-based solutions for both industries. As expansion into the commercial market continues, additional features will become critical to sustain market share in aerial surveillance, monitoring, and measurement (ASMM) markets. Each of these technologies has generated interest from potential customers and some have licensing partners already identified.

PROGRESS

The Center's companion spinout, Flying Sensors, was also funded for 2007-08 to enhance the commercialization of these technologies.

Imagine...

A miniature plane that could be flown to monitor traffic, the border, or a forest fire without the need to leave the office.

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2007-2008 Funded Licensees (Companies)

Dynamic Screening Solutions

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF COMPANY

Dynamic Screening Solutions, Inc. (DSS), formerly Universal Application Systems, provides simple solutions to the headache of paperwork. These solutions return legible, complete, electronic forms in a known format for ease of processing while providing robust administrative tools that help view, track, store, and report data. Using its licensed technology called The ONE Application, DSS created the award winning Utah Clicks System, www.utahclicks.org, that helps Utah citizens complete and electronically submit the paperwork for Medicaid, CHIP, Head Start, Baby Your Baby and others.

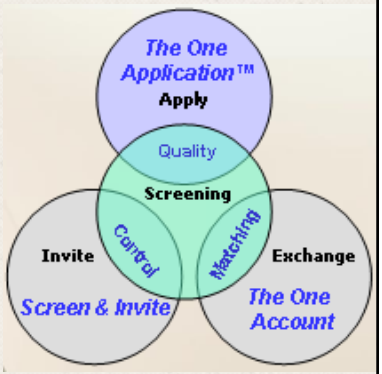
TECHNOLOGY

The ONE Application platform is the basis for the Center's ONE Application solutions. It provides technologies that enable customers to manage their paperwork process easily and efficiently. It is called The ONE Application because it combines application questions seamlessly so that clients feel as if they are only filling out one application. The ONE Application system gathers required information and populates the correct forms. The ONE Application can be deployed either as a J2EE application or as a stand-alone ColdFusion web application. The ONE Application incorporates the PostgreSQL open source database or SQL Server database. Other database implementations are also available.

PROGRESS

DSS launched from USU in 2007 as a C corporation and continues to operate and generate revenue from its base in Logan, UT. Similar systems have been set up for the states of Oregon and Indiana. Its web-service called Utah Clicks won a 2006 Innovation Award from the Council of State Governments. The Company continues to improve their technology and look for ways to expand their business.

Imagine...



Being able to fill out a single application for multiple programs including Medicaid, CHIP, and others.

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Flying Sensors

CENTER SMALL BUSINESS SPIN-OFF

DEFINITION OF COMPANY

Flying Sensors, a Licensee of the Center for Miniature Unmanned Air Vehicles, provides industry and government agencies cost-effective, fully-integrated, aerial sensing solutions. Integrated sensors include photograph, video, infrared, chemical, meteorological, and particulate sensors. The business model includes manufacturing, marketing and distribution of fully equipped planes, sensors and data acquisition software. Flying Sensors also maintains and provides a national full-service video production company. Flying Sensors has provided promotional videos to many State offices within Utah and other states. Flying Sensors has customers currently utilizing both product sales and service revenue models.

TECHNOLOGY

Flying Sensors' technology is focused on autonomous planes that don't need human intervention to fly. Other areas of focus are on remote control helicopters and various integrated sensors. The aircraft hosts many different integrated sensors such as cameras, videos, IR, meteorological, and chemical. This allows for the collection of multiple streams of data for analysis and studies. Some other technologies being developed are disposable balloons sensors, real-time air to ground sensor data, and low altitude & high maneuverability capabilities.

PROGRESS

Higher quality aircraft at lower costs is the goal of Flying Sensors. Flying Sensors has successfully grown since their inception. They look to continue to expand and increase their revenue through new ideas and prototypes. Through the bad economy they have continued to further develop the aerial technologies and have included an airship in their new offerings.

Imagine...

A miniature plane that could be flown to gather data and information without the need to leave the office.

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Glycosan BioSystems, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Glycosan BioSystems, a licensee of the Center for Therapeutic Biomaterials, is a privately held life-sciences technology company, based in Salt Lake City, Utah. The Company was founded by Glenn Prestwich, William Tew, and Anna Scott in January 2006. Glycosan BioSystems, Inc. manufactures and sells synthetic, defined, biodegradable hydrogels for biomedical research. Glycosan is located in Research Park adjacent to the University of Utah.

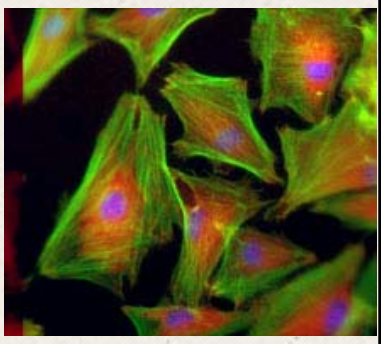
TECHNOLOGY

Glycosan is an early stage Utah-based company focused on the development, manufacture, and commercialization of Extracel™, a patent pending biomaterial licensed from the University of Utah Research Foundation. Extracel is a synthetic extracellular matrix (sECM) that has been extensively validated in laboratory and animal testing and is the subject of numerous published research papers. Extracel can be used for 3-D cell culture, tissue engineering, and human and animal therapeutics. This technology has been endorsed by the investment community with a $7.75 million investment in Carbylan BioSurgery, Inc. for human therapeutic uses of the material, and by the founding of Sentrx Animal Care, Inc. for veterinary applications.

PROGRESS

Glycosan BioSystems has signed a preliminary supply agreement with a global cell culture company to sell and market Glycosan's Extracel line of products in the field of general 3-D cell culture. Glycosan has also signed a supply agreement with another global cell culture company to sell their HyStem line of products in the field of cultivating stem cells, Cell Therapy, and Regenerative Medicine. Sales are steadily growing for the company from website and distributor sales worldwide.

Imagine...



A way to plate cells in 3-D so their growth will model human growth more closely.

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Larada Sciences

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Larada Sciences, a licensee of the Center for Alternate Strategies of Parasite Removal, will develop, manufacture and market medical products and services based on a warm-air treatment for head-lice infestations – the core technology generated from the Center. Key products include a durable medical device (the LouseBuster™) and associated single-use disposable kits marketed primarily for institutional sale to healthcare professionals. Lice eradication treatment services using the LouseBuster products will also be marketed via licensed service providers. The company will sell these products and services through established medical product distributors and sales organizations, and through a small inside sales force for direct sales.

TECHNOLOGY

The principal company technology encompasses a new device and procedure to offer healthcare professionals a breakthrough, non-chemical solution for eliminating head lice infestations. The LouseBuster™, kills lice and their eggs with a large volume of warm air delivered to the patient through a special applicator that exposes lice and eggs clinging at the base of hair shafts to the air. Clinical research has demonstrated the device is safe and effective, killing virtually all eggs and a majority of hatched lice.

PROGRESS

The Company has accomplished two complete product design cycles and conducted significant development work toward the final commercial design of the product. The team has greatly refined the original University device and the disposable applicator for improved performance, reduced manufacturing cost, and power efficiency. These engineering refinements allowed them to pass all of the applicable UL and IEC 60601 safety certification requirements – a major milestone. As of the close of FY 07-08, they have also conducted most of the clinical investigations necessary for submitting a 510(k) pre-market notification to the FDA, the approval of which is necessary before marketing the device in the US.

Imagine...

A very effective non-chemical solution for eliminating head lice and other parasites.

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Nano-Oxides, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Nano-Oxides, Inc., a licensee of the Center for Nanosize Inorganic Material Powders by Molecular Decomposition. The company's main focus has been to synthesize and market nanosize powders of various oxides. The powders are used in chemical industries in many various forms. These powders are used as catalysts, fillers in polymers, precursors for the fabrication of fuel cells, capacitors and other energy-related devices. The technology's novelty comes from the uniqueness and relatively low cost of its fabrication process.

TECHNOLOGY

The company has licensed technology from the University of Utah which is protected by three issued patents, and one that has been applied for. The principle company technology is on the synthesis of nanosize oxide powders in the 5 to 50 nm range. The powders are made by molecular decomposition. While other nano powder producing faculties can become expensive and yield less product, the processes developed at this company uses a patented molecular decomposition process to save on both product costs and equipment.

PROGRESS

Three patents have been licensed from the University of Utah. The company has sold powders to many national and international businesses. Nano-Oxides also sells products to many universities and research institutes. The company has been able to successfully synthesize Fe2O3, Fe3O4, metallic Fe, yttria-stabilized and un-stabilized zirconia.

Progress now moves to fabrication of high temperature proton exchange fuel cells using these nano-size powders.

Nano-Oxides Inc. has already started marketing its powders via brochures as a direct customer contact. Its fully running website www.Nano-Oxides.com has already received orders through its purchasing applet and local companies have shown investment interest.

Imagine...

Reducing the price of the basic materials used in fuel cells, capacitors, and other catalyzing agents while at the same time maintaining efficiency and quality.

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Navigen Pharmaceuticals, Inc.

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Navigen Pharmaceuticals is a licensee of the Center for Vascular Biotherapeutics. Navigen is a biotechnology company formed to develop therapeutics that address the vascular instability that underlies a variety of important disease states. Navigen's initial focus is on therapies to resolve hyperpermeability and neovascularization. Disease states that Navigen's therapies address include, but are not limited to, acute respiratory distress syndrome, retinopathies (including both wet and dry age-related macular degeneration (AMD) and diabetic retinopathy), arthritis, and cancer.

TECHNOLOGY

The company's technology base comprises the complementary but distinct technologies of two University of Utah scientists, Dr. Dean Li, Benning Professor of Medicine and Cardiology at the University of Utah, and Dr. Kang Zhang, Director of Ophthalmic Genetics of the Moran Eye Center and Associate Professor of Ophthalmology and Visual Science at the University of Utah. Dr. Li has identified novel molecules mediating vascular stability while Dr. Zhang's technology identifies a new approach to limiting neovascularization and vascular leak in the eye. Their lead therapy is protein therapeutic Slit2N which has arisen from Dr. Li's research.

PROGRESS

Navigen has continued to advance its therapies and has filed five additional patents since licensing the technologies from the University of Utah. Navigen recently entered a research and development collaboration with a large pharmaceutical company for the development of Slit2N in retinopathies. Under this collaboration, Navigen will receive $7 to $9 MM over three years.

Imagine...

NAVIGEN™ PHARMACEUTICALS

A small protein that can aid in repairing vascular instability caused by various diseases such as acute respiratory distress syndrome, retinopathies, arthritis, and cancer.

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Brandisimpson@
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Philotek, LLC

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

Philotek, LLC is a licensee of the Center for Microarray Technology and its focus is commercialization of a suite of next generation microarray technologies licensed from the University of Utah. The company plans to do this by forming product development and distribution relationships with existing companies that are well-established in their space.

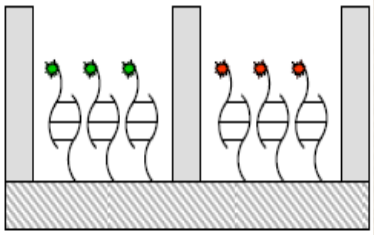
TECHNOLOGY

The company technology covers three main areas. The first is that they have the highest sensitivity microarray substrates available on the market, a significant 2-3 times more sensitive than the closest competitor and 10-12 times more sensitive than the standard substrates now on the market. Second, the company has real time analysis software to measure the progress of gene-to-gene binding reactions. This results in many data points, much greater accuracy in analyzing the gene-to-gene binding reactions versus the single, much less reliable data point taken at the end of the binding reaction used in current protocols, and potentially much faster time to results. The third area is microarray assay technologies to measure single nucleotide polymorphisms, DNA methylation, and a generally applicable simplification (called CDA) of microarray formats to pre-label genes rather than to have the end user perform an expensive and time-consuming labeling preparation themselves.

PROGRESS

The Company licensed from the University of Utah all of the applicable disclosures and inventions emanating from the Center for Microarray Technology. Philotek partnered with the U of U Center team to apply for a $1.6 million FastTrack NIH grant to fund the development of the real time software and CDA technologies in the field of performing mitochondrial DNA analysis using microarrays – a breakthrough from several perspectives. Philotek also filed another NIH grant at the end of 2007 to study the genes associated with epilepsy using real time software and the Company's high sensitivity microarray substrates. The Company developed commercialization plans for market opportunities with respect to developing all of the originally licensed technologies.

Imagine...



Metallic
Nanocavities

Viewing microarray substrate concentrations real time, with much greater sensitivity than the current technology available.

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State of RT

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

State of RT is a Licensee of the Center for Interactive Ray-Tracing & Photo-Realistic Visualization, and was formed to commercialize the interactive ray tracing technologies developed at the Center at the University of Utah over the past decade.

The company focuses on "ray tracing", a software method for generating more visually compelling and accurate images than those produced by current graphics hardware such as that produced by ATI and NVIDIA. The State of RT team is working on improving the features and robustness of Manta Ray, a software program developed at the University of Utah. The Manta Ray is a program plug-in that emphasizes speed, and is the most flexible high speed ray tracer in the world today.

TECHNOLOGY

Two main software products, Manta and Galileo were the cornerstone of the original development at the Center and were built on three key patents. This technology exploits parallel processing to render highly realistic images in real-time. The core ideas are now being incorporated into products at NVIDIA.

It is the company's plan to commercialize the ray tracing plug-in application for leading industry visualization and 3-D animation tools such as 3ds Max and Maya. The value of starting with these industry leading partners is that they are already established as leaders across a range of video game, film and manufacturing markets. The plug-in application will be called Manta Ray. This first commercialization step will further harden the Centers unique ray tracing engine, which will then be reused and improved upon to enter other market opportunities ahead, with its first follow-on target being interactive ray tracing video games, a $50 billion market growing at twice the rate of film and television.

PROGRESS

State of RT was acquired by NVIDIA Corporation in the Spring of 2008. The employees of State of RT opened the Salt Lake City branch office of NVIDIA.

Imagine...

A way for video game programmers and television producers to manipulate scenes and images to make them more realistic than ever before.

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VisualShare, LLC

U N I V E R S I T Y O F U T A H

DEFINITION OF COMPANY

VisualShare, a Licensee of the Center for Electronic Medical Education, provides software solutions for image sharing and collaboration, with a focus on the medical industry. VisualShare builds applications for organizations that need to share images, conduct reviews and document results. One of VisualShare's initial markets is Tele-health applications that serve geographically distant communities. The company products establish a framework to support image-centric collaboration and sharing. The framework stores all collected information in a single record that can be re-used for many stakeholder requirements, such as internal or external reviews, quality assurance/quality control, audit, and evidentiary logging purposes.

TECHNOLOGY

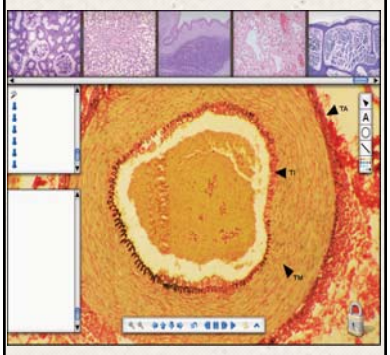
VisualShare's technology includes TeleCAM™, a solution for expert review of child abuse. The Center also has VisualStrata™, which is an on demand solution for internal/external review of clinical imaging in pathology, ophthalmology and cardiology.

PROGRESS

VisualShare has recently been issued a United States patent and has two divisional patents pending. TeleCAM™ is the underlying telehealth technology for diagnosing child abuse as part of a public-private network with Intermountain Healthcare's Center for Safe and Healthy Families and the Utah Attorney General's office.

VisualShare technology has been launched into a National telehealth program for addressing the needs of primary care in rural and underserved communities in Minnesota, Alaska, Nebraska, South Dakota, Maryland and New Hampshire.

Imagine...



Being able to collect, publish, review, share, and collaborate your documents, worksheets, images and other files with one software application.

Patricia Goede
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2007-2008 Business Team Grant Recipients

These teams received Business Team support during the 2007-08 year of $25,000, on average, to help mature their business plans and move closer to commercialization.

Biomolecular Nanophotonics

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Biomolecular Nanophotonics team develops chemically engineered micro/nanosystems to dramatically improve the performance of Nucleic Acid Amplification and Detection. Currently they are characterizing electromagnetic interactions with biological materials for sensing, optoelectronics, biomedicine, and microscopy.

The team expects that these improvements will radically improve diagnosis of gene disorders and development of gene therapies, including RNAi. This would allow for more efficient and quicker diagnosis and treatment of human diseases.

TECHNOLOGY

Many advances by the Center were made using proprietary antennae called Optical Plasmon Capillaries developed and fabricated in the proposed Center for Biomolecular Nanophotonics. The Center uses a rectangular silica capillary coated on one surface with gold that covalently binds a proprietary chemistry which attaches to a hexagonal virus. Free electron plasmons, induced to vibrate by incident polarized green light, are shifted from blue to red by unlabeled virus that binds to the gold chemical surface. Binding produces an optical signal. Plasmon capillaries are coupled to a remote source of electromagnetism and integrated with a detector to produce a surface plasmon resonance (SPR) system.

PROGRESS

With assistance from their COE funded Business Team members, Biomolecular Nanophotonics has successfully been able to spin off a startup company, Celux Scientific, LLC in Jan, 2008. In the last 2.5 years, with funding from National Institutes of Health, Environmental Protection Agency, Millipore Corp., UofU and local sources, researchers in the proposed Center have been able to couple electrons to visible light in a new way to destroy bacteria ≥200% more effectively. With this, they have also identified new ways to catalyze protein interactions ≥1000% faster.. They have developed many other detection methods and interaction properties with no dyes or labels.

Imagine...

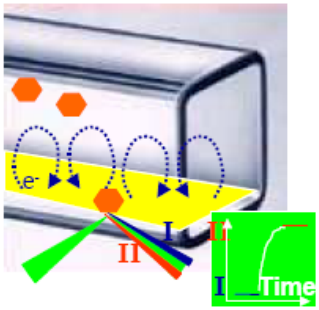

Figure 1. Virus detected in plasmon capillary

Detect and classify a virus with up to 100x better resolution and as much as 100x faster than conventional methods.

Keith Roper
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Management of Provenance & Exploratory Workflows

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Management of Provenance & Exploratory Workflows provides novel techniques and user interfaces that streamline exploratory computational processes, such as data mining, simulations, and the construction of insightful visualizations. Applicable industries include medical imaging, digital artistry and modeling. This project will transition existing university developed technology into commercial products. Specific objectives include the development of a high-quality licensable "core" library, a plug-in architecture, and a spin-off company, VisTrails, Inc. aimed at the 3-D animation software market.

TECHNOLOGY

The Center at the University of Utah continues to generate new technologies along with new patents. The spin-off company, VisTrails, Inc., has used the core VisTrails library to create a plug-in application for AutoDesk's Maya software system and Kitware's Paraview visualization system.

PROGRESS

The Center has established a spin-off company, VisTrails, Inc., incorporated as a Delaware Corporation, and based in Salt Lake City. Over the past year, VisTrails, Inc. obtained funding from the National Science Foundation (SBIR phase I and IB) the Department of Energy (SBIR Phase I) and the University of Utah (VIP award). With these funds and the help of the COE Business Team, the team created plug-in applications for Maya and Paraview. Both applications are in Beta.

Additionally, VisTrails, Inc. demonstrated at SIGGRAPH '08 in the VisTrails, Inc. booth. The demo was well received and generated over 150 leads from the conference. In Feb. 2009 VisTrails will present at the Wayne Brown Forum in Midway. This will be the start of the company's fund raising efforts.

The Center has filed 5 patent applications and has also developed a comprehensive business plan. They are also beginning to build relationships with potential partners and customers

Imagine...

Being able to track the creative process of a digital artist and use the software based history to both replicate their work quickly and precisely and to train new artists.

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MIMO Communication Systems

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for MIMO Communication Systems started the year as an academic center with a series of patent pending MIMO algorithms developed by its director. The Center's goal, along with its companion spinout, is to work with an outside ASIC development team to develop and market a prototype "System On Chip" that uses the MIMO Center's primary patents.

TECHNOLOGY

Dr. Behrouz Farhang-Boroujeny has invented a family of algorithms for reducing the complexity of the signal detection and searching process from exponential to linear. So, instead of requiring 2^X searches - the system requires Xn searches, where n is a fixed number in the range of 10 to 30. As an example, while the current three antenna system needs 4096 (2^{12}) searches, 12n searches suffice using this technology. A new system with six antennas could be deployed (using this technology) for the same processing costs of current two antenna systems.

The complexity of the signal detection and searching process has presented the industry with a natural limit on the number of transactions which could be performed cost effectively. This innovation has eliminated this natural limit. It is, by definition, a breakthrough technology.

PROGRESS

During the course of the year, the Center launched a spinout company called Advanced Signal Detection, Inc. – which is a firm entirely founded on the algorithms developed by the Center's director. At the end of the year, despite a very difficult economic climate, Advanced Signal Detection is nearing its first infusion of capital. As a business, a decision was made to secure the funding necessary to build the technology and then to sell the resulting technology. So, the role of the Business Team Partnership was entirely focused on securing capital for development and operational purposes. Accomplishments in terms of raising capital is a fairly straightforward thing. While the capital has not been raised, progress has been achieved to an unexpected degree.

Imagine...

Advanced Signal Detection

Send and receive ten or a hundred times more data through a multiple antenna system that uses the same power as a conventional antenna.

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Nanomedicine Applications in Cancer

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Nanomedicine Applications in Cancer received a Business Team grant to support the commercialization efforts for its novel, targeted nano-scale drug delivery systems for diagnostic and therapeutic purposes. The propriety technology consists of a nanoglobular delivery system capable of transporting more than one agent at a time to solid tumors in the body; e.g., contrast agents for imaging and detecting tumors, peptides for targeting tumors and chemotherapeutic agents for treating tumors without invasive surgery. The team believes its nanoglobules are the first and only rigid, three-dimensional synthetic biomaterials developed for biomedical applications. The water-soluble drug carrier is capable of orally delivering anti-cancer drugs directly to targeted organs and tumors in unmodified forms and swiftly eliminating the drug from the normal tissues of the body.

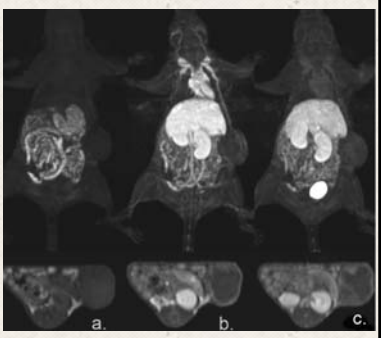
TECHNOLOGY

The initial product is a biodegradable macromolecular MRI contrast agent that can be attached to the nanoglobular delivery system and transported to solid tumors for imaging and detection. The Company's longer-term strategy is to non-invasively treat solid tumors by using its nanoglobular system to deliver therapeutic agents directly into cancerous tumor cells via targeted peptides. Features of the nanoglobular technology include oral administration, specific delivery of drug to targeted sites, and rapid clearance from the normal tissues of the body. The benefits include safer and more accurate cancer detection and more effective treatment than currently available procedures.

PROGRESS

ContraDyn, Inc. is a spinout of the Center which was incorporated in 2006. The Center has effectively demonstrated the feasibility of its contrast agents for non-invasive evaluation of therapeutic efficacy of an anticancer treatment with MRI. The center is now developing site-specific nanoscaled drug delivery system for cancer therapy. Monthly meetings have been organized with the Business Team. With the help of Business Team members, two requests for funding have been submitted to the National Cancer Institute for preclinical development of our contrast agents.

Imagine...



Being able to transport cancer fighting drugs easily and safely to targeted tissue through a carrier macromolecule.

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Nanoparticle Production

B R I G H A M Y O U N G U N I V E R S I T Y

DEFINITION OF CENTER

Cosmas, Inc. is a new licensee emerging from a Center of Excellence Business Team grant to the BYU Center for Nanoparticle Production, formerly the Center for the Production of Nanometer Sized Metals, Alloys, Metal Oxides & Mixed-Metal Oxide Powders. It will commercialize a very low energy process to produce a nearly unlimited array of different, high-quality, well-defined inorganic nanoparticles. It is positioned perfectly to take advantage of the emerging field of nanomaterials, which is just now seeing its first commercial applications. The European Commission recently published a comprehensive report which predicted that the nanomaterials market will reach 300 Billion Euros by 2015. It is the goal of Cosmas, Inc. to use strategic partnering to become a leading international supplier of nanoparticles.

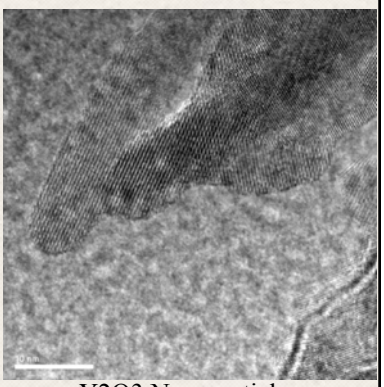
TECHNOLOGY

The Center has developed a unique synthetic method to produce a wide range of inorganic nanoparticles. They can successfully produce metal oxide nanoparticles of up to 75 different elements with little variation in the production method. The Center can make mixed metal oxide nanoparticles of any combination of any number of metals in any exact ratio, one of the most attractive features of their products. They can produce very small particles typically less than 10nm and as small as 2 nm, quite a breakthrough in size and consistency in the industry. The small size increases surface area for chemical applications and it increases efficiency in coatings. The Center can also control particle size variation, make crystalline particles which retain physical properties of the bulk material, with purity levels as high as 99.9999%.

PROGRESS

In this past year the Center has developed commercial partnerships with a variety of established chemical companies around the world. The team is currently developing these partnerships for potential commercial applications and sales. They have also scaled the process to easily produce kilogram quantities per day. Along with producing larger quantities of particles, they have developed processes to disperse the particles.

Imagine...



Y2O3 Nanoparticles

Be able to synthesize nanoparticles at a lower cost and faster than the current methods, at a purity as high as 99.99999%.

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Resveratrol Technology

BRIGHAM YOUNG UNIVERSITY

DEFINITION OF CENTER

The Center for Resveratrol Technology at Brigham Young University has developed stable analogs of resveratrol in order to commercialize novel applications such as topical (skin and hair), nutritional supplements and pharmaceutical products. The Center received a Business Team grant for the 2007-08 fiscal year to try and assist the team in their commercialization efforts.

TECHNOLOGY

Resveratrol is a compound that occurs in red wine, leading to the "French Paradox" where moderate alcohol consumption has been consistently associated with 20-30% reductions in coronary heart disease. The compound is well-absorbed in humans when taken orally, but it is not very stable. The Center's concept was to commercialize stable analogs (synthetic) versions of resveratrol to improve shelf life of compounds.

PROGRESS

The Center for Resveratrol Technology was unable to fully utilize their Business Team during the 2007-08 fiscal year and no progress was reported to the Centers of Excellence Program.

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Water Treatment Technology

U N I V E R S I T Y O F U T A H

DEFINITION OF CENTER

The Center for Water Treatment Technology (formerly Tero Technologies) received a 2007-08 COE Business Team grant. With the help of the Business Team, the Center created the spinout company Wastewater Compliance Systems (WCS), Inc. WCS addresses the need of wastewater lagoon operators who seek to comply with state and federal environmental regulations by improving efficiency and capacity of existing systems without dramatically increasing capital or operating costs. Using patented technology licensed from UU-TCO, the company provides evaluations, installation and monitoring services to wastewater lagoon operators.

TECHNOLOGY

Lagoon efficiency and utilization can be dramatically improved by creating biological conditions to enhance growth and development of diverse microbial colonies. Such colonies thoroughly consume water-borne contaminants, but exist only within a thin bio-film attached to a submerged surface exposed to varying degrees of aeration; from highly aerated aerobic zones to lesser aerated anoxic zones. Beneficial bacterial colonies also require protection from sunlight, a warm environment, and proper air-nutrient mixing.

All these conditions are satisfied with the Center's patented Poo-Gloo® submerged devices. Poo-Gloos® consist of several concentrically nested domes that economically remove water-borne containments by enhancing the growth of naturally occurring bacteria. These bacteria effectively reduce biochemical oxygen demand, total suspended solids, and ammonia (NH_3/NH_4^+) in wastewater prior to discharge. Other compounds are also removed.

PROGRESS

WCS, Inc. was formed under a Business Team partnership in February, 2008. By December 31, 2008, WCS profitably completed commercial beta projects at two Utah municipalities. Currently, WCS employs seven full and part-time persons to support 2009 operations. The Company is currently closing an initial seed investment round from the angel investor community.

Imagine...

A device that could dramatically increase the purification process of lagoons without a large investment of capital or operating costs.

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Web IDEA*SIS

U T A H S T A T E U N I V E R S I T Y

DEFINITION OF CENTER

The Center for Web IDEA*SIS is part of USU's Summit Research, which is made up of educators, researchers, and computer experts who are interested in helping educators and administrators do their jobs easier, better, more cost-effectively and in a more legally compliant way, with an initial focus on the Special Education marketplace and the requirements of the Individuals with Disabilities Education Act (IDEA). The Center sees their markets as individual schools in the Bureau of Indian Education (BIE) system, single school districts, and small consortia that cannot attract or afford the companies currently doing expensive and less effective custom web-based software. Through the IDEA*SIS software and their software support and training services, the Center offers expertly designed and written web-based programs and training materials for teachers and administrators. They also offer expertise in helping educators to collect the data they need to satisfy the ever-changing IDEA and monitoring requirements, and understand Special Education procedures, requirements, and changes.

TECHNOLOGY

Current technologies and their plan for this fiscal year include the use of a flexible and complete set of "generic," but "up-to-date" forms and reports to keep start-up costs low. The Team has implemented the use of online training materials and WYSIWYG screens and printed forms to reduce initial training needs. The Center looks to provide comprehensive Special Education administrative reports, and a superior special education partnership and close-to-the customer computer support services and response systems.

PROGRESS

Through the Business Team Partnership, the Center has accomplished the following goals. They have successfully created Summit Research, LLC, and begun preparations to take the products to market. The Center has established sales, invoicing, and accounts receivable processes, and also has implemented a web-based contact management system.

Imagine...

IDEA SIS

Improve education, research, and administration through web based programs designed to be more efficient and more cost effective.

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Program Description

PROGRAM DESCRIPTION

BACKGROUND - "OUR JOB IS JOBS"

The purpose of the Centers of Excellence Program is to accelerate the commercialization of promising technologies that have strategic value for Utah. The end goal of the COE Program is to help drive economic development and job creation.

The Centers of Excellence program plays a unique role in helping to grow sophisticated technology based companies in our state, by filling funding gaps and encouraging entrepreneurs to partner with Utah colleges and universities, to effectively commercialize technology from these institutions.

Licensee Grants Come to Fruition During 2007-08

During the 2007 Legislative Session, the Legislature passed and the Governor signed law changes to the COE statute that permitted ongoing support of grants to Licensees of technologies developed at Utah's colleges and universities. Due to these changes, during the 2007-08 selection process, Licensees of any former Center of Excellence were eligible to apply for a Licensee Grant.

For 2007-08, the funded teams included 9 Licensees, 3 of which had companion Centers which were also recommended for funding. Another 8 standalone University Centers received funding, for a total of 11 University Centers, and a final 8 University Teams were received Business Team support, which is intended to develop a better understanding of the market before further grants are made. For 2007-08, the Centers of Excellence program supported a total of 28 teams, and 25 different technologies, with 20 selected for significant development funding.

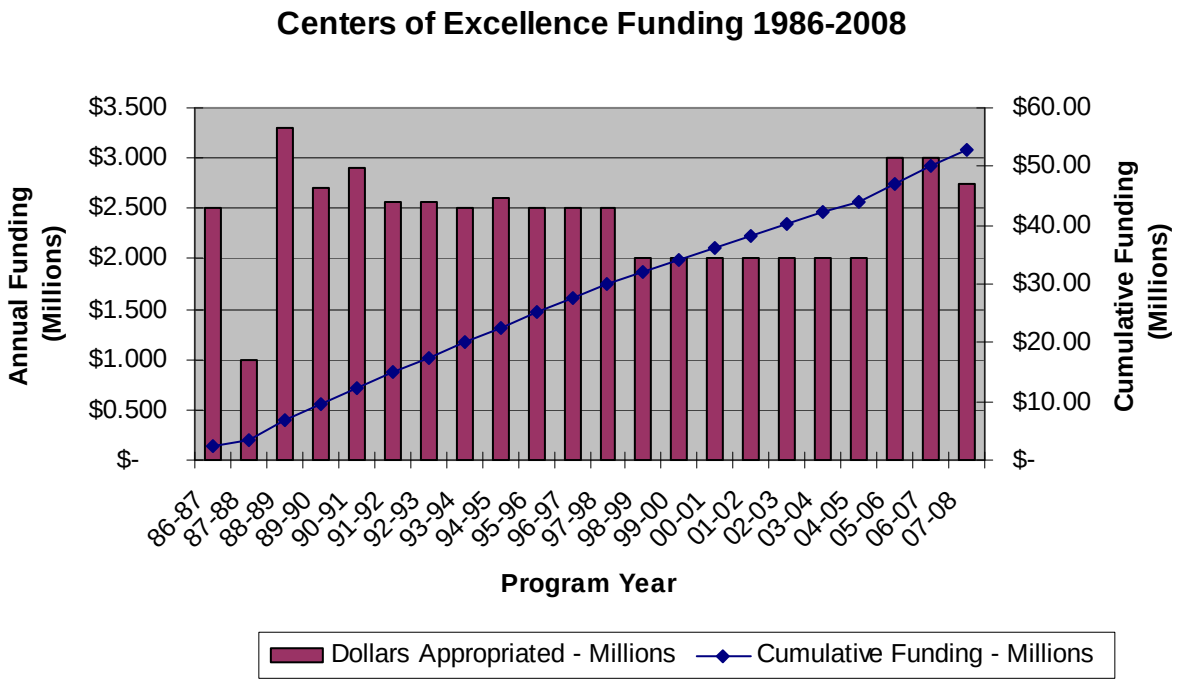
The excellent progress made by the Licensees funded during 2007-08 in creating jobs and expanding the success of their businesses and strengthening Utah's economy led to significant changes to the program for 2008-09. The program has been refocused to help provide funding to the Licensee, the company that is licensing a university-developed technology.

The intent of this grant funding is to help accelerate the process of taking these leading

edge technologies to market. Companies of any size are eligible to apply, including startups as well as existing companies that are planning to create a new product or product line from the licensed technology. The goal of these funds is to help defray the risk in taking these innovative new technologies to market in order to encourage more such licensing and the accompanying job creation that comes from exciting new market opportunities.

HISTORICAL SUCCESS AND FUNDING

Funding for the Centers of Excellence Program is granted on an annual basis by the Utah State Legislature and has varied over the past two-plus decades from year to year. Initial funding, granted in 1986 for the 1986-87 fiscal year was $2.5 million, increasing to $3.3 million to be granted during the 88-89 fiscal year and declining to between $2 and $2.5 million for much of the program's history. Since the 2005-06 fiscal year, annual funding has stood between $2.75 million and $3 million. The historical annual and cumulative totals, standing at $52.89 million at the end of the 2007-08 fiscal year, are shown in the graph below. During the 2008 Legislative session, $2.75 million was allocated to the Centers of Excellence Program for the 2008-09 fiscal year.



FUNDING ONGOING SUCCESS

Success Story #1—VisualShare

VisualShare is a pioneering life sciences software-as-a-service healthcare technology company. VisualShare provides technology that permits remotely located medical professionals to share images as well as notes and information about those images, providing access to high quality medical care and specialists for patients everywhere. This is the first solution available in the marketplace that provides real-time image collaboration across clinical locations.

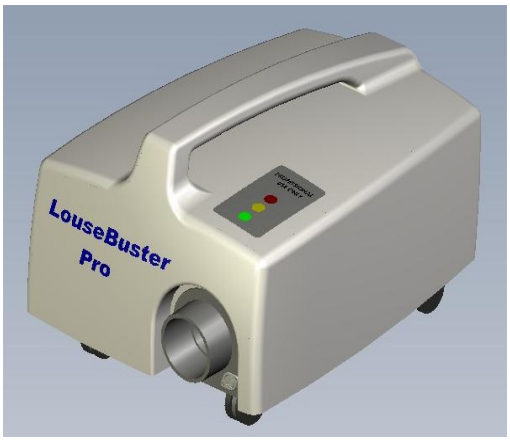
VisualShare, established in 2005, is a spin-out of the Center of Excellence for Electronic Medical Education (CEME) at the University of Utah and is also a Licensee Grant Recipient. The Company develops image-based decision support solutions for telehealth and diagnostic imaging as part of an exclusive license to all intellectual property developed in CEME.

As a Licensee grant recipient, a major goal of the Company was to use the COE funds to create two new sales and marketing positions that focused on creating brand awareness, develop a marketing plan and expand existing customer/sales pipeline. "I am grateful for the COE program because it has allowed VisualShare to hire the necessary expertise in sales and marketing that, in turn, has led to an increase in sales revenue more than five times from the previous year" says Patricia Goede, President and Co-founder.

In addition to funding new positions and thereby creating jobs for Utah, the relationship with COE provided access to business expertise that allowed the Company to gain feedback on go to market strategies, develop a business pitch and prepare for fundraising. Associates of the COE program carefully reviewed and critically evaluated the business model and facilitated introductions to the business community that led to introductions to the larger investment community. "The COE program contributes tremendous value in helping to develop a network of opportunities for companies and the Utah business community" states Goede "the human resources at COE take a hands on approach and are very supportive of each center".

Success Story #2—Larada Sciences

Larada Sciences Inc. formed in 2006, delivers medical products and services based on breakthrough technology, for the safe and effective non-chemical treatment of head lice. Pediculosis (head lice) is a multi-billion dollar problem that afflicts about 25% of children by the time they're teenagers and the problem is growing rapidly because head lice are evolving resistance to many of the currently used lice pesticides. Larada's first product, the "LouseBusterT", is a medical device that uses a high volume of warm air to kill head lice and their eggs, in a way that is completely chemical-free, safe, effective, inexpensive, and requires only one treatment lasting about 30 minutes.



Larada Sciences is a spin-out company of the University of Utah Center for Alternate Strategies for Parasite Removal. The LouseBuster technology was the driving innovation behind the Center. This device (the "LouseBuster™"), kills lice and their eggs with a large volume of warm air, precisely temperature-controlled, that is delivered to the patient through a special applicator that exposes lice and eggs clinging at the base of hair shafts to the air. Preliminary trials have demonstrated the device is safe and very effective, killing virtually all eggs and a majority of hatched lice, leading to cure rates of virtually 100% from a single 30 minute procedure. Patents are pending and licensed, and full clinical trials are currently underway that will lead to FDA clearance and CE marking. The company will soon be ready to complete the final product design and certification testing, then scale-up for manufacturing and market entry.

COEP funding has helped Larada achieve significant milestones including:

- Developing critical proof-of-concept and working prototypes
- Attracting matching funds for research and development
- Attracting research and distribution partners
- Expanding intellectual property rights
- Securing a major round of private investment capital

"We consider our relationship with the COEP and the State of Utah more than a small affiliation. The plain truth is that Larada Sciences would have never gotten off the ground or grown, or been able to grow as fast as we have without the financial support of the COEP". Randall Block, President & COO

CENTER SELECTION PROCESS

The purpose of the Centers of Excellence Program is to accelerate the commercialization of promising technologies that have strategic value for Utah. The end goal of the COE Program is to help drive economic development and job creation.

"Our Job is Jobs"

Selection Process

For the 2007-08 selection process, the Centers of Excellence program kept in place last year's changes to the selection process which proved to be very effective.

The COE Advisory Council is a group of experienced, seasoned technology industry executives, CEOs and CTOs, VPs and Senior Directors, who are interested in helping Utah and the Centers of Excellence Program. This year there were 34 volunteer reviewers, 13 of them new to the program this year. Together the Advisory Council contributed more than an estimated 600 hours of volunteer time to the selection process. For the 2007-08 selection year, the COE Advisory Council conducted 55 reviews, including 9 that included both a University Center proposal and a Licensee (company) proposal, for a total of 64 funding opportunities. There were 41 university proposals, and 23 Licensee proposals, including the 9 "companion" Licensees. The funding requests totaled $10,050,656, more than 3 times the COE budget of approximately $3 million. After completing these 55 separate review meetings, the reviewers met in 3 sub-committees. These sub-committees are:

- Materials / Manufacturing / Environmental / Energy
- Information Technology / Communications / Aerospace/Defense / Electronics/ Electrical Devices
- Life Sciences / Other

Each sub-committee, comprised of the reviewers in that area, met for a 5-6 hour sub-committee meeting where they discussed each proposal, evaluated the proposed funding request, and made the initial recommendations for funding and amount of funding. Each proposal that was recommended for funding also received a score on a scale of 0-5 (5 is high score). The average of the reviewers score was assigned to the proposal, and then each sub-committee's selections were ranked by score. This process narrowed the field of proposals from 64 down to 35 which were considered by the full Advisory Council.

On May 22, 2007, the COE Advisory Council met as a group to review the entire slate of potential Centers and make the final funding recommendations. The Council reviewed the "top 9" recommendations from the sub-committees, 3 from each group and

voted to accept these as a group. Next, the Council worked its way down the list of sub-committee recommendations, in descending order of score, rotating through each sub-committee. The Council then either accepted the committee's recommendation, or modified the recommendation. Each recommendation was accepted by a majority vote, and the process of discussion and recommendation continued until a majority vote was reached for each proposal. At the end of the process, the Council also accepted the list of all of those proposals which were not recommended for funding. The Council then allocated approximately $186,000 to be used for a second round of business team funding and for additional business team funding for this year's Centers, under the discretion of the COE Director.

As it was last year, this process was very successful this year and allowed reviewers to go deep into technical and market issues within the sub-committee, while still allowing the entire Council to provide the "give and take" of the collective perspective for all recommendations. The bar was high for any Center to receive a recommendation for funding, and difficult decisions had to be made, given the extremely high number of proposals this year compared to last year. The key requirements for funding this year included: The potential for a technology to create a large Utah employer (100 or more employees), whether the proposing team was credible to accomplish the needed commercialization activities, and for teams already in the program, whether the program was "on track" and meeting key milestones.

Evaluation of Licensee Grant Concept during 2006-07

During the 2006-07 year, we performed an evaluation of the concept of licensee grants, providing small grants of funds to two licensees, Flying Sensors and Glycosan Biosystems. During the 2007 Legislative session, GOED approached the Legislature to make permanent changes to the COE statute in order to permit this type of program on an ongoing basis. Both companies' CEO's testified to the legislature of the value of these grants to their businesses, allowing them to quickly secure additional capital, sales, or both and move their businesses rapidly forward. Their success helped the Legislature support these statutory changes.

Grants to Licensees

During the 2007 Legislative session, the Legislature passed House Bill 125, attached as an appendix to this report, which permits the Centers of Excellence program to grant funds to any licensee of a technology developed at one of Utah's colleges or universities. This significant change was intended to help "bridge the gap" in the process of maturing a technology out of the university and into industry. In particular, these funds are intended to complement the friends and family and angel rounds of funding – funding which can be very challenging to get here in Utah. This funding gap can also delay the ability to take a technology to market, as it may take an entire year to

raise a first round of funding here, where it might take only 3-6 months in other parts of the country.

Throughout the history of the program, Centers spinouts have not been immune to these market dynamics. Therefore, this year, the Utah Legislature passed the bill permitting licensee grants.

It is important to understand the appropriate role of the COE Licensee grants. These are not intended to replace private capital, but to augment it. In cases where Licensee applicants this year either had received actual venture capital or had projected revenues in excess for $1million per year, the council was very clear that these were not appropriate uses of the COE licensee grant program. In cases where the team had been able to raise or was in the process of raising angel funds, the COE Licensee grants were deemed entirely appropriate in the context of the Legislature's intent.

New Concept implemented in 2006-07 - Pre-Proposal Business Teams

Last year, after reviewing 35 proposals, it was clear that every New Center Proposal could have benefited from a business team in advance of the proposal process. Some seasoned business advice could have helped clarify the business strategy as well as the job creation potential. Under the "Pre-Proposal Business Team" Concept, a pre-proposal solicitation went out in late summer, and applicants went through an abbreviated application process. Seven (7) additional proposals were selected for business team support in early fall 2006. Of these 7 teams, 3 received core funding this year, and another 2 were granted another full year of business team support. For these two, the Council felt that although progress had been made in clarifying the "go to market" strategy, additional effort was needed to get a complete plan in place. This year, it is hoped that we will be able to offer the business team solicitation even earlier in the year for additional time for business plan development.

FUNDING SUMMARY

For the 2007-08 selection process, the Program received a total of 64 proposals with a total of 55 reviews as 9 of the reviews were concurrent reviews of both a university Center proposal and a licensee proposal for that technology. There were 23 total licensee proposals and 41 university proposals and total funding requests exceeding $10 million.

The final recommendations for funding include 9 licensees, 3 of which had companion Centers which were also recommended for funding. Another 8 standalone University Centers (the more traditional model) were recommended for funding, for a total of 11 university Centers, and a final 8 university teams were recommended to receive Business Team support. This totals 28 teams selected for support of one kind or another, and 20 recommended for "core" support (Center or Licensee grant). This also represents 25 different technologies with support this year.

6 existing university Centers were renewed this year, and 5 new Centers were granted this year. Of last year's 28 teams which received support in some way, including 16 funded university teams and 12 teams receiving business team support, the following statistics are of interest. Ten (10) university teams were selected for funding. Of these, three (3) also had companion licensees, six (6) were existing funded Centers for 2006-07 and four (4) were awarded Business Teams last year. The last of the 11 centers selected for funding was a new Center proposal that had not received a business team last year.

Another 3 of last year's 28 teams had a licensee funded, but the center was not funded. This reflected the fact that these Centers were viewed as ready to transition into the licensee and serves as incentive for the teams to accomplish this transition completely out of the university. Three of last year's 28 teams were granted a follow-on full year of Business Team support. Finally, twelve of last year's teams were not funded. Three (3) of these completed their participation in the program and graduated, 3 did not apply, and 6 applied but were not renewed.

In addition, out of the 5 new university teams selected for funding this year, 4 of them had business teams last year and the fifth had an experienced former Center Director as a co-PI. This reflects the view of our COE advisory council that having a business team work with a Center before receiving funding helps establish confidence in the market and in the team. It is a way of reducing the risk to the taxpayer. There were many new Centers this year that had hoped for funding, but who received a business team. Of the 29 proposals for new university Centers, 8 received business team funding and 5 received core funding, for a total of 13 receiving support in some way.

Approximately $2.4million of the program budget went to "core support" grants, with

just under $1.3 million going to licensees and the remainder, just over $1.1million going to Centers. In addition, all university teams also receive business team support, which is funded separately and is expected to be $200,000 this year for 8 teams. Another $225,000 is scheduled to be invested in Business Team Grants to potential Centers.

The largest single core grant was $190k to a Licensee, and the largest "total" funding to a single technology, was $200k (a combination of a Center and Licensee). In addition, for the first time, grants were made to Southern Utah University and the College of Eastern Utah under the updated matching grant program passed in the 2006 legislative session. Under this program, non-doctoral granting schools are required to have a 1:1 funding match. Grant recipients from institutions offering doctorate degrees are still required to have a 2:1 funding match.

Funds Allocated by the Legislature + Carryover	~$3,000,000
Direct Center Funding (Technology Funding to Centers)	**$ 1,109,318**
Licensee Funding	**$ 1,285,000**
Business Team Funding for Centers*	$ 200,000
Business Team-ONLY Funding*	$ 225,000
Funding for 2007-08 pre-proposal Business Teams and additional Business Team Support	$ 180,682
* Average estimated funding of approx. $25,000 per Center customized based on Center needs. Paid and Managed directly by COEP	

2007-2008 Selection Process

Some statistics on the applicants and awardees are listed below.

Total Number of University Proposals for 2007-2008	**41**
Total Number of Licensee Proposals	**23**
Total Number of REVIEWS for 06-07	**55**
Total Number of Funding Opportunities	**64**
Existing Centers Seeking Renewal	**12**
Proposals for New Centers	**29**
Proposals from BYU	**12**
Centers + Licensees funded from BYU	**2**
Proposals from U of U	**32**
Centers + Licensees funded from U of U	**12**
Proposals from USU	**17**
Centers + Licensees funded from USU	**4**
Proposals from SUU	**1**
Centers + Licensees funded from SUU	**1**
Proposals from CEU	**1**
Centers + Licensees funded from CEU	**1**
Proposals from WSU	**1**
Centers + Licensees funded from WSU	**0**
Centers + Licensees Funded	**20**
Existing Centers Renewed	**6**
New Centers Funded	**5**
Licensees Funded	**9**
Centers with Business Team Grants	**8**
Total of Centers Supported for 2007-08	**28**
Total of Technologies support for 2007-08	**25**
Graduating Centers at end of 2006-2007 year	**3**
Existing (06-07) Centers not renewed for 07-08	**6**
2006-07 Teams that did not apply for 07-08	**3**

Centers by Technology Area	
Mat./Mfg./Energy/Environment Total	**8**
Licensee + University Core Funding	6
Business Team Only	2
Inf. Tech / Aerospace/ Defense/ Electronics Total	**9**
Licensee + University Core Funding	6
Business Team Only	3
Life Sciences	**11**
Licensee + University Core Funding	8
Business Team Only	3
Total Recommended for Funding	**28**

Distribution by University

	Centers	Biz Teams	Licensees	Total
BYU	**1**	**2**	**1**	**4**
USU	**3**	**1**	**1**	**5**
UU	**5**	**5**	**7**	**17**
CEU	**1**	**0**	**0**	**1**
SUU	**1**	**0**	**0**	**1**
WSU	**0**	**0**	**0**	**0**
Total Supported Teams	**11**	**8**	**9**	**28**

Business Team Enhancement to Accelerate Time to Market

The second year of the COE Business Team program, which uses a State RFP to recruit seasoned entrepreneurs and technology executives to assist the Centers, has been very successful. Of this year's licensee grants, 6 of them have emerged from current Centers with the strong support, and in 4 cases direct participation, of the business team members. In addition, one of the Licensees from a graduated Center also includes a former Business Team Member who spent a year to get the Licensee up and running in partnership with the Center Director.

We have been fortunate that we have been able to recruit so many experienced individuals who have been able to help foster not only the plan and strategy, but also the actual process, of taking these technologies into the market. This year's process produced 4 new spinouts, in addition to the two that received Licensee grants last year. All of these were deemed by the Council to be on a strong track for success, with experienced management in place, which reflects very well on the past 2 years of the Business Team program.

COMMERCIALIZATION PROCESS

The COE program continues to work to assist both Centers and Licensees in tapping resources and expertise to help them grow to be successful companies in Utah. The Business Team program continues and the COE program partners with a variety of existing non-profits to help teams establish industry relationships. These groups include the Wayne Brown Institute, the Utah Fund of Funds, the Utah Technology Council and the Utah Fund of Funds.

2007-2008 Financial Summary

The Financial Summary is a summary of the information provided by each Center in their annual report to the program and the funding summary is based on the funds granted during the fiscal year. For reference, "Total Funding" means COE funding since starting with the program, "Patents Pend. 07-08" means patents newly filed during the fiscal year, "New Patents (Issued)" refers to those issued during the fiscal year and "Spin-Offs/ Licensees" refers to companies which have been formed to "spin-off" technology from the Center while "Licensees" refers to companies which already existed which have licensed the technology.

University	Funded Centers	07-08 Funding	Total Funding	07-08 Matching	Patents Pend. 07-08	New Patents (Issued)	Spin-Offs/ Licensees
UU	Cellular Therapy and Regenerative Medicine	100,000	100,000	655,983	1	0	2
CEU	Clean Coke Technology	125,000	125,000	488,835	1	0	1
USU	Control of Flow in Manufacturing	175,182	330,490	592,779	2	0	1
UU	Tungsten Carbide and Diamond Composite	125,000	250,000	372,853	4	0	1
SUU	High end Pharmaceutical and Biomedical Process Optimization	59,760	59,760	35,000	2	0	0
USU	Hybrid and Adaptive Multimedia Processors	50,000	50,000	98,000	2	0	1
UU	Microarray Technology	50,000	250,000	507,280	5+	0	1
UU	Nanopore Sensor Technologies	125,000	125,000	502,000	4	0	1/2
UU	Therapeutic Biomaterials	70,000	570,000	698,000	4	0	4
USU	Thermal Management Technologies	154,376	154,376	518,283	2	0	1
BYU	Unmanned Air Vehicles	75,000	481,385	675,000	0	1	2
University	**Funded Companies**	**07-08 Funding**	**Total Funding**	**07-08 Matching**	**Patents Pend. 07-08**	**New Patents (Issued)**	**Spin-Offs/ Licensees**
USU	Dynamic Screening Solutions	150,000	150,000	102,567	NA	NA	NA
BYU	Flying Sensors	125,000	200,000	325,000	NA	NA	NA
UU	Glycosan BioSystems	75,000	135,000	-	NA	NA	NA
UU	LARADA Sciences	170,000	170,000	-	NA	NA	NA
UU	Nano-Oxides, Inc.	150,000	150,000	-	NA	NA	NA
UU	Navigen Pharmaceuticals, Inc	190,000	190,000	-	NA	NA	NA
UU	Philotek, LLC	100,000	100,000	605,000	NA	NA	NA
UU	State of RT	175,000	175,000	225,000	NA	NA	NA
UU	VisualShare, LLC	150,000	150,000	939,000	NA	NA	NA

University	Business Team Grant Recipients	07-08 Funding	Total Funding	07-08 Matching	Patents Pend. 07-08	New Patents (Issued)	Spin-Offs/ Licensees
UU	Bimolecular Nanophotonics	Business team N/A	N/A	N/A	5	1	1
UU	Management of Provenance & Exploratory Workflows	Business team N/A	N/A	N/A	1	0	1
UU	MIMO Communications Systems	Business team N/A	N/A	N/A	4	3	1
UU	Nanomedicine Applications in Cancer	Business team N/A	N/A	N/A	3	0	1
BYU	Nanoparticle Production	Business team N/A	N/A	N/A	1	0	0
UU	Water Treatment Technology	Business team N/A	N/A	N/A	2	0	1
USU	Web IDEA*SIS	Business team N/A	N/A	N/A	0	0	1

2008-2009 Funded Centers

2008-09 Selection Process Completed in Calendar Q2 2008.

For the 2008-09 selection process, there were two categories of eligible applicants. First were 5 University Centers which had received their first year of funding in 2007-08 and who were eligible for a second year of funding as a university Center. The second group was any company, an existing firm or a startup, which was newly licensing a university developed technology.

For the 2008-09 Solicitation, 3 of the 5 eligible University Centers and 36 Licensees submitted proposals for a total of 39 proposals received, of which 21 Licensees were selected for funding and 1 University Center recommended for a second year of funding, bringing the total to 22 proposals recommended for a COE grant this year.

For the 2008-09 fiscal year funding recommendation, the Centers of Excellence Program continued to refine the selection process. As always, the linchpin of the Centers of Excellence program is the COE Advisory Council, anchored by members of the GOED Board and by the State Advisory Council on Science and Technology.

The COE Advisory Council is a group of seasoned technology industry executives, CEOs and CTOs, VPs and Senior Directors, who are interested in helping Utah and the Centers of Excellence Program succeed. This year there were 28 volunteer reviewers on the Advisory Council, 5 of them new to the program for 2008-09. For the 2008-09 selection year, the COE Advisory Council conducted 39 reviews of 3 University Center proposals and 36 Licensee Grant proposals. The funding requests this year were in excess of $4.5million, significantly exceeding the current COE budget of $2.75 million.

Funding Recipients for the 2008-09 Centers of Excellence Program

Funding Recipients which are Licensees (Companies) of Center Supported, University Developed Technologies

Licensee / Center (University) Years Funded to Date Award Amount

Advanced Composite Solutions (Licensee of Center for Advanced Structural Composites – BYU) Jonathan Adams, Founder/CEO NEW as a company $100,000

Taking to market a premier composite 3D structural technology, IsoTruss® that delivers extremely high strength, very light structures. ACS has successfully introduced the IsoTruss® technology through our Delta 7 subsidiary (www.delta7sports.com) by producing high-end handcrafted bicycles. The company's long term strategy includes Recreation, Aviation & Manufacturing. New innovations include new tooling and manufacturing techniques permitting cost reduction while maintaining performance.

CastleRock Engineering, Inc (Licensee of Center for Control of Flows in Manufacturing USU) Angela Minichiello, President 1st year as Licensee $75,000

CastleRock Engineering Inc. will commercialize two technologies developed at Utah State University (USU): Aerodynamic Vectoring Particle Sorting (AVPS) and Coanda-assisted Spray Manipulation (CSM). Each technology applies flow control techniques to particle laden flow streams to improve current, and enable new, more efficient particulate based manufacturing processes.

ContraDyn, Inc. (Licensee of Center for Nanomedicine Applications in Cancer U/ U) Dennis Farrar, CEO 1st as Licensee $100,000

"ContraDyn is a startup focused on commercializing targeted nanoglobular drug delivery systems, which the Center has developed. These novel three-dimensional globular structures can carry multiple compounds including small molecule drugs, imaging agents and targeting peptides directly to cancer tumor sites at lower doses, reduced systemic toxicity, and much greater therapeutic efficacy than other delivery technologies. Delivery of off patent or well studied but unapproved drugs should substantially abbreviate FDA approval requirements."

Licensee / Center (University) **Years Funded to Date** **Award Amount (cont.)**

COSMAS, Inc. (Licensee of Center for The Production of Nanometer Sized Metals, Alloys, Metal Oxides & Mixed Metal Oxide Powders BYU)
Lynn Astle, CEO **New as company** **$100,000**

Cosmas, Inc. will commercialize a solid state process to produce a nearly unlimited array of high quality, well-defined metal oxide, mixed metal oxide, metal and metal alloy nanoparticles. The process is simple, requires comparatively little energy (i.e., low cost) and is easily scalable for production. It produces products up to 99.999% pure, as small as 1 nm, with size distributions of typically ±10%. Applications include protective coatings, catalysts, batteries & fuel cells, electronics and ceramics.

CRE Energy, Inc (New License – BYU)
Dr. Ralph L. Coates, President **New as company** **$100,000**

The central mission of CRE is to demonstrate and commercialize the Clean Shale Oil Surface Process (CSOS), incorporating patent pending CRE technology, and sublicensed BYU technology for CO2 management. Demonstrated technology for significant production of gasoline and diesel with no CO2 emissions; compliant with UT/Federal emissions regulations.

GlycoMira, Inc. (New Licensee – U/U)
Thomas P. Kennedy, MD and Glenn D. Prestwich, PhD, Cofounders and Co-inventors
New as company **$100,000**

GlycoMira ("Amazing Sugars") is a development stage pharmaceutical company targeting the topical treatment of inflammatory skin diseases affecting over 100 million Americans. GlycoMira's motto is "From Life. For Life." Our proprietary sulfated compounds are derived from the natural sugar hyaluronic acid to make remarkably potent drugs that block inflammation. Our topical therapeutics have the potential to restore health and quality of life to those suffering from disfiguring diseases such as rosacea, psoriasis, eczema, acne, and actinic keratosis.

Heavystone Laboratory, LLC (Licensee of Center for Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials U/U)
Dr. Zak Fang, Principle & CTO, Dr. Al Poskanzer, CEO
1st year as Licensee **$120,000**

Developing advanced composite materials with predictable wear and failure characteristics designed for demanding applications such as mining, drilling, and grinding. These new materials developed at the University of Utah are designed to extend the life of tools and bits used in oil and gas drilling, metal cutting, milling, drilling, mining, construction, and other wear resistant tools.

Licensee / Center (University) **Years Funded to Date** **Award Amount (cont.)**

International Reservoir Simulation Research Institute, Inc. (New License – BYU)
Hugh B. Hales (Key contact/PI) **New as company** **$50,000**

International Reservoir Simulation Research Institute, Inc. (IRSRI) will employ new technologies developed at Brigham Young University's International Reservoir Simulation Research Institute, particularly a high performance, high speed Pressure Solver, to revolutionize the reservoir simulation industry. Reservoir simulation is the use of computer programs to model the production of oil and gas from oil fields allowing optimization of actual production, helping to increase the world's oil supply.

Larada Sciences, Inc. (Licensee of Center for Alternate Strategies of Parasite Removal (U/U) Larry Rigby, CEO **2nd year as Licensee $80,000**

Larada Sciences Inc. is a University of Utah spinout company formed in 2006 to deliver medical products and services based on breakthrough technology for the safe and effective Nonchemical treatment of head lice. Pediculosis (head lice) is a multibillion dollar problem that afflicts about 25% of children by the time they're teenagers and the problem is growing rapidly because head lice are evolving resistance to many of the currently used lice pesticides. Larada's first product, the "LouseBusterT", is a medical device that uses air to kill head lice and their eggs, in a way that is completely chemicalfree, safe, effective, inexpensive, and requires only one treatment lasting about 30 minutes.

Millenniata, Inc. (New License – BYU)
Henry J. O'Connell, Pres./ CEO/Founder **New as company** **$85,000**

Millenniata has licensed optical data storage technology from BYU that is the first permanent, Backwards compatible archiving solution for the digital age. Millenniata's new Write Once Read Forever ™ DVD technology will provide secure, accessible, permanent data storage in excess of 1000 years for all types of digital records, data, and media. The patented Milliennial Disc™ is made from materials known to endure for centuries, yet is readable in any standard DVD drive so it can easily be used by business, institutions, and families.

NeuroAdjuvants, Inc. (New License – U/U)
Theodore Stanley, M.D., Pres. & CEO **New as company** **$100,000**

NeuroAdjuvants, Inc. will develop and commercialize a proprietary platform technology enabling multiple "first in class" neuropeptide based therapeutics for a wide variety of neurologic and psychiatric disorders. This platform provides a breakthrough ability to harness therapeutic potential of neuropeptides and provides both stability & blood-brain-barrier permeability. The initial focus is to identify novel therapies for pain and epilepsy with future potential applications to other neurologic and psychiatric disorders.

Licensee / Center (University)	Years Funded to Date	Award Amount (cont.)

RUReady, Inc. (New License – U/U)
Charles Wight, Managing Director **New as company** **$100,000**

RUReady is a company that provides an interactive and self paced online learning program for mathematics that bridges the academic gap between high school curriculum and college requirements. Using RUReady instead of college based remedial classes reduces institutional costs of remedial instruction and provides curriculum based, open-ended questions, creativity assessment, hints, instant error feedback, and partial credit scoring, providing a "teacher like" experience online, at a fraction of the cost of traditional instruction.

Sera Prognostics, Inc. (New License – BYU and U/U Joint Biomarker Center)
Dennis Farrar, President & CEO **New as company** **$100,000**

Sera Prognostics will identify and commercialize peptide biomarkers that are predictive of preterm birth (13% of pregnancies), preeclampsia (5%) and other pregnancy complications. These biomarkers have emerged from the Joint Biomarker Center, a collaboration between BYU and the University of Utah with blood samples provided by the U of U and serum proteomics performed at BYU. So far, Sera has identified 5 biomarkers for PTB and 2 for PE. Both conditions can be treated, with outcomes significantly improved by early detection.

STEDI, LLC (New License – USU)
Geoffrey G. Smith (Key contact) **New as company** **$100,000**
STEDI is licensing from Utah State University's Substitute Teaching Institute a training solution and materials to train substitute teachers. 70% of substitutes in the U.S. are not trained and STEDI provides the only university based training program for Substitutes. Via the university, STI/USU has sold materials for 13 years, and sales last year were $900,000. The system currently reaches 900 of the nation's 16,000 school districts, but only 38 have sales of $5,000 or more. STEDI, LLC will allow significant expansion of the reach for this system to help train America's substitute teachers.

TSplines, Inc. (New License – BYU)
Matt Sederberg, CEO **New as company** **$100,000**

TSplines, Inc. has licensed from BYU a revolutionary new technology, TSplines, that solves significant modeling problems in computer-aided design (CAD). This new technology, which is compatible with NURBS (nonuniform rational Bsplines— the industry standard technology), creates analysis ready CAD models by default, and also introduces timesaving animation modeling workflows to CAD, two breakthroughs which significantly reduce the design time of product development. Current company products focus on industrial design and architecture, and COE funding will help the firm expand into aerospace, automotive and analysis.

Licensee / Center (University) **Years Funded to Date** **Award Amount (cont.)**

Thermimage, Inc. (New License – U/U)
Douglas Turnquist, President & CEO **New as company** **$100,000**
Thermimage, Inc. has invented a noninvasive, painless and less costly way to produce deep tissue temperature measurements. The device will first be used to diagnose Vesicoureteral Reflux (VUR) in children, a dangerous condition that allows urine to backflow into the kidneys of young children. The current procedure is painful and requires the use of catheters and ionizing radiation, where this new technique will heat the bladder contents and then detect any increase in temperature in the kidneys signaling reflux.

TMT, Inc. (Licensee of Center for Thermal Management Technologies USU)
Forrest Fackrell & Clair Batty **1st year as Licensee** **$100,000**

Thermal Management Technologies, L.L.C. is a new spinout of the Center of the same name at Utah State University. The company will create solutions for high performance thermal management challenges. Products include flexible thermal links for thermal connection and mechanical isolation used in imaging satellites with commercial applicability to aircraft, automobiles, and communications systems; and channeled cooling panels for rapid response spacecraft with commercial applicability to computer and electronics cooling.

Torion Technologies, Inc. (New License – BYU)
Dr. Douglas Later, President and CEO **New as company** **$100,000**
Torion Technologies, Inc. is commercializing the GUARDION™7 chemical detector using technology developed at BYU. The GUARDION7 is a hand portable, sensitive, selective, and rapid instrument for detecting chemical threats. The GUARDION7 is lightweight, reliable, and easy to use and detects hazardous compounds in as little as 30 seconds. Key markets for the gas chromatograph toroidal ion trap mass spectrometer (GCTMS) include the defense and military, first responders, security, environmental, and forensics.

VisTrails, Inc. (Licensee of Center for Management of Provenance & Exploratory Workflows U/U) Greg M. Jones, PhD, CEO **1st as Licensee** **$200,000**

VisTrails' goal is to “Provenance Enable the World” and become the leading provider of software solutions for the provenance of computational tasks. Based on our patent pending technology, VisTrails is developing provenance enabled management solutions for complex software applications, offering new functionality that will revolutionize the way people explore, analyze, and create data. This technology dramatically improves such tasks as: improving animation and graphics consistency and speed, calibrating simulations for hedge funds, for locating oil wells, and review and analysis of medical images.

Licensee / Center (University)	Years Funded to Date	Award Amount (cont.)
Wasatch Nanopore Sensors, LLC (Licensee of Center for Nanopore Sensor Technologies UU) William Pagels, PhD CEO	**1st Year as Licensee**	**$100,000**

Wasatch Nanopore Sensors (WNS) is a recently formed spinoff from the Center for Nanopore Sensor Technology (CNST) to commercialize nanopore sensor technology fabricated from glass, quartz and other materials. A nanopore sensor relies on molecule and particle transport through a single conical shaped pore that can be modified by chemical methods to design sensors for different applications. These extremely sensitive sensors are useful in key applications such as DNA sequencing and particle size analysis.

Wastewater Compliance Systems, Inc. (Licensee of Center for Water Treatment Technology U/U) Fred Jaeger, President	**1st Year as Licensee**	**$100,000**

The company addresses the need of wastewater lagoon operators, generally municipalities, who seek to comply with state and federal environmental regulations by improving efficiency and capacity of existing systems without dramatically increasing capital or operating costs. The company provides robust, low cost ways to remove common pollutants such as nitrogen compounds from lagoon systems with a submergible, domed shaped aeration device that resembles an igloo. The patented "pogo" is simple and inexpensive to build and easy to install and maintain.

University Centers of Excellence

Center (University)	Years Funded to Date	Award Amount
Center for Clean Coke Technology (CEU) Dr. Robert Topping, PI	**1**	**$275,000**

This team, led by the College of Eastern Utah's Western Energy Training Center, aims to commercialize research to create Clean Coke from coke fines and waste products and to develop process control expertise by developing a pilot scale facility. The pilot scale facility will demonstrate the upgrading of carbonaceous feedstocks by calcining and briquetting into Clean Coke products.. This Center also intends to use the pilot plant and related expertise to enhance the training and expertise of employees throughout the area served by CEU.

Graduating Centers June 30, 2008 (Completed)

Flying Sensors (Licensee of Miniature Unmanned Air Vehicles) (BYU)

Developing commercial (nonmilitary) applications for miniature unmanned air vehicles (UAVs) including Real Estate, Insurance Industry, EPA MultiSource Air Quality Sampling, Random Testing, Pipeline/Remote Facility Surveillance and Emergency Response/Fire Monitoring – Forest & Commercial.

Center for Miniature Unmanned Air Vehicles (BYU)

Companion Licensee Flying Sensors also funded Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies. An autopilot design has been licensed to Procerus, Inc. in Utah.

Glycosan BioSystems, Inc. (Licensee of Therapeutic Biomaterials) (U/U)

Commercializing the compounds from Therapeutic Biomaterials for 3D Cell Culture, Tissue Engineering, Drug Toxicity Testing, & Skin Care.

Center for Therapeutic Biomaterials (U/U)

Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs. Three companies, 1 in California (Carbylan) and 2 in Utah (Sentrx Animal Care and Glycosan Biosciences) have been spun out of the Center to date.

Center for Hybrid & Adaptive Multimedia Processors (CHAMP) (USU)

Commercializing tools and software systems to accelerate time to market of new features for multimedia consumer devices.

Center for Microarray Technology (U/U)

Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Navigen, Inc. (Licensee of Center For Vascular Biotherapeutics) (U/U)

Proof of concept in animal models of stabilizing vasculature in macular degeneration and acute lung injury based on a new signaling pathway that regulates the balance between vascular regeneration and stabilization.

Nano-Oxides (Licensee of Nanosize Inorganic Material Powders By Molecular Decomposition) (UU)

Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

State of RT (Licensee of Interactive Ray Tracing & PhotoRealistic Visualization) (U/U)

Commercializing a software module to deliver real time ray tracing to existing graphics modeling tools and to deliver next generation game development tools based on ray tracing to the market.

VisualShare (Licensee of Center of Excellence for Electronic Medical Education (CEME) (U/U)

Commercializing multiuser real-time image conferencing using the Software as a Service (SaaS) Model. This technology provides the remote convergence of images & text for distributed user populations and permits knowledge capture for legal and compliance purposes. First application is for child abuse situations in rural/remote areas to involve specialists in diagnosis of consequences.

Center for High End Pharmaceutical and Biomedical Process Optimization (SUU)

Southern Utah University has established a high performance supercomputing facility to enable high fidelity computer modeling of topics of importance to regional industry. The goal of this Center is to partner with a regional pharmaceutical business to develop a 3dimensional model of a fluidized bed reactor to help optimize their multiphase production processes using computational fluid dynamics. Obviously of interest is to determine if such modeling could be expanded from a single partner to broader applications.

Legislation Passed in 2007 Session (Effective July 1, 2007)

Centers of Excellence Legislation Passed in 2007 Session-Effective July 1, 2007

During the 2007 Legislative session, the COE Director worked with Rep. Bradley Daw to incorporate into the Centers of Excellence statute, changes that would encourage the granting of funds to Licensees of technologies developed at Utah's Colleges and Universities. The goal of these changes was to help such licensees cross the so-called "Valley of Death" that often faces companies starting up with a technology from a university in hand. These companies face significant funding hurdles, the and goal of the COE program is to help mobilize private sector investment in these technologies.

Representative Daw sponsored House Bill 125 with Senate sponsor Senator Sheldon Killpack, to permit grants to licensees of University developed technologies. In addition, the statute was clarified to more fully instantiate the Business Team program.

The selection process for the 2007-08 fiscal year included grants to "companion licensees", based on these statutory changes.

Enrolled Copy H.B. 125

CENTERS OF EXCELLENCE AMENDMENTS

2007 GENERAL SESSION

STATE OF UTAH

Chief Sponsor: Bradley M. Daw

Senate Sponsor: Sheldon L. Killpack

LONG TITLE

General Description:

This bill modifies the Centers of Excellence Act by creating a commercialization grant component to more readily link companies with college and university researchers in transitioning their research developed technologies into industry.

Highlighted Provisions:

This bill:

< modifies the recognized purposes of the Centers of Excellence Act to include facilitating the transition of research generated technologies from the state's colleges and universities into industry to grow and expand the state's economy;

< provides that, in addition to state colleges and universities, Centers of Excellence grants may be awarded to companies that are working in partnership with colleges and universities and their researchers to transition their research generated technologies into industry for economic development;

< provides that a repayment by a college or university of grant proceeds or a portion of grant proceeds shall come only from the proceeds of a license established between the company and the college or university, or in the case of a company that receives a grant, from the proceeds of the license to that company; and

< provides that the Governor's Office of Economic Development may enter into work agreements with business team consultants, who would assist colleges and universities in facilitating the transition of technology into industry.

Monies Appropriated in this Bill:

None

H.B. 125 Enrolled Copy

Other Special Clauses:

None

Utah Code Sections Affected:

AMENDS:

63-38f-701, as last amended by Chapter 356, Laws of Utah 2006

63-38f-703, as enacted by Chapter 148, Laws of Utah 2005
63-38f-704, as last amended by Chapter 356, Laws of Utah 2006
ENACTS:
63-38f-705, Utah Code Annotated 1953

Be it enacted by the Legislature of the state of Utah:
Section 1. Section **63-38f-701** is amended to read:
63-38f-701. Purpose.
(1) (a) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes.
(b) These generally come from strong research colleges and universities.
(c) Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development.
(d) Most states are enhancing their research base by direct funding, usually on a matching basis.
(e) The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas and by facilitating the transition of these technologies out of the university environment into industry where the technologies can be used to enhance job creation.
(f) The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.
(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis for colleges and universities in the state that offer any doctoral degrees.
(3) (a) The Legislature recommends that the funds be allocated on a competitive basis to the various colleges and universities in the state[.] and to companies working in partnership with colleges and universities to commercialize their technologies.
(b) The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state and to help transition these technologies out of the colleges and universities into industry.

Section 2. Section **63-38f-703** is amended to read:

63-38f-703. Definitions.
As used in this part[, "centers]:
(1) "Business team consultant" means an experienced technology executive, entrepreneur, or business person who:
(a) is recruited by the office through a request for proposal process to work directly with a college or university in the Centers for Excellence program; and
(b) works with the institution to facilitate the transition of its technology into industry by assisting the institution in developing strategies, including spin out strategies when appropriate, and go-to-market plans, and identifying and working with potential customers and partners.
(2) "Centers of excellence" means university-based, federal and industry-supported, cooperative research and development programs.
(3) "Direct license" means the licensing between a company and a Utah college or university of technology developed at the college or university for the intent of commercializing the technology or facilitating its transition into industry.
(4) "Licensee" means:
(a) a company that executes or is in the process of executing a direct license; or
(b) a sublicensee of the technology from a direct license.
Section 3. Section **63-38f-704** is amended to read:

63-38f-704. Administration -- Grants.
(1) The Governor's Office of Economic Development shall administer this part.
(2) (a) The office may award Centers of Excellence grants to the various colleges [and], universities, and licensees in the state for the purposes of this part.
(b) The governor's Office of Economic Development shall develop a process to determine whether a college or university that receives a grant under this part must return the grant proceeds or a portion of the grant proceeds if the technology that is developed with the grant proceeds is licensed to a licensee that:
(i) does not maintain a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology; or
(ii) initially maintains a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology, but within five years after issuance of the license the licensee or sublicensee transfers the manufacturing or service location for the

technology to a location out of the state.
(c) A repayment by a college or university of grant proceeds or a portion of the grant

proceeds shall come only from the proceeds of the license established between the licensee and
the college or university.
(d) (i) A licensee that receives a grant under this part shall return the grant proceeds or
a portion of the grant proceeds to the office if the licensee:
(A) does not maintain a manufacturing or service location in the state from which the
licensee exploits the technology; or
(B) initially maintains a manufacturing or service location in the state from which the
licensee exploits the technology, but within five years after issuance of the grant the licensee
transfers the manufacturing or service location for the technology to an out of state location.
(ii) A repayment by a licensee that receives a grant shall come only from the proceeds
of the license to that licensee.
(iii) A repayment by a licensee shall be prorated based only on the number of full years
the licensee operated in the state from the date of the awarded grant.
(3) (a) Funding allocations shall be made by the office with the advice of the State
Advisory Council for Science and Technology and the board.
(b) Each proposal shall receive the best available outside review.
(4) (a) In considering each proposal, the office shall weigh technical merit, the level of
matching funds from private and federal sources, and the potential for job creation and
economic development.
(b) Proposals or consortia that combine and coordinate related research at two or more
colleges and universities shall be encouraged.
(5) The State Advisory Council on Science and Technology shall review the activities
and progress of [individual centers] grant recipients on a regular basis and assist the office in

preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

Section 4. Section **63-38f-705** is enacted to read:

63-38f-705. Business team consultants.

(1) The office may enter into work agreements with business team consultants through a request for proposal process to participate in the Centers for Excellence program.

(2) Under a work agreement, a business team consultant shall assist a college or university in facilitating the transition of its technology into industry.

Appendix A – Centers of Excellence Summaries

Aerospace Cluster

Center for ADVANCED SATELLITE MANUFACTURING	
The Center for Advanced Satellite Manufacturing is seeking to create a viable Utah-based satellite manufacturing enterprise based upon years of expertise and projects within Utah State University and its Space Dynamics Laboratory. The Center is pursuing the development of novel advanced manufacturing and design techniques to reduce the cost and time involved with satellite manufacturing while improving quality and performance.	*USU* *Funded 2004-* Brent Stucker (435) 797-8173 brent.stucker@usu.edu

Center for AEROSPACE SCIENCE TECHNOLOGY	
The center focuses on the development of small, low-earth orbiting satellites and related aerospace technology. The center exploits opportunities with expertise developed in the design, manufacture, and operation of small satellites to commercialize technologies.	*WEBER STATE* *Funded 1987-1992* Robert J. Twiggs (650) 723-8651 Bob.Twiggs@Stanford.edu
• The Center has developed and flown two satellites: NUSAT I and WEBERSAT; receiving world-wide recognition as a leader in small satellite development. • Some of the Center research was transferred to Stanford University with Twiggs, It is now being used to develop CUBESAT	**Spin Out Companies** • One Stop Satellite Solutions, Inc. • Wasatach Aerospace Co. **Benefiting Companies** • Intraspace, Inc. • Simulacrum, Inc. • Wasatch Research & Engineering

Center for MINIATURE UNMANNED AIR VEHICLES	
The Center focuses on the rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices. The Center has earned the attention of both military and civilian agencies.	*BYU* *Funded 2004-* Tim McLain (801) 422-6537 mclain@byu.edu **Spin Out Companies** • Procerus Technologies • Flying Sensors

Center for SPACE ENGINEERING	
Established in 1986, the center is Utah's leader for new technology developments involving space remote and in-situ sensing systems, image compression technology and small satellite systems. Sensing equipment developed at the center was the primary experimental effort on a previous shuttle mission. Technologies include: • Infrared instrumentation • Sensor calibration • Upper atmosphere measurements & modeling • Plasma diagnostics • Data analysis • Image compression technology • Cryogenic systems • Program management • New technology developments in space remote and in-situ sensing systems	*USU* *Funded 1986-1992*
• Center has flown 350 payloads, 75 of which involved cryogenics • Joint composites projects with BYU Center and Hercules Corp. • Success of CIRRIS 1A experiment aboard space shuttle Discovery promises increased business opportunities	Dr. Frank Redd fjredd@usu.edu **Spin Out Companies** • CXT, Inc. • Globesat Holding Co. • ICOMP, Inc. • Interactive Resources Co. • Medcom, Inc. **Benefiting Companies** • Hercules • Thiokol • Space Dynamics Lab

Competitive Accelerators Cluster

Center for ADVANCED ARCHAEOLOGIC & PALEONTOLOGIC IMAGING & MODELING	
The center provides an opportunity to utilize leading edge technology to implement a revolutionary approach to the creation of museum reproductions, models and miniatures. The overall objective is to integrate CAD-CAM technologies in the areas of archaeology and paleontology	*College of Eastern Utah* *Funded 1992-1993*
• Remodeling of the Huntington Canyon Mammoth • Two recently discovered dinosaur species will be molded by the Center	Dr. Don Burge

Center for ADVANCED COMPOSITES MANUFACTURING & ENGINEERING	
	BYU *Funded 1989-1995*
Established as the focal point and coordinator of technical resources in Utah in the areas of composite materials, plastics, and other advanced materials. ACME assists existing industry and start-up companies and also conceives, invents, develops, and spins-out new and enhanced products into commercial enterprises.	Brent Strong (801) 422-7878 strongb@byu.edu
	Spin Out Companies • Advanced Laminate Technology • American Vitrolite • Baal • Emily Rose • Fiber Dynamics • Futura Propulsion Systems • IsoTruss • Merrell Enterprises • Rocky Mtn. Composites • Synergy Marketing **Benefiting Companies** • AeroTrans • American Polymer • Ashton Aerospace • Automated Process Control • B&M Enterprises • Beckwith Technology • Bemsco • BGA • Blue Cow, Inc. • Bradley Instruments • Creative Composites • Dimensional Research • CRP/Springlite • Curecrete • DAH Inc. • Delta Fiberglass • EDO • Evolution Skis • Fiber Tek • H K Corporation

	• Haelan Medical • Hexatron • Ideas to Products • INCO VaporFab • International Biokenetics • LCC Fabrications • Legends Technologies • MATCO • Medi-Sight • Medilight • Mountain High Engineering • Mountain Land Support • Performance Composites • Potter Management • Pro Design Corporation • Red Hawk, Inc. • Rotomolding of Utah • Sound Composites • Springlite • Terra Tek • TRA • Ultralite of America • UP International • Utah Rocketry • Van Patten Corporation • Wasatch Engineering • Wasatch Technology Group

Center for ADVANCED CONSTRUCTION MATERIALS

The center's major emphasis is in the development of new and recycled construction materials, and innovative techniques for inspecting the condition of constructed facilities. Core technologies include:

- Automated facilities management system (AFMS) to measure and analyze pavement cracks to schedule maintenance strategies
- Tire added latex concrete blocks, to use waste materials and to improve performance
- New construction product testing and evaluation services

- Two software modules, PicCrack and MapCrack have produced great results in four Utah cities

UU
Funded 1993-1994
1996-1997

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Benefiting Companies

- Green Hill Recycling
- Soil Stabilization Inc.
- uniAMS

Center for ADVANCED JOINING OF MATERIALS

The Center for Advanced Joining of Materials (CAJM) is developing enhancements and new technologies based on friction stir welding (FSW). FSW is a relatively new, innovative joining technology which is revolutionizing the way in which aluminum, copper and other materials are being joined. The objectives are to develop enhancements to this existing technology that will broaden the use of this process in new materials and applications, and to transfer these technologies to
local, national and international companies.

The Center has been focused on the development and marketing of three technological aspects of FSW:

- Tooling that will last longer, offer the ability to join a wider range of advanced materials, and enable better control of the resulting quality of the weld and its properties
- New control systems and hardware for large scale, three-dimensional FSW capabilities
- New methods and novel tooling for joining polymeric materials

- 11 pending and 2 issued patents
- Utah spin-out company Megastir

BYU
Funded 2000-2004

Tracy Nelson, Ph. D.
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Spin Out Companies

- Megastir

Benefiting Companies

- Advanced Metal Products

Center for ADVANCED MATERIALS & MICROELECTRONICS	
	UU *Funded 1987-1992*
	Gerald B. Stringfellow (801) 581-8387 stringfellow@coe.utah.edu
This center provided unique testing facilities, technical expertise and problem solving assistance to Utah industry. Composite, ceramic and semiconductor materials were explored for structural, aerospace and electronic applications. Technologies included: • Multiple layer epitaxy • III/V compound chip design • Ceramics as solid electrolytes and structural components • Composite materials • Organometallic vapor phase epitaxy	**Benefiting Companies** • Beta Power, Inc. • Bonneville Microelectronics • Ceramatec • Concoyle Oilfield Tools, Inc. • Edo Western • Evans & Sutherland • Fisher Co. • Hercules • Nova Tech • Space Systems Engineering • Thiokol • Westcott Co.

Center for ADVANCED STRUCTURAL COMPOSITES

BYU
Funded 1999-2004

David W. Jensen
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david@byu.edu

The objective of the Center for Advanced Structural Composites is to commercialize the IsoTruss technology. The IsoTruss enables the creation of super lightweight grid structures with the potential for revolutionizing industries as diverse as civil infrastructure (e.g., communication and construction), aerospace, automotive, marine and sporting structures and virtually any application area requiring high strength, high stiffness, light weight and superb corrosion resistance.

The core technology consists of an ultra-lightweight composite structural shape known as the IsoTruss. The IsoTruss is a novel, patented, three-dimensional structural form that takes advantage of the highly directional properties of high strength composites to produce an extremely efficient and lightweight structure. The IsoTruss incorporates stable geometric configurations with helical members that spiral in opposing directions around a central cavity, coupled with longitudinal members that pass through the intersections.

- Spin-out IsoTruss Structures Inc., is selling products, aiming to first displace wooden utility poles.
- Conventional poles weigh half a ton and last 5-40 years, while IsoTruss poles weigh 300 pounds and are expected to last 60-100 years for the same price, while costing less to transport and install.

Spin Out Companies

- IsoTruss
- Patterned Fiber Composites, Inc
- TauRuss

Center for APPLICATIONS FOR MATERIALS ENGINEERING

BYU
Funded 1996-1997

Paul Eastman
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paul_eastman@byu.edu

The center was an important resource in Utah for technical knowledge and capability in the areas of plastics, composite materials and metallurgy. The center assists existing start-up companies and also conceives, invents, develops and spins off into commercial enterprises new or enhanced products. The center has patented the following technologies:

- Cure and contamination sensing devices
- Damping of composites through unique orientation of fibers
- Improvement of fiber binding on thermoplastic composites
- Forming technique for large thermoplastic composites

- Assisted 164 companies

Center for CHEMICAL REACTORS	
The center focused on the development of fluid-bed technology for catalytic reactions and biological leaching technology for recovery of gold from refractory ores.	*UU* *Funded 1989-1990*
	A Lamont Tyler lamont.tyler@m.cc.utah.edu
	Benefiting Companies • Kennecott • EIMCO
• Biological leaching of refractory gold ores supported by Kennecott and EIMCO	

Center for CHEMICAL SEPARATION	
Researchers with backgrounds in organic chemistry, inorganic chemistry and chemical engineering studied the full development of a new ligand bonded silica gel technology. The resulting products are used in a variety of separation systems. A few applications of center technology include precious and base metal refining, heavy metal and organic clean-up and nuclear waste management. .	*BYU* *Funded 1987-1992*
	Dr. Reed Izatt (801) 422-2315 reed_izatt@byu.edu
	Spin Out Companies • IBC Advanced Technologies **Benefiting Companies**
• Set up pilot plants in four of the largest precious metal refineries in the U.S. • Processes for separating Paladium and Rhodium represents a 40%-60% cost reduction to the industry	• ASARCO • Cascade Refining • DataChem • GalTech Semiconductor • Johnson Matthey • Parish Chemical • Tronac, Inc.

Center for COMPLIANT MECHANISMS

BYU
Funded 2000-2003

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The objective of the Center for Compliant Mechanisms is to direct the development and commercialization of compliant mechanism technologies and associated product applications so that they can be effectively licensed to existing or new companies in Utah. The Center also seeks to develop approaches that will accelerate this development, and promote co-development with interested Utah companies.

Compliant mechanisms are devices that obtain their motion from the deflection of flexible component parts rather than pin joints, thus offering advantages of lower manufacturing costs (reduced part count, elimination of assembly), increased performance (reduced friction, increased precision, reduced weight, etc.), and ability to miniaturize (including microelectromechanical systems). Brigham Young University is a recognized leader in compliant mechanisms and is uniquely poised for helping companies exploit the advantages of compliant mechanisms.

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- 12 patents issued and 4 pending
- “Near Constant-Force Electrical Contact,” patented and exclusively licensed to ATL, Springville, Utah.
- "Compliant, Ortho-Planar, Linear Motion Spring,” patented and non-exclusive license for a specific application granted to Flowserve, Springville, Utah.
- "Continuously Variable Transmission,” patented and exclusively licensed to Recreational Systems, Inc., Kaysville, Utah

Benefiting Companies

- ATL
- ICON
- MityLite
- Grandway USA
- Flowserve
- Recreation Systems

Center for COMPOSITES IN CONSTRUCTION

The Center has a primary focus on composite materials that may be used to strengthen or reinforce precast concrete structures such as bridge columns, freeway overpass beams, concrete walls and other structural components. The basic technology utilizes fiber-reinforced polymers woven into industrial fabrics that can be used to wrap structures or be imbedded in precast concrete designs.

The Center develops design guidelines and specifications for the strengthening of columns and seismic retrofit of bridge caps and joints with FRP composites.

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- The Center has developed a patent application for “Fiber Reinforced Polymer" (FRP) composite connections of precast concrete walls.
- More than 70 columns of I-80 bridges will be retrofitted with the composite wraps.
- In addition, the State Street bridge on I-80 will get a seismic retrofit using FRP composites.

UU
Funded 1998-1999

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Benefiting Companies

- Thiokol
- Waterpoint
- Monroc, Inc (Eagle Precast Co.)
- EDO Fiber Science
- Sika
- Hydrotech

Center for COMPUTATIONAL DESIGN AND TESTING

The objective of this new Center is to commercialize computational engines that facilitate and accelerate the design and testing of novel materials and device elements, with a special focus on nanostructured materials and devices.

The center is focused on two computational engines: Materials Designer (MaDes) and Device Simulator (DeSim). The algorithms of MaDes predict the structural and mechanical properties of new materials based on first principles analysis at the level of atomic forces, while De- Sim models the electrical properties and performance of components constructed with novel materials.

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- A patent is now pending on the design for a carbon nanotube electromechanical pressure sensor
- A web based user interface for on-line computational applications has been successfully demonstrated

UU
Funded 2002-2004

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Spin Out Companies

- Visco

Benefiting Companies

- Fairchild Semiconductor

Center for COMPUTER AIDED ENGINEERING, DESIGN & MANUFACTURING

The center's focus is research in computerized drafting, 3-D design, solid modeling, finite element modeling, numerical controlled mfg, robotics, facilities management, plant monitoring and control, database management and inventory planning.

The center has developed six software products:

- Promodel
- ROBLINE
- OPTDESX
- CATS
- Movie(c-Quel.byu and movistar.byu)
- MAXXICAD
- GEOSOLID.BYU

.

- Products are marketed exclusively through three spin-out companies
- Over 1,600 licensed users of Center generated software

BYU
Funded 1988-1992

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Spin Out Companies

- CIMETRIX
- PROMODEL Corp
- Design Synthesis

Benefiting Companies

- AgriDyne Technologies
- Albion Technologies
- Arrow Dynamics
- Artistic Precision Enterprises
- Bel Viso Labs
- Vuena Ventura
- Bureau of Mines
- C.T. Film, In c.
- Cache Valley Cheese
- Chromalox
- Del Med, Inc.
- Evans & Sutherland
- Great Basin Brine Shrimp
- Great Salt Lake Mineral
- Hercules
- Hewlett-Packard
- Hill AFB
- Industrial Research
- IOMEGA
- KEMGAS
- Miller Labs
- Morton Automotive
- Reilly Wendover
- Schreiber Foods, Inc.
- Solaray
- SusumuConstruction
- Thiokol
- Trysan
- VALTEK
- Viewpoint Animation
- Western Zirconium
- Williams International

Center for CONTROL OF FLOW IN MANUFACTURING	
The Center is applying flow control technology to improve manufacturing processing including particle sorting and thermal sprays. This Center was assigned a business team in 2005-06.	*USU* *Funded 2006-* Barton Smith (435) 797-3278 barton.smith@usu.edu

Center for DIRECT MACHINING AND CONTROL (DMAC)	
This Center is commercializing a disruptive technology for manufacturing: A new paradigm of one controller for many devices. That is, multiple machine tools can be run by one operator, through a network, rather than by individual operators. Instead of every machine having its own control panel, one program and one controller could theoretically manage all the machines within a plant—creating dramatic cost savings. A related application of the core technology (VMAC) is being developed for the home automation market. The DMAC technology is based on the development of an open architecture controller and supporting control algorithms for general control of advanced mechanisms such as 5-axis machine tools. This controller uses a dual CPU PC/controller so that the CAD/CAM application can run under Windows, while the real time control software can run under a second CPU. The motors and machine Input/ Output (I/O) are commanded over a high speed network such as fiber optic and IEEE 1394 (firewire). The control software consists of object oriented libraries that integrate motion planning, trajectory generation, servocontrol, communication, and user interfaces. .	*BYU* *Funded 2002-2005* Ed Red (801) 422-5539 ered5@comcast.net **Spin Out Companies** • Direct Controls, Inc.
• Four patents pending • Multiple contracts from major industrial partners.	

Center for ENGINEERING DESIGN	
The center exists to develop original solutions for technological challenges. By utilizing state-of-the-art equipment and research facilities, the CED can and will continue to bring innovative ideas in the form of superior products to the marketplace.	*UU* *Funded 1987-1993*
	Stephen Jacobsen (801) 581-6499 s.jacobsen@sarcos.com
• RDT (rotary displacement transducer) is an integrated chip-based rotary position encoder • The Dextrous Telescoping System surpasses the severly limited, traditional robotic manipulators	**Spin Out Companies** • Sarcos Medical **Benefiting Companies** • Animate Systems • MicroJet, Inc. • Sarcos Research Group

Center for FUNCTIONALLY GRADED AND DESIGNED CEMENTED TUNGSTEN CARBIDE AND POLYCRYSTALLINE DIAMOND COMPOSITE MATERIALS	
Advanced composite materials with predictable wear and failure characteristics designed for demanding applications such as mining, drilling, and grinding.	*UU* *Funded 2006-*
	Zak Fang (801) 581-8128 zfang@mines.utah.edu

Center for HARSH ENVIRONMENT ELECTRONICS	
The Center for Harsh Environment Electronics (formerly the Center for Flat Panel Displays) developed micro-miniature thermionic vacuum emitter (MTV) display panels. As the MTV technology matured and license agreements were signed, the center moved its focus to electronic circuits and devices for operation in high temperature environments. The center also provided services in the following areas: prototype development and testing; development of high-temperature electronics based on MTV technology; and development of tools to test flat panel display technologies.	*UU* *Funded 1995-2000*
	Laurence P. Sadwick, Ph.D. (801) 581-8282 sadwick@ee.utah.edu
• Enhanced flat panel display was patented	**Spin Out Companies** • Innosys • Radiant Labs

Center for MAGNETIC SENSOR & ACTUATOR MATERIALS	
Working to commercialize a novel magnetostrictive alloy exhibiting a large physical effect in response to small magnetic fields, which may find use in applications from antilock brakes to nanomachining and ultrasonic devices.	*UU* *Funded 2005-*
	Sivarman Guruswamy (801) 581-7217 sguruswa@mines.utah.edu

Center for NANOSIZE INORGANIC MATERIAL POWDERS

Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

The main focus of this new Center has been to synthesize nanosize oxide powders by a low-cost, commercially scalable process using low-cost precursors. These powders find applications in numerous technologies. During the past year, one patent application was filed and one patent was issued. During the year, the use of nanosize powders in sensors and as a material for fuel cells, an energy conversion device which converts chemical energy of fuels directly into electricity was explored.

- One venture will be started this year. Fact Sheet has been sent to over 130 potential clients.
- ZrO2, CeO2: Fuel cells, structural ceramic components. Cells to be supplied to Versa Power Systems and FuelCell Energy this year.
- TiO2, ZnO, SnO2: Optics, coatings. Samples supplied.
- Fe2O3, CeO2, TiO2: Environmental clean-up. Samples being evaluated by the MAC Center.

UU
Funded 2004-

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Benefiting Companies

- Versa Power Systems
- FuelCell Energy
- Materials and Systems Research, Inc. MSRI

Center for NOVEL TITANIUM BORIDE SURFACE HARDENING TECHNOLOGY

This Center is commercializing a novel method for hardening the surface of components fabricated from Titanium. Originally developed with government funding for use in creating lightweight Titanium armor, their approach for the first time makes this strong metal suitable for use in applications such as hip replacements, bearings and cutting tools where superior hardness coupled with wear resistance create a superior product.

- Two patents have been filed.
- License signed with Ortho Development Corporation, a Utah company, for the development and FDA validation of orthopedic implants using the TiB coating

UU
Funded 2003-

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Benefiting Companies

- Ortho Development Corp.

Center for ADVANCED PYROMETALLURGICAL TECHNOLOGY

UU
Funded 1988-1989

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The goal of the Center was to test the feasibility of a clean, pollution-free and energy efficient new technology for producing copper from the sulfide minerals.

The technology investigated at this Center was aimed at copper smelters which were using technologies that generated large amounts of sulfur dioxide emissions and were not efficient in terms of energy consumption. The industrial feasibility of a closed and continuous copper smelting technology based on bottom gas injection was evaluated and confirmed. The technology was proven to be technically sound and environmentally superb. During the Center project a patent on a entirely new and different technology on solvent extraction processes was developed: H. Y. Sohn, "Continuous Solvent Extraction with Bottom Gas Injection," U.S. Patent No. 5,641, 462, June 24, 1997.

- Patent issued on new low pollution, energy efficient copper smelter technology.

Benefiting Companies

- Kennecott

Center for QUALITY AND INTEGRITY DESIGN

UU
Funded 1989-1991

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QIDEC was originally established with the goal of "developing additional knowledge and an improved engineering educational system to help prevent our loss of manufacturing capability and decrease our liability problems related to failures" within the engineering community in the U.S. The center expanded the goal to address the shorter tem needs of industry and government in their increasing efforts to regain control over technical issues affecting product quality, safety and reliability, and organizational productivity. Work is centered on three major industrial sectors:

1. Medical device reliability
2. Aircraft and aerospace structural integrity
3. Structural fatigue and reliability of mechanical systems

- License agreements with FASIDE Int'l and Technology Management Assoc.

Spin Out Companies

- FASIDE International
- HOLSIP (organization)

Benefiting Companies

- Technology Management Associates

Center for RAMAN TECHNOLOGY

This center was established to commercialize Raman technology for chemical monitoring in natural gas, metal processing, and medical applications. Advances in instrumentation have made Raman scattering attractive as a general purpose analytical technique for measuring chemicals in sold, liquid and gaseous samples. Raman spectroscopy is the measurement of the wavelength and intensity of inelastically scattered light from molecules. The Raman scattered light occurs at wavelengths that are shifted from the incident light by the energies of molecular vibrations. Typical applications are in structure determination, multicomponent qualitative analysis, and quantitative analysis. Technology development is focuses on the following areas:

- Laser diode configuration
- Sample handling schemes
- Fiber coupling techniques
- Data-analysis algorithms
- Modifications to the core Raman detection systems.

- Patented laser (U.S. Patent No. 6,100,975), spectrograph (U.S. Patent No. 6,028,667), and 18 channel multiplexer (U.S. Patent No. 6,859,581)
- Process Instruments has its Raman systems in some of the largest refinery and petrochemical plants in the U.S.

UU
Funded 1996-1998

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Spin Out Companies

- Process Instruments, Inc.

Center for RAPID PRODUCT REALIZATION	
The center was established to provide manufacturing technology extension services designed to assist small manufacturing companies, to bridge the gap between new product concepts and manufacturing realization, and to develop innovative technologies which will result in products, patents, and related economic benefits for the state. The center went on to become Utah's Manufacturing Extension Partnership.	*BYU* *Funded 1993-1996* David Sorensen and Brent Strong (801) 863-7901 dsorensen@mep.org
• Assisted over 171 individuals and companies with new product development, prototyping and testing.	**Benefiting Companies** • Accuserve • American International • Bolick, Co. • CellTek, Int'l • GWH • Hatch Biomedical • Tile Roof Associates • Manufacturing Extension Program • Youth Reclamation, Inc.

Center for RAPID PROTOTYPING

The Center for Rapid Prototyping is focused on commercializing technologies related to ultrasonic sensing for injection molding processes, and physical and virtual geometric modeling for computer aided design.

The Center has been working on multiple projects, including:

- Machining techniques that allow the prototyping of geometric objects of arbitrary complexity on a 3 axis CNC mill with limited tools and little operator skill required
- A series of new sensors and controls for improved polymer processing
- Personal Prototyping System (PPS) that makes rapid prototyping affordable for small companies and perhaps even the average consumer
- Low cost 3-D scanning technologies that make the acquisition of 3-D geometric data practical and affordable for reverse engineering, medical imaging/reconstruction, etc
- A device that is capable of producing very large prototypes (Shapemaker)
- A photopolymer-based technique to create prototypes in a single step (Inverse Tomographic Construction)
- New micro and nano-scale polymer manufacturing techniques have been developed, including a micro-forging technique and a nanoscale injection molding machine.

- Production of the first micro-scale injection molded parts
- Completion and testing of a production-type prototype high temperature ultrasound transducer and control system
- Production and test marketing of individualized replicas of human faces captured in a polymer based collectible
- One spin-off company already formed.

UU
Funded 2001-2004

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Benefiting Companies

- Accuserve
- American International
- Bolick, Co.
- CellTek, Int'l
- GWH
- Hatch Biomedical
- Tile Roof Associates
- Manufacturing Extension Program
- Youth Reclamation, Inc.

Center for THERMAL MANAGEMENT TECHNOLOGIES	
Technologies for extremely high performance thermal management in the context of physical and vibration isolation, in part from collaboration with Utah State University's Space Dynamics Lab.	*USU* *Funded 2006-*
	Clair Batty (435) 881-1325 clairbatty@comcast.net
• Provision patent application in August 2006	**Benefiting Companies** • Starsys

Center for UTAH RESEARCH INSTITUTE	
The main focus of the Center was "Parts on Demand System (PODS)," a cooperative effort among Utah's largest universities to implement a paperless order and production process for small parts. Combined resources have enabled URI to successfully compete for military and industrial contracts.	*UU, USU, BYU, WSU* *Funded 1988-1992*
• $4.5M contract for CALS/PODS program at Ogden Air Logistics Command • $380K contract to provide software engineering services to the Air Force Software Technology Support Center. • $3.7M contract to help develop, test and install a Spare Parts Productions and Reprocurement System (SPARES) for Ogden Air Logistics Center.	David Norton dave.norton@usurf.usu.edu

Defense and Homeland Security Cluster

Center for ADVANCED IMAGING LADAR	
The Center for Advanced Imaging LADAR was formed to commercialize a now patented camera technique that uniquely combines laser distance measurement with digital color imaging, resulting in detailed, 3-D color images that can be captured in real time and also stored for later analysis and manipulation in virtual reality environments. Civilian and military markets exist for stationary, airborne and spaceborne versions of the technology. CAIL's technology couples existing 3D LADAR (Laser Detection and Ranging) technology with 2D digital color imaging in the unique 3D Texel Camera. Previously, distance and spectral datasets had to be collected separately, carefully registered, and then superimposed – laborious reprocessing that often required days to weeks. The CAIL technology works in real time – the first system to enable precise 3D color imaging when either the scene, the camera or both are moving.	*USU* *Funded 2003-* Robert T. Pack (435) 797-7049 rtpack@cc.usu.edu **Benefiting Companies** • InteliSum (Rapidmapper)
• Key Patent Issued • Utah company InteliSum is marketing land based LADAR system	

Center for SELF ORGANIZING & INTELLIGENT SYSTEMS	
The center provides design services to Utah companies to develop intelligent systems solutions for new and improved commercial products. The center maintains a national and international reputation as a leading contributor to the advancement of intelligent systems research. Intelligent systems include any device and/or software concept which attempts to artificially emulate the unique cognizance and control abilities of the human mind.	*USU* *Funded 1992-2000* Kevin Moore, Ph.D. snowvax@cc.usu.edu **Spin Out Companies** • Autonomous Solutions Inc. • Kachemak Research and Development • Monetary Services, Inc. • Visionary Products Inc.
• Leader in Unmanned Ground Vehicles (UGVs) • $4MM in defense contracts • Research contract with nation's largest agricultural equipment manufacturer	

Center for SMART SENSORS

In a general sense, Smart Sensors meld sensor, signal processing, and computer technologies to create new functionalities such as the ability to probe the environment and modify sensor function in order to improve their data gathering capability. Applications envisioned by this Center span medicine, precision agriculture, electronics manufacturing, wireless communication, transportation and radar.

The Center for Smart Sensors focuses on two core technologies which have the greatest commercial potential:

- Circuitry for measuring length, distance or impedance; this enables a Smart Wire inspection system that can detect and locate faults or insulation breaks in aircraft wiring in real time.
- Imbedded Microstrip Antenna (IMA), which can sense or communicate in a buried environment.

Both families of technologies are based on simple ideas and simple circuits that result in two critical characteristics -- Small and Cheap. This makes them applicable to a wide array of applications.

- Single IMA antenna can both sense and communicate
- 12 pending patents
- 1 issued patent
- Commercialization of aircraft wiring fault detection has over $1MM in funding from FAA and aircraft firms

USU/UU
Funded 2000-2005

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Spin Out Companies

- LiveWire Test Labs, Inc.
- RF Sensor Innovations

Energy and Natural Resources

Center for ACOUSTIC COOLING	
The Center for Acoustic Cooling Technologies was originally established to commercialize novel high frequency thermoacoustic engines for cooling applications. One important application for this technology is in the heat management of computers and other devices employing dense arrays of microcircuits. Subsequent work has resulted in the demonstration of a prototype device capable of converting heat into electricity at high efficiency. The Center for Acoustic Cooling is leveraging fundamental developments in miniature thermo-acoustic devices supported by the Office of Naval Research and DARPA. The Center's technology is based on two effects in thermo acoustics: The first is that heat can be converted into sound energy, and the second is that sound can pump heat. Both have been employed in devices with dimensions ranging from 4 cm to 0.8 cm. Piezoelectric materials have now been incorporated in order to recover electricity in some cases.	*UU* *Funded 2000-2004* Orest G. Symko 801-581-6132 orest@physics.utah.edu **Benefiting Companies** • Coen Co. • Parvus Co.
• Intel and HP interested in acoustic refrigerator • Involved in $27MM DoD project with Washington State and University of Mississippi	

Center for ADVANCED COMBUSTION ENGINEERING & RESEARCH

Established in 1986 as a joint collaboration between Brigham Young University and the University of Utah for the purpose of advancing combustion engineering research, education, and technology. The principle focus is on clean and efficient use of fossil fuels including coal, oil, and natural gas as well as the combustion of toxic and municipal solid wastes. The center research program consists of 35 active research projects among 62 participants focused on 6 thrust areas.

The nation's basic and high-technology industries rely upon the adequate supply of high-quality energy, the production of which depends upon combustion technology. The international competitiveness of these industries depends in part on their ability to more efficiently use low-cost fuel resources such as coal, heavy oil, oil shale, and tar sands, which are abundantly available in the western United States and particularly in Utah.

Specific center technologies include:

- Mechanisms of fossil-fuel combustion and pollutant and soot formation
- The relationship between fuel properties and conversion
- Computer models to control and record the performance of particular combustion chambers
- Pollution formation/control and waste incineration

- The center is one of 18 highly sought-after national engineering centers.
- More than 60 licensing agreements
- Provides ongoing consulting services to Utah companies

BYU
Funded 1987-1995

L. Douglas Smoot, Ph.D.
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Spin Out Companies

- Combustion Resources
- Reaction Engineering Intl.

Benefiting Companies

- Animate Systems
- Combustion Services Inc.
- Ford, Bacon, Davis
- Geneva Steel
- GMH Engineering
- Hercules
- IOMED
- Pacific Corp.
- Questar
- Sarcos Research Corp Sarcos, Inc
- Thiokol
- Utah Power & Light

Center for COAL AND OIL RESEARCH	
The main focus of the center is the development of new markets for Utah coals and their products. The center promotes efforts to bring university and industry researchers together to develop and implement advanced methods of processing, upgrading, and preparing Utah coal and tar sand resources including coal/water slurry transport, differential liquefaction and resin extraction.	*UU* *Funded 1987-1991*
	Dr. Larry Andersen larry.anderson@utah.edu
• Nine patents issued	**Spin Out Companies** • FemtoScan Corp. • International Resin Resources **Benefiting Companies** • Advanced Processing Technology

Center for COAL PROCESSING TECHNOLOGY	
The center was established to provide the advanced processing technology required to extract coal resins economically and promote the development of a coal resin industry in Utah. The center has three proprietary technologies which will have applicability to Utah's coal industry • Processing technologies for the efficient retrieval and refining of organic resins from coal • X-ray CT technology for the analysis of coal wash-ability • Methods for cleaning coal and the development of air-sparged hydrocyclone technology	*UU* *Funded 1996-1998*
	J.D. Miller (801) 581-5160 jdmiller@mines.utah.edu
	Benefiting Companies • TerraTek

Center for MINERALS TECHNOLOGY

The Center's focus is on developing new technologies for minerals processing. Specific areas of expertise include the design of high efficiency grinding mills using state of the art computer simulation software, advanced mill analysis and monitoring methods, technologies for the in-line monitoring and measurement of particle size on moving conveyor belts, and the real-time control of industrial milling processes.

Computer software, on-line instruments and laboratory procedures for the design, monitoring, control and analysis of industrial grinding machines and operating mineral recovery plants have been demonstrated and are now available for application in industry.

- An instrument to measure the distribution of sizes of particles on moving conveyor belts has been developed and successfully tested at industrial sites.
- Millsoft software was sold to Process Engineering Resources, Inc., a Utah company.

UU
Funded 1995-1999

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Spin Out Companies

- Mineral Tehnologies, Inc.
- Milltech Engineering

Benefiting Companies

- Process Engineering Resources, Inc.

Center for MODIFIED ACTIVATED CARBONS TECHNOLOGY

The Center is focused on modifications to existing activated carbon products and expanding into new products based on modifications to various organic (carbon) materials.

- Technology #1: Magnetic activated carbons
- Technology #2: Biological modified activated carbon
- Technology #3: Inorganic modified activated carbon

All current technologies deal with removal of materials from fluid streams.

UU
Funded 2005-

Jack Adams
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Spin Out Companies

- Inotech

Benefiting Companies

- Benefiting Co

Center for PETROLEUM RESEARCH

UU
Funded 2000-2005

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The Petroleum Research Center (PERC), which is an integral part of the Department of Chemical and Fuels Engineering at the University of Utah, is developing practical, cost-effective solutions to liquid hydrocarbon production, handling and transportation. PERC specifically works to understand problems related to the production, transportation and processing of waxy and asphaltenic crude oils, and alleviate those problems by developing a variety of methods and software tools (models) for the efficient and optimal production of oil and gas from underground reservoirs.

The Center is commercializing products in three areas:

- Flow Assurance (tools to help keep oil products moving through pipelines)
- Oil Simulants (environmentally safe yet accurate substitutes for crude oil)
- Reservoir Simulators (finite-element models for optimizing production from geometrically complex oil and gas fields)

With funding from the U.S. DOE and the petroleum industry, the PERC coordinates basic and applied research in the physical properties and physical and chemical thermodynamics of naturally occurring hydrocarbons.

Benefiting Companies

- Systems Engineering and Simulation
- LT Industries
- Trans Alaskan Pipeline
- Exxon Mobil

- 2 patents issued on Oil Simulants
- Pursuing copyrights on several software products - Chemometric Database and Finite Element Reservoir Simulator

Center for PROFITABLE USES OF AGRICULTURAL BYPRODUCTS

The Center for Profitable Use of Agricultural Byproducts was established to commercialize technologies utilizing agricultural production and processing byproducts. Waste materials of little or no value are transformed into energy and other salable items using technology developed at the center.

The USU technology has two basic components: 1) an induced sludge bed anaerobic reactor that can produce energy (biogas) and soil amendment from manure and food processing waste, and 2) a high rate aerobic (drum composter based) bioreactor that make the system more cost effective, and the products produced by the process more valuable. The scalable, modular system is reliable and easily managed.

- At least three operational plants in Utah producing electricity.
- One of these generates enough electricity to power its own farm and put $1,000 worth of electricity back into the grid monthly.
- One issued and one pending patent.
- A new Utah company, Andigen, has been formed to build the anaerobic systems.

USU
Funded 2000-2004

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Spin Out Companies

- Andigen

Benefiting Companies

- Inrepid (ITR) - Idaho
- Agrimass – California
- HHE

Center for SOLID OXIDE FUEL CELL TECHNOLOGY

The center was established to develop solid oxide fuel cell (SOFC) technology for the direct conversion of chemical energy of a variety of fuels, such as natural gas, coal gas and other reformed logistic fuels, into electricity at a very high efficiency. Center technologies are based on the design and fabrication of novel, anode-supported solid oxide fuel cells with highly efficient electrodes that have a very low resistance. This concept makes it possible to develop a cost effective, compact power unit for direct conversion of chemical energy of fuels into electricity for remote and residential applications.

- Based on IP generated by the SOFC Center, a Fuel Cell Consortium was formed for commercialization of SOFC technology
- (MSRI) co-founded by the Center Director, won an Advanced Technology Project (ATP) from the Department of Commerce (DOC) totaling $2M
- 3 patents issued

UU
Funded 1996-2001

Prof. Anil V. Virkar
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Spin Out Companies

- Materials and Systems Research, Inc. (MSRI)
- Versa Power Systems

Benefiting Companies

- FuelCell Energy

Center for SOLID WASTE RECYCLING

The center was established to pursue realistic and comprehensive solutions designed to overcome the social and economic problems our environment faces in the elimination of solid waste. In conjunction with the Huntsman Environmental Research Center, research will focus on four areas:

- Recycling
- Improving air quality
- Degradability
- Conservation of trees

- Polymax 5000 Polystyrene Foam Densifier makes it economical to ship polystyrene to facilities where it can be recycled

USU
Funded 1990-1993

Reed M. Nielsen

Benefiting Companies

- Recycling Technologies Corp.
- Huntsman Chemical Corporation

Center for SOLVENT SEPARATION OF HEAVY OILS

The center is focused on the development of commercially viable applications and processes for exploiting Utah's reserves of heavy oil resources, and to continue its efforts in developing hydro chemical remediation processes. Development is concentrated in the following:

- Production of flux oil and adhesives from the Great Salt Lake Oil
- Cleaning of oil from contaminated soils
- Removal of waste oil from engine filters
- Production of high performance road asphalt from tar sand bitumen.

- Two license agreements
- 1 patent filed

Weber State
Funded 1996-1997

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Benefiting Companies

- Crown Energy
- Oasis Industries

Center for SUPERCRITICAL FLUID SEPARATIONS

The center provides a focal point for research and development, education and training in the area of chemical analysis where high resolution separation and high sensitivity detection are emphasized. Technologies:

- Supercritical fluid chromotography and extraction
- Radio frequency plasma detection
- Time-of-flight mass spectrometry
- Capillary chromotography and electrophoresis

- New technology for deactivating small diameter spherical silica packing materials in the pharmaceutical industry
- Director Milton L. Lee received **The R&D 100 Award** for the technologically most significant products developed nationally
- Transitioned to "Distinguished Center" in 1991

BYU
Funded 1987-1991

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Spin Out Companies

- Lee Scientific

Benefiting Companies

- Dionex Corp.
- Sensar Corp.

Life Sciences Cluster

Center for ALTERNATE STRATEGIES FOR PARASITE REMOVAL	
The center to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they are teenagers. The Centers is currently testing a safe, effective, non-chemical treatment for head lice, Pediculus humanus. We have secured funding from Utah Centers of Excellence program and approval from the University of Utah Institutional Review Board to perform our treatment on children six and older, and adults in the Salt Lake Valley.	*UU* *Funded 2004-* Dale Clayton (801) 581-6482 clayton@biology.utah.edu **Spin Out Companies** • Larada Sciences

Center for APPLIED MOLECULAR GENETICS	
Useful DNA based probes are being evaluated. The technologies being developed for selecting DNA markers include: random amplified polymorphic DNA (RAPD), restriction fragment length polymorphisms (RFLP) and sequence characterized amplified regions (SCAR). The objective is to identify probes that correlate with useful qualitative and or quantitative traits. Swine markers showing correlations with specific traits are: back-fat (9), feed intake (4), and growth rate (11). The search for DNA markers in dairy cattle to correlate with milk and protein yield, has resulted in the identification of 3 useful markers.	*BYU* *Funded 1995 –1998* Robert L. Park, Ph.D. (801) 378-6871 robert_park@byu.edu
• DNA markers have been established for a serious disease (spontaneous cardiomyopathy) in turkeys, which could be used for the benefit of Utah's turkey industry.	

Center for ARTIFICIAL HEARTS AND BIOMEDICAL DEVICES	
Established to develop the first electro-hydraulic artificial heart (an advanced version of the JARVIK-7) which utilizes a single energy converter and unified ventricles that will fit in humans. Other implant projects included the urinary bladder, urethra, ureter and a sphincter. The center's scope of research includes: conceptualization, prototype development, fabrication, bench and implant testing and assessment. • Engineering-miniature hydraulics, device design, design analysis, CNC machining capability, computer machining capability, device fabrication, polymers, plastics, metallics and QA/QC • Electrical design & fabrication • Integrated circuits & VLSl • Device testing • Animal experimentation-surgery, radiology, hematology, immunology, biochemistry, pathology, device retrieval analysis	*UU* *Funded 1987-1992*
	Dr. Donald B. Olsen (801) 323-1122 don.b.olsen@m.cc.utah.edu
	Spin Out Companies • Medquest Products • Medquest Manufacturing • Utah Artificial Heart Center **Benefiting Companies** • St. Jude Medical • CardioWest • Symcardia
• Developed Rotary Blood Pump • Involved in Pneumatic Heart Development	

Center for BIOMEDICAL MICROFLUIDICS	
The Center focuses on engineering technology that controls the movement of fluids in channels smaller than a human hair. Micropumps that can deliver tiny quantities of drugs and improved devices for DNA screening are some product examples.	*UU* *Funded 2004-*
	Bruce Gale (801) 585-5944 gale@eng.utah.edu
	Spin Out Companies • Wasatch Microfluidics

Center for BIOMEDICAL OPTICS

UU
Funded 1999-2003

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The Center for Biomedical Optics was established to commercialize optical technologies for diagnosis, therapeutic treatment, and disease risk assessment in medicine. The center capitalized on advancements in laser materials and laser spectroscopy to enable noninvasive assessment.

The center developed several new optical laser instruments to detect antioxidants in living human tissue. Specifically, the instruments detect the concentration and spatial distribution of carotenoid compounds, which are a family of antioxidants thought to prevent a number of degenerative diseases.

One application allows for the detection of carotenoids in the human retina. This will be useful to assess a subject's risk for developing age-related macular degeneration, which is the leading cause of blindness in the elderly. In the past, no reliable noninvasive test procedure existed. The new laser detection technology makes it possible to noninvasively test the concentration and spatial distribution of antioxidants in the retina through undilated eyes within a fraction of a second. The test results provide the physician with valuable information regarding the health of the retina and potentially required intervention strategies.

Another application is the use of the technology to detect the level of antioxidants in the human body by taking a reading of skin carotenoid levels. A link exists between the level of antioxidants in the human body and the immune system, which is being researched.

- The success connected to the technology licensed by NuSkin Pharmanex has impacted Utah's economy with jobs and increased revenues, and also generated a significant annual royalty income stream to the University of Utah.
- The level of antioxidants in the eye and skin can now be measured using noninvasive techniques

Spin Out Companies

- Nutriscan
- Caroderm, Inc.
- Spectratek, LLC

Benefiting Companies

- NuSkin/Pharmanex

Center for BIOMOLECULAR TECHNOLOGIES

The center was established to develop and commercialize technologies aimed at improving the efficiency of detecting rearrangements in the human genome and reducing the high cost of genetic microarrays (i.e."gene chips") which are ideally suited to unraveling complex genetic information. Each of these aims to remove major technological impediments in the biotechnology and health fields. For example, the inefficient methods to detect chromosome rearrangements have hitherto limited their use in the early detection of cancer, environmental health, and population genetics, even though such rearrangements are known to provide important diagnostic information.

- Two patent applications have been filed

UU
Funded 1998-2000

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Spin Out Companies

- GenMetrix, LLC

Center for BIOPOLYMERS AT INTERFACES

The center was established to increase knowledge and understanding of the interaction of proteins, nucleic acids, and cells with synthetic surfaces. This mission is important to the development of artificial organs and implants, production of contact lenses and diagnostic devices, and for biotechnological process development.

- 11 patents issued
- 2 patent applications

UU
Funded 1986-1991

Dr. Karin D. Caldwell
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Spin Out Companies

- Cell-Link (now Allvivo)
- Protein Solutions, Inc.

Benefiting Companies

- Becton Dickinson Critical Care Monitoring
- Cardiopulmonics, Inc
- Hyclone Labs
- Research Industries
- Silicon Graphics
- CIBA Vision

Center for BIOREMEDIATION	
The Center for Bioremediation develops, refines, and implements innovative biotechnologies for the removal of heavy metal and other inorganic contaminants. The Center's technology focus is biological selenium removal. Additional technologies include technologies for arsenic removal and cyanide degradation with an emphasis on enzymatic cyanide degradation.	*Weber State* *Funded 1996-2003* Jack Adams (801) 585-7349 jadams@mines.utah.edu
• Field-proven biotechnologies include Selenium reduction, Arsenic Reduction and Cyanide Biooxidation Technology. • The Center's technology has been demonstrated to be approximately 1/10 the cost of EPA's past BDAT and removes selenium to lower levels.	**Spin Out Companies** • Applied Biosciences **Benefiting Companies** • Non-invasive Geotracking - now called Willowstick

Center for BIOTECHNOLOGY	
The Center for Biotechnology was based on the phenomenon that fungi not only degrade organic materials, but inorganic materials as well. A technology was developed that breaks down pollutants such as TNT, DDT, and PCB. The process must be adapted based on where the chemicals are located, i.e., in soil or in water. If the pollution is in soil, the soil makeup and moisture content must be considered.	*USU* *Funded 1987-1992* Steven D. Aust (435) 797-2730 sdaust@cc.usu.edu
• Issued seven patents that provided for blanket environmental clean-up.	**Spin Out Companies** • INTECH One-eighty Corp. **Benefiting Companies** • Agridyne Technologies • EarthFAX • Natural Product Services

Center for CANCER GENETIC EPIDEMIOLOGY	
Established to study the genetic causes and origins of common cancers (e.g. breast, melanoma, colon, and prostate) and to develop DNA based diagnostics. Focus is on developing approaches to gene mapping and gene isolation for future applications in cancer diagnosis and therapy.	*UU* *Funded 1990-1995*
	Mark Skolnick (801) 584-3643 mark@myriad.com
• The Center has cloned the 17q linked breast cancer gene and the 9p linked melanoma gene. • Myriad Genetics employs 770 people with revenues of approximately $100MM	**Spin Out Companies** • Myriad Genetics

Center for CELL SIGNALING

Cell signaling consists of the set of biochemical interactions that mediate physiological changes within and between living cells. When a ligand binds to a receptor, for example, the interaction causes a biochemical response within the cell. Many diseases are associated with signaling pathways that have gone awry -- cancer, allergy, asthma, and acute inflammation are all examples of cellular responses unchecked by normally self regulating pathways. The absence of a single protein or lipid can result in the disruption of a pathway that may be crucial for cellular function. The CCS Faculty seeks to understand these fundamental signaling pathways. By identifying technologies to manipulate the signaling processes, highly selective pharmaceutical agents can be developed to treat cancer, diabetes, and cardiovascular disease.

- New technology from CCS has also been developed and licensed by Echelon to create a molecular sensor for directly monitoring heparin levels in blood.
- A microbiological assay platform invented by Dr. C. D. Poulter for identification of selective anti-anthrax agents was also optioned by Echelon.
- The discovery in 2002 of a natural ligand for the nuclear protein target of the $3 B/yr diabetes drug rosiglitazone emerged from collaboration by Dr's. McIntyre, Prestwich, and Zimmerman.

UU
Funded 1997-2002

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Spin Out Companies

- Echelon Biosciences, Inc.
- Salus Therapeutics - acquired by Genta Inc.

Benefiting Companies

- ComGenex
- Molecular Probes, Inc. - acquired by Invitrogen, Inc.

Center for CHEMICAL TECHNOLOGY

Weber State
Funded 1990-1995

Edward Walker, Ph.D.
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This center functioned as an innovative resource to the business community by conducting applied research in a variety of chemistry related areas leading directly to new or enhanced products.

The center facilitated the collaboration of Utah companies with diversified chemical interests to form alliances that benefited the company and the state.

- The Center has been awarded four patents
- License agreements with three companies
- Major contracts have been signed with TRW and AORC to study environmental fate of azide impacted landfills
- Corporate partner, Nutraceutical, Inc., has acquired two other companies and moved its manufacturing and marketing to Utah

Spin Out Companies

- Linco Technology (now First Scientific)
- ZymeQuest, Inc.

Benefiting Companies

- Nutraceutical
- Eastman Chemical

Center for CONTROLLED CHEMICAL DELIVERY

UU
Funded 1988-1993

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The Center for Controlled Chemical Delivery (CCCD) was established at the University of Utah in 1986, consisting of faculty from the Department of Pharmaceutics and Pharmaceutical Science. As an extension of these departments, the CCCD maintains a strong graduate training program and has attained a leading position in worldwide pharmaceutical, polymer, and biomedical research. Ongoing research projects at CCCD include:

- POLYMERIC MATERIALS
- NONTHROMBOGENIC SURFACES
- SELF-REGULATED INSULIN DELIVERY SYSTEMS
- TARGETABLE DRUG DELIVERY
- ORAL DELIVERY

Spin Out Companies

- Insutech/TTI

Benefiting Companies

- Research Medical, Inc.
- MacroMed
- TheraTech, Inc. - Watson Labs

Center for DAIRY FOODS TECHNOLOGY

The focus of the center is to develop new technologies to improve and develop products for the dairy foods industry.

The center uses membrane technologies (reverse osmosis and ultrafiltration) to concentrate fluid milk at low temperatures so as not to impart any off flavors to milk concentrates.

Another technology uses ultra-high temperature heat processing to commercially sterilize milk and milk concentrates yielding new products that do not require refrigeration and can be stored for up to 12 months. The concentrated and ultra high temperature process milk can be used in reconstituted fluid milk, yogurt, ice cream and cheeses.

- The center has an agreement with Utah Milk Technologies to commercialize membrane concentrated, sterile milk for export.
- A patent for the center's "Creamier Skim Milk" was issued in November 1994.
- Gossner Foods, Inc. Logan, holds the contract for the production and packaging of new products researched and developed by national food companies with the assistance of the center.
- Heart-to-Heart Foods, Inc., Richmond, which produces yogurt and ice cream products and new lines of cream cheese, has used center equipment and expertise to research and develop new product lines.
- International Dairy Foods Association has shown interest in "Creamier Skim Milk" to increase consumer acceptability of skim milk.

USU
Funded 1991-1996

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Spin Out Companies

- Dairy Research Consulting of Utah
- Food Research & Dev Group
- Utah Milk Technology

Benefiting Companies

- Gossner Foods, Inc
- Nichols Research
- NutriScience, Inc
- R-Con International

Center for DAIRY TECHNOLOGY COMMERCIALIZATION	
The Center for Dairy Technology Commercialization was established to commercialize technologies developed at the Western Dairy Center, whose research is funded by a consortium of dairy food companies, for a variety of applications in the dairy industry. The Center is currently pursuing commercialization of the following inventions: utilization of bacterial cultures that produce polysaccharides externally to increase cheese yield; production of flavored cheese using high pressure injection technology, using textured whey protein both as a meat extender and as a high protein snack food.	*USU* *Funded 1998-2001* Carl Brotherson (435) 797-3466 wcdprt@cc.usu.edu **Benefiting Companies** • Shepherds Goat and Sheep Dairy Products, LLC - acquired by Fire Ridge Ranch LLC, Shepherds Dairy.
• Cheese trials have begun using the exopolysaccaride gene to determine commercial interest among cheese producers. • One company intends to modify the cheese flavor and the other company will use the technology as a method of creating new and novel cheeses for children.	

Center for DESIGN OF MOLECULAR FUNCTION (formerly BIOCATALYSIS)

With funding of approximately $1.8 M from the NIH Biomedical Research Technology Program, the Center for Biocatalysis Science and Technology has expanded to become the National Center for the Design of Molecular Function. The goals are to:

1. Establish the underlying bases for the design of molecular function which includes the development of real-time time-resolved spectroscopic technology
2. Apply this basic knowledge and technology to biomedical and environmental applications and monitoring
3. Provide this information and specialized tools of its utilization to the scientific and engineering community

- Two patents have been issued, two are allowed, and several are pending
- The capture surface identification technology selectively bind bacterial cells, spores, toxins, and viruses [many from the CDC select agent list] using molecular engineering methods.
- DARPA is currently funding a team effort on self decontamination surfaces.
- The optical reader technology was demonstrated for the detection of microbial contamination in public water supplies for the Department of Public Health of Utah, the EPA and the Office of Public Health of the State of Louisiana in the aftermath of hurricane Katrina.

USU
Funded 1988-1994

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Spin Out Companies

- Envirol
- Whetstone
- MicroBioSystems, LP

Benefiting Companies

- CSA of Provo, Utah

Center for DEVELOPMENTAL AND MOLECULAR BIOLOGY	
Technologies are being developed for the high efficiency production of valuable proteins, not normally found in animal milk, by producing transgenic animals. A specific gene (DNA sequence) that codes for a specific protein is placed under the genetic control of a promoter that is expressed in mammary cells during lactation. The "genetically engineered DNA" is introduced into the embryo of selected animal species which, when successful, express the desired protein in the milk producing cells. The expression of the foreign protein in the milk in relatively high quantities provides a cost-effective method of producing the valuable proteins.	*USU* *Funded 1992-1998*
	Kenneth White & John Morrey (435) 797-2194 kwhite@cc.usu.edu
• Genes for specific proteins have been sequenced and prepared for injection into animal embryos. • Transgenic nature of newborn animals confirmed • Expression of a valuable protein has been confirmed in these animals' milk	**Spin Out Companies** • Pangenics, Inc.

Center for ENVIRONMENTAL TECHNOLOGIES

Established to support Utah's environmental technologies industry through focused research and development in monitoring and sensing technologies, waste-stream reduction technologies, pollutant destruction and remediation, technology transfer, and advanced technical training. The center focused on the following:

- Knowledge-based expert system for Waste-fed Cement Kilns.
- Environmental applications of Time-of-Flight Mass Spectrometry
- Environmental applications of the Air-Sparged Hydrocyclone (radionuclide separations, oil-water separations, VOC stripping).
- HydroPur industrial wastewater recycling system.

- A subcontract was signed with Thiokol Corp. For development of an electrolytic process to recycle industrial wastestreams. A pilot plant is in place at Thiokol.
- The Center has formed strategic partnerships with twelve companies and federal installations.

USU
Funded 1992-1995

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russ.price@usu.edu

Benefiting Companies

- Thiokol
- Dugway Proving Ground

Center for GENETIC IMPROVEMENT OF LIVESTOCK

Established to identify genetic markers for economically important traits of livestock. The first trait for which genetic markers were identified, was for callipyge gene in sheep, responsible for heavy muscling. Sheep carrying the callipyge gene have 8% more muscle, 8% less fat and 2% less bone, when compared to sheep that do not express the gene. The center also identified a genetic marker for Spider Lamb Syndrome (SLS), which results in severe bone deformities of the legs and back.

- The center determined that the callipyge gene provides an additional 10.3% to the value of each marketed sheep.
- Developed a test that is 97% accurate in identifying the callipyge gene and 100% accurate in identifying the SLS gene.

USU
Funded 1993-1997

Noelle Cockett
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Spin Out Companies

- Livestock Molecular Research and Development, Inc.

Center for GENOME TECHNOLOGIES

The Center's main focus was on developing and refining technologies for large scale sequencing and genotyping of DNA, the genetic material involved in inheritance of every organism. The Center was also developing technology for gridded DNA array detection.

The Center developed novel technologies in three areas:

- Molecular reagents and techniques
- Automated sequencing devices
- Computer software.

UU
Funded 1996-1998

Robert Weiss
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Spin Out Companies

- Cimarron Software Inc.

Center for HOMOGENEOUS DNA ANALYSIS

This new center was formed to commercialize a novel suite of fast, user-friendly and inexpensive DNA sequence analysis tools that could be fielded in a doctor's office rather than requiring the services of an expensive reference laboratory, and which will reach markets including cancer testing, the diagnosis of inherited diseases, and rapid bioterrorism detection.

The central innovation involves a new, high-resolution twist on a very old technique for DNA sequence analysis: thermal denaturation profiles. A fluorescent dye, added before amplification via polymerase chain reaction (PCR), allows the melting transition of the PCR product to be continuously monitored without ever moving it from the same tube. Data processing allows even minute sequence changes to be readily identified through their effect on the melting profile.

- The Center's first product has been licensed to a Utah firm, Idaho Technologies, Inc., which has commenced commercial sales.

UU
Funded 2003-

Carl Wittwer
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carl.wittwer@path.utah.edu

Benefiting Companies

- Idaho Technologies, Inc.

Center for IN SITU OZONATOR	
The powerful oxidizing power of ozone is harnessed in a safe, effective mechanism wherein sediments are processed and redeposited in a minimally invasive manner – immediately arresting contaminant release into the water, capping deeper contaminated layers, and promoting the onset of natural biodegradation.	*UU* *Funded 2003-2004*
• Center has already completed laboratory treatment tests on PCBs and DDT • International patent pending • Funding from both government and industry partners	P.K. Andy Hong (801) 581-7232 hong@civil.utah.edu

Center for LASER INSTITUTE	
The main focus is the development of cardiac surgical laser devices, drugs (photosensitizers), fluorescence sensors, laser fibers and laser power sources in the photodynamic therapy of cancer, and multiple wavelength treatment capabilities for Laser surgery. • Fiber optic lasers • Light activated drugs • Metal vapor laser applications • Laser angioplasty • Cardiac surgical laser devices • Fluorescence sensors	*UU* *Funded 1988-1989*
	Richard C. Straight
• Six patent applications	**Benefiting Companies** • Benefiting Co • HGM Corp.

Center for MEAT PROCESSING TECHNOLOGY	
The center focused on the development of new meat products and processing technologies, including: • Ultra-High Temperature (UHT) pasteurization of meat surfaces. • Low-fat lamb chops, beef steaks, pork chops, and bacon. • Processing technology to reduce fat content of raw meat. • Processing technology to bond meat to bone. • Combining UHT with electron beam radiation technology to produce sterile meat products. • UHT pasteurization combined with High-Temperature Aging (HTA) to produce tender steaks and roasts from the cheaper, less tender primal cuts of beef carcasses.	*USU* *Funded 1991-1996* Von T. Mendenhall, Ph.D. **Spin Out Companies** • Mountain Lamb Co-op • Timpanagos Meats • Canyon Rayas **Benefiting Companies** • B.V. Holland • Agri-Products, Inc. • ConAgra • E.A. Miller & Sons • NUTEK, Corp. • Stone Meats
• Four patents issued • Two license agreements: B.V. Holland and Agri-Products Inc.	

Center for MICROARRAY TECHNOLOGY	
Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.	*UU* *Funded 2005-* Steve Blair (801) 585-6157 blair@ece.utah.edu **Spin Out Companies** • Sigma Technology Holding Company
• Six patent applications in process for molecular diagnostics technologies	

Center for NEURAL INTERFACES	
It is only by recording the activity patterns of large groups of neurons that we can begin to understand how sight, hearing, touch and volitional information are encoded and processed by the brain. The center for Neural Interface has created a tool that makes this investigation possible. The center is focused on the development of technologies that will permit bi-directional (i.e. stimulation and recording) communication with large numbers of neurons in the central and peripheral nervous systems. The center has developed silicon-based arrays of microelectrodes that can either listen in on or talk directly to hundreds of neurons simultaneously. The center has also developed the surgical tools and techniques that allow these high-density arrays to be implanted in central and/or peripheral nervous systems. The long range goal is to use these neural interfaces as therapies for disorders of the nervous system e.g. limited, but functional sensory restoration in individuals with blindness or deafness, and enhanced motor function to individuals with high spinal cord injuries.	*UU* *Funded 1995-2000* Richard A. Normann, Ph.D. (801) 581-8528 normann@cc.utah.edu **Spin Out Companies** • Bionic Technologies **Benefiting Companies** • Cyberkinetics

Center for NUCLEAR, MEDICAL & ENVIRONMENTAL TECHNOLOGIES	
The commercial strategy of the Center for Nuclear, Medical, and Environmental Technology (CNMET) is to acquire selected spin off facilities and consolidate existing niche markets into a single, well-managed and licensed entity that can provide a convenient source for a full range of nuclear services. Large companies are currently downsizing, outsourcing, and eliminating risky and costly nuclear research and development (R&D) capabilities, and are teaming with universities with established nuclear engineering programs and research facilities to perform key services. An additional market trend is for companies to off-load ownership and operation of their nuclear testing, diagnostic, and irradiation facilities, and to contract with new owners for specific access and services. Others are simply decommissioning their nuclear facilities without replacement. The result is a decrease in availability of licensed facilities. That, in combination with an increasing demand for services from the private sector, provides the basis for a solid commercial opportunity. E-Cubed and Nuclear Labyrinth will assume commercial production to reduce costs, implement uninterrupted production cycles, and achieve economies of scale. Appropriate R&D functions then will be merged and contracted to universities with nuclear facilities, such as the University of Utah's TRIGA reactor, to promote innovation, train co-operatively, and supply a steady stream of knowledgeable and seasoned potential employees to the workforce.	*UU* *Funded 2001-2003* David M. Slaughter (801) 585-0759 slaughter@nuclear.utah.edu
• Nuclear Labyrinth is a newly formed company under CNMET that will engage in commercial nuclear services beginning in 2006.	**Spin Out Companies** • Nuclear Labyrinth

Center for RAPID MICROBE DETECTION

The focus of this center is the development of technologies which lead to the real-time detection of pathogenic micro-organisms. This involves the development of novel pathogen capture molecules, platform development, prototype development, and commercialization. Industries where this technology is useful include pharmaceuticals, biomedicine, biotechnology, veterinary, production agriculture, food processing, public health, defense, and water and sewage treatment. To date, four technologies have been developed:

- ImmunoFlow
- ImmunoDNA
- GlycoBind
- TissueTag

- The Center has licensed the ImmunoFlow technology to Stellar Technologies.
- 5 international patents issued, several more pending
- Seeking commercialization partners

USU
Funded 1998-2003

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Marie Walsh
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mkwalsh@cc.usu.edu

Spin Out Companies

- Bio Matrix Solutions
- Finite Technologies

Benefiting Companies

- Stellar Technologies

Center for SIGNAL PROCESSING

BYU
Funded 1988-1990

Richard W. Christiansen
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richard_christiansen@byu.edu

Rarely is a technology developed that is still valid 15+ years after it was first introduced. The Center for Digital Signal Processing was the first to create a way to accurately simulate digital imaging and digital sound.

The technology is comprised of three elements. Digital signal processing is the first. It has been marketed primarily to the military for use in creating accurate simulations for pilot training or military treasure hunts.

Digital signal hearing is the second. It has been used to create a better hearing aid.

The third, multi-spectral imaging is the technology being used to read ancient damaged scrolls. Script reading is just one of the applications for multi-spectral imaging.

Spin Out Companies

- Deseret Digital Design
- Sonic Innovations
- Vector Technology
- ASTECH

Benefiting Companies

- Eyring Research Institute
- Softsolutions
- Space Dynamics Laboratory
- Unisys Corp.

Center for THERAPEUTIC BIOMATERIALS

UU
Funded 2004-

Glenn Prestwich
(801) 585-9051
gprestwich@pharm.utah.edu

The Center for Therapeutic Biomaterials (CTB) prepares and uses new biomaterials for reparative medicine for the 3-D culture of human cells. The Center Develops applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs as well as permitting evaluation of cell response to various compounds. The compounds also have application in a variety of non-medical applications, such as cosmetics.

Spin Out Companies

- Sentrx Surgical
- Sentrx Animal Care
- Glycosan Biosystems

Center for VALUE ADDED SEED TECHNOLOGY	
The center was established to produce value-added crops: • Drought resistant turf grasses for roadways, lawns, golf courses (require 30-40% less water • Forage grasses with superior yield under arid land conditions • Hybrid vigor in wheat using molecular biology.	*USU* *Funded 1991-1997*
	H. Grant Vest grant@usu.edu
• A new forage grass, crested wheatgrass variety CD-2, has been released and licensed to 6 companies. • The DNA based genetic markers for apomixis (asexual seed formation) genes are being used to tag apomictic Australian wheat grasses. • Proprietary tissue culture media and procedures are being refined and show promise for use in the mass cloning and genetic engineering of agronomic, horticultural, and forestry plants.	**Spin Out Companies** • F1 Technologies

Center for VASCULAR BIOTHERAPEUTICS	
The Center for Vascular Biotherapeutics is focused on commercializing medical strategies and devices that target blood vessel formation for the treatment of cancer and obstructive vascular diseases such as atherosclerosis. This Center capitalizes on a robust scientific program aimed at deciphering the molecular blueprint for vessel regeneration using human genetics and transgenic mice technologies; these technologies were pioneered at the University of Utah. The "Functional Vascular Genetics" program established at the University of Utah is identifying genes that are essential for vascular development.	*UU* *Funded 2001-*
	Dean Y. Li (801) 585-5505 dean.li@hmbg.utah.edu
• Negotiations for a licensee are in progress and we have designed and tested a first generation elastin sheath-stent and showed it to be effective in preventing restenosis in a porcine model.	**Spin Out Companies** • Hydra Biosciences

Center for VENTRICULAR ASSIST DEVICE	
The goals of the center are to develop a magnetically suspended centrifugal blood pump to be used as continuous-flow ventricular assist device for nearly all sizes of human patients. A prototype continuous flow ventricular assist device (CVAD2), which has all-electromagnetic bearings has been designed and developed. The centrifugal blood pump is gentle to the blood and is suspended in magnetic bearings. The pump output (rotor speed) is readily controlled to meet the physiologic needs of the patient. This device can pump blood over a wide range of cardiac output from 1 to 10 liters/min, effectively satisfying the physiological needs and excellent blood flow dynamics.	*UU* *Funded 1995-1996*
	Donald Olsen, Ph.D. (801) 581-6991 don.b.olsen@m.cc.utah.edu
• The center received the Sezai Innovative Research Award at the International Society for Rotary Blood Pumps in 1995.	**Benefiting Companies** • MedQuest

Center for X-RAY IMAGING	
This center has successfully commercialized x-ray research by carving a product niche among the biggest manufacturers in the analytic instrument business. The ability to reflect and focus x-rays permit scientists to achieve remarkably high resolution when measuring minute objects. Experiments should begin soon on the compact x-ray laser, an instrument necessary for the success of the Strategic Defense Initiative. In addition to defense applications, advanced x-ray technology is used to detect trace materials in substances and would provide simpler, safer medical testing. Applications include: • Atomic Layer Epitaxy (ALE) • MultiLayer X-ray Optics • Leading edge technology in X-ray imaging • X-ray laser technology • Thin film technology and diagnostics • Bright x-ray sources • Electronic x-ray detectors • Damage resistant nano structures • Pure silicon production	*BYU* *Funded 1988-1992*
	Larry Knight larry_knight@byu.edu
	Spin Out Companies • MOXTEK **Benefiting Companies** • TechniScan

Software Development and IT Cluster

Center for 3D COMPUTER GRAPHICS / 3D SOFTWARE	
In the early stages of computer graphics technology, a software library of three dimensional shapes and textures in a computer environment was created by the Center for 3-D Computer Graphics. Though this does not seem "amazing" in today's world, at the time it was cutting edge technology. The center studied the practical applications of three dimensional modeling for the graphic arts industry. It created one of the first web pages in Utah.	*Dixie State College* *Funded 1991-1996* Eric Pederson (435) 652-7977 pedersen@dixie.edu **Spin Out Companies** • Illustrative Impressions • Infowest • NetEx • Paintbrush Productions • AK International **Benefiting Companies** • Mira Imaging • Strata, Inc.

Center for ACCOUSTICS RESEARCH	
Commercializing active sound control technology with superior ability to both reduce noise in varied settings (vehicle cabins, computer fans and telecommunications, e.g.) and modify sounds for commercial benefit.	*BYU* *Funded 2005-* Scott Sommerfeldt (801) 422-2205 scott_sommerfeldt@byu.edu

Center for ADVANCED COMMUNICATIONS TECHNOLOGY	
The Center for Advanced Communications Technology was formed to commercialize multi-antenna wireless communications: the main focus is using multiple antennas for robust wireless links to maneuvering air vehicles (tactical aircraft and UAV's). A secondary focus is in applying multi-antenna technology to improvement of commercial wireless communications. The Center has forged strong links with industry and with government as they've developed and refined the technology.	*BYU* *Funded 2004-* Michael Jensen (801) 422-5736 jensen@ee.byu.edu

Center for ASYNCHRONOUS CIRCUITS	
The Center for Asynchronous Circuit and Systems Design was established in 1997 to complete the development of software design tool that will allow engineers to efficiently design digital circuits that do not require a global clock in order to operate. While most of today's digital systems use a synchronous global clock to coordinate operations within an integrated circuit, the challenge of distributing such global clock signals becomes increasingly difficult as circuit densities increase. Asynchronous circuits do not require a global clock and therefore do not require clock distribution lines as traditional synchronous circuits do. Industry has not moved to asynchronous design in large part owing to a lack of computer aided design (CAD) tools supporting this technology. Meeting this need is the direct target of this Center. This Center is working with companies such as Intel and IBM not only to help solve their future asynchronous design problems, but also their current difficulties in the analysis and verification of high-speed integrated circuits.	*UU* *Funded 1997-2000* Chris Myers (801) 581-6490 myers@ee.utah.edu
• Significant design verification work was completed at IBM's Austin Research Laboratory, which has resulted in a non-exclusive license agreement with IBM to evaluate the Center's analysis tool in IBM's design flow. • The center worked in collaboration with Sonic Innovations, a spin-out of another Center, designing digital hearing aids. The Center is designing an asynchronous version of their hearing aid that will significantly reduce circuit size and power consumption.	

Center for BASE EDUCATION TECHNOLOGIES	
The center focused on creating new base education technologies.	*UU* *Funded 1987-1988*
	Carol Weller
• Two companies were formed out of this center, one focused on assessments, the other on developing software	**Spin Out Companies** • Assessment Co. • Software Co.

Center for COMMUNICATIONS RESEARCH	
The Center focused on the following technologies: • Multiple access communications • Coded modulation systems • High performance medical imaging • Vector quantization • Adaptive digital filters • Neural networks	*UU* *Funded 1987-1990*
	Craig Rushforth ckrush1@msn.com
	Spin Out Companies • Techniscan
• 2 patents granted on decoding algorithms • Unisys using products for expansion of Utah operations • Spin-out Techniscan awarded Phase II SBIR for $500K	**Benefiting Companies** • Unisys

Center for COMPUTER BASED EDUCATION	
Established as a center in 1987. State-of-the-art computer-based systems have been designed to improve foreign language and computer science instruction. These programs, currently being adopted by industry and education, are training those from kindergarten through adult education. Improved tools for the design, development and delivery of computer instruction systems are revolutionizing teaching and learning methodology.	*BYU* *Funded 1987-1991*
	Jerry Larson (801) 422-6529 jerry_larson@byu.edu
	Spin Out Companies • Cali, Inc. - Now Ellis
	Benefiting Companies • LinguaTech

Center for COMPUTER GRAPHICS AND SCIENTIFIC VISUALIZATION	
Established in 1991 to develop integrated computer aided solutions to problems in computer graphics, scientific visualization, computer aided geometric design and computer-aided manufacturing for industrial applications. Computer design, modeling, graphics, and manufacturing technology for automating the whole "art-to-part" process, scalable from a small job shop to a large advanced industrial shop, national televideo infrastruction and learning via the national information highway.	*UU* *Funded 1990-1996* Risenfeld and Cohen, Ph.D.'s (801) 581-8235 cohen@cs.utah.edu **Spin Out Companies** • Engineering Geometry Systems
• Spin-out Engineering Geometry Systems (EGS) • EGS has created and delivered a custom product to Hill Air Force Base to increase its manufacturing productivity	

Center for COMPUTER INTEGRATED MANUFACTURING	
The focus of the center is on the development and application of software, hardware and courseware, required for manufacturing systems integration; including software for variant and generative process planning, knowledge based systems, electronic component selection and a shop-floor data collection system.	*BYU* *Funded 1987-1989* Dr. Dell K. Allen **Spin Out Companies**
• IBM donated money to assist with research applications	• CIM Training Center • EDGE Foundation • EDGE Inc. • Ozone Saver Industries • Smartware • Utah PODS Manufacturing Co-op • CAM Software

Center for COMPUTER NETWORKS	
The main focus of the Center was to develop computer assisted methods for the design analysis, and simulation of large computer information networks. • Computer assisted methods for design analysis • Research for local area & large computer networks including network optimization software, network traffic models and verification software	*USU* *Funded 1987-1989*
	Dr. Bruce R. Peterson
• Assisted in creating ICOMP • Strong relationship with Novell	**Benefiting Companies** • ICOMP • Novell

Center for DESIGN SYSTEMS	
The Center focuses on researching, designing, developing and commercializing software that brokers information in a time critical way for manufacturing, distribution and design companies.	*UU* *Funded 1995-1996*
	Don R. Brown, Ph.D. dbrown@part.net
• Provision patent application in August 2006	**Spin Out Companies** • ErgoWeb • PartNet

Center for ELECTRONIC MEDICAL EDUCATION	
The objective of the Center for Electronic Medical Education was to develop software technology for use by physicians and scientists who require images as the primary means of communication and consultation. Initially the software consisted of tools to help medical professionals make diagnoses in real time using a database of images as a reference. The center extended development into three markets: 1) consultation, 2) medical and scientific imaging and 3) telehealth. The goal was to improve the process of delivering healthcare and scientific discoveries for the purposes of consistent communication and collaboration and by linking visual annotations and clinical notes to images without altering the images. By maintaining a consultation record, two physicians could have a consultation about the same patient in geographically distant locations. Both physicians could review clinical information (images and text) at the same time, discuss aspects of the clinical review and maintain an auditable record of the consultation.	*UU* *Funded 1999-2004* H. Ric Harnsberger, MD (801) 231-0637 Rharnsberger@amirsys.com **Spin Out Companies** • Amirsys • VisualShare • Globalmatics

Center for ELECTRONIC SYSTEMS TECHNOLOGY	
The Center for Electronic Systems and Technology combined the expertise, resources, and capability of three universities--the University of Utah, BYU, and Utah State University--to serve the industrial community in electronic systems technology. The goal of the Center is to ensure that Utah industry can compete more effectively in the global market and to enhance the opportunities for Utah researchers to develop and commercialize their technologies Electronic systems technologies include microelectronics, digital electronics, RF, microwave, millimeter wave electronics, as well as optoelectronics. The Center provides research, design, evaluation, and prototyping services to Utah businesses that need specialized help in developing new products or enhancing market strengths. Services provided to industry include access to test equipment, laboratory testing, fundamental research and technology development, market analysis, personnel, information, and strategic planning.	*UU* *Funded 1995-1999* R. Jennifer Hwu, Ph.D. and Benjamin V. Cox, Ph.D.
• Research contracts with a large number of technology-based companies were executed • The Center also provided a stream of new commercializable technologies that were patented and offered for licensing to Utah companies	**Spin Out Companies** • Bonneville Technologies • HDG

Center for GLOBAL KNOWLEDGE MANAGEMENT	
This Center was formed to effect the commercialization of software tools representing the next generation of data mining technology, with the potential to leapfrog competing approaches by enabling customers to both quickly and inexpensively discover useful knowledge from databases and efficiently manage that knowledge over time as the underlying data or conditions of use change.	*UU* *Funded 2003-2006*
• New Software Acculink in validation process	Olivia Sheng (801)-585-9071 olivia.sheng@business.utah.edu

Center for HIGH SPEED INFORMATION PROCESSING

USU
Funded 2002-2005

Tamal Bose
(435) 797-7227
tamal.bose@ece.usu.edu

The Center for High Speed Information Processing, focuses on miniaturizing digital devices by using faster algorithms (multiplier free technology), which allows the manufacturing of smaller, faster and cheaper chips.

Echo cancellation technology is the first application. It eliminates the echo that is created on a speaker phone or cell phone when two people talk at the same time. Two patents for this technology have been issued. This same technology can also make it possible for a person with hearing aids to hear someone (s)he is talking to when there is background noise. For hearing impaired people, this is revolutionary. With current hearing aids, when there is background noise, voices are canceled out, producing empty static.

Another area is building encoders and decoders for error correction that are compliant with emerging standards for low density parity check codes. This technology is in a commercialization phase.

- First spin out company, SP Communications was formed.
- Smaller, faster, cheaper chips are being developed by this center.
- A large Utah based company currently has licensing with the University for the technology connected to hearing-aid feedback

Spin Out Companies

- SP Communications

Center for INDUSTRIAL IMAGING

UU
Funded 1995-1999

Robert Ehrlich, Ph.D.
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behrlich@egi.utah.edu

The Center was established to commercialize image analysis, data analysis, and artificial intelligence technologies developed in the geosciences. Research at the University on fluid flow through porous media (i.e., aquifers, petroleum reservoirs) has resulted in generally useful image processing, image analysis, data analysis, and artificial intelligence techniques with commercial applications in geosciences and engineering.

Center technologies include Petrographic Image Analysis (PIA), which comprises four components: image acquisition, image processing, pattern recognition/data analysis, and linking to physical models. Each component involves specialized hardware, software, and expertise. The pattern recognition procedure within PIA has also proven useful in chemical fingerprinting in a variety of geoscience/environmental applications. The Center has begun to explore areas outside geoscience applications, including the application of PIA to medical imaging, and especially to automated screening of prostate biopsies. The Center also has been granted ownership of Integrated Paleontological System (IPS) software for further research, development, and commercialization. The Technical Alliance for Computational Stratigraphy (TACS), a consortium of nine petroleum companies, has been established to fund a three year commercialization and development initiative.

- GeoChem Metrix, Inc. was spun-off in September 1998. The company specializes in analysis of chemical data in the context of environmental and toxic tort litigation support.
- Two new software license agreements were signed with BP-Amoco Upstream Technology and Elf Exploration Production for the TACS consortium.

Spin Out Companies

- GeoChem Metrix, Inc.

Benefiting Companies

- BP-Amoco Upstream Technology
- Elf Exploration Production

Center for INFORMATION TECHNOLOGY - HANDICAPPED EDUCATION	
The Center for Information Technology—Handicapped Education was funded with two purposes in mind: first, to meet a federal requirement that government and education offices provide closed captioning for training videos, and second, to promote information technology in public schools. K-SAR captioning software was developed, as well as reading and other software for educators.	*USU* *Funded 1989-1991* Alan Hofmeister hofa@cc.usu.edu **Spin Out Companies** • Effective Instructional Tech

Center for INTELLIGENT COMPUTER TOOLS	
The Center focuses on interactive image segmentation, composition and digital image editing, automated creation/browsing of digital (microfilm) libraries, semiautomated creation of virtual environments, especially with Virtual Venues for the 2002 Winter Olympics. • The Center teamed up with a CA company to produce media for the 2002 Olympics which was featured on big screens along with individual event media.	*BYU* *Funded 1996-2001* William A. Barrett (801) 378-7430 barrett@cs.byu.edu **Benefiting Companies** • Virtual Venues • Adobe Systems • Park City Entertainment.

Center for INTERACTIVE RAY TRACING & PHOTOREALISTIC VISUALIZATION	
Producing a commercial form of two programs that can process 3-D graphics based on large data sets found in CAD, film animation and scientific models, which existing GPUs cannot handle	*UU* *Funded 2005-* Steven Parker (801) 585-1504 sparker@cs.utah.edu

Center for INVERSE PROBLEMS, IMAGING & TOMOGRAPHY

The Center for Inverse Problem, Imaging and Tomography (CIPIT) is the result of research efforts conducted at the University of Utah's Advanced Imaging Methods Laboratory (AIM lab). The AIM lab was developed to study medical ultrasound imaging. Further research was then introduced in advanced sonar and geographical/environmental imaging methods based on common mathematics. In 1990, the AIM lab submitted a proposal for independent support as the CIPIT and initial funding was received in February of 1991. Some of CIPIT's technical accomplishments are in the areas of:

- MEDICAL ULTRASOUND
- HAZARDOUS SITE IMAGING
- 3-D MICROSCOPE

UU
Funded 1989-1993

Steven A. Johnson
johnson@ee.utah.edu

Spin Out Companies

- Monolithic Tech
- Techniscan Medical Systems

Center for MAGNETISM IN INFORMATION TECHNOLOGY

The center was established in 1995 to produce superior magnetic materials including permanent magnets and magneto-resistive materials, which
would have applications in numerous markets including products such as motors, sensors, magnetic storage media, and electromagnetic circuitry.

- An agreement has been signed between the center and a Utah company, for the company to manufacture high corrosion resistance rare-earth materials using center technology.
- The center is collaborating with the Idaho National Engineering Laboratory (MEL) to develop efficient processing for permanent magnetic materials.
- The center is also working with a Utah company to manufacture flexible magnetic materials.
- The center is working with a Utah company to develop a new type of sensor for applications in the automotive industry.

USU
Funded 1995-1996

C.Y. Pan

Benefiting Companies

- Starsys

Center for MTV FLAT PANEL DISPLAY TECHNOLOGY	
Established in 1995 to study new technologies in producing flat panel displays for the information (e.g. computer monitors) and entertainment (e.g. television sets) markets. The main focus is to conduct proof-of-principle research on new and emerging potential flat panel display technologies and to evaluate new and existing flat panel display technologies. An additional focus is to create and support applications needed by flat panel display manufacturers especially those located in the State of Utah.	*UU* *Funded 1995-1997*
• Developed a new, enhanced flat panel display for which a patent application has been submitted. • Established a close working relationship with a local company involved in flat panel display development. A new company has been established with an option to license the flat panel display technology. • Received Department of Energy funding to investigate another spin-off technology for micro-energy converters under a collaborative development effort with Sandia National Laboratories.	Laurence P. Sadwick sadwick@ee.utah.edu

Center for MULTI-DIMENSIONAL INFORMATION - CROMDI

The Center for Multi Dimensional Information—CROMDI was established to commercialize audio-visualization technology that facilitates the rapid and accurate analysis of large quantities of quickly changing data. By visually displaying multiple variables using various objects and colors, a wide range of information is clearly presented. IntuInfo, the patented technology, enables the processing of events significantly faster and more accurately, while requiring less training from those who use the software. The areas of application are broad: finance programs, homeland security systems, DOE contacts, medicine, and entertainment. The most successful application at this time is in finance and networking.

- Licensing agreements with several existing companies have been negotiated.
- This center can quickly process large amounts of data and generate easy-to-interpret results.

UU
Funded 2000-2004

Stefano Foresti
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stefano@chpc.utah.edu

Spin Out Companies

- Applied Medical Visualization, Inc

Benefiting Companies

- GE Medical Systems
- Draeger Medical

Center for MULTIMEDIA EDUCATION AND TECHNOLOGY

Established in 1993 to develop state-of-the-art, interactive multimedia technology and also to author and produce with industrial partners a wide range of commercial training and education applications.

Interactive multimedia computer-based authoring systems. Some authoring technologies will be copyrighted, held, and owned by WSC and the Center while others will be developed with external corporate partners.

UVSC
Funded 1992-1995

Gary L. Phelps

Spin Out Companies

- Cela Solutions Inc.
- MC2
- Memory Lane Productions
- Utah Valley On-Line

Center for MULTIMEDIA EDUCATION AND TECHNOLOGY	
Established in 1993 for the development of interactive multimedia software modules for science, mathematics, and engineering education. Software and hardware interactive multimedia products for education including simulation software, virtual laboratories, software and hardware for data acquisition and analysis, inexpensive virtual reality applications. Production and distribution of interactive multimedia educational modules on CD-ROM.	*UU* *Funded 1993-1997*
• Two CD-ROM products have been developed: a multiplatform "Calculus Castle and "Engineering Electromagnetics." Another CD-ROM in genetics, "History of the Human Gene," is also completed. The Center is actively pursuing commercialization of these products. • The center manages the Conceptual Learning of Science (CoLoS), USA project, which is a consortium of eleven universities and is sponsored by Hewlett-Packard Company. • In collaboration with John Wiley & Sons, the center continues to publish the award-winning journal, "Computer Applications in Engineering Education." • The center hosted an international conference "1996 Frontiers in Education" in Salt Lake, which had 617 attendees from 14 countries.	Richard W. Grow (801) 581-7634

Center for ORGANIC ELECTRONICS	
Development of new polymers for the creation of OLEDs (Organic Light Emitting Diodes) resulting in the commercialization of organic semiconductors with superior luminescence efficiency and color spread, for multicolor displays and white light illumination.	*UU* *Funded 2006-*
	Valy Vardeny (801) 581-8372 val@physics.utah.edu

Center for PARALLEL SUPERCOMPUTING	
The Center was focused on Phase I Beta Testing including training, software porting, performance and development. There was potential for the center to become unique nationally in comparing supercomputer architectures.	*UU* *Funded 1988-1989*
• IBM provided a 3090 ($11.7MM) • Convex donated upgrading components for a C-120 and a C-220 to supercomputer status with a $100K donation • CSA donated a 16 processor system systolic processor for supercomputer at smaller workstations	Dr. Douglas Chabries

Center for SCIENTIFIC COMPUTING AND IMAGING	
The Center for Scientific Computing Imaging, SCI, developed the SCIRun technology, which provides scientists and engineers with a new model for scientific computing. The model uses graphic interfaces and 3D graphics to provide a visual program for solving complex problems. Previously three separate programs had to be used. SCIRun incorporated the programs into one	*UU* *Funded 1996-2000*
	Chris Johnson (801) 581-7705 crj@cs.utah.edu
• The SCI Center has become the SCI Institute, which has a huge impact on Utah's economy.	**Spin Out Companies** • Visual Influence, Inc.

Center for SOFTWARE SCIENCE

The Center for Software Science created a complete integration capability to enable a Unix based program to be run in a Windows Operating System. The product allowed for compatibility between PC and Unix workstations throughout the country, running approximately 150 functions.

This was an especially useful software during the transition from Unix to a Windows based environment. At that time the center was well funded. However once Windows became the standard, the need for this technology almost completely disappeared.

- This technology was critical during the transition from Unix to Windows Operating Systems.
- While funded this center had a 17 to 1 match in funding.
- The technology enabled Unix based programs to be run in Windows Operating Systems.

UU
Funded 1989-1994

Robert R. Kessler
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kessler@cs.utah.edu

Spin Out Companies

- Hippo Software

Center for SUPERCOMPUTING

The mission of the Center was to establish a High Performance Computing Center to serve as a computational resource for Utah companies and universities. This partnership among industry and education was a unique resource for solving scientific and engineering problems that required unusually large memory and visualization requirements.

The Center for Parallel Supercomputing, now the Center for High Performance Computing provides large scale computer sources to facilitate advances in the field of computational science.

The projects supported by CHPC come from a wide array of disciplines requiring large capacity computing resources, both for calculating the solutions of large-scale, two and three dimensional problems and for graphical visualization of the results.

The published results of research supported by CHPC facilities are maintained in the CHPC Bibliography (PDF).

- IBM contracted for $13M in matching funds
- Signed a new 3 year agreement with IBM regarding visualization

UU
Funded 1988-1992

Julio Facelli
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julio.facelli@utah.edu

Benefiting Companies

- 3M Health Systems
- Eden Solutions
- Hercules
- IBM
- Kennecott
- Relational Technology Products
- SyncSort
- Thiokol
- WordPerfect

Center for VLSI DESIGN

The Center was established to explore a new technology called Path Programmable Logic (PPL), an innovative design approach for compact integrated circuits. This technology has been developed in response to an identified market niche for a less expensive, more user-friendly design program. The ability to interface PPL with other commercial software packages makes this design program attractive to smaller engineering firms needing custom integrated circuits.

- Joint venture was formed with a European company to sell center products in Europe

UU
Funded 1990-1992

Kent F. Smith
kjsthree@gmail.com

Spin Out Companies

- Bonneville Microelectronics

Benefiting Companies

- Cirque Corp.
- IOMEGA Co.
- Phoenix
- Softeze

Appendix B – Benefiting Companies (by center)

CENTER	COMPANY
3D Computer Graphics	Mira Imaging
	Strata, Inc
ACERC	Ford, Bacon, Davis
	Geneva Steel
	Hercules
	IOMED
	Pacific Corp.
	Questar
	Sarcos Research Corp
	Sarcos, Inc
	Thiokol
	UP&L
Advanced Composites	AeroTrans
	American Polymer
	Ashton Aerospace
	Automated Process Control
	B&M Enterprises
	Beckwith Technology Group
	Bemsco
	BGA
	Blue Cow, Inc.
	Bradley Instruments
	ClayTech
	Controlled Composite Technology
	CRP/Springlite
	Curecrete
	DAH, Inc.
	Delta Fiberglass
	Dimensional Research
	DMS
	DPE
	EDO
	Evolution Skis
	Fiber Tek
	Futura Propulsion Systems
	H K Corporation
	Haelan Medical
	Hexatron
	Ideas to Products
	INCO VaporFab
	International Biokenetics
	LCC Fabrications
	Legends Technologies
	MATCO
	Medilight
	Mountain High Engineering
	Mountain Land Support
	Performance Composites
	Potter Management
	Pro Design Corporation
	Red Hawk, Inc.
	Rotomolding of Utah

Advanced Composites	Sound Composites
	Terra Tek
	TRA
	Ultralite of America
	UP International
	Utah Rocketry
	Van Patten Corporation
	Wasatch Engineering
Advanced Imaging LADAR	Wasatch Technology Group
	RapidMapper
Advanced Materials & Microelectronics	Bonneville Microelectronics
	Ceramatec
	Concoyle Oilfield Tools, Inc
	Evans & Sutherland
	Fisher Company
	Hercules
	Nova Tech
	Space Systems Engineering
	Thiokol
	Westcot Co.
Aerospace Technology	Intraspace Inc.
	R & D Inc.
	Wasatch Research & Engineering
Biocatalysis	Computer Systems Architects
	Hyclone Labs
Biopolymers	Becton Dickinson Critical Care Monitoring
	Cardiopulmonics, Inc
	Hyclone Labs
	Research Industries
	Silicon Graphics
Bioremediation	Non-invasive Geotracking
	AgriDyne Technologies
Biotechnology	EarthFax
	Thiokol
	UP&L
CAEDM	AgriDyne Technologies
	Albion Technologies
	Arrow Dynamics
	Artistic Precision Enterprises
	Bel Viso Labs
	Buena Ventura
	Bureau of Mines
	C.T. Film Inc.
	Cache Valley Cheese
	Chromalox
	Del Med, Inc
	Evans & Sutherland
	Great Basin Brine Shrimp
	Great Salt Lake Mineral
	Hercules
	Hewlett-Packard
	Hill AFB
	Industrial Research
	IOMEGA Co.
	KEMGAS
	Miller Labs

CAEDM	Monarch Labs
	Morton Automotive
	Reily Wendover
	Schreiber Foods, Inc
	Solaray
	Susumu Construction
	Thiokol
	Trysan
	VALTEK
	Viewpoint Animation
	Western Zirconium
	Williams International
Chemical Reactors	EIMCO
	Kennecott
Chemical Separations	ASARCO
	Cascade Refining
	DataChem
	GalTech Semiconductor
	Johnson Matthey
	Parish Chemical
	Tronac, Inc.
Coal Research	Advanced Processing Technology
	ATL (Springville)
	Flowserve (Springville)
Compliant Mechanisms	Grandway USA (Salt Lake City)
	ICON (Logan)
	MityLite (Orem)
	Recreation Systems (Kaysville)
Computer Based Education	LinguaTech
	MacroMed
Controlled Chemical Delivery	Research Medical Inc
	TheraTech Inc. (Watson Labs)
	Gossner Foods, Inc
Dairy Foods Technology	Nichols Research
	NutriScience, Inc
	R-Con International
Design of Molecular Function	CSA
Engineering Design	Sarcos Research Corp
Homogeneous DNA Analysis	Idaho Technologies
	Digitran
Information Technology (Handicapped)	SkiHi
	Systems Inpact Inc.
	Alta Technologies
	Computer Systems Architects
Inverse Imaging & Tomography	Evans & Sutherland
	MOXTEK
	TechniScan
	Unisys Defense Systems
	HGM Corp.
	Innovative Imaging Services
Laser Institute	MetaLaser Corp.
	Primemed
	QLT, Inc.
	ConAgra
Meat Processing Technology	E.A. Miller & Sons
	NUTEK Corp.
	Stone Meats

Novel TiB Surface Hardening	Ortho Development Corporation, Draper, UT
Pyrometallurgical	Kennecott
Quality and Integrity Design	Technology Mgt. Associates, Inc.
Rapid Microbe Detection	Stellar Technologies
Rapid Product Realization	Accuserve
	American International
	Bolick Co.
	CellTek, International
	GWH
	Hatch Biomedical
	Tile Roof Associates
	Youth Reclamation Inc.
Signal Processing	Eyring Research Institute
	Softsolutions
	Space Dynamics Laboratory
	Unisys Corp.
Space Engineering	Hercules
	Thiokol
Supercomputer	3M Health Systems
	Eden Solutions
	Hercules
	IBM
	Kennecott
	Relational Technology Products
	SyncSort
	Thiokol
	WordPerfect
VLSI Design	Cirque Corp.
	IOMEGA Co.
	Phonix
X-RAY Imaging	Softeze
	TechniScan
Supercritical Fluid	Process Engineering Resources
Solid Oxide Fuel Cells	Dionex
Profitable Uses of Agricultural Byproducts	FuelCell Energy (FCE) of Danbury, CT
	Agrimass – Cali – licensing
	Inrepid – ITR Idaho
Green Hill Recycling	Advanced Construction Materials
Soil Stabilization Inc.	Advanced Construction Materials
uniAMS	Advanced Construction Materials
Advanced Composites	ACI Technology
	Behavioral Technology Inc.
	Ridgeway & Fautz
	Springlite
Advanced Materials & Microelectronics	Beta Power Inc.
	Edo Western
Advanced Structural Composites	Patterned Fiber Composites, Inc.
Biotechnology	Natural Product Sciences
Composites in Construction	EDO Fiber Science
	Hydrotech
	Monroc, Inc. (Eagle Precast Co.)
	Sika
	Thiokol
	Waterpoint
Engineering Design	Animate Systems
	MicroJect, Inc.

Harsh Environment Electronics (formerly MTV Flat Panel)	Innosys
Profitable Uses of Agricultural Byproducts	HHE
Rapid Product Realization	UniFoods
Scientific Computing & Imaging	Manufacturing Extension Partnership
Self Organizing Intelligent Systems	Visual Influence Inc.
Solid Oxide Fuel Cells	Kuchera Defense Systems
	Fuel Cell Energy
	Versa Power Systems

Governor's Office of

Economic Development

Centers of Excellence

Jon M. Huntsman, Jr.
Governor

20th ANNIVERSARY REPORT
(1986-2006)

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Executive Summary

The Centers of Excellence program has a 20 year history of helping mature technologies developed at Utah's colleges and universities and bringing those technologies into the marketplace. The purpose of the Centers of Excellence Program (COEP) is to accelerate the commercialization of promising technologies that have value for Utah.

This report will explain the program's objectives and operations, detail the technology and commercialization progress of each Center and evaluate the economic impact the program has generated for the State of Utah.

Since its inception in 1986, the program has helped create thousands of high-tech jobs, assisted in the creation of spin-off companies, and by improving technologies and processes has helped hundreds of Utah companies experience tremendous growth.

Over the first 20 years of the program, the Centers of Excellence Program has generated more than 186 patents, resulting in 226 license agreements[1], and 126 plus Utah based companies have been created to license and market proprietary technology fostered by the program. 55 of these spinouts are still "alive" in Utah, three are alive out of State, and another 11 have been acquired and moved out of state. As of this report, the Utah companies directly employ over 2035 persons in the state, at an average salary over $65,000.

Well-known firms that have been assisted by the Centers of Excellence program include Myriad Genetics, Inc. (MYGN), Sonic Innovations, Inc. (SNCI), Moxtek, Cimetrix, and Autonomous Solutions Inc. Emerging successes include InfoWest, Live Wire, Andigen and Rocky Mountain Composites and startups just emerging from the Centers program in the past two years include Flying Sensors, Procerus Technologies, Wasatch Microfluidics Inc., and Glycosan Biosystems. These firms are among the many companies strengthening Utah's economy through technologies developed at Utah's colleges and universities.

These firms and many more, continue to generate new jobs in Utah and strengthen Utah's high tech business community and are strong examples of the compelling research being created in Utah's colleges and universities.

This report summarizes nearly a year of primary research to identify the results of the past two decades of the program. Extensive work was done by two interns beginning in May 2006 through February 2007. Vincent Beerman began the study and gathered the bulk of the data and performed the initial analysis, and Danica Nelson provided additional research and analysis. Vincent and Danica contacted 81 of the program's 111 principal investigators to gather data about the fruits of each of their Centers and what had happened. They then reached out to the actual companies to quantify these results. This report is the first time such a comprehensive look had been taken at the program and reveals both a tremendous "startup rate" for the Utah Centers of Excellence program, and opportunities to further improve the success rate of "significant growth" among the spinouts from the program.

[1] Patents and license agreements were compiled from historical annual reports. These reports changed formats multiple times throughout the history of the program, thus this data is only as accurate as these reports allow.

The Centers of Excellence Program Definitions

Utah State Law

Chapter 63-38f-703 - Definitions
"Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.

Chapter 63-38f-901 - Purpose statement
The Legislature finds and declares that the fostering and development of industry in Utah is a state public purpose necessary to assure the welfare of its citizens, the growth of its economy, and adequate employment for its citizens.

The purpose of the Centers of Excellence Program (COEP)

To accelerate the commercialization of promising technologies that have strategic value for Utah. The COEP, which is part of the Business Creation Team in the Governor's Office of Economic Development (GOED), accelerates this commercialization process in three critical ways:

1. By selecting the most promising technology maturation proposals from those submitted by University-based research teams
2. By providing the grants to the teams to help mature the technology so that it will be attractive to potential investors and customers
3. By finding highly qualified Business Team members to help develop the plans and begin implementation of the plans to take the product to market

Additional definitions:

Benefiting Company

- Any company other than a spin-out that is using the technology from a Center in a substantial way, frequently an existing company that is a licensee of the technology.

Business Team

- Seasoned, proven technology executives and entrepreneurs recruited by the COEP to help develop strong business plans and go-to-market strategies for each Center. Although recruited on a part time "consulting" basis, these are individuals who are truly part of the Center team and are widely considered the "secret sauce" to the success of the Centers of Excellence program.

Center of Excellence

- Located at a Utah institution of higher learning, a "Center" is a designated university-based team which has previously developed specific, commercially attractive technology under Federal or corporate sponsored research grants, and which needs assistance in moving the technology forward to a "product" or "near-product" stage.

Companion Spin-out or Licensee Grants

- A company (spin-out, startup, or licensee) that forms out of a Center (i.e. is a Spinout) and receives direct assistance to the company from the Centers of Excellence program. Such a company also licenses the Center-developed technology and may also be referred to as a "Licensee."

Companion Spin-out Grants

- Funds awarded to a Center spin-out which has demonstrated that funds granted directly to the spinout would substantially accelerate job creation and economic development in Utah. These direct grants are awarded on a competitive basis and require matching funds (typically 1:1) from investors, revenue or founders.

Distinguished Center of Excellence

- A Center receiving funding in excess of $10 million or national recognition. These centers are allowed special funding beyond graduation if proposed projects are deemed worthy by the Advisory Council, Note that this was used earlier in the program's history but is rarely used at this time.

Faculty, Graduate Student and Post Doctorates Employed

- Positions being funded directly to support the Center's activity within the university setting

Graduated Center of Excellence

- The Centers of Excellence program helps specific technologies developed at a university move into the marketplace. As such, a maximum funding term of 5 years was provided from 1986-2005. Starting with the 2005-06 fiscal year, this was changed to a maximum of 4 years. The change was intended to help accelerate the time-to-market of these promising technologies and has had the practical effect of condensing the same total funding into a shorter period of time.

Industry Jobs Created

- Those jobs that have directly or indirectly resulted from activity at a Center.

Principal Investigator (PI)

- Also referred to as a Center Director, a PI is the principal researcher at a Center.

Spin-out Company

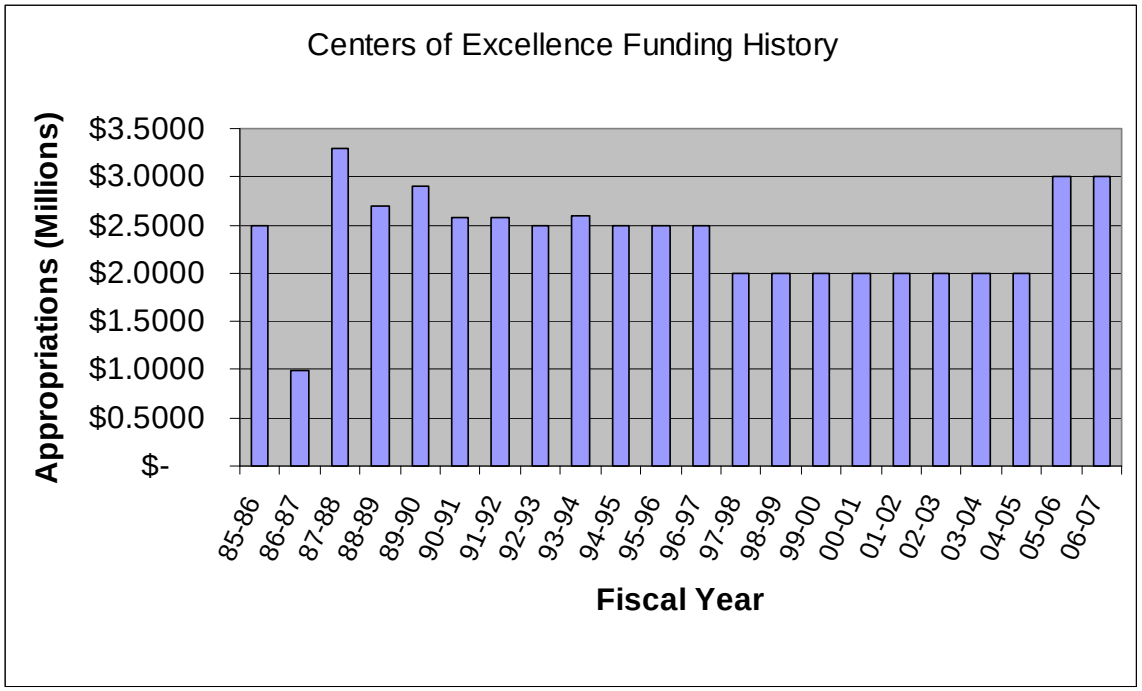
- Any startup company that is created directly as a result of Center technology.

Background

Recognizing that the growth of new industry and the expansion of existing industry in the next century would require both a strong technology base and a steady supply of new ideas, concepts, innovations, and prototypes, the Utah State Legislature created the Centers of Excellence Program (COEP) in 1986. The Legislature has recommended the allocation of economic development funds annually to the COEP, generally to be awarded to college and university faculty on a competitive basis. The objectives of the COEP are to support maturation of technologies that have potential for economic development in the state and assist in the commercialization of those technologies.

This technology commercialization process results in job creation through the formation of new companies and the enhancement of business opportunities for existing companies. In addition, the value of technologies created is further reflected in the number of patents issued and the associated royalty-bearing licenses that are signed. The State does not assume any equity positions in the licenses. Instead, the return on investment to Utah comes from converting university developed technologies into job creating products and services through spin-out or existing businesses.

Ongoing funding of the program has varied during the years. The program started in 1986 with $2.5 million in funding and maintained approximately that level until 1996-97.
Following the 1996-97 fiscal year, the program's funding remained at $2 million per year, and returned to $3 million in 2005-06. Despite the program's success, COEP funding has not kept pace with inflation. The following chart shows the history of funding for the Centers of Excellence program, through the 2006-07 fiscal year.



Operations and Objectives

The goal of the Centers of Excellence program is to help grow the economy of Utah. When the current Director joined the program, she coined the tagline, "Our job is jobs" and she has shared this perspective with everyone involved with the program. In order to help foster job growth, the COE program encourages licensing of Centers-supported technology to either existing Utah businesses, to help them develop innovative new products and services, or the startup of a new company (called a spin-out). The program continues to mentor some Graduated Centers, introducing them to sources of funding and identifying management and other talent.

Center Selection Process

In late December of each year, the COE program issues an RFP through its website which is advertised to the Universities, their Technology Commercialization Offices (TCOs), existing PIs, and other industry contacts. In response to this RFP, prospective PIs as well as existing Center Directors prepare a proposal for a potential new Center, for a business team grant to assist in preparing a future potential Center or for renewal of funding for an existing Center.

The review process is a very demanding element of the Centers of Excellence program, but also demonstrates the strong support the program has among industry and the overall Utah community. 30 or more individuals with strong technology business backgrounds, all at the Director or VP level and above, volunteer to serve on the Centers of Excellence Advisory Council as reviewers for the program. At least two reviewers, along with the COEP Director and other GOED team members review the written proposal and then conduct a site visit and review. This meeting allows the reviewers to hear directly from the PIs about the technology and business opportunity. After all proposed Centers have received a site visit and evaluation; the Director conducts what is currently a two tier selection process. In the past, the entire Advisory Council would gather in a two day process to discuss each proposal, rate them, and make the final funding recommendations. As the program has grown, that has changed into a two tier process, beginning in 2006. The Advisory Council is divided into three groups, the Life Sciences sub-committee, the Materials/Manufacturing/Energy/Environment sub-committee and the Information Technology/Aerospace/Electronics sub-committee. Each sub-committee meets and does a preliminary ranking of the proposals in their sub-committee, and makes a preliminary funding recommendation. Then, the entire Advisory Council meets together, reviews the recommendations in rank order, and makes the final funding recommendations.

The State Advisory Council (SAC) for Science and Technology has statutory responsibility for advising the Centers of Excellence Program. SAC members participate on the Centers Advisory Council, reviewing proposals and conducting site visits. This provides SAC members with in-depth knowledge of the program, Center specific information, and a strong technical and industrial perspective for making funding recommendations. The SAC also reviews the Centers of Excellence Annual Report before its delivery to the Legislature and publication.

In addition, members of the Governor's Office of Economic Development (GOED) Board also participate in the COE review process. These members are also able to verify that the selection process has been fair and was conducted in a way to help advance economic development in the state of Utah. Once the final list of recommended funding allocations is prepared, the proposed Centers and their budgets are presented to the GOED Board.

Centers of Excellence Program 1986-2006

Report Purpose

Acknowledging two decades of tremendous effort within the state in the Centers of Excellence program, the current Director decided in 2006 to perform primary research into the success of the program to date. Although some sampling data had been captured in past years, it was not a census of the program's past Centers, and it seemed that it would be helpful to reach out to every past and current Center to understand the success of each Center in commercializing its technologies.

Program Directors

The program has had the benefit of six dedicated, and quite long serving, Directors over its 20 year history. This is the first time that the list of all directors and their tenures has been compiled. Almost all of them continue to be active in the commercialization of university-developed technology, either through their industry work, through tenure at the technology commercialization offices of various Utah universities, or through continued service as reviewers for the program.

Tenure	**Director**
1986-1988	Lynn H. Blake, Ph.D.
1988-1993	G. Michael Alder
1994-2000	Roderick J. Linton
2000-2002	Rajiv K. Kulkarni, Ph.D.
2002-Jan 2005	Michael A. Keene, Ph.D., MBA
May 2005-Current	Nicole Toomey Davis, MBA

Centers of Excellence Primary Research and Analysis

Methodology

Research conducted in the summer of 2006 by Vincent Beerman surveyed 75 Center Directors of the 111 Centers of Excellence over the past 20 years. There were 24 Center Directors whose contact information could not be found or who had passed away and 12 who were unavailable during the survey period. Additional research was conducted by Danica Nelson during the end of 2006 and beginning of 2007, and seven of those 12 were surveyed and their updated center information was added to this report. The final date of data collection for this report was February 15, 2006. Former and current Center Directors were asked to update Center accomplishments and provide all available information about benefiting and spin-out companies. A thorough web search was conducted on all listed spin-out and, where possible, benefiting companies. Spin-outs were contacted and asked to verify their association with the center and provide revenue and employee information. Many companies asked us to keep this information confidential or declined our request. Confidential information was used in aggregate data but omitted from the web site and report, or was replaced with publicly available estimates, where available.

Challenges:
It is extraordinarily difficult to accurately measure the effect of a program such as the Centers of Excellence. COEP plants the seeds of business by fostering the development and commercialization of technologies at Utah's universities. Once a technology has been patented and the applications proven, the economic story often diverges and becomes difficult to trace. Some technologies are licensed to several companies, who then integrate them into existing products or build new divisions around them. Frequently, these licenses result in significant job creation in Utah, but it is nearly impossible to measure the number of jobs directly attributable to the Center as the technology is combined with existing company resources and products. Thus, the economic impact of the Center technology and COEP becomes inextricable from the overall success of the licensee.

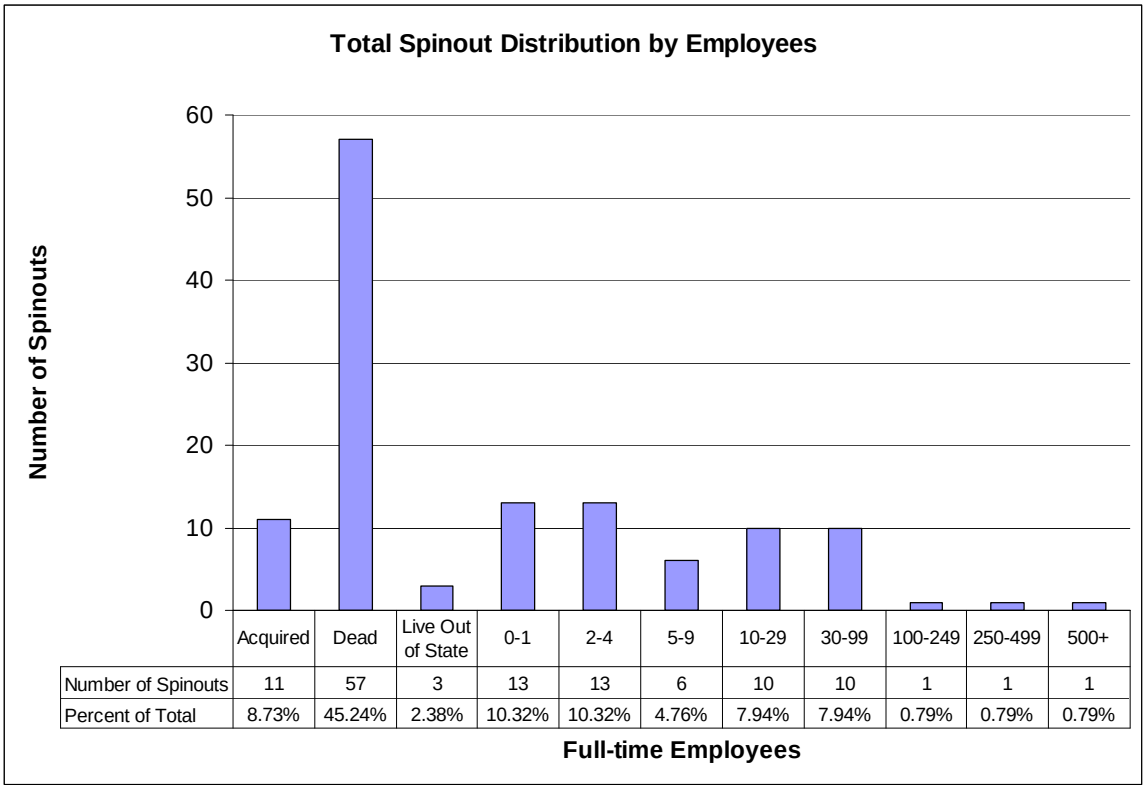
Spin-outs:
Center spin-out companies are easier to measure as they credit their foundation to a Center's personnel and technology. Although over the life of the business there are many inputs (capital, talent, other technologies and assets) that build the business, without the Centers of Excellence Program, that company would likely never have existed. Therefore we can say that COEP 'helped to create' those companies and jobs. However, many Center spin-outs have been acquired over the years. When this happens, the company facility and personnel may remain intact as a subsidiary or division, are released as redundant resources, or are absorbed into the new parent company. For the purposes of this report, if a company was left intact, those employees were still counted in the aggregate statistics. Otherwise, that company is no longer considered a "live spin-out" for the purposes of this report.

Limitations of this report:
As explained, measuring the ***total economic impact*** of the Centers of Excellence Program is difficult and imprecise. Many, if not most, of the jobs created through COEP are now inextricably tied to licensees and acquired spin-out companies across the state and the country. In spite of this difficulty, those spin-outs that we are able to track show that the program has created significant economic growth and job creation in Utah.

Corrected data:
An unpublished internal report in 2003 included some spinouts that were determined during the research of this report to be benefiting companies instead. A correction was made to the 2003 data which resulted in an adjustment of 937 jobs attributed to COEP spinouts being deducted from the initial reported total of 2,008. The corrected total number of jobs created as of 2003 is 1,966. The net increase in jobs from 2003 to 2006 is 922. The corrected ROI for 2003 is 2.04 based on an average salary of $59,000.

Spinout Distribution by Number of Employees

Of the 126 total spinouts in the history of the COEP, 11 have been acquired by companies outside the state of Utah and moved out of state, while three are still live, but were started outside of the state. For the spinouts within the state, 32 have fewer than 10 full-time employees and many of these companies have remained at that level of employment for a significant amount of time and are not likely to grow. There are 20 spinouts with 20-99 employees. Companies that employ more than 100 people bring significant benefit to the state's economy and are likely to stay within the state. These companies are often referred to as "big wins" within the Centers of Excellence community. It is important to note that companies of fewer than 500 employees are still considered small businesses by the Federal Government (for example, in the Small Business Innovation Research (SBIR) Program), but for Utah they contribute significant employment and are therefore very valuable to the state. The COEP has helped foster three such highly-valued companies: Myriad Genetics, Sonic Innovations, and MOXTEK. The following graphs illustrate the distribution of spinouts based on the number of full-time employees, thus demonstrating the history of the program and the benefits it has brought to the state.

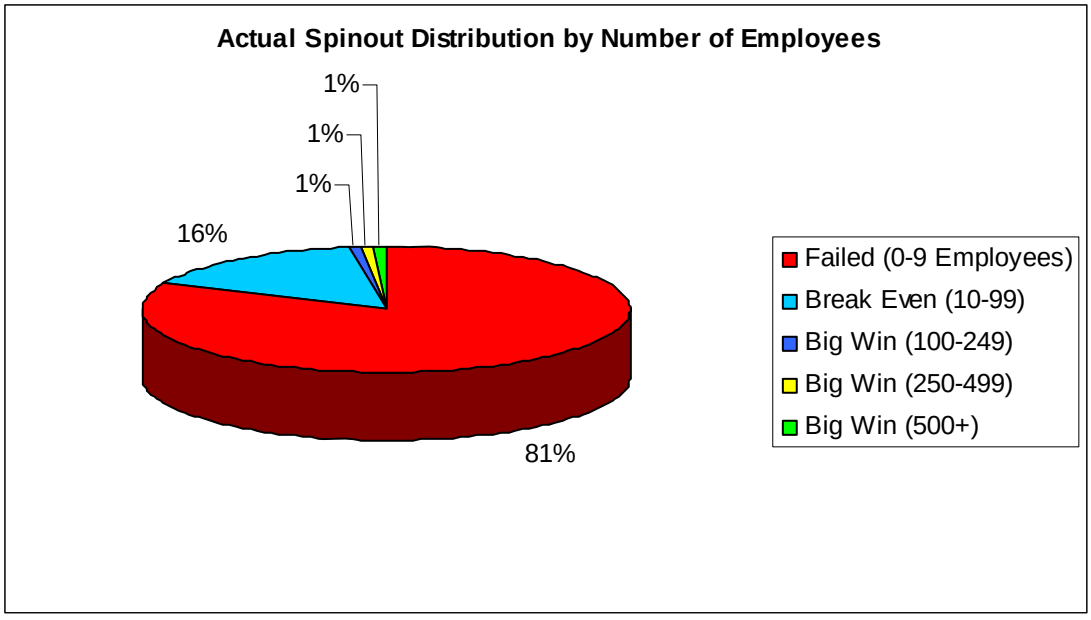


	Acquired	Dead	Live Out of State	0-1	2-4	5-9	10-29	30-99	100-249	250-499	500+
Number of Spinouts	11	57	3	13	13	6	10	10	1	1	1
Percent of Total	8.73%	45.24%	2.38%	10.32%	10.32%	4.76%	7.94%	7.94%	0.79%	0.79%	0.79%

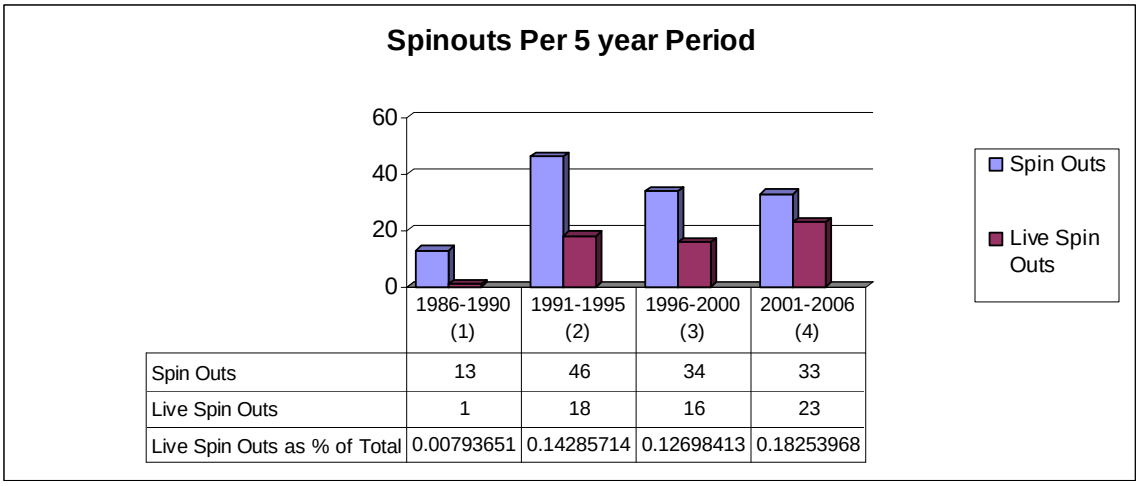
This graph shows the significant number of startups the program has helped to foster. It also points to opportunities to further strengthen the program's ability to position companies for growth to greater than 100 employees. Obviously having spinouts from the Centers of Excellence program grow to greater than 100 employees, the so-called "big wins", is highly desirable. As the graph shows, three of the 126 attempts have achieved this employment level.

As a comparison, the professional venture capital community has an expectation that 10% of their investments will reach the 'big win' category, while 30-40% are considered "losses" and the remaining 50-60% are "break even" in terms of their return to the firm. Of course the venture community's definition of "big win" is much bigger than the COE target, but the "ratio" of various levels of success is relevant.. As part of this analysis, the Director considered that any company that has less than 10 employees will likely never be able to return back to the state the investment that was made, on average over $400,000 per Center. Therefore, all Center spinouts that have failed, been acquired and moved out of state, or started out of state, are considered to have zero employees in the state and are grouped with those spinouts that are live and have 0-9 employees in the category labeled "failed." We acknowledge that in some cases those live spinouts with less than 10 employees may eventually leave that category, but as a rule, if they have never gained momentum, this is very difficult.

The graph below shows the distribution of spinouts by number of employees.

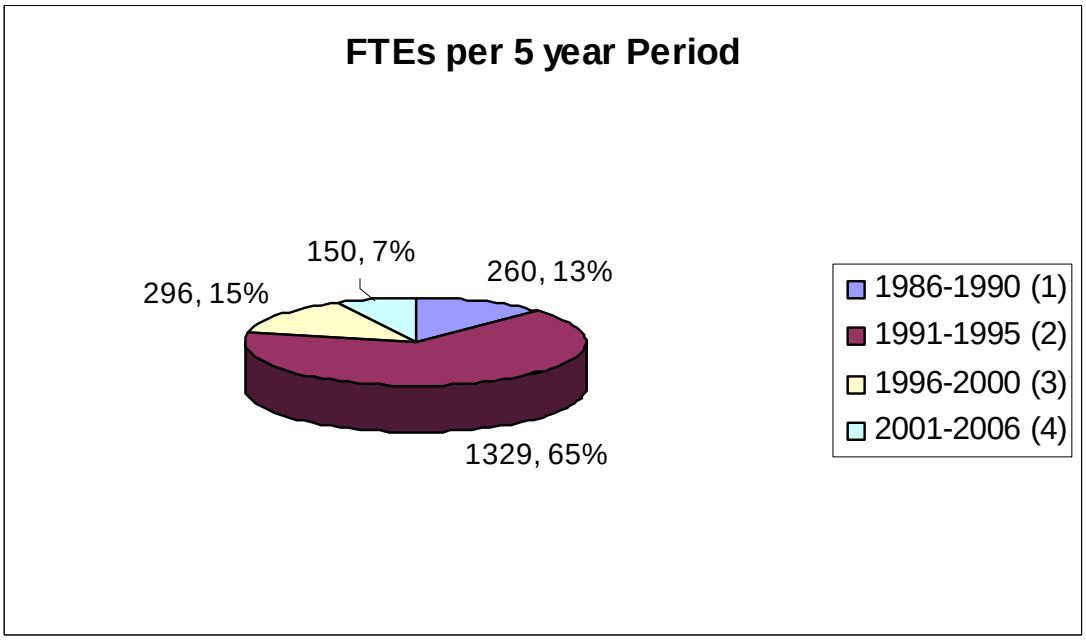


Another interesting way to look at the data is to look at the relative performance among different five-year periods. It is interesting to note that the last 10 years of the program, the number of spinouts has been fairly consistent, and that the number of live spinouts over the past 15 years of the program has also been quite consistent, with the last five years having a higher "live" rate simply due to the fact that some are still in the startup stage and their long term fate is not yet known.



	1986-1990 (1)	1991-1995 (2)	1996-2000 (3)	2001-2006 (4)
Spin Outs	13	46	34	33
Live Spin Outs	1	18	16	23
Live Spin Outs as % of Total	0.00793651	0.14285714	0.12698413	0.18253968

Even more interesting is the distribution of FTE's among the five-year periods. Clearly the period of 1991 to 1995 was the most productive as fully 65% of the people employed at spinouts of the Centers of Excellence program are employed at companies that emerged from this period. It is, of course, important to note that the period from 1996-2000 was a difficult period for startups altogether, both nationally and in Utah, due to the "dot com collapse" and retrenchment in the financial markets that followed the "boom". At the same time, some significant winners in Utah's broader technology landscape did begin in this time frame, so we know that the "external" factors alone cannot account for the very low rate of employment from this period. Of course the period of 2001-2006 has many younger companies and these are expected to have fewer employees this early in their development.



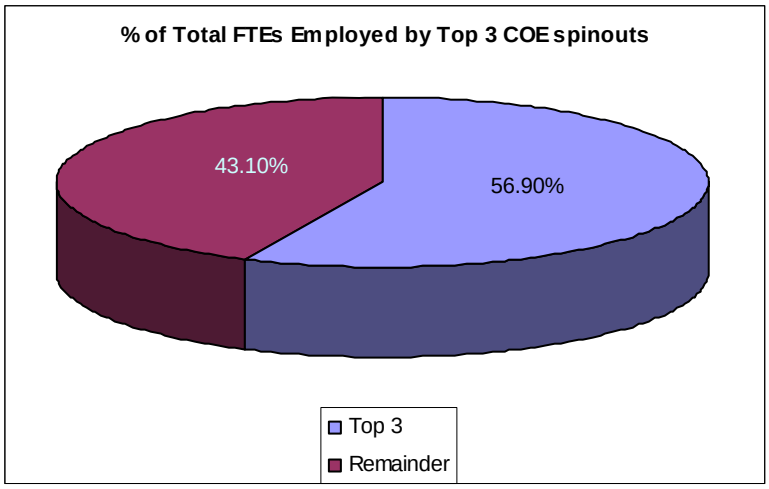
One of the challenges facing this program, a program with job creation and economic development as its primary mission, is the concentration of jobs among the largest of the

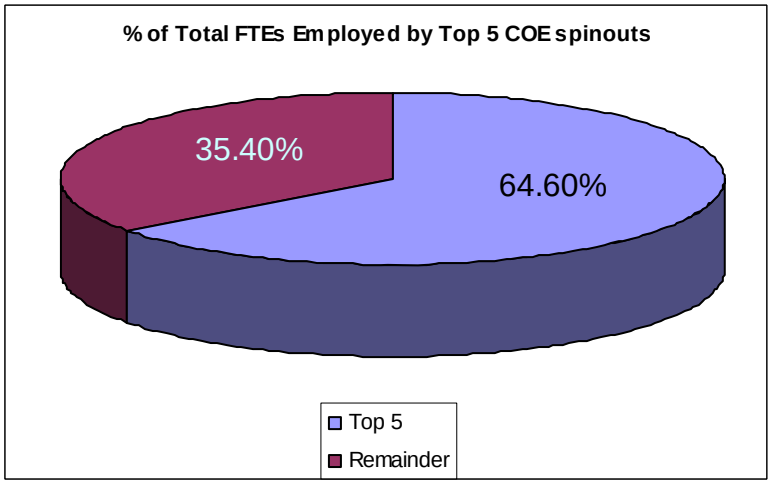
spinouts. Despite the fact that 55 of the 126 spinouts are still 'live' in Utah, the top 10 spinouts by size account for nearly 75% of all employment in the program. This indicates that we could have dramatically larger employment numbers if only some of the smaller firms (10-99 employees) had been able to grow to be larger than 100 employees.

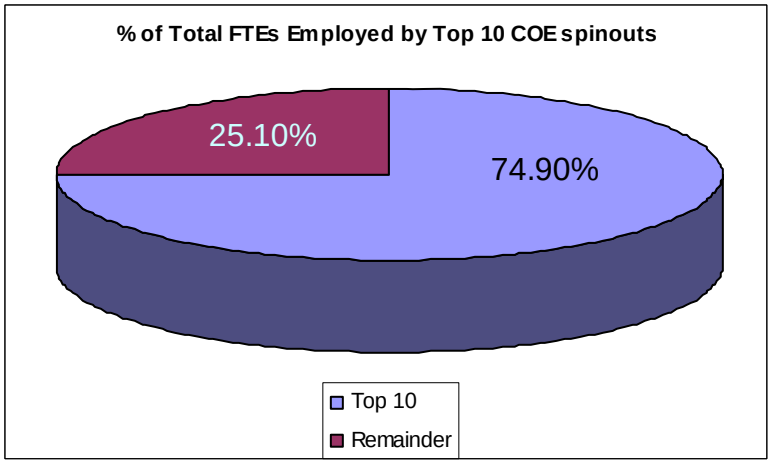
However, this points to a significant opportunity for the program that the current administration is working to capture. If spinouts can be better positioned with capital so that they can gain momentum in their earliest days, combined with increased availability of professional venture capital through the Utah Fund of Funds program, they can capture crucial early market share and presence and emerge as market leaders nationally and globally. It is this type of market positioning that helps companies grow to dominate their markets. Therefore, during the past 2 years of this administration's tenure, we have put in place significant changes that help accelerate business planning and execution for our Centers, as well as a new (in 2007) program to provide grants directly to the licensees of Center supported technologies, thus better positioning them for long term success.

Below are three charts that show the concentration of employees among the top three, top five and top 10 spinouts by size.

Charts showing concentration of employees by spinout size







Below is a list of all of the spinouts identified in this research program, listed by size. Obviously companies change size constantly, but this is a very good look at the relative spinouts that have emerged from the Centers of Excellence program. Size data comes from the primary research conducted for this report, unless otherwise noted.

COE Spinouts By Size (Active spin-outs only)

UNIV	CENTER	COMPANY	STATUS	FTE's
U/U	Cancer Genetic Epidemiology	Myriad Genetics	Live	760
BYU	Signal Processing	Sonic Innovations*	Live	100-249
BYU	X-RAY Imaging	MOXTEK	Live	138
BYU	Advanced Composites	Rocky Mtn. Composites	Live	85
USU	Self Organizing Intelligent Systems	Autonomous Solutions Inc. (ASI)	Live	72
U/U	Engineering Design	Sarcos Medical Corporation*	Live	50-99
USU	Computer Aided Engineering Design	CIMETRIX	Live	45
USU	Computer Aided Engineering Design	PROMODEL Co.	Live	45
USU	Self Organizing Intelligent Systems	Visionary Products	Live	44
U/U	Computer Graphics & Scientific Visualization	Engineering & Geometry Systems	Live	35
U/U	Design Systems	Part.Net (Medibuy)	Live	35
U/U	Controlled Chemical Delivery	Insutech became MacroMed	Live	30
U/U	Electronic Medical Education	Amirsys	Live	30
DIXIE	3D Computer Graphics	InfoWest*	Live	20-49
U/U	Cell Signaling	Echelon Research Laboratories Inc.	Live	25
U/U	Artificial Hearts and Biomedical Devices	Utah Artificial Heart Institute	Live	22
U/U	Neural Interfaces	Bionic Technologies Inc.	Live	22
BYU	Solid Oxide Fuel Cells	Materials and Systems Research, Inc. (MSRI)	Live	20
BYU	Chemical Separations	IBC Advanced Technologies*	Live	10-19
BYU	ACERC	Reaction Engineering Intl	Live	19
BYU	ACERC	Combustion Resources	Live	15
U/U	Inverse Imaging & Tomography	TechniScan	Live	15
U/U	Raman Scattering	Process Instruments	Live	15
U/U	Genome Technologies	Cimmeron Software	Live	8
U/U	Smart Sensors	Live Wire	Live	6
U/U	Direct Machining and Control	Direct Controls	Live	5
USU	Profitable Uses of Agricultural Byproducts	Andigen	Live	5
U/U	Scientific Computing & Imaging	Visual Influence Inc.	Live	5
U/U	Biomedical Microfluidics	Wasatch Microfluidics	Live	4
U/U	CROMDI	Applied Medical Visualization, Inc.	Live	4
U/U	Design of Molecular Function	MicroBioSystems	Live	4
U/U	Design Systems	ErgoWeb	Live	4
U/U	Electronic Medical Education	Visual Share	Live	4
BYU	Miniature Unmanned Air Vehicles	Procerus Technologies	Live	4
BYU	Advanced Structural Composites	IsoTruss	Live	2
U/U	Industrial Imaging	GeoChem Metrix, Inc.	Live	2
U/U	Minerals Technology	Milltech Engineering	Live	2
U/U	Minerals Technology	Mineral Technologies Inc.	Live	2
BYU	Miniature Unmanned Air Vehicles	Flying Sensors	Live	2
U/U	Smart Sensors	RF Innovations	Live	2

UNIV	CENTER	COMPANY	STATUS	FTE's
U/U	Therapeutic Biomaterials	Glycosan Bio	Live	2
U/U	Alternate Strategies for Parasite Removal	Larada Sciences	Live	1
USU	Biotechnology	Intech One-Eighty Corp.	Live	1
U/U	Biomolecular Technologies	GenMetrix, LLC	Live	0
U/U	Computational Design and Testing	Visco	Live	0
USU	High Speed Information Processing	SP Communications	Live	0
USU	Information Technology (Handicapped)	Effective Instructional Technologies	Live	0
U/U	MicroArray Technology	Sigma Technology Holding Company- now Philotek	Live	0
U/U	Nuclear, Medical, and Environmental Technology	Nuclear Labyrinth	Live	0
U/U	Quality and Integrity Design	FASIDE Itnl, Inc.	Live	0
U/U	Quality and Integrity Design	Holsip	Live	0
U/U	Therapeutic Biomaterials	Sentrx Animal Care	Live	0
U/U	Coal Research	FemtoScan Corp.	Live	0
USU	Rapid Microbe Detection	Finite Technologies	Live	0
BYU	Solid Oxide Fuel Cells	Versa Power Systems (VPS)	Live Out of State	40
USU	Self Organizing Intelligent Systems	Kachemak Research and Development	Live Out of State	0
U/U	Therapeutic Biomaterials	Sentrx Surgical - now Carbylan Biosurgery	Live Out of State	0
BYU	Computer Based Education	Cali, Inc. (became Ellis, then acquired by Pearson)	Acquired	45
U/U	Artificial Hearts and Biomedical Devices	Medquest Products	Acquired	30
WSU	Bioremediation	Applied Biosciences Corp.	Acquired	9
U/U	Cell Signaling	Salus Therapeutics	Acquired	6
BYU	Advanced Joining of Materials	Megastir	Acquired	5
U/U	Modified Activated Carbons Technology	INOTECH*	Live	n/a

**Employment Information Source: Division of Workforce Services, Firm Find*

Economic Impact Highlights

- 111 Centers
- Cumulative State funding through June 2007: **$52 million**
- Estimated matching funds: **$272 million**
- Over **126 spin-out companies** - 55 are alive in Utah today
- Spin-out companies impact
    - Employ over 2035 individuals in Utah
    - Average annual salary over $65,000
    - One year wage impact over $132 million
    - Estimated Annual personal income tax generated @ 5% rate = $6.6 million
    - COEP avg. funding last 5 fiscal years = $2.37 M/year
- Annual ROI = State tax revenue / avg. annual funding
- Annual Return on Investment = $6.6M / $2.37 M = **2.81**

Matching Funds

Under the statute changes passed during the 2006 Legislative session, Centers at a university that awards doctoral degrees ("the doctoral granting institutions") are required to have 2:1 matching funds. This is because these institutions have significant Federal research programs which bring with them momentum and many helps in identifying and securing funding. At universities without these robust, doctoral granting programs, securing research funds is more challenging. Therefore, in the 2006 session, the Utah state Legislature modified the matching requirement so that Centers at non-doctoral granting schools were not required to have the 2:1 match, and in policy the program adopted a 1:1 matching requirement. All matching funds are reviewed through the Center's annual reports. A key element of the program is the emphasis during the renewal process on the achievement of milestones and commitment to commercialization.

Center of Excellence funds are credited by many researchers as "priming the pump" for additional research funds. Although COEP requires a 2:1 matching funds ratio for doctoral granting institutions, most Centers raise considerably more in outside funds from federal and private grants. Although this money is spent on a variety of equipment and activities, some of which leaves the state, much of it goes to pay local researchers' salaries and local utilities and supplies. At the time of this report, matching funds data was available for 34 centers. The ratio of matching funds to those provided by COEP was 5.24:1. Assuming this ratio is representative of all the Centers, approximately $272 million has been funneled into Utah through the Centers since 1986.

Metrics by Cluster, School and Age of Center

The success of the COEP program is demonstrated in the following metrics that are grouped by clusters, institution, and age quartile (the year in which the Center operated expressed in quarters of the COEP's 20-year history.) Performance indicators include the number of centers that were funded, the number of spinouts created, the number of companies benefiting through a license agreement, full-time employees of the spinouts, revenue generated by the spinouts, and that revenue divided by the number of centers.

Clusters	# of Centers	# Total Spinouts	# Live Spinouts	# Benefit-ting Co's	FTEs	Avg Salary	Reported Revenue ($M)	Average Jobs/ Center	Revenue/ Center
Aerospace	4	9	2	5	6	$86,667	2	1.5	$450,000
Competitive Accelerators	27	19	11	289	277	$61,000	12	10	$450,741
Defense & Homeland Security	3	6	5	1	124	$45,000	10	41	$3,333,333
Energy & Natural Resources	12	11	9	31	108	$76,830	15	9	$1,288,333
Life Sciences	34	45	19	53	1,316	$58,778	119	39	$3,485,294
Software & IT	31	36	12	39	204	$70,521	26	7	$830,645
Total	**111**	**126**	**58**	**418**	**2035**		**$183.7**		
Institution									
U of U	61	57	36	82	1180	$68,589	110.25	19	$1,807,377
USU	23	27	9	34	126	$60,000	10.26	5	$446,087
BYU	21	28	12	293	695	$62,686	59.17	33	$2,817,619
WSU	4	5	0	8	9	$50,000	1	2	$250,000
Dixie	1	5	1	1	25	$0	3	25	$3,000,000
UVSC	1	4	0	0	0	$0	0	0	$0
Total	**111**	**126**	**58**	**418**	**2035**		**$183.7**		
Age Quartile									
1986-1990 (1)	9	13	1	18	260	$0	0	29	n/a
1991-1995 (2)	29	46	18	148	1329	$63,282	139.37	46	$4,805,862
1996-2000 (3)	31	34	16	221	296	$76,923	23.4	10	$754,839
2001-2006 (4)	42	33	23	31	150	$65,449	20.91	4	$497,857
Total	**111**	**126**	**58**	**418**	**2035**		**$183.7**		

Outstanding Successes

The following descriptions provide additional insight into some of the successful and emerging spinouts that are powering job creation in the State of Utah. This list is only meant to provide a sampling of information. Appendix A provides a summary of every Center of Excellence since the inception of the program, and includes contact information and a list of spinouts.

Myriad Genetics (MYGN) - 1991

A spin-out from the Center for Cancer Genetic Epidemiology at the University of Utah, Myriad is a biopharmaceutical company that develops novel healthcare products to address some of the most pervasive diseases such as cancer and Alzheimer's. Their products include predictive cancer products in addition to drug therapeutics. The company is a leader in cancer prediction medical products, such as BRACanalysis for breast cancer and COLARIS for colon cancer. Myriad also develops and markets predictive and personalized medicine products. Currently, the company is engaged in the largest placebo-controlled study ever undertaken of an investigational medicine in patients with Alzheimer's disease.

Myriad was formed in 1991 and went public in 1995, with an initial public offering valued at $54 million. In 2005, the company earned revenues of $82 million with 760 full time employees and a median salary of $58,000. Approximately 660 of those employees reside in Utah. As of February 2007, the company was valued at $1.51 billion.

Sonic Innovations (SNCI) - 1995

A spin-out from the Center for Signal Processing at Brigham Young University, SONIC innovations has become the fastest growing hearing aid company in the world. Through the development of patented digital signal processing technology at Brigham Young University, the company produces the smallest single chip platform ever installed in a hearing aid. The success of the companies product is a direct result of the developments at BYU that give the hearing aids the ability to accurately reproduce natural sound from an extremely small device.

Sonic Innovations was founded in 1995 and went public in 2000 with an initial offering of 3,600,000 shares at $14.00 per share.. The company received total net proceeds, including the exercise of the over allotment, of $53.9 million. Sonic has grown to more than $100 million in revenue with operations in nine countries. The company was valued at $187 million in February 2007. The company employed 634 individuals in 2005, 110 of which are in Utah with an average salary of $80,000.

Moxtek - 1986

A spin-out from the Center for Xray Imaging at Brigham Young University, Moxtek is an OEM provider for X-ray analytical products and wire grid polarizers for projectors and rear-projection televisions. The company was founded on specialized optical technology developed at Brigham Young University. Their polarizer technology is a leader in the projection industry, and is used in most major-brand high definition televisions. Moxtek was awarded the 2002 Silver Award by the Society for Information Display (SID) in recognition of its ProFlux polarizer.

Moxtek was founded in 1986 by a group of professors and was acquired as a wholly owned subsidiary of Polatechno in 2004. The acquisition kept intact Moxtek headquarters in Orem, UT and retained the company name and personnel. Through the increased access to capital, Moxtek has been able to expand capacity. This has led to increases from $9.4M in sales and 60 employees in 2004 to 138 full time employees with an average salary of $36,000 and $31 million in sales in 2006.

Autonomous Solutions Inc. – 2000

A spin-out form the Center for Self Organizing Intelligent Systems at Utah State University, Autonomous Solutions, Inc. produces unmanned vehicle systems based on technology developed at Utah State University. The company has developed products for many top companies, including a robotic vehicle for Goodyear to safely test tires without human drivers. The company has received such a high interest in its products that it is actually turning down customers, according to the founder. Recently, ASI won a million-dollar grant to develop an unmanned vehicle for the Department of Defense's Grand Challenge in November 2007. The company will be competing against major corporations such as Lockheed Martin and Boeing.

ASI was founded in 2000 by Mel Torrie, who was a graduate student working in the Center at USU. The company now has over 72 full-time employees earning an average of $45,000 and 2006 revenues were over $7 million.

Cimetrix (CMXX) - 1985

A spin-out from the Center for Computer Aided Engineering Design and Manufacturing at Utah State University, Cimetrix is a public company located in Salt Lake City, UT that designs factory automation software for the global semiconductor and electronics industries. Cimetrix's PC-based motion control software is used by leading equipment manufacturers for demanding robotic applications. One of the company's most recent products, CIMPortal, has been selected for Semiconductor Equipment and Materials International's (SEMI) Interface A standards compliance by 50 percent of the top 20 largest semiconductor equipment suppliers in the world.

Cimetrix was founded in 1985 based on open architecture motion control software developed at Brigham Young University. Cimetrix used this core PC based technology to develop a unique software framework bringing to life the Cimetrix Open Development Environment (CODE). The company continues to receive worldwide recognition and increasing sales. 2006 revenues were $5.637 million with 45 full time employees worldwide, 36 of which reside in Utah. The company was valued at $9.2 million in February 2007.

Flying Sensors - 2006

One of two spin-outs from the Center for Miniature Unmanned Air Vehicles at Brigham Young University, Flying Sensors is a full-service, aerial-based, data collection company. Their unique approach combines aerial photography and video with unmanned air vehicles and aerial sensing technology developed at Brigham Young University to provide aerial detail not available by traditional means. The company integrates these technologies with their patent-pending analysis and presentation tools to give its customers a complete aerial imaging product. Their products

and services are used for many imaging applications such as real estate, environmental studies and motion pictures.

Flying Sensors was founded in 2006 by Bob Carter and Brian Odette. The company currently has 2 full time employees with an average salary of $100,000. Flying Sensors will record its first revenues in August 2006.

Procerus Technologies - 2004

The second spin-out from the Center for Miniature Unmanned Air Vehicles at Brigham Young University, Procerus designs small automatic pilots for miniature unmanned air vehicles using leading edge technology developed at Brigham young University.. This technology led to the company's premier product, the Kestrel. This is the smallest and lightest autopilot on the market and is used by military and research institutions. In addition, the company offers ground control software to be fully integrated with the autopilot.

Procerus Technologies was founded in 2004 by the Center Director and partners. In 2005, Procerus had approximately $1.8 million in revenues with 4 full time employees averaging $80,000 in salary.

InfoWest - 1994

A spin-out from the Center for 3D Computer Graphics at Dixie College, InfoWest has been a leading provider of high quality Internet services to the Utah community since 1994 and was the first to offer Internet services to Southern Utah. Being the first provider in this community led to the company's name being synonymous with the Internet. Even today, with many competitors in the area, InfoWest maintains the majority share of the market. InfoWest continues to lead by providing fiber-optic transmission and advanced spam and virus filtering.

Established in 1994, InfoWest came together under through a group of former IT students at Dixie College under the direction of Eric Pedersen. The idea was born when this group helped to equip the college campus with Internet service. InfoWest has since had a ten-year up-trend in revenue and has spun-out several other companies including NetEx.net, DevShed.com and 32Bit.com. The company currently has approximately 49 full time employees in Utah.

LiveWire Test Labs - 2003

A spin-out from the Center for Smart Sensors at the University of Utah, LiveWire Test Labs provides technologically advanced and easy to use products for identifying the nature and location of faults in live electrical wiring systems. The company was founded on technology developed at the University of Utah, called Spread Spectrum Time Domain Reflectometry (SSTDR). This technology allows testing on live wiring systems and is able to detect problems that traditional methods have failed at. SSTDR is capable of sensing faults in the wiring without interfering with normal operation, thus making it useful in a multitude of applications, such as on aircraft during flight. This is particularly beneficial for use on aging aircraft for compliance with FAA standards.

LiveWire was founded in 2003 by the Center Director, Cynthia Furse and partner Paul Smith. The company currently has 6 full time employees and is growing rapidly.

Andigen, LC - 2003
A spin out from the Center for Profitable Uses of Agricultural Byproducts at Utah State University, Andigen designs and builds high rate anaerobic digester systems for animal waste. The patented digester processes animal waste into methane gas which is pumped into an engine and converted into electricity. This allows farmers to manage pollution and odor, and gives them an additional revenue stream if they choose to sell the electricity back to the utility company. The methane gas may also be used to produce biodiesel.

Andigen is growing rapidly with worldwide sales out of its headquarters in Logan, UT. Founded in 2003 by the Center Director - Dr. Conly Hansen and partners, Andigen maintains ongoing research collaboration with Utah State University. Revenues from 2005 were $260,000 and 2006 revenues are forecasted at $1.5-$2M. In 2006 there were 5 full time employees with an average salary of $75,000.

Perspectives About the Centers of Excellence Program

SSTI
"Utah's approach is unique -- the partnership between economic development, the tech transfer office, and the commercialization transfer office, makes sense and seems to be working. …I can't point to any other program that has the same results."

--Dan Berglund, President and CEO, SSTI -State Science and Technology Institute

MedQuest/Worldheart
"I recently sold the company that I co-founded (MedQuest Products Inc.) to a publicly-traded company, WorldHeart. My company was a spin-off of the Center for Artificial Hearts at the University of Utah, which is a Distinguished Center of Excellence and has obtained COE funding/support since 1988 for both Artificial Hearts ('88-'92) and Ventricular Assist Devices (1 yr in the mid-90s). The COE support for VAD commercialization was very important at that time- we used COE-recommended commercialization consultants and also worked with the UU Tech Transfer Office to get things moving for my business. This early support has played a role in our success so far: from Mar-June 2006 we had our first successful patient experience with our revolutionary VAD. The news of this implant was carried all over the world: Russia, Australia, South Korea, India and so on… (including the US and Europe of course). I believe it demonstrated and reinforced Utah's leadership in this field that had been established in 1982 with the first implant of a long-term artificial heart in Dr. Barney Clark- a heart that was developed by Symbion (at that time a UU spin-off) and the Center for Artificial Hearts."

-- Pratap Khanwilkar, PhD, MBA, VP: Rotary Systems & Business Development Worldheart, Inc.

Center for Thermal Management Technologies
"It is my observation that most university faculty in engineering and science are talented, dedicated, hard working people with more great marketable ideas than they have time to develop without substantive encouragement and support. Academics are often not business oriented

people and so many ideas with potential commercial application languish and miss the passing window of opportunity. Utah's COEP provides the needed incentive and support for busy faculty to develop their ideas into useful products. Students involved have their education enhanced by real world applications as the states economy is benefited. It seems like a win-win all around. Please count me as an enthusiastic COEP advocate."

--J. Clair Batty, Trustee Professor Emeritus, Utah State University

Flying Sensors

The Centers of Excellence (COE) program has been on of the key stepping stones to launching Flying Sensors. I was a consultant for the BYU magic lab (the Center for Miniature Unmanned Air Vehicles) that focused on small unmanned aerial vehicles. My partner, Brian Odette and I quickly realized the commercial potential for their technologies in an industrial setting. Most UAV work was focused on the military and this left a great opportunity to integrate existing technology into a new vertical market. The first grant we received from the COE program allowed us to immediately get matching funds from a private investor. The COE, private equity and revenue funded the first year growth and infrastructure development. As founders we utilized the income from our consulting efforts to buy the assets necessary to launch a successful unmanned aerial product and service company. The COE funds provided operating capital to hire the necessary personnel to get the company launched. The second year award is critical as we expand our efforts and hire additional personnel to accelerate our growth. I have been an entrepreneur of many different startups. I see COE providing the essential bridge to motivate people to take the necessary risk to spin research technologies out into industry. I am proud to be associated with this program and lead the way for other future companies.

--Bob Carter, CEO, Flying Sensors

Future Research

The depth of primary research conducted for this report provides significant insight into the program's performance. However, some crucial questions emerged from this data that will form the basis for future research to help strengthen the program and Utah's economy. These questions include: Why did so many spinouts fail outright? Are the issues related to management? Capital? Licensing issues and terms? PI focus and involvement? Are these still barriers or have any/all issues been resolved? What issues remain to be resolved?

Other questions that need additional research to answer include: Why did three of these spinouts start out of state entirely? What ingredients in Utah's economy were missing or what problems were there? Why did so many of these spinouts get "stuck" in the 0-9 employee category? What are these companies doing and how are they structured? Are the PI's still involved? Who else is employed by these companies? Why didn't more of the 10-99 employee companies keep growing to breach that 100 employee mark? How did Utah's private sector startup community fare relative to the COE startup community? What are other states doing in the very early seed stage area and how successful are their programs? How does Utah's COE Program compare against these other programs in terms of effectiveness and what might some additional "best practices" be?

And finally, looking for opportunities to replicate success leads to questions such as: What were the key elements that helped to contribute to the success of the three "big wins" that did occur? How could those same factors be brought to bear on a wider segment of Centers spinouts?

More information about the benefiting companies and the level of benefit received from their work with the Centers would be helpful. In the end, did any of them license and use Center technology to significantly grow their businesses? How? What works/doesn't work in the company/professor/university relationships?

Future research efforts will be made to answer these and other questions that emerge.

Program Evolution – Building on Success

The Centers of Excellence Program is building on the past 20 years of success. Based on successful examples of technology commercialization, the COE Director, under the new leadership of the Governor's Office of Economic Development, is working to strengthen those elements of the program that have been crucial to success as well as to introduce new opportunities.

Accelerate time to market

Funding Period Compressed to Four Years

During the first 19 years of the program, the funding time frame allowed a maximum of five years for a Center. During the 05-06 fiscal year, this time frame was compressed from five years to four years – with roughly the same amount of money allocated to each Center over the history. The purpose of this change is to accelerate commercialization and reduce the time to market.

In addition, the COE program implemented a system to provide business team assistance to "Potential Centers" before they receive full funding in order to improve their performance during their funded time as a Center. This replaces the past "planning grants" (typically around $5,000) that were made directly to a potential Center. Instead, this money is directed to the business team for assistance during the year. During the 2006 selection process this was expanded to authorize approximately $75,000 to fund pre-proposal business team assistance (enough for 5-7 Centers) before they applied to the COE program. All of this is intended to help prepare university teams for the COE program, to facilitate the selection process and to further accelerate commercialization.

The first example of a new team with this support occurred during the 05-06 year. During the 2006 selection process, one seasoned COE Reviewer said, "I had to keep reminding myself that this was a new Center, their presentation was so good!"

Business Expertise Essential to Success

Throughout most of the program's history, Utah has sponsored "COE consultants" to work with each Center. These consultants spent about 80 hours per year working with a given Center. They were paid through the universities by a block grant provided by the state and were selected by the universities from a list of consultants approved by the State.

For the 2005-06 fiscal year, the former "COE consulting program" underwent a complete overhaul to result in the COE Business Team program. Under the Business Team program, seasoned technology executives, serial entrepreneurs, and market experts were recruited through a statewide RFP to meet the specific needs of each Center. In addition, the funding level was increased to pay for approximately 250 hours of assistance per year for each Center, significantly increasing the ability of the Business Team members to help move the technologies out of the university and into industry.

This enhancement builds on the historical importance of providing business expertise to complement the technical expertise of each Center, while helping to pair entrepreneurs and seasoned executives with the Centers as part of the process of building strong startup and "go to market" teams. In addition, the Centers program has emphasized that licensing to an existing Utah company is a very positive outcome and has encouraged our business team members to search out Utah firms which might have an interest in these technologies.

Industry-University collaboration

A major objective of the Centers of Excellence program under the Huntsman Administration is to significantly increase the interaction between members of industry and university talent in order to facilitate the exchange of technologies and opportunities. Strong economies around the world are built around the movement of technologies from research institutions into industry, and the subsequent flow of funds and talent back to the institutions. It is the goal of the COE Director that the Centers of Excellence Program can help increase this virtuous cycle in Utah and further strengthen our high tech economy.

Changes in Legislation

Utah's Legislature is very sensitive to the value of technology based economic development and the current Director has taken the opportunity to approach the legislature twice to ask for changes that strengthen the COE statute and enhance the program.

2006 Legislative Changes

During the 2006 Legislative session, Senator Thomas Hatch sponsored Senate Bill 112, with House sponsor Representative Peggy Wallace. The centerpiece of this bill was changes in the COE statute which were implemented to encourage the non-doctoral schools in the State to participate in the COE program by reducing the matching requirements for those schools from 2:1 to 1:1. In addition, when a doctoral-granting school and a non-doctoral granting school partner in a so-called "supercenter", the non-doctoral granting school is not required raise any matching funds, although the doctoral granting school still maintains its 2:1 matching requirement.

Matching Requirements for schools that do not offer Doctoral degrees

During the 2006 legislative session, the Utah State Legislature passed, with no dissenting votes, SB 112, Centers of Excellence Amendments. One of amendments included in this bill narrowed the requirement of the 2:1 match to schools that offer Doctoral degrees (language listed below). This statutory change also required match guidelines for schools that do not offer doctoral degrees. The new guidelines are listed below.

Statutory Change

"The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis for colleges and universities in the state that offer any doctoral degrees"

New Guidelines:

- For a non-doctoral-degree granting school, a stand-alone Center will be required to have its Centers of Excellence funds to be matched by industry and federal grants on at least a 1:1 basis.
- When a non-doctoral-degree granting school partners with a school that does grant doctoral degrees, the non-doctoral-degree granting school will not be required to have a match for their portion of the COE funding. The doctoral-granting school will be required to meet their 2:1 match as per statute.

Note: The COE Statute specifies that, "Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged."

Additional changes by the Legislature modified the Accountability of Licensing Decisions in Centers of Excellence. Excerpts are included below.

Accountability of Licensing Decisions in Centers of Excellence

During the 2006 legislative session, the Utah State Legislature passed, with no dissenting votes, SB 112, Centers of Excellence Amendments. The Second Statutory Change in SB 112 is detailed below.

"The Governor's Office of Economic Development shall develop a process to determine whether a college or university that receives a grant under this part must return the grant proceeds if the technology that is developed with the grant proceeds is licensed to a licensee that:

(i) does not maintain a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology; or

(ii) initially maintains a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology, but within five years after issuance of the license the licensee or sublicensee transfers the manufacturing or service location for the technology to a location out of the state."

The Governor's Office of Economic Development is currently in the process of establishing the process specified in the statute. The State Advisory Council on Science and Technology, as requested by the Office, has convened a task force to make recommendations to GOED on this process. In addition, the Governor's Office of Economic Development Board will provide final review and approval of the process.

Procedural Updates

In February of 2006, in order to continue strengthening the program, the COE Director took before the State Advisory Council of Science and Technology a series of procedural enhancements and clarifications which were approved. These are listed below.

Centers support for licensed technologies

- Past: once a technology was licensed to a company, the Center could no longer be funded or support the technology.

Opportunity:

- Permit a Center to continue to support a licensed technology for a certain period of time or under certain conditions in order to better support the transition from university to industry.

New Guideline:

- When a Center-supported technology is licensed to an existing established firm, the Center can use the COE funding to support that technology through the end of the current fiscal year (i.e. current contract).
- When a Center-supported technology is licensed to a startup/spinout, the Center can use the COE funding to support that technology through the end of the current fiscal year (i.e. current contract).
- In addition, the Center may apply for renewal of funding from the COE program (subject to the normal term of up to 4 years), to enable the Center and Business Team to continue to support the technology AND those commercial applications UNTIL a) the startup/spinout completes an arms-length financing transaction with a value equal to or greater than $500,000 or b) the startup/spinout is awarded one or more contracts with a value equal to or greater than $500,000.
- In all situations, if there are still significant applications of the technology available for licensing (other vertical markets) the Center may apply for renewal of funding from the COE program on a competitive basis.

Ability to Start the COE Funding Clock over for new Opportunities

- Past: Once a Center was "done" with one round of funding, they could not really "come back" into the program unless it was a "new Center" (with new PI)

Opportunity:

- Proposed: Dynamic Centers teams and PIs have many areas of research that can provide new Market Opportunities
- COE should encourage them to continue to bring new technologies to the program for new Market Opportunities

New Guideline:
A former Center of Excellence (one that has "graduated"), may return to the program and request a new series of funding years, typically up to 4 years, as long as the technology that is being proposed for commercialization is different enough from the original Center to create new market, business and licensing opportunities. However, it should NOT be used to extend the life of a Center that failed to achieve their commercialization goals. The Center may either keep its same name with a differentiating designation (example "Center II"), OR may propose under a new name. The PI may be the same PI or may be a different PI (but there is no requirement to make a change).

Center Designation – Funding + 3 years

- Past: Conflicting interpretations of use of "Utah Center of Excellence" Title

New Guideline:
A Center can use the "Utah Center of Excellence Designation" (and logo) for the term of funding plus 3 years. After that they can refer to being a "former Utah Center of Excellence". If, after 3 years, a Center is still actively supporting the commercialization of the technology which was funded through the Center, they may apply to the Director for an extension of the use of the title.

Clarification: The name of the Center ("Center for New Technology") is not covered by this guideline and it is up to the college/university, PI and team to determine its appropriate use.

Additional Item of Clarification from the Feb 13, 2006 Meeting of the SAC

The council concurs with the Director that PI's/Researchers do NOT have to be tenured to be considered as a Director for a Center of Excellence.

2007 Legislative Changes

During the 2007 Legislative session, Representative Bradley Daw sponsored House Bill 125, with Senate Sponsor Senator Sheldon Killpack. The goal of this statutory change was to permit the program to make funding grants directly to licensees of university technologies. It was clear from research and experience with the program that the COE funded ended frequently at precisely the moment it was most needed – when the technology rolled out of the university and into the company.

Utah's Legislature agreed that it was a wise use of state funding to help defray the real and perceived risk in licensing university technologies. The funds are specifically earmarked to help existing firms and startups fund the transition and "go to market" work of getting the technology out of the lab and into a product. These funds require a 1:1 match from the company and those funds can be founder cash contributions, investor funds, or sales or contract revenue. The 2007-08 selection process will the first time that such funds are available to licensees (companies).

Tables of Centers and Spinouts

Below are lists of the Centers and their spinouts, organized in a variety of formats to share insights about the program's history.

Centers by Cluster

The Centers are linked to their respective websites where links to the universities, spinouts, and annual reports can be found.

CLUSTER	CENTER	FUNDED	GRADUATED	SCHOOL
Aerospace	Space Engineering	1986	1991	USU
	Advanced Satellite Manufacturing	2004	2006	USU
	Miniature Unmanned Air Vehicle	2004	Currently funded	BYU
	Aerospace Science Technology	1987	1992	Weber State
Competitive Accelerators	Chemical Reactors	1989	1990	U of U
	Pyrometallurgical	1988	1989	U of U
	Advanced Materials & Microelectronics	1987	1992	U of U
	Engineering Design	1987	1992	U of U
	Quality & Integrity Design	1989	1991	U of U
	Advanced Construction Materials	1993	1997	U of U
	Composites in Construction	1998	1999	U of U
	Harsh Environmental Electronics	1995	2000	U of U
	Raman Technology	1996	1998	U of U
	Computational Design & Testing	2002	2004	U of U
	Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline	2006	Currently funded	U of U
	Magnetic Sensor & Actuator materials	2005	2006	U of U
	Nanosize Inorganic Material Powders	2004	Currently funded	U of U
	Novel Titanium Boride Surface Hardening Technology	2003	Currently funded	U of U
	Rapid Prototyping	2001	2004	U of U
	Utah Research Institute	1987	1992	USU
	Control of Flow in Manufacturing	2006	Currently funded	USU
	Thermal Management Technologies	2006	Currently funded	USU
	Advanced Composites Manufacturing & Engineering	1989	1995	BYU
	Chemical Separation	1987	1992	BYU
	Computer Aided Engineering Design & Mfg (CA2EDM)*	1988	1992	BYU
	Application Center for Materials Engineering	1996	1997	BYU
	Rapid Product Realization	1993	1996	BYU
	Advanced Joining of Materials	1999	2004	BYU
	Advanced Structural Composites	1998	2003	BYU
	Compliant Mechanisms	1999	2004	BYU
	DMAC--Direct Machining & Control	2002	2005	BYU
	Smart Sensors	2000	2005	U of U
Defense	Self Organizing Intelligent Systems	1993	2000	USU
	Advance Imaging LADAR	2003	Currently funded	USU

	Coal & Oil / Coal Research	1987	1991	U of U
	Coal Processing Technology	1996	1998	U of U
	Minerals Technology	1995	1999	U of U
	Acoustic Cooling	2000	2004	U of U
	Modified Activated Carbons Technology	2005	Currently funded	U of U
Energy & Natural Resources	Petroleum Research	2000	2005	U of U
	Solid Oxide Fuel Cell Technology	1996	2001	U of U
	Solid Waste Recycling	1990	1993	USU
	Profitable uses of Agricultural Byproducts	2000	2005	USU
	Advanced Combustion Engineering Research	1987	1995	BYU
	Supercritical Fluid	1987	1991	BYU
	Solvent Separation of Heavy Oils	1996	1997	Weber State
	Laser Institute	1986	1989	U of U
	Artificial Hearts & Biomedical Devices	1987	1992	U of U
	Biopolymers at Interfaces	1986	1991	U of U
	Cancer Genetic Epidemiology	1990	1995	U of U
	Controlled Chemical Delivery	1986	1993	U of U
	Environmental Technologies	1993	1995	U of U
	Biomolecular Technologies	1998	2000	U of U
	Cell Signaling	1997	2002	U of U
	Genome Technologies	1996	1998	U of U
	Neural Interfaces	1995	2000	U of U
	Ventricular Assist Device	1995	1996	U of U
	Alternate Strategies Parasite Removal (CASPeR)	2004	2006	U of U
	Biomedical Microfluidics	2004	Currently funded	U of U
	Biomedical Optics	1999	2003	U of U
	Homogeneous DNA Analysis	2003	Currently funded	U of U
	In Situ Ozonator	2003	2004	U of U
Life Sciences	Microarray Technology	2005	Currently funded	U of U
	Nuclear, Medical and Environmental Technologies	2001	2003	U of U
	Therapeutic Biomaterials	2004	Currently funded	U of U
	Vascular Biotherapeutics	2001	2003	U of U
	Biotechnology	1987	1992	USU
	Design of Molecular Function - Environmental	1988	1994	USU
	Dairy Foods Technology	1990	1996	USU
	Developmental & Molecular Biology	1992	1998	USU
	Genetic Improvement In Livestock	1993	1997	USU
	Meat Processing Technology	1990	1996	USU
	Value Added Seed Technology	1990	1997	USU
	Dairy Technology Commercialization	1998	2001	USU
	Rapid Microbe	1998	2003	USU
	Signal Processing	1986	1990	BYU
	X-Ray Imaging	1987	1992	BYU
	Applied Molecular Genetics	1995	1998	BYU
	Chemical Technology	1989	1995	Weber State
	Bioremediation	1996	2003	Weber State
Software and IT	Base Education Technologies	1987	1988	U of U

Communications Research	1986	1990	U of U
Inverse Problems, Imaging & Tomography	1989	1993	U of U
Software Science	1989	1994	U of U
Supercomputing	1988	1992	U of U
VLSI Design	1990	1992	U of U
Asynchronous Circuits	1997	2000	U of U
Computer Graphics & Scientific Visualization	1990	1996	U of U
Design Systems	1995	1996	U of U
Electronic Systems Technology	1995	1999	U of U
Industrial Imaging	1996	1999	U of U
MTV Flat Panel Display Technology	1995	1997	U of U
Multimedia Education & Technology - U of U	1993	1997	U of U
Scientific Computing & Imaging	1996	2000	U of U
Electronic Medical Education	1999	2004	U of U
Global Knowledge Management	2003	2005	U of U
Interactive Ray-Tracing & Photo-Realistic Visualization	2005	Currently funded	U of U
Multi-Dimensional Information --CROMDI	2000	2005	U of U
Organic Electronics	2006	Currently funded	U of U
Computer Networks	1987	1989	USU
Information Technologies (handicapped Education)	1988	1991	USU
Magnetism in Information Technology	1995	1996	USU
High speed information processing- CHIP	2002	2006	USU
Computer Integrated Manufacturing	1987	1989	BYU
Parallel Supercomputing	1988	1989	BYU
Computer Based Education	1987	1991	BYU
Acoustics Research	2005	Currently funded	BYU
Advanced Communications Technology	2004	Currently funded	BYU
Intelligent Computer Tools	1996	2001	BYU
Multimedia Education & Technology - UVSC	1992	1995	Weber State
3D Computer Graphics / 3 D Software	1990	1996	Dixie State

Spin Out Companies

By Center

SCHOOL	CENTER	COMPANY	STATUS
DIXIE	3D Computer Graphics	AK international	Dead
		Illustrative Impressions	Dead
		InfoWest	Live
		NetEx	Dead
		Paintbrush Productions	Dead
BYU	ACERC	Combustion Resources	Live
		Reaction Engineering Intl	Live
BYU	Advanced Composites	Rocky Mtn. Composites	Live
BYU	Advanced Joining of Materials	Megastir	Acquired
BYU	Advanced Structural Composites	IsoTruss	Live
		Patterned Fiber Composites	Dead

		TauRuss	Dead
WSU	Aerospace Technology	One Stop Satellite Solutions Inc.	Dead
		Wasatch Aerospace Co.	Dead
U/U	Alternate Strategies for Parasite Removal	Larada Sciences	Live
U/U	Artificial Hearts and Biomedical Devices	Medquest Manufacturing	Dead
		Medquest Products	Acquired
		Utah Artificial Heart Institute	Live
U/U	Base Technical Education	Assessment Co.	Dead
		Software Co.	Dead
U/U	Biomedical Microfluidics	Wasatch Microfluidics	Live
U/U	Biomedical Optics	Carroderm	Acquired
		Nutriscan	Acquired
		Spectratek	Dead
U/U	Biomolecular Technologies	GenMetrix, LLC	Live
U/U	Biopolymers at Interfaces	HCP Diagnostics	Dead
		Protein Solutions, Inc.	Dead
WSU	Bioremediation	Applied Biosciences Corp.	Acquired
USU	Biotechnology	Intech One-Eighty Corp.	Live
U/U	Cancer Genetic Epidemiology	Myriad Genetics	Live
U/U	Cell Signaling	Echelon Research Laboratories Inc.	Live
		Salus Therapeutics	Acquired
BYU	Chemical Separations	IBC Advanced Technologies	Live
WSU	Chemical Technology	Linco Technology (now First Scientific)	Dead
U/U	Coal Research	FemtoScan Corp.	Live
		International Resin Resources	Dead
U/U	Computational Design and Testing	Visco	Live
USU	Computer Aided Engineering Design	CIMETRIX	Live
		Design Synthesis	Dead
		PROMODEL Co.	Live
BYU	Computer Based Education	Cali, Inc. (became Ellis, then acquired by Pearson)	Acquired
U/U	Computer Graphics & Scientific Visualization	Engineering & Geometry Systems	Live
BYU	Computer Integrated Manufacturing	CAM Software	Dead
		CIM Training Center	Dead
		EDGE Foundation	Dead
		EDGE Inc.	Dead
		Ozone Saver Industries	Dead
		Smartware	Dead
		Utah PODS Manufacturing Co-op	Dead
U/U	Controlled Chemical Delivery	Insutech became MacroMed	Live
U/U	CROMDI	Applied Medical Visualization, Inc.	Live
USU	Dairy Foods Technology	Dairy Research Consulting of Utah	Dead
		Food Research & Dev Group	Dead
		Utah Milk Technology	Dead
U/U	Design of Molecular Function	Envirol	Acquired
		MicroBioSystems	Live
		Whetstone	Dead
U/U	Design Systems	ErgoWeb	Live
		Part.Net (Medibuy)	Live
USU	Developmental & Molecular Biology	PanGenics, Inc.	Dead

U/U	Direct Machining and Control	Direct Controls	Live
U/U	Electronic Medical Education	Amirsys	Live
		Global Matics	Acquired
		Visual Share	Live
U/U	Electronic Systems Technology	Bonneville Technologies	Dead
		HDG	Dead
U/U	Engineering Design	Animate Systems	Dead
		MicroJect, Inc.	Dead
		Sarcos Medical Corporation	Live
USU	Genetic Improvement of Livestock	Livestock Molecular Research & Development Inc.	Acquired
U/U	Genome Technologies	Cimmeron Software	Live
U/U	Harsh Environment Electronics (formerly MTV Flat Panel)	Innosys	Dead
		Radiant Labs	Dead
USU	High Speed Information Processing	SP Communications	Live
U/U	Industrial Imaging	GeoChem Metrix, Inc.	Live
USU	Information Technology (Handicapped)	Effective Instructional Technologies	Live
U/U	Inverse Imaging & Tomography	Monolithic Tech	Dead
		TechniScan	Live
USU	Meat Processing Technology	Canyon Rayas	Dead
		Mountain Lamb (land?) Co-op	Dead
		Timpanogos Meats	Dead
U/U	MicroArray Technology	Sigma Technology Holding Company- now Philotek	Live
U/U	Minerals Technology	Milltech Engineering	Live
		Mineral Technologies Inc.	Live
BYU	Miniature Unmanned Air Vehicles	Flying Sensors	Live
		Procerus Technologis	Live
U/U	Modified Activated Carbons Technology	INOTECH	Live
UVSC	MultiMedia Ed & Tech (UVSC)	Cela Solutions Inc.	Dead
		MC2	Dead
		Memory Lane Productions	Dead
		Utah Valley On-Line	Dead
U/U	Neural Interfaces	Bionic Technologies Inc.	Live
U/U	Nuclear, Medical, and Environmental Technology	Nuclear Labyrinth	Live
USU	Profitable Uses of Agricultural Byproducts	Andigen	Live
U/U	Quality and Integrity Design	FASIDE Itnl, Inc.	Live
		Holsip	Live
U/U	Raman Scattering	Process Instruments	Live
USU	Rapid Microbe Detection	Bio Matrix Solutions	Dead
		Finite Technologies	Live
	Rapid Prototyping	Unknown Name	Dead
U/U	Scientific Computing & Imaging	Visual Influence Inc.	Live
USU	Self Organizing Intelligent Systems	Autonomous Solutions Inc. (ASI)	Live
		Kachemak Research and Development	Live - Out of State
		Monetary Services Inc.	Dead
		Visionary Products	Live
BYU	Signal Processing	ASTECH	Dead
		Deseret Digital Designs	Dead
		Sonic Innovations	Live

		Vector Technologies	Dead
U/U	Smart Sensors	Live Wire	Live
		RF Innovations	Live
U/U	Software Science	Hippo Software, Inc.	Dead
BYU	Solid Oxide Fuel Cells	Materials and Systems Research, Inc. (MSRI)	Live
		Versa Power Systems (VPS)	Live - Out of State
USU	Space Engineering	CXT, Inc.	Dead
		Globesat Holding Co.	Dead
		ICOMP, Inc.	Dead
		Interactive Resources Co.	Dead
		Medcom, Inc.	Dead
USU	Supercritical Fluid	Lee Scientific	Acquired
U/U	Therapeutic Biomaterials	Glycosan Bio	Live
		Sentrx Animal Care	Live
		Sentrx Surgical - now Carbylan Biosurgery	Live - Out of State
USU	Value Added Seed Technology	F1 Technologies	Dead
USU	Vascluar Biosciences	Hydra Bioscience	Dead - Formed Out of State
U/U	VLSI Design	Bonneville Microelectronics	Dead
BYU	X-RAY Imaging	MOXTEK	Live

Governor's Office of

Economic Development

Centers of Excellence

Jon M. Huntsman, Jr.
Governor

20th ANNIVERSARY REPORT
(1986-2006)

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Executive Summary

The Centers of Excellence program has a 20 year history of helping mature technologies developed at Utah's colleges and universities and bringing those technologies into the marketplace. The purpose of the Centers of Excellence Program (COEP) is to accelerate the commercialization of promising technologies that have value for Utah.

This report will explain the program's objectives and operations, detail the technology and commercialization progress of each Center and evaluate the economic impact the program has generated for the State of Utah.

Since its inception in 1986, the program has helped create thousands of high-tech jobs, assisted in the creation of spin-off companies, and by improving technologies and processes has helped hundreds of Utah companies experience tremendous growth.

Over the first 20 years of the program, the Centers of Excellence Program has generated more than 186 patents, resulting in 226 license agreements[1], and 126 plus Utah based companies have been created to license and market proprietary technology fostered by the program. 55 of these spinouts are still "alive" in Utah, three are alive out of State, and another 11 have been acquired and moved out of state. As of this report, the Utah companies directly employ over 2035 persons in the state, at an average salary over $65,000.

Well-known firms that have been assisted by the Centers of Excellence program include Myriad Genetics, Inc. (MYGN), Sonic Innovations, Inc. (SNCI), Moxtek, Cimetrix, and Autonomous Solutions Inc. Emerging successes include InfoWest, Live Wire, Andigen and Rocky Mountain Composites and startups just emerging from the Centers program in the past two years include Flying Sensors, Procerus Technologies, Wasatch Microfluidics Inc., and Glycosan Biosystems. These firms are among the many companies strengthening Utah's economy through technologies developed at Utah's colleges and universities.

These firms and many more, continue to generate new jobs in Utah and strengthen Utah's high tech business community and are strong examples of the compelling research being created in Utah's colleges and universities.

This report summarizes nearly a year of primary research to identify the results of the past two decades of the program. Extensive work was done by two interns beginning in May 2006 through February 2007. Vincent Beerman began the study and gathered the bulk of the data and performed the initial analysis, and Danica Nelson provided additional research and analysis. Vincent and Danica contacted 81 of the program's 111 principal investigators to gather data about the fruits of each of their Centers and what had happened. They then reached out to the actual companies to quantify these results. This report is the first time such a comprehensive look had been taken at the program and reveals both a tremendous "startup rate" for the Utah Centers of Excellence program, and opportunities to further improve the success rate of "significant growth" among the spinouts from the program.

[1] Patents and license agreements were compiled from historical annual reports. These reports changed formats multiple times throughout the history of the program, thus this data is only as accurate as these reports allow.

The Centers of Excellence Program Definitions

Utah State Law

Chapter 63-38f-703 - Definitions
"Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.

Chapter 63-38f-901 - Purpose statement
The Legislature finds and declares that the fostering and development of industry in Utah is a state public purpose necessary to assure the welfare of its citizens, the growth of its economy, and adequate employment for its citizens.

The purpose of the Centers of Excellence Program (COEP)

To accelerate the commercialization of promising technologies that have strategic value for Utah. The COEP, which is part of the Business Creation Team in the Governor's Office of Economic Development (GOED), accelerates this commercialization process in three critical ways:

1. By selecting the most promising technology maturation proposals from those submitted by University-based research teams
2. By providing the grants to the teams to help mature the technology so that it will be attractive to potential investors and customers
3. By finding highly qualified Business Team members to help develop the plans and begin implementation of the plans to take the product to market

Additional definitions:

Benefiting Company

- Any company other than a spin-out that is using the technology from a Center in a substantial way, frequently an existing company that is a licensee of the technology.

Business Team

- Seasoned, proven technology executives and entrepreneurs recruited by the COEP to help develop strong business plans and go-to-market strategies for each Center. Although recruited on a part time "consulting" basis, these are individuals who are truly part of the Center team and are widely considered the "secret sauce" to the success of the Centers of Excellence program.

Center of Excellence

- Located at a Utah institution of higher learning, a "Center" is a designated university-based team which has previously developed specific, commercially attractive technology under Federal or corporate sponsored research grants, and which needs assistance in moving the technology forward to a "product" or "near-product" stage.

Companion Spin-out or Licensee Grants

- A company (spin-out, startup, or licensee) that forms out of a Center (i.e. is a Spinout) and receives direct assistance to the company from the Centers of Excellence program. Such a company also licenses the Center-developed technology and may also be referred to as a "Licensee."

Companion Spin-out Grants

- Funds awarded to a Center spin-out which has demonstrated that funds granted directly to the spinout would substantially accelerate job creation and economic development in Utah. These direct grants are awarded on a competitive basis and require matching funds (typically 1:1) from investors, revenue or founders.

Distinguished Center of Excellence

- A Center receiving funding in excess of $10 million or national recognition. These centers are allowed special funding beyond graduation if proposed projects are deemed worthy by the Advisory Council, Note that this was used earlier in the program's history but is rarely used at this time.

Faculty, Graduate Student and Post Doctorates Employed

- Positions being funded directly to support the Center's activity within the university setting

Graduated Center of Excellence

- The Centers of Excellence program helps specific technologies developed at a university move into the marketplace. As such, a maximum funding term of 5 years was provided from 1986-2005. Starting with the 2005-06 fiscal year, this was changed to a maximum of 4 years. The change was intended to help accelerate the time-to-market of these promising technologies and has had the practical effect of condensing the same total funding into a shorter period of time.

Industry Jobs Created

- Those jobs that have directly or indirectly resulted from activity at a Center.

Principal Investigator (PI)

- Also referred to as a Center Director, a PI is the principal researcher at a Center.

Spin-out Company

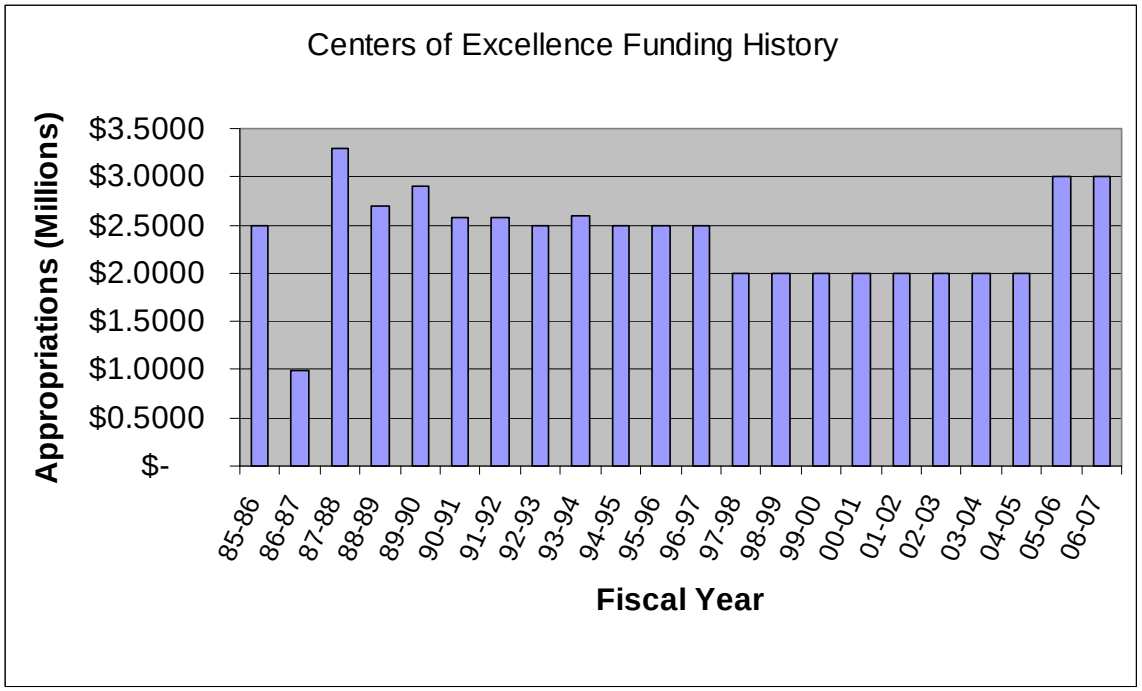
- Any startup company that is created directly as a result of Center technology.

Background

Recognizing that the growth of new industry and the expansion of existing industry in the next century would require both a strong technology base and a steady supply of new ideas, concepts, innovations, and prototypes, the Utah State Legislature created the Centers of Excellence Program (COEP) in 1986. The Legislature has recommended the allocation of economic development funds annually to the COEP, generally to be awarded to college and university faculty on a competitive basis. The objectives of the COEP are to support maturation of technologies that have potential for economic development in the state and assist in the commercialization of those technologies.

This technology commercialization process results in job creation through the formation of new companies and the enhancement of business opportunities for existing companies. In addition, the value of technologies created is further reflected in the number of patents issued and the associated royalty-bearing licenses that are signed. The State does not assume any equity positions in the licenses. Instead, the return on investment to Utah comes from converting university developed technologies into job creating products and services through spin-out or existing businesses.

Ongoing funding of the program has varied during the years. The program started in 1986 with $2.5 million in funding and maintained approximately that level until 1996-97.
Following the 1996-97 fiscal year, the program's funding remained at $2 million per year, and returned to $3 million in 2005-06. Despite the program's success, COEP funding has not kept pace with inflation. The following chart shows the history of funding for the Centers of Excellence program, through the 2006-07 fiscal year.



Operations and Objectives

The goal of the Centers of Excellence program is to help grow the economy of Utah. When the current Director joined the program, she coined the tagline, "Our job is jobs" and she has shared this perspective with everyone involved with the program. In order to help foster job growth, the COE program encourages licensing of Centers-supported technology to either existing Utah businesses, to help them develop innovative new products and services, or the startup of a new company (called a spin-out). The program continues to mentor some Graduated Centers, introducing them to sources of funding and identifying management and other talent.

Center Selection Process

In late December of each year, the COE program issues an RFP through its website which is advertised to the Universities, their Technology Commercialization Offices (TCOs), existing PIs, and other industry contacts. In response to this RFP, prospective PIs as well as existing Center Directors prepare a proposal for a potential new Center, for a business team grant to assist in preparing a future potential Center or for renewal of funding for an existing Center.

The review process is a very demanding element of the Centers of Excellence program, but also demonstrates the strong support the program has among industry and the overall Utah community. 30 or more individuals with strong technology business backgrounds, all at the Director or VP level and above, volunteer to serve on the Centers of Excellence Advisory Council as reviewers for the program. At least two reviewers, along with the COEP Director and other GOED team members review the written proposal and then conduct a site visit and review. This meeting allows the reviewers to hear directly from the PIs about the technology and business opportunity. After all proposed Centers have received a site visit and evaluation; the Director conducts what is currently a two tier selection process. In the past, the entire Advisory Council would gather in a two day process to discuss each proposal, rate them, and make the final funding recommendations. As the program has grown, that has changed into a two tier process, beginning in 2006. The Advisory Council is divided into three groups, the Life Sciences sub-committee, the Materials/Manufacturing/Energy/Environment sub-committee and the Information Technology/Aerospace/Electronics sub-committee. Each sub-committee meets and does a preliminary ranking of the proposals in their sub-committee, and makes a preliminary funding recommendation. Then, the entire Advisory Council meets together, reviews the recommendations in rank order, and makes the final funding recommendations.

The State Advisory Council (SAC) for Science and Technology has statutory responsibility for advising the Centers of Excellence Program. SAC members participate on the Centers Advisory Council, reviewing proposals and conducting site visits. This provides SAC members with in-depth knowledge of the program, Center specific information, and a strong technical and industrial perspective for making funding recommendations. The SAC also reviews the Centers of Excellence Annual Report before its delivery to the Legislature and publication.

In addition, members of the Governor's Office of Economic Development (GOED) Board also participate in the COE review process. These members are also able to verify that the selection process has been fair and was conducted in a way to help advance economic development in the state of Utah. Once the final list of recommended funding allocations is prepared, the proposed Centers and their budgets are presented to the GOED Board.

Centers of Excellence Program 1986-2006

Report Purpose

Acknowledging two decades of tremendous effort within the state in the Centers of Excellence program, the current Director decided in 2006 to perform primary research into the success of the program to date. Although some sampling data had been captured in past years, it was not a census of the program's past Centers, and it seemed that it would be helpful to reach out to every past and current Center to understand the success of each Center in commercializing its technologies.

Program Directors

The program has had the benefit of six dedicated, and quite long serving, Directors over its 20 year history. This is the first time that the list of all directors and their tenures has been compiled. Almost all of them continue to be active in the commercialization of university-developed technology, either through their industry work, through tenure at the technology commercialization offices of various Utah universities, or through continued service as reviewers for the program.

Tenure	**Director**
1986-1988	Lynn H. Blake, Ph.D.
1988-1993	G. Michael Alder
1994-2000	Roderick J. Linton
2000-2002	Rajiv K. Kulkarni, Ph.D.
2002-Jan 2005	Michael A. Keene, Ph.D., MBA
May 2005-Current	Nicole Toomey Davis, MBA

Centers of Excellence Primary Research and Analysis

Methodology

Research conducted in the summer of 2006 by Vincent Beerman surveyed 75 Center Directors of the 111 Centers of Excellence over the past 20 years. There were 24 Center Directors whose contact information could not be found or who had passed away and 12 who were unavailable during the survey period. Additional research was conducted by Danica Nelson during the end of 2006 and beginning of 2007, and seven of those 12 were surveyed and their updated center information was added to this report. The final date of data collection for this report was February 15, 2006. Former and current Center Directors were asked to update Center accomplishments and provide all available information about benefiting and spin-out companies. A thorough web search was conducted on all listed spin-out and, where possible, benefiting companies. Spin-outs were contacted and asked to verify their association with the center and provide revenue and employee information. Many companies asked us to keep this information confidential or declined our request. Confidential information was used in aggregate data but omitted from the web site and report, or was replaced with publicly available estimates, where available.

Challenges:
It is extraordinarily difficult to accurately measure the effect of a program such as the Centers of Excellence. COEP plants the seeds of business by fostering the development and commercialization of technologies at Utah's universities. Once a technology has been patented and the applications proven, the economic story often diverges and becomes difficult to trace. Some technologies are licensed to several companies, who then integrate them into existing products or build new divisions around them. Frequently, these licenses result in significant job creation in Utah, but it is nearly impossible to measure the number of jobs directly attributable to the Center as the technology is combined with existing company resources and products. Thus, the economic impact of the Center technology and COEP becomes inextricable from the overall success of the licensee.

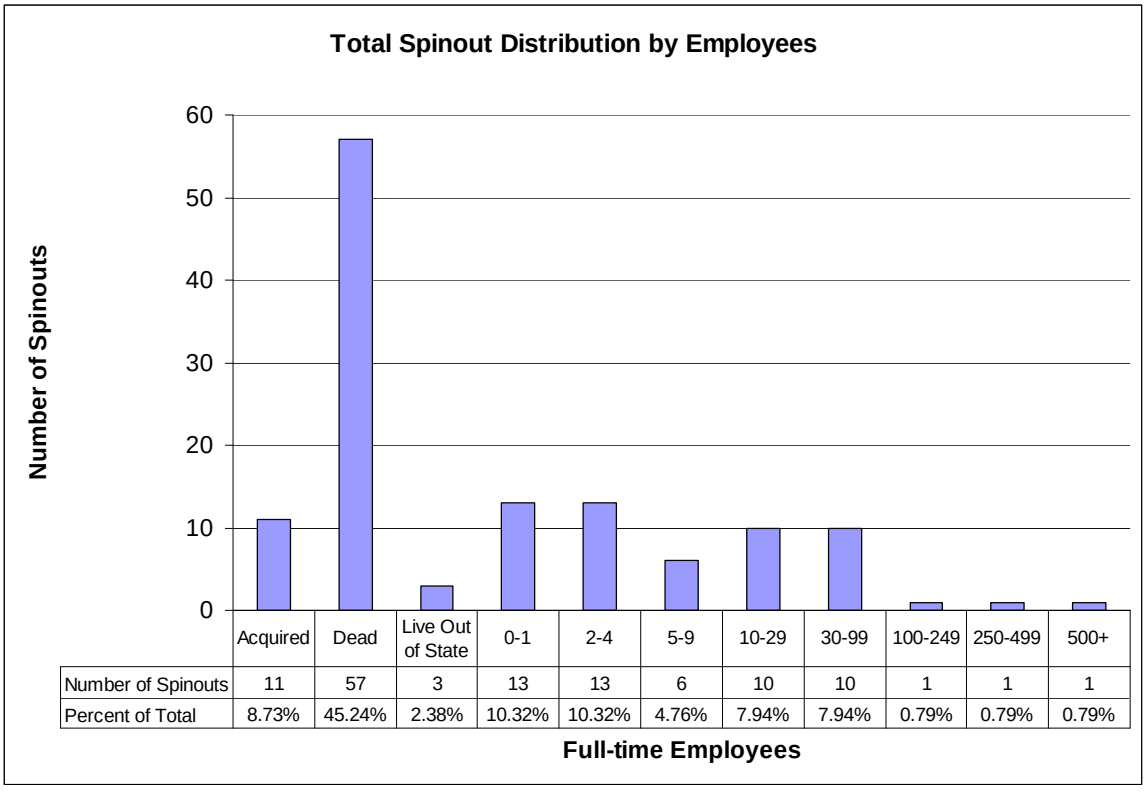
Spin-outs:
Center spin-out companies are easier to measure as they credit their foundation to a Center's personnel and technology. Although over the life of the business there are many inputs (capital, talent, other technologies and assets) that build the business, without the Centers of Excellence Program, that company would likely never have existed. Therefore we can say that COEP 'helped to create' those companies and jobs. However, many Center spin-outs have been acquired over the years. When this happens, the company facility and personnel may remain intact as a subsidiary or division, are released as redundant resources, or are absorbed into the new parent company. For the purposes of this report, if a company was left intact, those employees were still counted in the aggregate statistics. Otherwise, that company is no longer considered a "live spin-out" for the purposes of this report.

Limitations of this report:
As explained, measuring the ***total economic impact*** of the Centers of Excellence Program is difficult and imprecise. Many, if not most, of the jobs created through COEP are now inextricably tied to licensees and acquired spin-out companies across the state and the country. In spite of this difficulty, those spin-outs that we are able to track show that the program has created significant economic growth and job creation in Utah.

Corrected data:
An unpublished internal report in 2003 included some spinouts that were determined during the research of this report to be benefiting companies instead. A correction was made to the 2003 data which resulted in an adjustment of 937 jobs attributed to COEP spinouts being deducted from the initial reported total of 2,008. The corrected total number of jobs created as of 2003 is 1,966. The net increase in jobs from 2003 to 2006 is 922. The corrected ROI for 2003 is 2.04 based on an average salary of $59,000.

Spinout Distribution by Number of Employees

Of the 126 total spinouts in the history of the COEP, 11 have been acquired by companies outside the state of Utah and moved out of state, while three are still live, but were started outside of the state. For the spinouts within the state, 32 have fewer than 10 full-time employees and many of these companies have remained at that level of employment for a significant amount of time and are not likely to grow. There are 20 spinouts with 20-99 employees. Companies that employ more than 100 people bring significant benefit to the state's economy and are likely to stay within the state. These companies are often referred to as "big wins" within the Centers of Excellence community. It is important to note that companies of fewer than 500 employees are still considered small businesses by the Federal Government (for example, in the Small Business Innovation Research (SBIR) Program), but for Utah they contribute significant employment and are therefore very valuable to the state. The COEP has helped foster three such highly-valued companies: Myriad Genetics, Sonic Innovations, and MOXTEK. The following graphs illustrate the distribution of spinouts based on the number of full-time employees, thus demonstrating the history of the program and the benefits it has brought to the state.

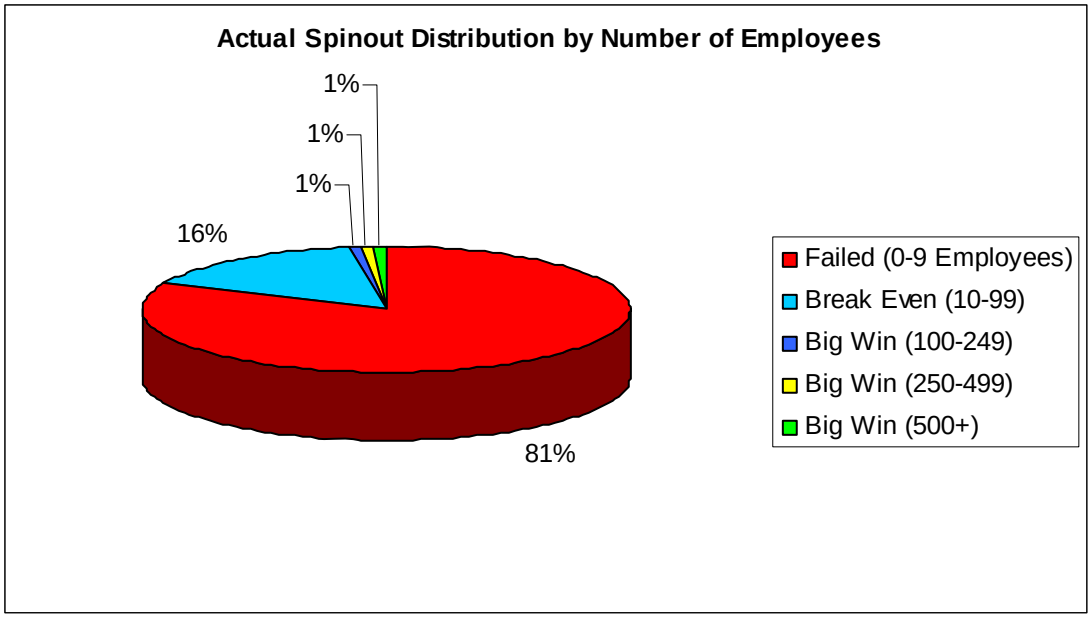


	Acquired	Dead	Live Out of State	0-1	2-4	5-9	10-29	30-99	100-249	250-499	500+
Number of Spinouts	11	57	3	13	13	6	10	10	1	1	1
Percent of Total	8.73%	45.24%	2.38%	10.32%	10.32%	4.76%	7.94%	7.94%	0.79%	0.79%	0.79%

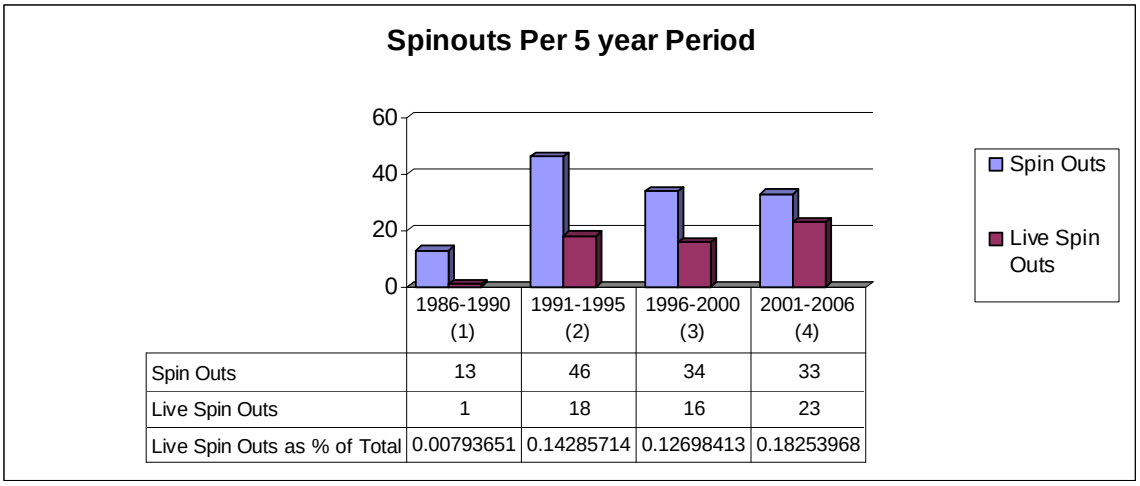
This graph shows the significant number of startups the program has helped to foster. It also points to opportunities to further strengthen the program's ability to position companies for growth to greater than 100 employees. Obviously having spinouts from the Centers of Excellence program grow to greater than 100 employees, the so-called "big wins", is highly desirable. As the graph shows, three of the 126 attempts have achieved this employment level.

As a comparison, the professional venture capital community has an expectation that 10% of their investments will reach the 'big win' category, while 30-40% are considered "losses" and the remaining 50-60% are "break even" in terms of their return to the firm. Of course the venture community's definition of "big win" is much bigger than the COE target, but the "ratio" of various levels of success is relevant.. As part of this analysis, the Director considered that any company that has less than 10 employees will likely never be able to return back to the state the investment that was made, on average over $400,000 per Center. Therefore, all Center spinouts that have failed, been acquired and moved out of state, or started out of state, are considered to have zero employees in the state and are grouped with those spinouts that are live and have 0-9 employees in the category labeled "failed." We acknowledge that in some cases those live spinouts with less than 10 employees may eventually leave that category, but as a rule, if they have never gained momentum, this is very difficult.

The graph below shows the distribution of spinouts by number of employees.

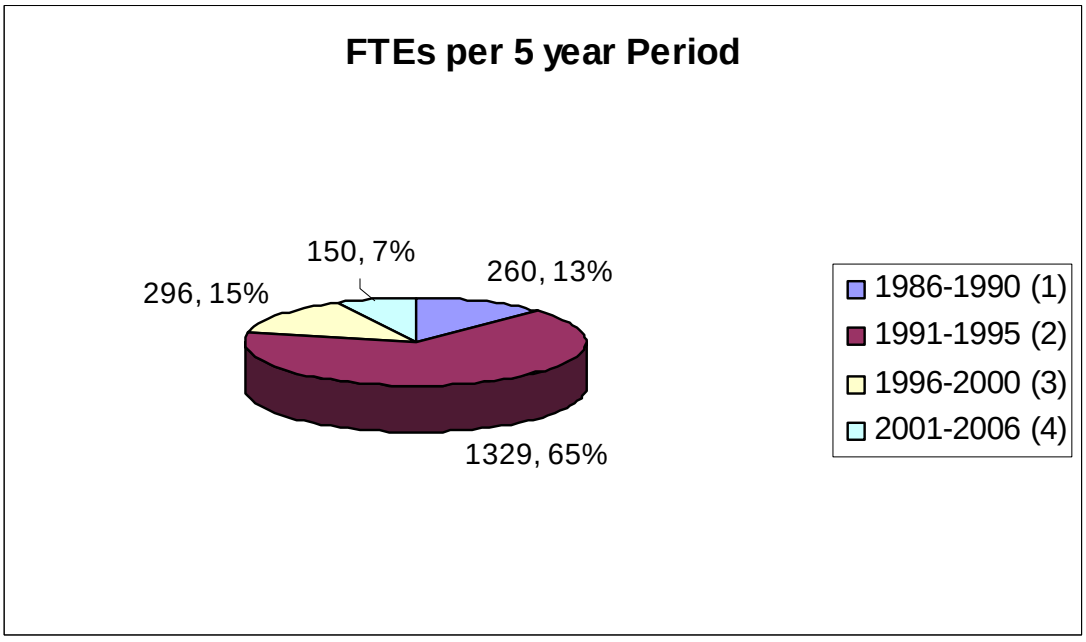


Another interesting way to look at the data is to look at the relative performance among different five-year periods. It is interesting to note that the last 10 years of the program, the number of spinouts has been fairly consistent, and that the number of live spinouts over the past 15 years of the program has also been quite consistent, with the last five years having a higher "live" rate simply due to the fact that some are still in the startup stage and their long term fate is not yet known.



	1986-1990 (1)	1991-1995 (2)	1996-2000 (3)	2001-2006 (4)
Spin Outs	13	46	34	33
Live Spin Outs	1	18	16	23
Live Spin Outs as % of Total	0.00793651	0.14285714	0.12698413	0.18253968

Even more interesting is the distribution of FTE's among the five-year periods. Clearly the period of 1991 to 1995 was the most productive as fully 65% of the people employed at spinouts of the Centers of Excellence program are employed at companies that emerged from this period. It is, of course, important to note that the period from 1996-2000 was a difficult period for startups altogether, both nationally and in Utah, due to the "dot com collapse" and retrenchment in the financial markets that followed the "boom". At the same time, some significant winners in Utah's broader technology landscape did begin in this time frame, so we know that the "external" factors alone cannot account for the very low rate of employment from this period. Of course the period of 2001-2006 has many younger companies and these are expected to have fewer employees this early in their development.



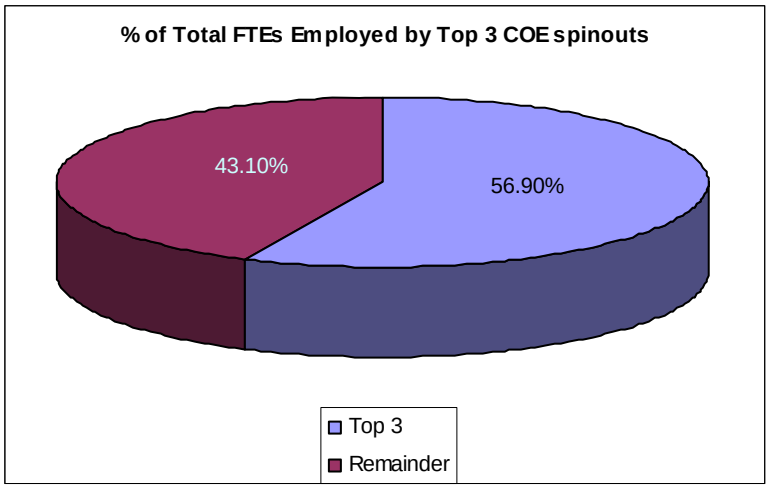
One of the challenges facing this program, a program with job creation and economic development as its primary mission, is the concentration of jobs among the largest of the

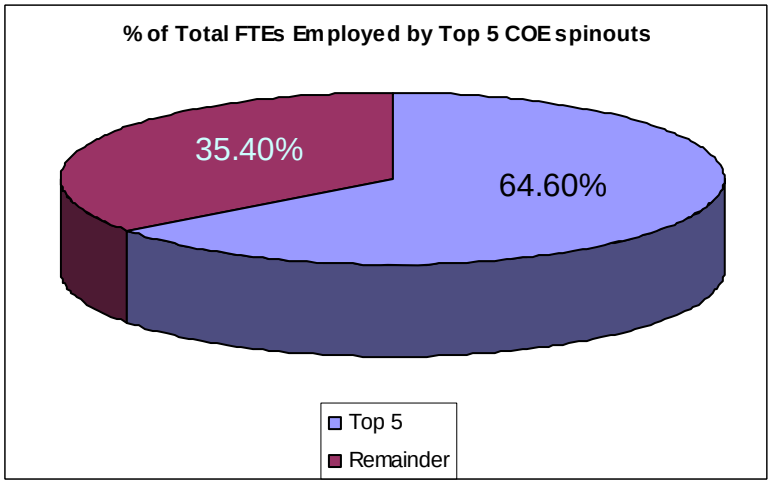
spinouts. Despite the fact that 55 of the 126 spinouts are still 'live' in Utah, the top 10 spinouts by size account for nearly 75% of all employment in the program. This indicates that we could have dramatically larger employment numbers if only some of the smaller firms (10-99 employees) had been able to grow to be larger than 100 employees.

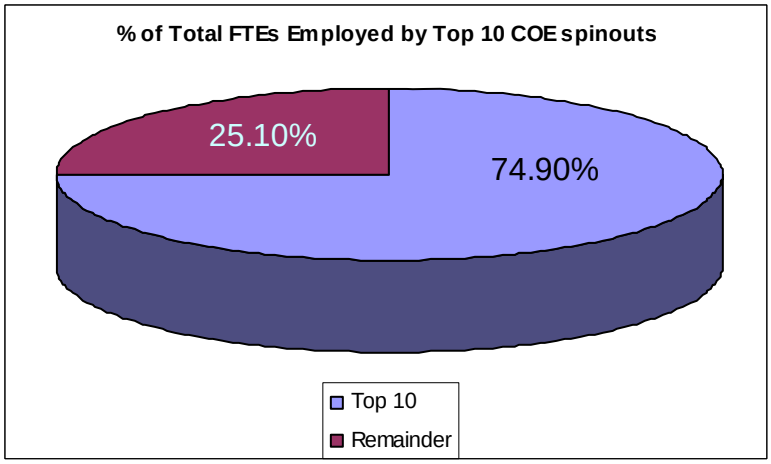
However, this points to a significant opportunity for the program that the current administration is working to capture. If spinouts can be better positioned with capital so that they can gain momentum in their earliest days, combined with increased availability of professional venture capital through the Utah Fund of Funds program, they can capture crucial early market share and presence and emerge as market leaders nationally and globally. It is this type of market positioning that helps companies grow to dominate their markets. Therefore, during the past 2 years of this administration's tenure, we have put in place significant changes that help accelerate business planning and execution for our Centers, as well as a new (in 2007) program to provide grants directly to the licensees of Center supported technologies, thus better positioning them for long term success.

Below are three charts that show the concentration of employees among the top three, top five and top 10 spinouts by size.

Charts showing concentration of employees by spinout size







Below is a list of all of the spinouts identified in this research program, listed by size. Obviously companies change size constantly, but this is a very good look at the relative spinouts that have emerged from the Centers of Excellence program. Size data comes from the primary research conducted for this report, unless otherwise noted.

COE Spinouts By Size (Active spin-outs only)

UNIV	CENTER	COMPANY	STATUS	FTE's
U/U	Cancer Genetic Epidemiology	Myriad Genetics	Live	760
BYU	Signal Processing	Sonic Innovations*	Live	100-249
BYU	X-RAY Imaging	MOXTEK	Live	138
BYU	Advanced Composites	Rocky Mtn. Composites	Live	85
USU	Self Organizing Intelligent Systems	Autonomous Solutions Inc. (ASI)	Live	72
U/U	Engineering Design	Sarcos Medical Corporation*	Live	50-99
USU	Computer Aided Engineering Design	CIMETRIX	Live	45
USU	Computer Aided Engineering Design	PROMODEL Co.	Live	45
USU	Self Organizing Intelligent Systems	Visionary Products	Live	44
U/U	Computer Graphics & Scientific Visualization	Engineering & Geometry Systems	Live	35
U/U	Design Systems	Part.Net (Medibuy)	Live	35
U/U	Controlled Chemical Delivery	Insutech became MacroMed	Live	30
U/U	Electronic Medical Education	Amirsys	Live	30
DIXIE	3D Computer Graphics	InfoWest*	Live	20-49
U/U	Cell Signaling	Echelon Research Laboratories Inc.	Live	25
U/U	Artificial Hearts and Biomedical Devices	Utah Artificial Heart Institute	Live	22
U/U	Neural Interfaces	Bionic Technologies Inc.	Live	22
BYU	Solid Oxide Fuel Cells	Materials and Systems Research, Inc. (MSRI)	Live	20
BYU	Chemical Separations	IBC Advanced Technologies*	Live	10-19
BYU	ACERC	Reaction Engineering Intl	Live	19
BYU	ACERC	Combustion Resources	Live	15
U/U	Inverse Imaging & Tomography	TechniScan	Live	15
U/U	Raman Scattering	Process Instruments	Live	15
U/U	Genome Technologies	Cimmeron Software	Live	8
U/U	Smart Sensors	Live Wire	Live	6
U/U	Direct Machining and Control	Direct Controls	Live	5
USU	Profitable Uses of Agricultural Byproducts	Andigen	Live	5
U/U	Scientific Computing & Imaging	Visual Influence Inc.	Live	5
U/U	Biomedical Microfluidics	Wasatch Microfluidics	Live	4
U/U	CROMDI	Applied Medical Visualization, Inc.	Live	4
U/U	Design of Molecular Function	MicroBioSystems	Live	4
U/U	Design Systems	ErgoWeb	Live	4
U/U	Electronic Medical Education	Visual Share	Live	4
BYU	Miniature Unmanned Air Vehicles	Procerus Technologies	Live	4
BYU	Advanced Structural Composites	IsoTruss	Live	2
U/U	Industrial Imaging	GeoChem Metrix, Inc.	Live	2
U/U	Minerals Technology	Milltech Engineering	Live	2
U/U	Minerals Technology	Mineral Technologies Inc.	Live	2
BYU	Miniature Unmanned Air Vehicles	Flying Sensors	Live	2
U/U	Smart Sensors	RF Innovations	Live	2

UNIV	CENTER	COMPANY	STATUS	FTE's
U/U	Therapeutic Biomaterials	Glycosan Bio	Live	2
U/U	Alternate Strategies for Parasite Removal	Larada Sciences	Live	1
USU	Biotechnology	Intech One-Eighty Corp.	Live	1
U/U	Biomolecular Technologies	GenMetrix, LLC	Live	0
U/U	Computational Design and Testing	Visco	Live	0
USU	High Speed Information Processing	SP Communications	Live	0
USU	Information Technology (Handicapped)	Effective Instructional Technologies	Live	0
U/U	MicroArray Technology	Sigma Technology Holding Company- now Philotek	Live	0
U/U	Nuclear, Medical, and Environmental Technology	Nuclear Labyrinth	Live	0
U/U	Quality and Integrity Design	FASIDE Itnl, Inc.	Live	0
U/U	Quality and Integrity Design	Holsip	Live	0
U/U	Therapeutic Biomaterials	Sentrx Animal Care	Live	0
U/U	Coal Research	FemtoScan Corp.	Live	0
USU	Rapid Microbe Detection	Finite Technologies	Live	0
BYU	Solid Oxide Fuel Cells	Versa Power Systems (VPS)	Live Out of State	40
USU	Self Organizing Intelligent Systems	Kachemak Research and Development	Live Out of State	0
U/U	Therapeutic Biomaterials	Sentrx Surgical - now Carbylan Biosurgery	Live Out of State	0
BYU	Computer Based Education	Cali, Inc. (became Ellis, then acquired by Pearson)	Acquired	45
U/U	Artificial Hearts and Biomedical Devices	Medquest Products	Acquired	30
WSU	Bioremediation	Applied Biosciences Corp.	Acquired	9
U/U	Cell Signaling	Salus Therapeutics	Acquired	6
BYU	Advanced Joining of Materials	Megastir	Acquired	5
U/U	Modified Activated Carbons Technology	INOTECH*	Live	n/a

**Employment Information Source: Division of Workforce Services, Firm Find*

Economic Impact Highlights

- 111 Centers
- Cumulative State funding through June 2007: **$52 million**
- Estimated matching funds: **$272 million**
- Over **126 spin-out companies** - 55 are alive in Utah today
- Spin-out companies impact
    - Employ over 2035 individuals in Utah
    - Average annual salary over $65,000
    - One year wage impact over $132 million
    - Estimated Annual personal income tax generated @ 5% rate = $6.6 million
    - COEP avg. funding last 5 fiscal years = $2.37 M/year
- Annual ROI = State tax revenue / avg. annual funding
- Annual Return on Investment = $6.6M / $2.37 M = **2.81**

Matching Funds

Under the statute changes passed during the 2006 Legislative session, Centers at a university that awards doctoral degrees ("the doctoral granting institutions") are required to have 2:1 matching funds. This is because these institutions have significant Federal research programs which bring with them momentum and many helps in identifying and securing funding. At universities without these robust, doctoral granting programs, securing research funds is more challenging. Therefore, in the 2006 session, the Utah state Legislature modified the matching requirement so that Centers at non-doctoral granting schools were not required to have the 2:1 match, and in policy the program adopted a 1:1 matching requirement. All matching funds are reviewed through the Center's annual reports. A key element of the program is the emphasis during the renewal process on the achievement of milestones and commitment to commercialization.

Center of Excellence funds are credited by many researchers as "priming the pump" for additional research funds. Although COEP requires a 2:1 matching funds ratio for doctoral granting institutions, most Centers raise considerably more in outside funds from federal and private grants. Although this money is spent on a variety of equipment and activities, some of which leaves the state, much of it goes to pay local researchers' salaries and local utilities and supplies. At the time of this report, matching funds data was available for 34 centers. The ratio of matching funds to those provided by COEP was 5.24:1. Assuming this ratio is representative of all the Centers, approximately $272 million has been funneled into Utah through the Centers since 1986.

Metrics by Cluster, School and Age of Center

The success of the COEP program is demonstrated in the following metrics that are grouped by clusters, institution, and age quartile (the year in which the Center operated expressed in quarters of the COEP's 20-year history.) Performance indicators include the number of centers that were funded, the number of spinouts created, the number of companies benefiting through a license agreement, full-time employees of the spinouts, revenue generated by the spinouts, and that revenue divided by the number of centers.

Clusters	# of Centers	# Total Spinouts	# Live Spinouts	# Benefit-ting Co's	FTEs	Avg Salary	Reported Revenue ($M)	Average Jobs/ Center	Revenue/ Center
Aerospace	4	9	2	5	6	$86,667	2	1.5	$450,000
Competitive Accelerators	27	19	11	289	277	$61,000	12	10	$450,741
Defense & Homeland Security	3	6	5	1	124	$45,000	10	41	$3,333,333
Energy & Natural Resources	12	11	9	31	108	$76,830	15	9	$1,288,333
Life Sciences	34	45	19	53	1,316	$58,778	119	39	$3,485,294
Software & IT	31	36	12	39	204	$70,521	26	7	$830,645
Total	**111**	**126**	**58**	**418**	**2035**		**$183.7**		
Institution									
U of U	61	57	36	82	1180	$68,589	110.25	19	$1,807,377
USU	23	27	9	34	126	$60,000	10.26	5	$446,087
BYU	21	28	12	293	695	$62,686	59.17	33	$2,817,619
WSU	4	5	0	8	9	$50,000	1	2	$250,000
Dixie	1	5	1	1	25	$0	3	25	$3,000,000
UVSC	1	4	0	0	0	$0	0	0	$0
Total	**111**	**126**	**58**	**418**	**2035**		**$183.7**		
Age Quartile									
1986-1990 (1)	9	13	1	18	260	$0	0	29	n/a
1991-1995 (2)	29	46	18	148	1329	$63,282	139.37	46	$4,805,862
1996-2000 (3)	31	34	16	221	296	$76,923	23.4	10	$754,839
2001-2006 (4)	42	33	23	31	150	$65,449	20.91	4	$497,857
Total	**111**	**126**	**58**	**418**	**2035**		**$183.7**		

Outstanding Successes

The following descriptions provide additional insight into some of the successful and emerging spinouts that are powering job creation in the State of Utah. This list is only meant to provide a sampling of information. Appendix A provides a summary of every Center of Excellence since the inception of the program, and includes contact information and a list of spinouts.

Myriad Genetics (MYGN) - 1991

A spin-out from the Center for Cancer Genetic Epidemiology at the University of Utah, Myriad is a biopharmaceutical company that develops novel healthcare products to address some of the most pervasive diseases such as cancer and Alzheimer's. Their products include predictive cancer products in addition to drug therapeutics. The company is a leader in cancer prediction medical products, such as BRACanalysis for breast cancer and COLARIS for colon cancer. Myriad also develops and markets predictive and personalized medicine products. Currently, the company is engaged in the largest placebo-controlled study ever undertaken of an investigational medicine in patients with Alzheimer's disease.

Myriad was formed in 1991 and went public in 1995, with an initial public offering valued at $54 million. In 2005, the company earned revenues of $82 million with 760 full time employees and a median salary of $58,000. Approximately 660 of those employees reside in Utah. As of February 2007, the company was valued at $1.51 billion.

Sonic Innovations (SNCI) - 1995

A spin-out from the Center for Signal Processing at Brigham Young University, SONIC innovations has become the fastest growing hearing aid company in the world. Through the development of patented digital signal processing technology at Brigham Young University, the company produces the smallest single chip platform ever installed in a hearing aid. The success of the companies product is a direct result of the developments at BYU that give the hearing aids the ability to accurately reproduce natural sound from an extremely small device.

Sonic Innovations was founded in 1995 and went public in 2000 with an initial offering of 3,600,000 shares at $14.00 per share.. The company received total net proceeds, including the exercise of the over allotment, of $53.9 million. Sonic has grown to more than $100 million in revenue with operations in nine countries. The company was valued at $187 million in February 2007. The company employed 634 individuals in 2005, 110 of which are in Utah with an average salary of $80,000.

Moxtek - 1986

A spin-out from the Center for Xray Imaging at Brigham Young University, Moxtek is an OEM provider for X-ray analytical products and wire grid polarizers for projectors and rear-projection televisions. The company was founded on specialized optical technology developed at Brigham Young University. Their polarizer technology is a leader in the projection industry, and is used in most major-brand high definition televisions. Moxtek was awarded the 2002 Silver Award by the Society for Information Display (SID) in recognition of its ProFlux polarizer.

Moxtek was founded in 1986 by a group of professors and was acquired as a wholly owned subsidiary of Polatechno in 2004. The acquisition kept intact Moxtek headquarters in Orem, UT and retained the company name and personnel. Through the increased access to capital, Moxtek has been able to expand capacity. This has led to increases from $9.4M in sales and 60 employees in 2004 to 138 full time employees with an average salary of $36,000 and $31 million in sales in 2006.

Autonomous Solutions Inc. – 2000

A spin-out form the Center for Self Organizing Intelligent Systems at Utah State University, Autonomous Solutions, Inc. produces unmanned vehicle systems based on technology developed at Utah State University. The company has developed products for many top companies, including a robotic vehicle for Goodyear to safely test tires without human drivers. The company has received such a high interest in its products that it is actually turning down customers, according to the founder. Recently, ASI won a million-dollar grant to develop an unmanned vehicle for the Department of Defense's Grand Challenge in November 2007. The company will be competing against major corporations such as Lockheed Martin and Boeing.

ASI was founded in 2000 by Mel Torrie, who was a graduate student working in the Center at USU. The company now has over 72 full-time employees earning an average of $45,000 and 2006 revenues were over $7 million.

Cimetrix (CMXX) - 1985

A spin-out from the Center for Computer Aided Engineering Design and Manufacturing at Utah State University, Cimetrix is a public company located in Salt Lake City, UT that designs factory automation software for the global semiconductor and electronics industries. Cimetrix's PC-based motion control software is used by leading equipment manufacturers for demanding robotic applications. One of the company's most recent products, CIMPortal, has been selected for Semiconductor Equipment and Materials International's (SEMI) Interface A standards compliance by 50 percent of the top 20 largest semiconductor equipment suppliers in the world.

Cimetrix was founded in 1985 based on open architecture motion control software developed at Brigham Young University. Cimetrix used this core PC based technology to develop a unique software framework bringing to life the Cimetrix Open Development Environment (CODE). The company continues to receive worldwide recognition and increasing sales. 2006 revenues were $5.637 million with 45 full time employees worldwide, 36 of which reside in Utah. The company was valued at $9.2 million in February 2007.

Flying Sensors - 2006

One of two spin-outs from the Center for Miniature Unmanned Air Vehicles at Brigham Young University, Flying Sensors is a full-service, aerial-based, data collection company. Their unique approach combines aerial photography and video with unmanned air vehicles and aerial sensing technology developed at Brigham Young University to provide aerial detail not available by traditional means. The company integrates these technologies with their patent-pending analysis and presentation tools to give its customers a complete aerial imaging product. Their products

and services are used for many imaging applications such as real estate, environmental studies and motion pictures.

Flying Sensors was founded in 2006 by Bob Carter and Brian Odette. The company currently has 2 full time employees with an average salary of $100,000. Flying Sensors will record its first revenues in August 2006.

Procerus Technologies - 2004

The second spin-out from the Center for Miniature Unmanned Air Vehicles at Brigham Young University, Procerus designs small automatic pilots for miniature unmanned air vehicles using leading edge technology developed at Brigham young University.. This technology led to the company's premier product, the Kestrel. This is the smallest and lightest autopilot on the market and is used by military and research institutions. In addition, the company offers ground control software to be fully integrated with the autopilot.

Procerus Technologies was founded in 2004 by the Center Director and partners. In 2005, Procerus had approximately $1.8 million in revenues with 4 full time employees averaging $80,000 in salary.

InfoWest - 1994

A spin-out from the Center for 3D Computer Graphics at Dixie College, InfoWest has been a leading provider of high quality Internet services to the Utah community since 1994 and was the first to offer Internet services to Southern Utah. Being the first provider in this community led to the company's name being synonymous with the Internet. Even today, with many competitors in the area, InfoWest maintains the majority share of the market. InfoWest continues to lead by providing fiber-optic transmission and advanced spam and virus filtering.

Established in 1994, InfoWest came together under through a group of former IT students at Dixie College under the direction of Eric Pedersen. The idea was born when this group helped to equip the college campus with Internet service. InfoWest has since had a ten-year up-trend in revenue and has spun-out several other companies including NetEx.net, DevShed.com and 32Bit.com. The company currently has approximately 49 full time employees in Utah.

LiveWire Test Labs - 2003

A spin-out from the Center for Smart Sensors at the University of Utah, LiveWire Test Labs provides technologically advanced and easy to use products for identifying the nature and location of faults in live electrical wiring systems. The company was founded on technology developed at the University of Utah, called Spread Spectrum Time Domain Reflectometry (SSTDR). This technology allows testing on live wiring systems and is able to detect problems that traditional methods have failed at. SSTDR is capable of sensing faults in the wiring without interfering with normal operation, thus making it useful in a multitude of applications, such as on aircraft during flight. This is particularly beneficial for use on aging aircraft for compliance with FAA standards.

LiveWire was founded in 2003 by the Center Director, Cynthia Furse and partner Paul Smith. The company currently has 6 full time employees and is growing rapidly.

Andigen, LC - 2003
A spin out from the Center for Profitable Uses of Agricultural Byproducts at Utah State University, Andigen designs and builds high rate anaerobic digester systems for animal waste. The patented digester processes animal waste into methane gas which is pumped into an engine and converted into electricity. This allows farmers to manage pollution and odor, and gives them an additional revenue stream if they choose to sell the electricity back to the utility company. The methane gas may also be used to produce biodiesel.

Andigen is growing rapidly with worldwide sales out of its headquarters in Logan, UT. Founded in 2003 by the Center Director - Dr. Conly Hansen and partners, Andigen maintains ongoing research collaboration with Utah State University. Revenues from 2005 were $260,000 and 2006 revenues are forecasted at $1.5-$2M. In 2006 there were 5 full time employees with an average salary of $75,000.

Perspectives About the Centers of Excellence Program

SSTI
"Utah's approach is unique -- the partnership between economic development, the tech transfer office, and the commercialization transfer office, makes sense and seems to be working. …I can't point to any other program that has the same results."

--Dan Berglund, President and CEO, SSTI -State Science and Technology Institute

MedQuest/Worldheart
"I recently sold the company that I co-founded (MedQuest Products Inc.) to a publicly-traded company, WorldHeart. My company was a spin-off of the Center for Artificial Hearts at the University of Utah, which is a Distinguished Center of Excellence and has obtained COE funding/support since 1988 for both Artificial Hearts ('88-'92) and Ventricular Assist Devices (1 yr in the mid-90s). The COE support for VAD commercialization was very important at that time- we used COE-recommended commercialization consultants and also worked with the UU Tech Transfer Office to get things moving for my business. This early support has played a role in our success so far: from Mar-June 2006 we had our first successful patient experience with our revolutionary VAD. The news of this implant was carried all over the world: Russia, Australia, South Korea, India and so on… (including the US and Europe of course). I believe it demonstrated and reinforced Utah's leadership in this field that had been established in 1982 with the first implant of a long-term artificial heart in Dr. Barney Clark- a heart that was developed by Symbion (at that time a UU spin-off) and the Center for Artificial Hearts."

-- Pratap Khanwilkar, PhD, MBA, VP: Rotary Systems & Business Development Worldheart, Inc.

Center for Thermal Management Technologies
"It is my observation that most university faculty in engineering and science are talented, dedicated, hard working people with more great marketable ideas than they have time to develop without substantive encouragement and support. Academics are often not business oriented

people and so many ideas with potential commercial application languish and miss the passing window of opportunity. Utah's COEP provides the needed incentive and support for busy faculty to develop their ideas into useful products. Students involved have their education enhanced by real world applications as the states economy is benefited. It seems like a win-win all around. Please count me as an enthusiastic COEP advocate."

--J. Clair Batty, Trustee Professor Emeritus, Utah State University

Flying Sensors

The Centers of Excellence (COE) program has been on of the key stepping stones to launching Flying Sensors. I was a consultant for the BYU magic lab (the Center for Miniature Unmanned Air Vehicles) that focused on small unmanned aerial vehicles. My partner, Brian Odette and I quickly realized the commercial potential for their technologies in an industrial setting. Most UAV work was focused on the military and this left a great opportunity to integrate existing technology into a new vertical market. The first grant we received from the COE program allowed us to immediately get matching funds from a private investor. The COE, private equity and revenue funded the first year growth and infrastructure development. As founders we utilized the income from our consulting efforts to buy the assets necessary to launch a successful unmanned aerial product and service company. The COE funds provided operating capital to hire the necessary personnel to get the company launched. The second year award is critical as we expand our efforts and hire additional personnel to accelerate our growth. I have been an entrepreneur of many different startups. I see COE providing the essential bridge to motivate people to take the necessary risk to spin research technologies out into industry. I am proud to be associated with this program and lead the way for other future companies.

--Bob Carter, CEO, Flying Sensors

Future Research

The depth of primary research conducted for this report provides significant insight into the program's performance. However, some crucial questions emerged from this data that will form the basis for future research to help strengthen the program and Utah's economy. These questions include: Why did so many spinouts fail outright? Are the issues related to management? Capital? Licensing issues and terms? PI focus and involvement? Are these still barriers or have any/all issues been resolved? What issues remain to be resolved?

Other questions that need additional research to answer include: Why did three of these spinouts start out of state entirely? What ingredients in Utah's economy were missing or what problems were there? Why did so many of these spinouts get "stuck" in the 0-9 employee category? What are these companies doing and how are they structured? Are the PI's still involved? Who else is employed by these companies? Why didn't more of the 10-99 employee companies keep growing to breach that 100 employee mark? How did Utah's private sector startup community fare relative to the COE startup community? What are other states doing in the very early seed stage area and how successful are their programs? How does Utah's COE Program compare against these other programs in terms of effectiveness and what might some additional "best practices" be?

And finally, looking for opportunities to replicate success leads to questions such as: What were the key elements that helped to contribute to the success of the three "big wins" that did occur? How could those same factors be brought to bear on a wider segment of Centers spinouts?

More information about the benefiting companies and the level of benefit received from their work with the Centers would be helpful. In the end, did any of them license and use Center technology to significantly grow their businesses? How? What works/doesn't work in the company/professor/university relationships?

Future research efforts will be made to answer these and other questions that emerge.

Program Evolution – Building on Success

The Centers of Excellence Program is building on the past 20 years of success. Based on successful examples of technology commercialization, the COE Director, under the new leadership of the Governor's Office of Economic Development, is working to strengthen those elements of the program that have been crucial to success as well as to introduce new opportunities.

Accelerate time to market

Funding Period Compressed to Four Years

During the first 19 years of the program, the funding time frame allowed a maximum of five years for a Center. During the 05-06 fiscal year, this time frame was compressed from five years to four years – with roughly the same amount of money allocated to each Center over the history. The purpose of this change is to accelerate commercialization and reduce the time to market.

In addition, the COE program implemented a system to provide business team assistance to "Potential Centers" before they receive full funding in order to improve their performance during their funded time as a Center. This replaces the past "planning grants" (typically around $5,000) that were made directly to a potential Center. Instead, this money is directed to the business team for assistance during the year. During the 2006 selection process this was expanded to authorize approximately $75,000 to fund pre-proposal business team assistance (enough for 5-7 Centers) before they applied to the COE program. All of this is intended to help prepare university teams for the COE program, to facilitate the selection process and to further accelerate commercialization.

The first example of a new team with this support occurred during the 05-06 year. During the 2006 selection process, one seasoned COE Reviewer said, "I had to keep reminding myself that this was a new Center, their presentation was so good!"

Business Expertise Essential to Success

Throughout most of the program's history, Utah has sponsored "COE consultants" to work with each Center. These consultants spent about 80 hours per year working with a given Center. They were paid through the universities by a block grant provided by the state and were selected by the universities from a list of consultants approved by the State.

For the 2005-06 fiscal year, the former "COE consulting program" underwent a complete overhaul to result in the COE Business Team program. Under the Business Team program, seasoned technology executives, serial entrepreneurs, and market experts were recruited through a statewide RFP to meet the specific needs of each Center. In addition, the funding level was increased to pay for approximately 250 hours of assistance per year for each Center, significantly increasing the ability of the Business Team members to help move the technologies out of the university and into industry.

This enhancement builds on the historical importance of providing business expertise to complement the technical expertise of each Center, while helping to pair entrepreneurs and seasoned executives with the Centers as part of the process of building strong startup and "go to market" teams. In addition, the Centers program has emphasized that licensing to an existing Utah company is a very positive outcome and has encouraged our business team members to search out Utah firms which might have an interest in these technologies.

Industry-University collaboration

A major objective of the Centers of Excellence program under the Huntsman Administration is to significantly increase the interaction between members of industry and university talent in order to facilitate the exchange of technologies and opportunities. Strong economies around the world are built around the movement of technologies from research institutions into industry, and the subsequent flow of funds and talent back to the institutions. It is the goal of the COE Director that the Centers of Excellence Program can help increase this virtuous cycle in Utah and further strengthen our high tech economy.

Changes in Legislation

Utah's Legislature is very sensitive to the value of technology based economic development and the current Director has taken the opportunity to approach the legislature twice to ask for changes that strengthen the COE statute and enhance the program.

2006 Legislative Changes

During the 2006 Legislative session, Senator Thomas Hatch sponsored Senate Bill 112, with House sponsor Representative Peggy Wallace. The centerpiece of this bill was changes in the COE statute which were implemented to encourage the non-doctoral schools in the State to participate in the COE program by reducing the matching requirements for those schools from 2:1 to 1:1. In addition, when a doctoral-granting school and a non-doctoral granting school partner in a so-called "supercenter", the non-doctoral granting school is not required raise any matching funds, although the doctoral granting school still maintains its 2:1 matching requirement.

Matching Requirements for schools that do not offer Doctoral degrees

During the 2006 legislative session, the Utah State Legislature passed, with no dissenting votes, SB 112, Centers of Excellence Amendments. One of amendments included in this bill narrowed the requirement of the 2:1 match to schools that offer Doctoral degrees (language listed below). This statutory change also required match guidelines for schools that do not offer doctoral degrees. The new guidelines are listed below.

Statutory Change

"The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis for colleges and universities in the state that offer any doctoral degrees"

New Guidelines:

- For a non-doctoral-degree granting school, a stand-alone Center will be required to have its Centers of Excellence funds to be matched by industry and federal grants on at least a 1:1 basis.
- When a non-doctoral-degree granting school partners with a school that does grant doctoral degrees, the non-doctoral-degree granting school will not be required to have a match for their portion of the COE funding. The doctoral-granting school will be required to meet their 2:1 match as per statute.

Note: The COE Statute specifies that, "Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged."

Additional changes by the Legislature modified the Accountability of Licensing Decisions in Centers of Excellence. Excerpts are included below.

Accountability of Licensing Decisions in Centers of Excellence

During the 2006 legislative session, the Utah State Legislature passed, with no dissenting votes, SB 112, Centers of Excellence Amendments. The Second Statutory Change in SB 112 is detailed below.

"The Governor's Office of Economic Development shall develop a process to determine whether a college or university that receives a grant under this part must return the grant proceeds if the technology that is developed with the grant proceeds is licensed to a licensee that:

(i) does not maintain a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology; or

(ii) initially maintains a manufacturing or service location in the state from which the licensee or a sublicensee exploits the technology, but within five years after issuance of the license the licensee or sublicensee transfers the manufacturing or service location for the technology to a location out of the state."

The Governor's Office of Economic Development is currently in the process of establishing the process specified in the statute. The State Advisory Council on Science and Technology, as requested by the Office, has convened a task force to make recommendations to GOED on this process. In addition, the Governor's Office of Economic Development Board will provide final review and approval of the process.

Procedural Updates

In February of 2006, in order to continue strengthening the program, the COE Director took before the State Advisory Council of Science and Technology a series of procedural enhancements and clarifications which were approved. These are listed below.

Centers support for licensed technologies

- Past: once a technology was licensed to a company, the Center could no longer be funded or support the technology.

Opportunity:

- Permit a Center to continue to support a licensed technology for a certain period of time or under certain conditions in order to better support the transition from university to industry.

New Guideline:

- When a Center-supported technology is licensed to an existing established firm, the Center can use the COE funding to support that technology through the end of the current fiscal year (i.e. current contract).
- When a Center-supported technology is licensed to a startup/spinout, the Center can use the COE funding to support that technology through the end of the current fiscal year (i.e. current contract).
- In addition, the Center may apply for renewal of funding from the COE program (subject to the normal term of up to 4 years), to enable the Center and Business Team to continue to support the technology AND those commercial applications UNTIL a) the startup/spinout completes an arms-length financing transaction with a value equal to or greater than $500,000 or b) the startup/spinout is awarded one or more contracts with a value equal to or greater than $500,000.
- In all situations, if there are still significant applications of the technology available for licensing (other vertical markets) the Center may apply for renewal of funding from the COE program on a competitive basis.

Ability to Start the COE Funding Clock over for new Opportunities

- Past: Once a Center was "done" with one round of funding, they could not really "come back" into the program unless it was a "new Center" (with new PI)

Opportunity:

- Proposed: Dynamic Centers teams and PIs have many areas of research that can provide new Market Opportunities
- COE should encourage them to continue to bring new technologies to the program for new Market Opportunities

New Guideline:
A former Center of Excellence (one that has "graduated"), may return to the program and request a new series of funding years, typically up to 4 years, as long as the technology that is being proposed for commercialization is different enough from the original Center to create new market, business and licensing opportunities. However, it should NOT be used to extend the life of a Center that failed to achieve their commercialization goals. The Center may either keep its same name with a differentiating designation (example "Center II"), OR may propose under a new name. The PI may be the same PI or may be a different PI (but there is no requirement to make a change).

Center Designation – Funding + 3 years

- Past: Conflicting interpretations of use of "Utah Center of Excellence" Title

New Guideline:
A Center can use the "Utah Center of Excellence Designation" (and logo) for the term of funding plus 3 years. After that they can refer to being a "former Utah Center of Excellence". If, after 3 years, a Center is still actively supporting the commercialization of the technology which was funded through the Center, they may apply to the Director for an extension of the use of the title.

Clarification: The name of the Center ("Center for New Technology") is not covered by this guideline and it is up to the college/university, PI and team to determine its appropriate use.

Additional Item of Clarification from the Feb 13, 2006 Meeting of the SAC

The council concurs with the Director that PI's/Researchers do NOT have to be tenured to be considered as a Director for a Center of Excellence.

2007 Legislative Changes

During the 2007 Legislative session, Representative Bradley Daw sponsored House Bill 125, with Senate Sponsor Senator Sheldon Killpack. The goal of this statutory change was to permit the program to make funding grants directly to licensees of university technologies. It was clear from research and experience with the program that the COE funded ended frequently at precisely the moment it was most needed – when the technology rolled out of the university and into the company.

Utah's Legislature agreed that it was a wise use of state funding to help defray the real and perceived risk in licensing university technologies. The funds are specifically earmarked to help existing firms and startups fund the transition and "go to market" work of getting the technology out of the lab and into a product. These funds require a 1:1 match from the company and those funds can be founder cash contributions, investor funds, or sales or contract revenue. The 2007-08 selection process will the first time that such funds are available to licensees (companies).

Tables of Centers and Spinouts

Below are lists of the Centers and their spinouts, organized in a variety of formats to share insights about the program's history.

Centers by Cluster

The Centers are linked to their respective websites where links to the universities, spinouts, and annual reports can be found.

CLUSTER	CENTER	FUNDED	GRADUATED	SCHOOL
Aerospace	Space Engineering	1986	1991	USU
	Advanced Satellite Manufacturing	2004	2006	USU
	Miniature Unmanned Air Vehicle	2004	Currently funded	BYU
	Aerospace Science Technology	1987	1992	Weber State
Competitive Accelerators	Chemical Reactors	1989	1990	U of U
	Pyrometallurgical	1988	1989	U of U
	Advanced Materials & Microelectronics	1987	1992	U of U
	Engineering Design	1987	1992	U of U
	Quality & Integrity Design	1989	1991	U of U
	Advanced Construction Materials	1993	1997	U of U
	Composites in Construction	1998	1999	U of U
	Harsh Environmental Electronics	1995	2000	U of U
	Raman Technology	1996	1998	U of U
	Computational Design & Testing	2002	2004	U of U
	Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline	2006	Currently funded	U of U
	Magnetic Sensor & Actuator materials	2005	2006	U of U
	Nanosize Inorganic Material Powders	2004	Currently funded	U of U
	Novel Titanium Boride Surface Hardening Technology	2003	Currently funded	U of U
	Rapid Prototyping	2001	2004	U of U
	Utah Research Institute	1987	1992	USU
	Control of Flow in Manufacturing	2006	Currently funded	USU
	Thermal Management Technologies	2006	Currently funded	USU
	Advanced Composites Manufacturing & Engineering	1989	1995	BYU
	Chemical Separation	1987	1992	BYU
	Computer Aided Engineering Design & Mfg (CA2EDM)*	1988	1992	BYU
	Application Center for Materials Engineering	1996	1997	BYU
	Rapid Product Realization	1993	1996	BYU
	Advanced Joining of Materials	1999	2004	BYU
	Advanced Structural Composites	1998	2003	BYU
	Compliant Mechanisms	1999	2004	BYU
	DMAC--Direct Machining & Control	2002	2005	BYU
	Smart Sensors	2000	2005	U of U
Defense	Self Organizing Intelligent Systems	1993	2000	USU
	Advance Imaging LADAR	2003	Currently funded	USU

	Coal & Oil / Coal Research	1987	1991	U of U
	Coal Processing Technology	1996	1998	U of U
	Minerals Technology	1995	1999	U of U
	Acoustic Cooling	2000	2004	U of U
	Modified Activated Carbons Technology	2005	Currently funded	U of U
Energy & Natural Resources	Petroleum Research	2000	2005	U of U
	Solid Oxide Fuel Cell Technology	1996	2001	U of U
	Solid Waste Recycling	1990	1993	USU
	Profitable uses of Agricultural Byproducts	2000	2005	USU
	Advanced Combustion Engineering Research	1987	1995	BYU
	Supercritical Fluid	1987	1991	BYU
	Solvent Separation of Heavy Oils	1996	1997	Weber State
	Laser Institute	1986	1989	U of U
	Artificial Hearts & Biomedical Devices	1987	1992	U of U
	Biopolymers at Interfaces	1986	1991	U of U
	Cancer Genetic Epidemiology	1990	1995	U of U
	Controlled Chemical Delivery	1986	1993	U of U
	Environmental Technologies	1993	1995	U of U
	Biomolecular Technologies	1998	2000	U of U
	Cell Signaling	1997	2002	U of U
	Genome Technologies	1996	1998	U of U
	Neural Interfaces	1995	2000	U of U
	Ventricular Assist Device	1995	1996	U of U
	Alternate Strategies Parasite Removal (CASPeR)	2004	2006	U of U
	Biomedical Microfluidics	2004	Currently funded	U of U
	Biomedical Optics	1999	2003	U of U
	Homogeneous DNA Analysis	2003	Currently funded	U of U
	In Situ Ozonator	2003	2004	U of U
Life Sciences	Microarray Technology	2005	Currently funded	U of U
	Nuclear, Medical and Environmental Technologies	2001	2003	U of U
	Therapeutic Biomaterials	2004	Currently funded	U of U
	Vascular Biotherapeutics	2001	2003	U of U
	Biotechnology	1987	1992	USU
	Design of Molecular Function - Environmental	1988	1994	USU
	Dairy Foods Technology	1990	1996	USU
	Developmental & Molecular Biology	1992	1998	USU
	Genetic Improvement In Livestock	1993	1997	USU
	Meat Processing Technology	1990	1996	USU
	Value Added Seed Technology	1990	1997	USU
	Dairy Technology Commercialization	1998	2001	USU
	Rapid Microbe	1998	2003	USU
	Signal Processing	1986	1990	BYU
	X-Ray Imaging	1987	1992	BYU
	Applied Molecular Genetics	1995	1998	BYU
	Chemical Technology	1989	1995	Weber State
	Bioremediation	1996	2003	Weber State
Software and IT	Base Education Technologies	1987	1988	U of U

Communications Research	1986	1990	U of U
Inverse Problems, Imaging & Tomography	1989	1993	U of U
Software Science	1989	1994	U of U
Supercomputing	1988	1992	U of U
VLSI Design	1990	1992	U of U
Asynchronous Circuits	1997	2000	U of U
Computer Graphics & Scientific Visualization	1990	1996	U of U
Design Systems	1995	1996	U of U
Electronic Systems Technology	1995	1999	U of U
Industrial Imaging	1996	1999	U of U
MTV Flat Panel Display Technology	1995	1997	U of U
Multimedia Education & Technology - U of U	1993	1997	U of U
Scientific Computing & Imaging	1996	2000	U of U
Electronic Medical Education	1999	2004	U of U
Global Knowledge Management	2003	2005	U of U
Interactive Ray-Tracing & Photo-Realistic Visualization	2005	Currently funded	U of U
Multi-Dimensional Information --CROMDI	2000	2005	U of U
Organic Electronics	2006	Currently funded	U of U
Computer Networks	1987	1989	USU
Information Technologies (handicapped Education)	1988	1991	USU
Magnetism in Information Technology	1995	1996	USU
High speed information processing- CHIP	2002	2006	USU
Computer Integrated Manufacturing	1987	1989	BYU
Parallel Supercomputing	1988	1989	BYU
Computer Based Education	1987	1991	BYU
Acoustics Research	2005	Currently funded	BYU
Advanced Communications Technology	2004	Currently funded	BYU
Intelligent Computer Tools	1996	2001	BYU
Multimedia Education & Technology - UVSC	1992	1995	Weber State
3D Computer Graphics / 3 D Software	1990	1996	Dixie State

Spin Out Companies

By Center

SCHOOL	CENTER	COMPANY	STATUS
DIXIE	3D Computer Graphics	AK international	Dead
		Illustrative Impressions	Dead
		InfoWest	Live
		NetEx	Dead
		Paintbrush Productions	Dead
BYU	ACERC	Combustion Resources	Live
		Reaction Engineering Intl	Live
BYU	Advanced Composites	Rocky Mtn. Composites	Live
BYU	Advanced Joining of Materials	Megastir	Acquired
BYU	Advanced Structural Composites	IsoTruss	Live
		Patterned Fiber Composites	Dead

		TauRuss	Dead
WSU	Aerospace Technology	One Stop Satellite Solutions Inc.	Dead
		Wasatch Aerospace Co.	Dead
U/U	Alternate Strategies for Parasite Removal	Larada Sciences	Live
U/U	Artificial Hearts and Biomedical Devices	Medquest Manufacturing	Dead
		Medquest Products	Acquired
		Utah Artificial Heart Institute	Live
U/U	Base Technical Education	Assessment Co.	Dead
		Software Co.	Dead
U/U	Biomedical Microfluidics	Wasatch Microfluidics	Live
U/U	Biomedical Optics	Carroderm	Acquired
		Nutriscan	Acquired
		Spectratek	Dead
U/U	Biomolecular Technologies	GenMetrix, LLC	Live
U/U	Biopolymers at Interfaces	HCP Diagnostics	Dead
		Protein Solutions, Inc.	Dead
WSU	Bioremediation	Applied Biosciences Corp.	Acquired
USU	Biotechnology	Intech One-Eighty Corp.	Live
U/U	Cancer Genetic Epidemiology	Myriad Genetics	Live
U/U	Cell Signaling	Echelon Research Laboratories Inc.	Live
		Salus Therapeutics	Acquired
BYU	Chemical Separations	IBC Advanced Technologies	Live
WSU	Chemical Technology	Linco Technology (now First Scientific)	Dead
U/U	Coal Research	FemtoScan Corp.	Live
		International Resin Resources	Dead
U/U	Computational Design and Testing	Visco	Live
USU	Computer Aided Engineering Design	CIMETRIX	Live
		Design Synthesis	Dead
		PROMODEL Co.	Live
BYU	Computer Based Education	Cali, Inc. (became Ellis, then acquired by Pearson)	Acquired
U/U	Computer Graphics & Scientific Visualization	Engineering & Geometry Systems	Live
BYU	Computer Integrated Manufacturing	CAM Software	Dead
		CIM Training Center	Dead
		EDGE Foundation	Dead
		EDGE Inc.	Dead
		Ozone Saver Industries	Dead
		Smartware	Dead
		Utah PODS Manufacturing Co-op	Dead
U/U	Controlled Chemical Delivery	Insutech became MacroMed	Live
U/U	CROMDI	Applied Medical Visualization, Inc.	Live
USU	Dairy Foods Technology	Dairy Research Consulting of Utah	Dead
		Food Research & Dev Group	Dead
		Utah Milk Technology	Dead
U/U	Design of Molecular Function	Envirol	Acquired
		MicroBioSystems	Live
		Whetstone	Dead
U/U	Design Systems	ErgoWeb	Live
		Part.Net (Medibuy)	Live
USU	Developmental & Molecular Biology	PanGenics, Inc.	Dead

U/U	Direct Machining and Control	Direct Controls	Live
U/U	Electronic Medical Education	Amirsys	Live
		Global Matics	Acquired
		Visual Share	Live
U/U	Electronic Systems Technology	Bonneville Technologies	Dead
		HDG	Dead
U/U	Engineering Design	Animate Systems	Dead
		MicroJect, Inc.	Dead
		Sarcos Medical Corporation	Live
USU	Genetic Improvement of Livestock	Livestock Molecular Research & Development Inc.	Acquired
U/U	Genome Technologies	Cimmeron Software	Live
U/U	Harsh Environment Electronics (formerly MTV Flat Panel)	Innosys	Dead
		Radiant Labs	Dead
USU	High Speed Information Processing	SP Communications	Live
U/U	Industrial Imaging	GeoChem Metrix, Inc.	Live
USU	Information Technology (Handicapped)	Effective Instructional Technologies	Live
U/U	Inverse Imaging & Tomography	Monolithic Tech	Dead
		TechniScan	Live
USU	Meat Processing Technology	Canyon Rayas	Dead
		Mountain Lamb (land?) Co-op	Dead
		Timpanogos Meats	Dead
U/U	MicroArray Technology	Sigma Technology Holding Company- now Philotek	Live
U/U	Minerals Technology	Milltech Engineering	Live
		Mineral Technologies Inc.	Live
BYU	Miniature Unmanned Air Vehicles	Flying Sensors	Live
		Procerus Technologis	Live
U/U	Modified Activated Carbons Technology	INOTECH	Live
UVSC	MultiMedia Ed & Tech (UVSC)	Cela Solutions Inc.	Dead
		MC2	Dead
		Memory Lane Productions	Dead
		Utah Valley On-Line	Dead
U/U	Neural Interfaces	Bionic Technologies Inc.	Live
U/U	Nuclear, Medical, and Environmental Technology	Nuclear Labyrinth	Live
USU	Profitable Uses of Agricultural Byproducts	Andigen	Live
U/U	Quality and Integrity Design	FASIDE Itnl, Inc.	Live
		Holsip	Live
U/U	Raman Scattering	Process Instruments	Live
USU	Rapid Microbe Detection	Bio Matrix Solutions	Dead
		Finite Technologies	Live
	Rapid Prototyping	Unknown Name	Dead
U/U	Scientific Computing & Imaging	Visual Influence Inc.	Live
USU	Self Organizing Intelligent Systems	Autonomous Solutions Inc. (ASI)	Live
		Kachemak Research and Development	Live - Out of State
		Monetary Services Inc.	Dead
		Visionary Products	Live
BYU	Signal Processing	ASTECH	Dead
		Deseret Digital Designs	Dead
		Sonic Innovations	Live

		Vector Technologies	Dead
U/U	Smart Sensors	Live Wire	Live
		RF Innovations	Live
U/U	Software Science	Hippo Software, Inc.	Dead
BYU	Solid Oxide Fuel Cells	Materials and Systems Research, Inc. (MSRI)	Live
		Versa Power Systems (VPS)	Live - Out of State
USU	Space Engineering	CXT, Inc.	Dead
		Globesat Holding Co.	Dead
		ICOMP, Inc.	Dead
		Interactive Resources Co.	Dead
		Medcom, Inc.	Dead
USU	Supercritical Fluid	Lee Scientific	Acquired
U/U	Therapeutic Biomaterials	Glycosan Bio	Live
		Sentrx Animal Care	Live
		Sentrx Surgical - now Carbylan Biosurgery	Live - Out of State
USU	Value Added Seed Technology	F1 Technologies	Dead
USU	Vascluar Biosciences	Hydra Bioscience	Dead - Formed Out of State
U/U	VLSI Design	Bonneville Microelectronics	Dead
BYU	X-RAY Imaging	MOXTEK	Live

Appendix A – Centers of Excellence Summaries

Aerospace Cluster

Center for ADVANCED SATELLITE MANUFACTURING	
The Center for Advanced Satellite Manufacturing is seeking to create a viable Utah-based satellite manufacturing enterprise based upon years of expertise and projects within Utah State University and its Space Dynamics Laboratory. The Center is pursuing the development of novel advanced manufacturing and design techniques to reduce the cost and time involved with satellite manufacturing while improving quality and performance.	*USU* *Funded 2004-* Brent Stucker (435) 797-8173 brent.stucker@usu.edu

Center for AEROSPACE SCIENCE TECHNOLOGY	
The center focuses on the development of small, low-earth orbiting satellites and related aerospace technology. The center exploits opportunities with expertise developed in the design, manufacture, and operation of small satellites to commercialize technologies.	*WEBER STATE* *Funded 1987-1992* Robert J. Twiggs (650) 723-8651 Bob.Twiggs@Stanford.edu
• The Center has developed and flown two satellites: NUSAT I and WEBERSAT; receiving world-wide recognition as a leader in small satellite development. • Some of the Center research was transferred to Stanford University with Twiggs, It is now being used to develop CUBESAT	**Spin Out Companies** • One Stop Satellite Solutions, Inc. • Wasatach Aerospace Co. **Benefiting Companies** • Intraspace, Inc. • Simulacrum, Inc. • Wasatch Research & Engineering

Center for MINIATURE UNMANNED AIR VEHICLES	
The Center focuses on the rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices. The Center has earned the attention of both military and civilian agencies.	*BYU* *Funded 2004-* Tim McLain (801) 422-6537 mclain@byu.edu **Spin Out Companies** • Procerus Technologies • Flying Sensors

Center for SPACE ENGINEERING	
Established in 1986, the center is Utah's leader for new technology developments involving space remote and in-situ sensing systems, image compression technology and small satellite systems. Sensing equipment developed at the center was the primary experimental effort on a previous shuttle mission. Technologies include: • Infrared instrumentation • Sensor calibration • Upper atmosphere measurements & modeling • Plasma diagnostics • Data analysis • Image compression technology • Cryogenic systems • Program management • New technology developments in space remote and in-situ sensing systems	*USU* *Funded 1986-1992*
• Center has flown 350 payloads, 75 of which involved cryogenics • Joint composites projects with BYU Center and Hercules Corp. • Success of CIRRIS 1A experiment aboard space shuttle Discovery promises increased business opportunities	Dr. Frank Redd fjredd@usu.edu **Spin Out Companies** • CXT, Inc. • Globesat Holding Co. • ICOMP, Inc. • Interactive Resources Co. • Medcom, Inc. **Benefiting Companies** • Hercules • Thiokol • Space Dynamics Lab

Competitive Accelerators Cluster

Center for ADVANCED ARCHAEOLOGIC & PALEONTOLOGIC IMAGING & MODELING	
The center provides an opportunity to utilize leading edge technology to implement a revolutionary approach to the creation of museum reproductions, models and miniatures. The overall objective is to integrate CAD-CAM technologies in the areas of archaeology and paleontology	*College of Eastern Utah* *Funded 1992-1993*
• Remodeling of the Huntington Canyon Mammoth • Two recently discovered dinosaur species will be molded by the Center	Dr. Don Burge

Center for ADVANCED COMPOSITES MANUFACTURING & ENGINEERING	
	BYU *Funded 1989-1995*
Established as the focal point and coordinator of technical resources in Utah in the areas of composite materials, plastics, and other advanced materials. ACME assists existing industry and start-up companies and also conceives, invents, develops, and spins-out new and enhanced products into commercial enterprises.	Brent Strong (801) 422-7878 strongb@byu.edu
	Spin Out Companies • Advanced Laminate Technology • American Vitrolite • Baal • Emily Rose • Fiber Dynamics • Futura Propulsion Systems • IsoTruss • Merrell Enterprises • Rocky Mtn. Composites • Synergy Marketing **Benefiting Companies** • AeroTrans • American Polymer • Ashton Aerospace • Automated Process Control • B&M Enterprises • Beckwith Technology • Bemsco • BGA • Blue Cow, Inc. • Bradley Instruments • Creative Composites • Dimensional Research • CRP/Springlite • Curecrete • DAH Inc. • Delta Fiberglass • EDO • Evolution Skis • Fiber Tek • H K Corporation

	• Haelan Medical • Hexatron • Ideas to Products • INCO VaporFab • International Biokenetics • LCC Fabrications • Legends Technologies • MATCO • Medi-Sight • Medilight • Mountain High Engineering • Mountain Land Support • Performance Composites • Potter Management • Pro Design Corporation • Red Hawk, Inc. • Rotomolding of Utah • Sound Composites • Springlite • Terra Tek • TRA • Ultralite of America • UP International • Utah Rocketry • Van Patten Corporation • Wasatch Engineering • Wasatch Technology Group

Center for ADVANCED CONSTRUCTION MATERIALS

The center's major emphasis is in the development of new and recycled construction materials, and innovative techniques for inspecting the condition of constructed facilities. Core technologies include:

- Automated facilities management system (AFMS) to measure and analyze pavement cracks to schedule maintenance strategies
- Tire added latex concrete blocks, to use waste materials and to improve performance
- New construction product testing and evaluation services

- Two software modules, PicCrack and MapCrack have produced great results in four Utah cities

UU
Funded 1993-1994
1996-1997

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Benefiting Companies

- Green Hill Recycling
- Soil Stabilization Inc.
- uniAMS

Center for ADVANCED JOINING OF MATERIALS

The Center for Advanced Joining of Materials (CAJM) is developing enhancements and new technologies based on friction stir welding (FSW). FSW is a relatively new, innovative joining technology which is revolutionizing the way in which aluminum, copper and other materials are being joined. The objectives are to develop enhancements to this existing technology that will broaden the use of this process in new materials and applications, and to transfer these technologies to
local, national and international companies.

The Center has been focused on the development and marketing of three technological aspects of FSW:

- Tooling that will last longer, offer the ability to join a wider range of advanced materials, and enable better control of the resulting quality of the weld and its properties
- New control systems and hardware for large scale, three-dimensional FSW capabilities
- New methods and novel tooling for joining polymeric materials

- 11 pending and 2 issued patents
- Utah spin-out company Megastir

BYU
Funded 2000-2004

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Spin Out Companies

- Megastir

Benefiting Companies

- Advanced Metal Products

Center for ADVANCED MATERIALS & MICROELECTRONICS	
	UU *Funded 1987-1992*
	Gerald B. Stringfellow (801) 581-8387 stringfellow@coe.utah.edu
This center provided unique testing facilities, technical expertise and problem solving assistance to Utah industry. Composite, ceramic and semiconductor materials were explored for structural, aerospace and electronic applications. Technologies included: • Multiple layer epitaxy • III/V compound chip design • Ceramics as solid electrolytes and structural components • Composite materials • Organometallic vapor phase epitaxy	**Benefiting Companies** • Beta Power, Inc. • Bonneville Microelectronics • Ceramatec • Concoyle Oilfield Tools, Inc. • Edo Western • Evans & Sutherland • Fisher Co. • Hercules • Nova Tech • Space Systems Engineering • Thiokol • Westcott Co.

Center for ADVANCED STRUCTURAL COMPOSITES

BYU
Funded 1999-2004

David W. Jensen
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The objective of the Center for Advanced Structural Composites is to commercialize the IsoTruss technology. The IsoTruss enables the creation of super lightweight grid structures with the potential for revolutionizing industries as diverse as civil infrastructure (e.g., communication and construction), aerospace, automotive, marine and sporting structures and virtually any application area requiring high strength, high stiffness, light weight and superb corrosion resistance.

The core technology consists of an ultra-lightweight composite structural shape known as the IsoTruss. The IsoTruss is a novel, patented, three-dimensional structural form that takes advantage of the highly directional properties of high strength composites to produce an extremely efficient and lightweight structure. The IsoTruss incorporates stable geometric configurations with helical members that spiral in opposing directions around a central cavity, coupled with longitudinal members that pass through the intersections.

- Spin-out IsoTruss Structures Inc., is selling products, aiming to first displace wooden utility poles.
- Conventional poles weigh half a ton and last 5-40 years, while IsoTruss poles weigh 300 pounds and are expected to last 60-100 years for the same price, while costing less to transport and install.

Spin Out Companies

- IsoTruss
- Patterned Fiber Composites, Inc
- TauRuss

Center for APPLICATIONS FOR MATERIALS ENGINEERING

BYU
Funded 1996-1997

Paul Eastman
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The center was an important resource in Utah for technical knowledge and capability in the areas of plastics, composite materials and metallurgy. The center assists existing start-up companies and also conceives, invents, develops and spins off into commercial enterprises new or enhanced products. The center has patented the following technologies:

- Cure and contamination sensing devices
- Damping of composites through unique orientation of fibers
- Improvement of fiber binding on thermoplastic composites
- Forming technique for large thermoplastic composites

- Assisted 164 companies

Center for CHEMICAL REACTORS	
The center focused on the development of fluid-bed technology for catalytic reactions and biological leaching technology for recovery of gold from refractory ores.	*UU* *Funded 1989-1990*
	A Lamont Tyler lamont.tyler@m.cc.utah.edu
	Benefiting Companies • Kennecott • EIMCO
• Biological leaching of refractory gold ores supported by Kennecott and EIMCO	

Center for CHEMICAL SEPARATION	
Researchers with backgrounds in organic chemistry, inorganic chemistry and chemical engineering studied the full development of a new ligand bonded silica gel technology. The resulting products are used in a variety of separation systems. A few applications of center technology include precious and base metal refining, heavy metal and organic clean-up and nuclear waste management. .	*BYU* *Funded 1987-1992*
	Dr. Reed Izatt (801) 422-2315 reed_izatt@byu.edu
	Spin Out Companies • IBC Advanced Technologies **Benefiting Companies**
• Set up pilot plants in four of the largest precious metal refineries in the U.S. • Processes for separating Paladium and Rhodium represents a 40%-60% cost reduction to the industry	• ASARCO • Cascade Refining • DataChem • GalTech Semiconductor • Johnson Matthey • Parish Chemical • Tronac, Inc.

Center for COMPLIANT MECHANISMS

BYU
Funded 2000-2003

Larry L. Howell Co-PI
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The objective of the Center for Compliant Mechanisms is to direct the development and commercialization of compliant mechanism technologies and associated product applications so that they can be effectively licensed to existing or new companies in Utah. The Center also seeks to develop approaches that will accelerate this development, and promote co-development with interested Utah companies.

Compliant mechanisms are devices that obtain their motion from the deflection of flexible component parts rather than pin joints, thus offering advantages of lower manufacturing costs (reduced part count, elimination of assembly), increased performance (reduced friction, increased precision, reduced weight, etc.), and ability to miniaturize (including microelectromechanical systems). Brigham Young University is a recognized leader in compliant mechanisms and is uniquely poised for helping companies exploit the advantages of compliant mechanisms.

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- 12 patents issued and 4 pending
- “Near Constant-Force Electrical Contact,” patented and exclusively licensed to ATL, Springville, Utah.
- "Compliant, Ortho-Planar, Linear Motion Spring,” patented and non-exclusive license for a specific application granted to Flowserve, Springville, Utah.
- "Continuously Variable Transmission,” patented and exclusively licensed to Recreational Systems, Inc., Kaysville, Utah

Benefiting Companies

- ATL
- ICON
- MityLite
- Grandway USA
- Flowserve
- Recreation Systems

Center for COMPOSITES IN CONSTRUCTION

The Center has a primary focus on composite materials that may be used to strengthen or reinforce precast concrete structures such as bridge columns, freeway overpass beams, concrete walls and other structural components. The basic technology utilizes fiber-reinforced polymers woven into industrial fabrics that can be used to wrap structures or be imbedded in precast concrete designs.

The Center develops design guidelines and specifications for the strengthening of columns and seismic retrofit of bridge caps and joints with FRP composites.

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- The Center has developed a patent application for “Fiber Reinforced Polymer" (FRP) composite connections of precast concrete walls.
- More than 70 columns of I-80 bridges will be retrofitted with the composite wraps.
- In addition, the State Street bridge on I-80 will get a seismic retrofit using FRP composites.

UU
Funded 1998-1999

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Benefiting Companies

- Thiokol
- Waterpoint
- Monroc, Inc (Eagle Precast Co.)
- EDO Fiber Science
- Sika
- Hydrotech

Center for COMPUTATIONAL DESIGN AND TESTING

The objective of this new Center is to commercialize computational engines that facilitate and accelerate the design and testing of novel materials and device elements, with a special focus on nanostructured materials and devices.

The center is focused on two computational engines: Materials Designer (MaDes) and Device Simulator (DeSim). The algorithms of MaDes predict the structural and mechanical properties of new materials based on first principles analysis at the level of atomic forces, while De- Sim models the electrical properties and performance of components constructed with novel materials.

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- A patent is now pending on the design for a carbon nanotube electromechanical pressure sensor
- A web based user interface for on-line computational applications has been successfully demonstrated

UU
Funded 2002-2004

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Spin Out Companies

- Visco

Benefiting Companies

- Fairchild Semiconductor

Center for COMPUTER AIDED ENGINEERING, DESIGN & MANUFACTURING

The center's focus is research in computerized drafting, 3-D design, solid modeling, finite element modeling, numerical controlled mfg, robotics, facilities management, plant monitoring and control, database management and inventory planning.

The center has developed six software products:

- Promodel
- ROBLINE
- OPTDESX
- CATS
- Movie(c-Quel.byu and movistar.byu)
- MAXXICAD
- GEOSOLID.BYU

.

- Products are marketed exclusively through three spin-out companies
- Over 1,600 licensed users of Center generated software

BYU
Funded 1988-1992

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Spin Out Companies

- CIMETRIX
- PROMODEL Corp
- Design Synthesis

Benefiting Companies

- AgriDyne Technologies
- Albion Technologies
- Arrow Dynamics
- Artistic Precision Enterprises
- Bel Viso Labs
- Vuena Ventura
- Bureau of Mines
- C.T. Film, In c.
- Cache Valley Cheese
- Chromalox
- Del Med, Inc.
- Evans & Sutherland
- Great Basin Brine Shrimp
- Great Salt Lake Mineral
- Hercules
- Hewlett-Packard
- Hill AFB
- Industrial Research
- IOMEGA
- KEMGAS
- Miller Labs
- Morton Automotive
- Reilly Wendover
- Schreiber Foods, Inc.
- Solaray
- SusumuConstruction
- Thiokol
- Trysan
- VALTEK
- Viewpoint Animation
- Western Zirconium
- Williams International

Center for CONTROL OF FLOW IN MANUFACTURING	
The Center is applying flow control technology to improve manufacturing processing including particle sorting and thermal sprays. This Center was assigned a business team in 2005-06.	*USU* *Funded 2006-* Barton Smith (435) 797-3278 barton.smith@usu.edu

Center for DIRECT MACHINING AND CONTROL (DMAC)	
This Center is commercializing a disruptive technology for manufacturing: A new paradigm of one controller for many devices. That is, multiple machine tools can be run by one operator, through a network, rather than by individual operators. Instead of every machine having its own control panel, one program and one controller could theoretically manage all the machines within a plant—creating dramatic cost savings. A related application of the core technology (VMAC) is being developed for the home automation market. The DMAC technology is based on the development of an open architecture controller and supporting control algorithms for general control of advanced mechanisms such as 5-axis machine tools. This controller uses a dual CPU PC/controller so that the CAD/CAM application can run under Windows, while the real time control software can run under a second CPU. The motors and machine Input/ Output (I/O) are commanded over a high speed network such as fiber optic and IEEE 1394 (firewire). The control software consists of object oriented libraries that integrate motion planning, trajectory generation, servocontrol, communication, and user interfaces. .	*BYU* *Funded 2002-2005* Ed Red (801) 422-5539 ered5@comcast.net **Spin Out Companies** • Direct Controls, Inc.
• Four patents pending • Multiple contracts from major industrial partners.	

Center for ENGINEERING DESIGN	
The center exists to develop original solutions for technological challenges. By utilizing state-of-the-art equipment and research facilities, the CED can and will continue to bring innovative ideas in the form of superior products to the marketplace.	*UU* *Funded 1987-1993*
	Stephen Jacobsen (801) 581-6499 s.jacobsen@sarcos.com
• RDT (rotary displacement transducer) is an integrated chip-based rotary position encoder • The Dextrous Telescoping System surpasses the severly limited, traditional robotic manipulators	**Spin Out Companies** • Sarcos Medical **Benefiting Companies** • Animate Systems • MicroJet, Inc. • Sarcos Research Group

Center for FUNCTIONALLY GRADED AND DESIGNED CEMENTED TUNGSTEN CARBIDE AND POLYCRYSTALLINE DIAMOND COMPOSITE MATERIALS	
Advanced composite materials with predictable wear and failure characteristics designed for demanding applications such as mining, drilling, and grinding.	*UU* *Funded 2006-*
	Zak Fang (801) 581-8128 zfang@mines.utah.edu

Center for HARSH ENVIRONMENT ELECTRONICS	
The Center for Harsh Environment Electronics (formerly the Center for Flat Panel Displays) developed micro-miniature thermionic vacuum emitter (MTV) display panels. As the MTV technology matured and license agreements were signed, the center moved its focus to electronic circuits and devices for operation in high temperature environments. The center also provided services in the following areas: prototype development and testing; development of high-temperature electronics based on MTV technology; and development of tools to test flat panel display technologies.	*UU* *Funded 1995-2000*
	Laurence P. Sadwick, Ph.D. (801) 581-8282 sadwick@ee.utah.edu
• Enhanced flat panel display was patented	**Spin Out Companies** • Innosys • Radiant Labs

Center for MAGNETIC SENSOR & ACTUATOR MATERIALS	
Working to commercialize a novel magnetostrictive alloy exhibiting a large physical effect in response to small magnetic fields, which may find use in applications from antilock brakes to nanomachining and ultrasonic devices.	*UU* *Funded 2005-*
	Sivarman Guruswamy (801) 581-7217 sguruswa@mines.utah.edu

Center for NANOSIZE INORGANIC MATERIAL POWDERS

Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

The main focus of this new Center has been to synthesize nanosize oxide powders by a low-cost, commercially scalable process using low-cost precursors. These powders find applications in numerous technologies. During the past year, one patent application was filed and one patent was issued. During the year, the use of nanosize powders in sensors and as a material for fuel cells, an energy conversion device which converts chemical energy of fuels directly into electricity was explored.

- One venture will be started this year. Fact Sheet has been sent to over 130 potential clients.
- ZrO2, CeO2: Fuel cells, structural ceramic components. Cells to be supplied to Versa Power Systems and FuelCell Energy this year.
- TiO2, ZnO, SnO2: Optics, coatings. Samples supplied.
- Fe2O3, CeO2, TiO2: Environmental clean-up. Samples being evaluated by the MAC Center.

UU
Funded 2004-

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Benefiting Companies

- Versa Power Systems
- FuelCell Energy
- Materials and Systems Research, Inc. MSRI

Center for NOVEL TITANIUM BORIDE SURFACE HARDENING TECHNOLOGY

This Center is commercializing a novel method for hardening the surface of components fabricated from Titanium. Originally developed with government funding for use in creating lightweight Titanium armor, their approach for the first time makes this strong metal suitable for use in applications such as hip replacements, bearings and cutting tools where superior hardness coupled with wear resistance create a superior product.

- Two patents have been filed.
- License signed with Ortho Development Corporation, a Utah company, for the development and FDA validation of orthopedic implants using the TiB coating

UU
Funded 2003-

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Benefiting Companies

- Ortho Development Corp.

Center for ADVANCED PYROMETALLURGICAL TECHNOLOGY

UU
Funded 1988-1989

H. Y. Sohn
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myprofile.cos.com/sohnh18

The goal of the Center was to test the feasibility of a clean, pollution-free and energy efficient new technology for producing copper from the sulfide minerals.

The technology investigated at this Center was aimed at copper smelters which were using technologies that generated large amounts of sulfur dioxide emissions and were not efficient in terms of energy consumption. The industrial feasibility of a closed and continuous copper smelting technology based on bottom gas injection was evaluated and confirmed. The technology was proven to be technically sound and environmentally superb. During the Center project a patent on a entirely new and different technology on solvent extraction processes was developed: H. Y. Sohn, "Continuous Solvent Extraction with Bottom Gas Injection," U.S. Patent No. 5,641, 462, June 24, 1997.

- Patent issued on new low pollution, energy efficient copper smelter technology.

Benefiting Companies

- Kennecott

Center for QUALITY AND INTEGRITY DESIGN

UU
Funded 1989-1991

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QIDEC was originally established with the goal of "developing additional knowledge and an improved engineering educational system to help prevent our loss of manufacturing capability and decrease our liability problems related to failures" within the engineering community in the U.S. The center expanded the goal to address the shorter tem needs of industry and government in their increasing efforts to regain control over technical issues affecting product quality, safety and reliability, and organizational productivity. Work is centered on three major industrial sectors:

1. Medical device reliability
2. Aircraft and aerospace structural integrity
3. Structural fatigue and reliability of mechanical systems

- License agreements with FASIDE Int'l and Technology Management Assoc.

Spin Out Companies

- FASIDE International
- HOLSIP (organization)

Benefiting Companies

- Technology Management Associates

Center for RAMAN TECHNOLOGY

This center was established to commercialize Raman technology for chemical monitoring in natural gas, metal processing, and medical applications. Advances in instrumentation have made Raman scattering attractive as a general purpose analytical technique for measuring chemicals in sold, liquid and gaseous samples. Raman spectroscopy is the measurement of the wavelength and intensity of inelastically scattered light from molecules. The Raman scattered light occurs at wavelengths that are shifted from the incident light by the energies of molecular vibrations. Typical applications are in structure determination, multicomponent qualitative analysis, and quantitative analysis. Technology development is focuses on the following areas:

- Laser diode configuration
- Sample handling schemes
- Fiber coupling techniques
- Data-analysis algorithms
- Modifications to the core Raman detection systems.

- Patented laser (U.S. Patent No. 6,100,975), spectrograph (U.S. Patent No. 6,028,667), and 18 channel multiplexer (U.S. Patent No. 6,859,581)
- Process Instruments has its Raman systems in some of the largest refinery and petrochemical plants in the U.S.

UU
Funded 1996-1998

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Spin Out Companies

- Process Instruments, Inc.

Center for RAPID PRODUCT REALIZATION	
The center was established to provide manufacturing technology extension services designed to assist small manufacturing companies, to bridge the gap between new product concepts and manufacturing realization, and to develop innovative technologies which will result in products, patents, and related economic benefits for the state. The center went on to become Utah's Manufacturing Extension Partnership.	*BYU* *Funded 1993-1996* David Sorensen and Brent Strong (801) 863-7901 dsorensen@mep.org
• Assisted over 171 individuals and companies with new product development, prototyping and testing.	**Benefiting Companies** • Accuserve • American International • Bolick, Co. • CellTek, Int'l • GWH • Hatch Biomedical • Tile Roof Associates • Manufacturing Extension Program • Youth Reclamation, Inc.

Center for RAPID PROTOTYPING

The Center for Rapid Prototyping is focused on commercializing technologies related to ultrasonic sensing for injection molding processes, and physical and virtual geometric modeling for computer aided design.

The Center has been working on multiple projects, including:

- Machining techniques that allow the prototyping of geometric objects of arbitrary complexity on a 3 axis CNC mill with limited tools and little operator skill required
- A series of new sensors and controls for improved polymer processing
- Personal Prototyping System (PPS) that makes rapid prototyping affordable for small companies and perhaps even the average consumer
- Low cost 3-D scanning technologies that make the acquisition of 3-D geometric data practical and affordable for reverse engineering, medical imaging/reconstruction, etc
- A device that is capable of producing very large prototypes (Shapemaker)
- A photopolymer-based technique to create prototypes in a single step (Inverse Tomographic Construction)
- New micro and nano-scale polymer manufacturing techniques have been developed, including a micro-forging technique and a nanoscale injection molding machine.

- Production of the first micro-scale injection molded parts
- Completion and testing of a production-type prototype high temperature ultrasound transducer and control system
- Production and test marketing of individualized replicas of human faces captured in a polymer based collectible
- One spin-off company already formed.

UU
Funded 2001-2004

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Benefiting Companies

- Accuserve
- American International
- Bolick, Co.
- CellTek, Int'l
- GWH
- Hatch Biomedical
- Tile Roof Associates
- Manufacturing Extension Program
- Youth Reclamation, Inc.

Center for THERMAL MANAGEMENT TECHNOLOGIES	
Technologies for extremely high performance thermal management in the context of physical and vibration isolation, in part from collaboration with Utah State University's Space Dynamics Lab.	*USU* *Funded 2006-*
	Clair Batty (435) 881-1325 clairbatty@comcast.net
• Provision patent application in August 2006	**Benefiting Companies** • Starsys

Center for UTAH RESEARCH INSTITUTE	
The main focus of the Center was "Parts on Demand System (PODS)," a cooperative effort among Utah's largest universities to implement a paperless order and production process for small parts. Combined resources have enabled URI to successfully compete for military and industrial contracts.	*UU, USU, BYU, WSU* *Funded 1988-1992*
• $4.5M contract for CALS/PODS program at Ogden Air Logistics Command • $380K contract to provide software engineering services to the Air Force Software Technology Support Center. • $3.7M contract to help develop, test and install a Spare Parts Productions and Reprocurement System (SPARES) for Ogden Air Logistics Center.	David Norton dave.norton@usurf.usu.edu

Defense and Homeland Security Cluster

Center for ADVANCED IMAGING LADAR	
The Center for Advanced Imaging LADAR was formed to commercialize a now patented camera technique that uniquely combines laser distance measurement with digital color imaging, resulting in detailed, 3-D color images that can be captured in real time and also stored for later analysis and manipulation in virtual reality environments. Civilian and military markets exist for stationary, airborne and spaceborne versions of the technology. CAIL's technology couples existing 3D LADAR (Laser Detection and Ranging) technology with 2D digital color imaging in the unique 3D Texel Camera. Previously, distance and spectral datasets had to be collected separately, carefully registered, and then superimposed – laborious reprocessing that often required days to weeks. The CAIL technology works in real time – the first system to enable precise 3D color imaging when either the scene, the camera or both are moving.	*USU* *Funded 2003-* Robert T. Pack (435) 797-7049 rtpack@cc.usu.edu **Benefiting Companies** • InteliSum (Rapidmapper)
• Key Patent Issued • Utah company InteliSum is marketing land based LADAR system	

Center for SELF ORGANIZING & INTELLIGENT SYSTEMS	
The center provides design services to Utah companies to develop intelligent systems solutions for new and improved commercial products. The center maintains a national and international reputation as a leading contributor to the advancement of intelligent systems research. Intelligent systems include any device and/or software concept which attempts to artificially emulate the unique cognizance and control abilities of the human mind.	*USU* *Funded 1992-2000* Kevin Moore, Ph.D. snowvax@cc.usu.edu **Spin Out Companies** • Autonomous Solutions Inc. • Kachemak Research and Development • Monetary Services, Inc. • Visionary Products Inc.
• Leader in Unmanned Ground Vehicles (UGVs) • $4MM in defense contracts • Research contract with nation's largest agricultural equipment manufacturer	

Center for SMART SENSORS

In a general sense, Smart Sensors meld sensor, signal processing, and computer technologies to create new functionalities such as the ability to probe the environment and modify sensor function in order to improve their data gathering capability. Applications envisioned by this Center span medicine, precision agriculture, electronics manufacturing, wireless communication, transportation and radar.

The Center for Smart Sensors focuses on two core technologies which have the greatest commercial potential:

- Circuitry for measuring length, distance or impedance; this enables a Smart Wire inspection system that can detect and locate faults or insulation breaks in aircraft wiring in real time.
- Imbedded Microstrip Antenna (IMA), which can sense or communicate in a buried environment.

Both families of technologies are based on simple ideas and simple circuits that result in two critical characteristics -- Small and Cheap. This makes them applicable to a wide array of applications.

- Single IMA antenna can both sense and communicate
- 12 pending patents
- 1 issued patent
- Commercialization of aircraft wiring fault detection has over $1MM in funding from FAA and aircraft firms

USU/UU
Funded 2000-2005

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Spin Out Companies

- LiveWire Test Labs, Inc.
- RF Sensor Innovations

Energy and Natural Resources

Center for ACOUSTIC COOLING	
The Center for Acoustic Cooling Technologies was originally established to commercialize novel high frequency thermoacoustic engines for cooling applications. One important application for this technology is in the heat management of computers and other devices employing dense arrays of microcircuits. Subsequent work has resulted in the demonstration of a prototype device capable of converting heat into electricity at high efficiency. The Center for Acoustic Cooling is leveraging fundamental developments in miniature thermo-acoustic devices supported by the Office of Naval Research and DARPA. The Center's technology is based on two effects in thermo acoustics: The first is that heat can be converted into sound energy, and the second is that sound can pump heat. Both have been employed in devices with dimensions ranging from 4 cm to 0.8 cm. Piezoelectric materials have now been incorporated in order to recover electricity in some cases.	*UU* *Funded 2000-2004* Orest G. Symko 801-581-6132 orest@physics.utah.edu **Benefiting Companies** • Coen Co. • Parvus Co.
• Intel and HP interested in acoustic refrigerator • Involved in $27MM DoD project with Washington State and University of Mississippi	

Center for ADVANCED COMBUSTION ENGINEERING & RESEARCH

Established in 1986 as a joint collaboration between Brigham Young University and the University of Utah for the purpose of advancing combustion engineering research, education, and technology. The principle focus is on clean and efficient use of fossil fuels including coal, oil, and natural gas as well as the combustion of toxic and municipal solid wastes. The center research program consists of 35 active research projects among 62 participants focused on 6 thrust areas.

The nation's basic and high-technology industries rely upon the adequate supply of high-quality energy, the production of which depends upon combustion technology. The international competitiveness of these industries depends in part on their ability to more efficiently use low-cost fuel resources such as coal, heavy oil, oil shale, and tar sands, which are abundantly available in the western United States and particularly in Utah.

Specific center technologies include:

- Mechanisms of fossil-fuel combustion and pollutant and soot formation
- The relationship between fuel properties and conversion
- Computer models to control and record the performance of particular combustion chambers
- Pollution formation/control and waste incineration

- The center is one of 18 highly sought-after national engineering centers.
- More than 60 licensing agreements
- Provides ongoing consulting services to Utah companies

BYU
Funded 1987-1995

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Spin Out Companies

- Combustion Resources
- Reaction Engineering Intl.

Benefiting Companies

- Animate Systems
- Combustion Services Inc.
- Ford, Bacon, Davis
- Geneva Steel
- GMH Engineering
- Hercules
- IOMED
- Pacific Corp.
- Questar
- Sarcos Research Corp Sarcos, Inc
- Thiokol
- Utah Power & Light

Center for COAL AND OIL RESEARCH	
The main focus of the center is the development of new markets for Utah coals and their products. The center promotes efforts to bring university and industry researchers together to develop and implement advanced methods of processing, upgrading, and preparing Utah coal and tar sand resources including coal/water slurry transport, differential liquefaction and resin extraction.	*UU* *Funded 1987-1991*
	Dr. Larry Andersen larry.anderson@utah.edu
• Nine patents issued	**Spin Out Companies** • FemtoScan Corp. • International Resin Resources **Benefiting Companies** • Advanced Processing Technology

Center for COAL PROCESSING TECHNOLOGY	
The center was established to provide the advanced processing technology required to extract coal resins economically and promote the development of a coal resin industry in Utah. The center has three proprietary technologies which will have applicability to Utah's coal industry • Processing technologies for the efficient retrieval and refining of organic resins from coal • X-ray CT technology for the analysis of coal wash-ability • Methods for cleaning coal and the development of air-sparged hydrocyclone technology	*UU* *Funded 1996-1998*
	J.D. Miller (801) 581-5160 jdmiller@mines.utah.edu
	Benefiting Companies • TerraTek

Center for MINERALS TECHNOLOGY

The Center's focus is on developing new technologies for minerals processing. Specific areas of expertise include the design of high efficiency grinding mills using state of the art computer simulation software, advanced mill analysis and monitoring methods, technologies for the in-line monitoring and measurement of particle size on moving conveyor belts, and the real-time control of industrial milling processes.

Computer software, on-line instruments and laboratory procedures for the design, monitoring, control and analysis of industrial grinding machines and operating mineral recovery plants have been demonstrated and are now available for application in industry.

- An instrument to measure the distribution of sizes of particles on moving conveyor belts has been developed and successfully tested at industrial sites.
- Millsoft software was sold to Process Engineering Resources, Inc., a Utah company.

UU
Funded 1995-1999

R. Peter King, Ph.D.
rpking@mines.utah.edu

Spin Out Companies

- Mineral Tehnologies, Inc.
- Milltech Engineering

Benefiting Companies

- Process Engineering Resources, Inc.

Center for MODIFIED ACTIVATED CARBONS TECHNOLOGY

The Center is focused on modifications to existing activated carbon products and expanding into new products based on modifications to various organic (carbon) materials.

- Technology #1: Magnetic activated carbons
- Technology #2: Biological modified activated carbon
- Technology #3: Inorganic modified activated carbon

All current technologies deal with removal of materials from fluid streams.

UU
Funded 2005-

Jack Adams
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jadams@mines.utah.edu

Spin Out Companies

- Inotech

Benefiting Companies

- Benefiting Co

Center for PETROLEUM RESEARCH

UU
Funded 2000-2005

Milind Deo
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The Petroleum Research Center (PERC), which is an integral part of the Department of Chemical and Fuels Engineering at the University of Utah, is developing practical, cost-effective solutions to liquid hydrocarbon production, handling and transportation. PERC specifically works to understand problems related to the production, transportation and processing of waxy and asphaltenic crude oils, and alleviate those problems by developing a variety of methods and software tools (models) for the efficient and optimal production of oil and gas from underground reservoirs.

The Center is commercializing products in three areas:

- Flow Assurance (tools to help keep oil products moving through pipelines)
- Oil Simulants (environmentally safe yet accurate substitutes for crude oil)
- Reservoir Simulators (finite-element models for optimizing production from geometrically complex oil and gas fields)

With funding from the U.S. DOE and the petroleum industry, the PERC coordinates basic and applied research in the physical properties and physical and chemical thermodynamics of naturally occurring hydrocarbons.

Benefiting Companies

- Systems Engineering and Simulation
- LT Industries
- Trans Alaskan Pipeline
- Exxon Mobil

- 2 patents issued on Oil Simulants
- Pursuing copyrights on several software products - Chemometric Database and Finite Element Reservoir Simulator

Center for PROFITABLE USES OF AGRICULTURAL BYPRODUCTS

The Center for Profitable Use of Agricultural Byproducts was established to commercialize technologies utilizing agricultural production and processing byproducts. Waste materials of little or no value are transformed into energy and other salable items using technology developed at the center.

The USU technology has two basic components: 1) an induced sludge bed anaerobic reactor that can produce energy (biogas) and soil amendment from manure and food processing waste, and 2) a high rate aerobic (drum composter based) bioreactor that make the system more cost effective, and the products produced by the process more valuable. The scalable, modular system is reliable and easily managed.

- At least three operational plants in Utah producing electricity.
- One of these generates enough electricity to power its own farm and put $1,000 worth of electricity back into the grid monthly.
- One issued and one pending patent.
- A new Utah company, Andigen, has been formed to build the anaerobic systems.

USU
Funded 2000-2004

Conly Hansen
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Spin Out Companies

- Andigen

Benefiting Companies

- Inrepid (ITR) - Idaho
- Agrimass – California
- HHE

Center for SOLID OXIDE FUEL CELL TECHNOLOGY

The center was established to develop solid oxide fuel cell (SOFC) technology for the direct conversion of chemical energy of a variety of fuels, such as natural gas, coal gas and other reformed logistic fuels, into electricity at a very high efficiency. Center technologies are based on the design and fabrication of novel, anode-supported solid oxide fuel cells with highly efficient electrodes that have a very low resistance. This concept makes it possible to develop a cost effective, compact power unit for direct conversion of chemical energy of fuels into electricity for remote and residential applications.

- Based on IP generated by the SOFC Center, a Fuel Cell Consortium was formed for commercialization of SOFC technology
- (MSRI) co-founded by the Center Director, won an Advanced Technology Project (ATP) from the Department of Commerce (DOC) totaling $2M
- 3 patents issued

UU
Funded 1996-2001

Prof. Anil V. Virkar
(801) 581-5396
anil.virkar@m.cc.utah.edu

Spin Out Companies

- Materials and Systems Research, Inc. (MSRI)
- Versa Power Systems

Benefiting Companies

- FuelCell Energy

Center for SOLID WASTE RECYCLING

The center was established to pursue realistic and comprehensive solutions designed to overcome the social and economic problems our environment faces in the elimination of solid waste. In conjunction with the Huntsman Environmental Research Center, research will focus on four areas:

- Recycling
- Improving air quality
- Degradability
- Conservation of trees

- Polymax 5000 Polystyrene Foam Densifier makes it economical to ship polystyrene to facilities where it can be recycled

USU
Funded 1990-1993

Reed M. Nielsen

Benefiting Companies

- Recycling Technologies Corp.
- Huntsman Chemical Corporation

Center for SOLVENT SEPARATION OF HEAVY OILS

The center is focused on the development of commercially viable applications and processes for exploiting Utah's reserves of heavy oil resources, and to continue its efforts in developing hydro chemical remediation processes. Development is concentrated in the following:

- Production of flux oil and adhesives from the Great Salt Lake Oil
- Cleaning of oil from contaminated soils
- Removal of waste oil from engine filters
- Production of high performance road asphalt from tar sand bitumen.

- Two license agreements
- 1 patent filed

Weber State
Funded 1996-1997

E. Park Guymon, Ph.D.
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Benefiting Companies

- Crown Energy
- Oasis Industries

Center for SUPERCRITICAL FLUID SEPARATIONS

The center provides a focal point for research and development, education and training in the area of chemical analysis where high resolution separation and high sensitivity detection are emphasized. Technologies:

- Supercritical fluid chromotography and extraction
- Radio frequency plasma detection
- Time-of-flight mass spectrometry
- Capillary chromotography and electrophoresis

- New technology for deactivating small diameter spherical silica packing materials in the pharmaceutical industry
- Director Milton L. Lee received **The R&D 100 Award** for the technologically most significant products developed nationally
- Transitioned to "Distinguished Center" in 1991

BYU
Funded 1987-1991

Milton Lee, Ph.D.
(801) 378-2135
milton_lee@byu.edu

Spin Out Companies

- Lee Scientific

Benefiting Companies

- Dionex Corp.
- Sensar Corp.

Life Sciences Cluster

Center for ALTERNATE STRATEGIES FOR PARASITE REMOVAL	
The center to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they are teenagers. The Centers is currently testing a safe, effective, non-chemical treatment for head lice, Pediculus humanus. We have secured funding from Utah Centers of Excellence program and approval from the University of Utah Institutional Review Board to perform our treatment on children six and older, and adults in the Salt Lake Valley.	*UU* *Funded 2004-* Dale Clayton (801) 581-6482 clayton@biology.utah.edu **Spin Out Companies** • Larada Sciences

Center for APPLIED MOLECULAR GENETICS	
Useful DNA based probes are being evaluated. The technologies being developed for selecting DNA markers include: random amplified polymorphic DNA (RAPD), restriction fragment length polymorphisms (RFLP) and sequence characterized amplified regions (SCAR). The objective is to identify probes that correlate with useful qualitative and or quantitative traits. Swine markers showing correlations with specific traits are: back-fat (9), feed intake (4), and growth rate (11). The search for DNA markers in dairy cattle to correlate with milk and protein yield, has resulted in the identification of 3 useful markers.	*BYU* *Funded 1995 –1998* Robert L. Park, Ph.D. (801) 378-6871 robert_park@byu.edu
• DNA markers have been established for a serious disease (spontaneous cardiomyopathy) in turkeys, which could be used for the benefit of Utah's turkey industry.	

Center for ARTIFICIAL HEARTS AND BIOMEDICAL DEVICES	
Established to develop the first electro-hydraulic artificial heart (an advanced version of the JARVIK-7) which utilizes a single energy converter and unified ventricles that will fit in humans. Other implant projects included the urinary bladder, urethra, ureter and a sphincter. The center's scope of research includes: conceptualization, prototype development, fabrication, bench and implant testing and assessment. • Engineering-miniature hydraulics, device design, design analysis, CNC machining capability, computer machining capability, device fabrication, polymers, plastics, metallics and QA/QC • Electrical design & fabrication • Integrated circuits & VLSl • Device testing • Animal experimentation-surgery, radiology, hematology, immunology, biochemistry, pathology, device retrieval analysis	*UU* *Funded 1987-1992*
	Dr. Donald B. Olsen (801) 323-1122 don.b.olsen@m.cc.utah.edu
	Spin Out Companies • Medquest Products • Medquest Manufacturing • Utah Artificial Heart Center **Benefiting Companies** • St. Jude Medical • CardioWest • Symcardia
• Developed Rotary Blood Pump • Involved in Pneumatic Heart Development	

Center for BIOMEDICAL MICROFLUIDICS	
The Center focuses on engineering technology that controls the movement of fluids in channels smaller than a human hair. Micropumps that can deliver tiny quantities of drugs and improved devices for DNA screening are some product examples.	*UU* *Funded 2004-*
	Bruce Gale (801) 585-5944 gale@eng.utah.edu
	Spin Out Companies • Wasatch Microfluidics

Center for BIOMEDICAL OPTICS

UU
Funded 1999-2003

Werner Gellermann
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The Center for Biomedical Optics was established to commercialize optical technologies for diagnosis, therapeutic treatment, and disease risk assessment in medicine. The center capitalized on advancements in laser materials and laser spectroscopy to enable noninvasive assessment.

The center developed several new optical laser instruments to detect antioxidants in living human tissue. Specifically, the instruments detect the concentration and spatial distribution of carotenoid compounds, which are a family of antioxidants thought to prevent a number of degenerative diseases.

One application allows for the detection of carotenoids in the human retina. This will be useful to assess a subject's risk for developing age-related macular degeneration, which is the leading cause of blindness in the elderly. In the past, no reliable noninvasive test procedure existed. The new laser detection technology makes it possible to noninvasively test the concentration and spatial distribution of antioxidants in the retina through undilated eyes within a fraction of a second. The test results provide the physician with valuable information regarding the health of the retina and potentially required intervention strategies.

Another application is the use of the technology to detect the level of antioxidants in the human body by taking a reading of skin carotenoid levels. A link exists between the level of antioxidants in the human body and the immune system, which is being researched.

- The success connected to the technology licensed by NuSkin Pharmanex has impacted Utah's economy with jobs and increased revenues, and also generated a significant annual royalty income stream to the University of Utah.
- The level of antioxidants in the eye and skin can now be measured using noninvasive techniques

Spin Out Companies

- Nutriscan
- Caroderm, Inc.
- Spectratek, LLC

Benefiting Companies

- NuSkin/Pharmanex

Center for BIOMOLECULAR TECHNOLOGIES

The center was established to develop and commercialize technologies aimed at improving the efficiency of detecting rearrangements in the human genome and reducing the high cost of genetic microarrays (i.e."gene chips") which are ideally suited to unraveling complex genetic information. Each of these aims to remove major technological impediments in the biotechnology and health fields. For example, the inefficient methods to detect chromosome rearrangements have hitherto limited their use in the early detection of cancer, environmental health, and population genetics, even though such rearrangements are known to provide important diagnostic information.

- Two patent applications have been filed

UU
Funded 1998-2000

Tore Straume, Ph.D.
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Spin Out Companies

- GenMetrix, LLC

Center for BIOPOLYMERS AT INTERFACES

The center was established to increase knowledge and understanding of the interaction of proteins, nucleic acids, and cells with synthetic surfaces. This mission is important to the development of artificial organs and implants, production of contact lenses and diagnostic devices, and for biotechnological process development.

- 11 patents issued
- 2 patent applications

UU
Funded 1986-1991

Dr. Karin D. Caldwell
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Spin Out Companies

- Cell-Link (now Allvivo)
- Protein Solutions, Inc.

Benefiting Companies

- Becton Dickinson Critical Care Monitoring
- Cardiopulmonics, Inc
- Hyclone Labs
- Research Industries
- Silicon Graphics
- CIBA Vision

Center for BIOREMEDIATION	
The Center for Bioremediation develops, refines, and implements innovative biotechnologies for the removal of heavy metal and other inorganic contaminants. The Center's technology focus is biological selenium removal. Additional technologies include technologies for arsenic removal and cyanide degradation with an emphasis on enzymatic cyanide degradation.	*Weber State* *Funded 1996-2003* Jack Adams (801) 585-7349 jadams@mines.utah.edu
• Field-proven biotechnologies include Selenium reduction, Arsenic Reduction and Cyanide Biooxidation Technology. • The Center's technology has been demonstrated to be approximately 1/10 the cost of EPA's past BDAT and removes selenium to lower levels.	**Spin Out Companies** • Applied Biosciences **Benefiting Companies** • Non-invasive Geotracking - now called Willowstick

Center for BIOTECHNOLOGY	
The Center for Biotechnology was based on the phenomenon that fungi not only degrade organic materials, but inorganic materials as well. A technology was developed that breaks down pollutants such as TNT, DDT, and PCB. The process must be adapted based on where the chemicals are located, i.e., in soil or in water. If the pollution is in soil, the soil makeup and moisture content must be considered.	*USU* *Funded 1987-1992* Steven D. Aust (435) 797-2730 sdaust@cc.usu.edu
• Issued seven patents that provided for blanket environmental clean-up.	**Spin Out Companies** • INTECH One-eighty Corp. **Benefiting Companies** • Agridyne Technologies • EarthFAX • Natural Product Services

Center for CANCER GENETIC EPIDEMIOLOGY	
Established to study the genetic causes and origins of common cancers (e.g. breast, melanoma, colon, and prostate) and to develop DNA based diagnostics. Focus is on developing approaches to gene mapping and gene isolation for future applications in cancer diagnosis and therapy.	*UU* *Funded 1990-1995*
	Mark Skolnick (801) 584-3643 mark@myriad.com
• The Center has cloned the 17q linked breast cancer gene and the 9p linked melanoma gene. • Myriad Genetics employs 770 people with revenues of approximately $100MM	**Spin Out Companies** • Myriad Genetics

Center for CELL SIGNALING

Cell signaling consists of the set of biochemical interactions that mediate physiological changes within and between living cells. When a ligand binds to a receptor, for example, the interaction causes a biochemical response within the cell. Many diseases are associated with signaling pathways that have gone awry -- cancer, allergy, asthma, and acute inflammation are all examples of cellular responses unchecked by normally self regulating pathways. The absence of a single protein or lipid can result in the disruption of a pathway that may be crucial for cellular function. The CCS Faculty seeks to understand these fundamental signaling pathways. By identifying technologies to manipulate the signaling processes, highly selective pharmaceutical agents can be developed to treat cancer, diabetes, and cardiovascular disease.

- New technology from CCS has also been developed and licensed by Echelon to create a molecular sensor for directly monitoring heparin levels in blood.
- A microbiological assay platform invented by Dr. C. D. Poulter for identification of selective anti-anthrax agents was also optioned by Echelon.
- The discovery in 2002 of a natural ligand for the nuclear protein target of the $3 B/yr diabetes drug rosiglitazone emerged from collaboration by Dr's. McIntyre, Prestwich, and Zimmerman.

UU
Funded 1997-2002

Glenn Prestwich
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Spin Out Companies

- Echelon Biosciences, Inc.
- Salus Therapeutics - acquired by Genta Inc.

Benefiting Companies

- ComGenex
- Molecular Probes, Inc. - acquired by Invitrogen, Inc.

Center for CHEMICAL TECHNOLOGY

Weber State
Funded 1990-1995

Edward Walker, Ph.D.
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This center functioned as an innovative resource to the business community by conducting applied research in a variety of chemistry related areas leading directly to new or enhanced products.

The center facilitated the collaboration of Utah companies with diversified chemical interests to form alliances that benefited the company and the state.

- The Center has been awarded four patents
- License agreements with three companies
- Major contracts have been signed with TRW and AORC to study environmental fate of azide impacted landfills
- Corporate partner, Nutraceutical, Inc., has acquired two other companies and moved its manufacturing and marketing to Utah

Spin Out Companies

- Linco Technology (now First Scientific)
- ZymeQuest, Inc.

Benefiting Companies

- Nutraceutical
- Eastman Chemical

Center for CONTROLLED CHEMICAL DELIVERY

UU
Funded 1988-1993

Sung Wan Kim
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The Center for Controlled Chemical Delivery (CCCD) was established at the University of Utah in 1986, consisting of faculty from the Department of Pharmaceutics and Pharmaceutical Science. As an extension of these departments, the CCCD maintains a strong graduate training program and has attained a leading position in worldwide pharmaceutical, polymer, and biomedical research. Ongoing research projects at CCCD include:

- POLYMERIC MATERIALS
- NONTHROMBOGENIC SURFACES
- SELF-REGULATED INSULIN DELIVERY SYSTEMS
- TARGETABLE DRUG DELIVERY
- ORAL DELIVERY

Spin Out Companies

- Insutech/TTI

Benefiting Companies

- Research Medical, Inc.
- MacroMed
- TheraTech, Inc. - Watson Labs

Center for DAIRY FOODS TECHNOLOGY

The focus of the center is to develop new technologies to improve and develop products for the dairy foods industry.

The center uses membrane technologies (reverse osmosis and ultrafiltration) to concentrate fluid milk at low temperatures so as not to impart any off flavors to milk concentrates.

Another technology uses ultra-high temperature heat processing to commercially sterilize milk and milk concentrates yielding new products that do not require refrigeration and can be stored for up to 12 months. The concentrated and ultra high temperature process milk can be used in reconstituted fluid milk, yogurt, ice cream and cheeses.

- The center has an agreement with Utah Milk Technologies to commercialize membrane concentrated, sterile milk for export.
- A patent for the center's "Creamier Skim Milk" was issued in November 1994.
- Gossner Foods, Inc. Logan, holds the contract for the production and packaging of new products researched and developed by national food companies with the assistance of the center.
- Heart-to-Heart Foods, Inc., Richmond, which produces yogurt and ice cream products and new lines of cream cheese, has used center equipment and expertise to research and develop new product lines.
- International Dairy Foods Association has shown interest in "Creamier Skim Milk" to increase consumer acceptability of skim milk.

USU
Funded 1991-1996

Paul A. Savello
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Spin Out Companies

- Dairy Research Consulting of Utah
- Food Research & Dev Group
- Utah Milk Technology

Benefiting Companies

- Gossner Foods, Inc
- Nichols Research
- NutriScience, Inc
- R-Con International

Center for DAIRY TECHNOLOGY COMMERCIALIZATION	
The Center for Dairy Technology Commercialization was established to commercialize technologies developed at the Western Dairy Center, whose research is funded by a consortium of dairy food companies, for a variety of applications in the dairy industry. The Center is currently pursuing commercialization of the following inventions: utilization of bacterial cultures that produce polysaccharides externally to increase cheese yield; production of flavored cheese using high pressure injection technology, using textured whey protein both as a meat extender and as a high protein snack food.	*USU* *Funded 1998-2001* Carl Brotherson (435) 797-3466 wcdprt@cc.usu.edu **Benefiting Companies** • Shepherds Goat and Sheep Dairy Products, LLC - acquired by Fire Ridge Ranch LLC, Shepherds Dairy.
• Cheese trials have begun using the exopolysaccaride gene to determine commercial interest among cheese producers. • One company intends to modify the cheese flavor and the other company will use the technology as a method of creating new and novel cheeses for children.	

Center for DESIGN OF MOLECULAR FUNCTION (formerly BIOCATALYSIS)

With funding of approximately $1.8 M from the NIH Biomedical Research Technology Program, the Center for Biocatalysis Science and Technology has expanded to become the National Center for the Design of Molecular Function. The goals are to:

1. Establish the underlying bases for the design of molecular function which includes the development of real-time time-resolved spectroscopic technology
2. Apply this basic knowledge and technology to biomedical and environmental applications and monitoring
3. Provide this information and specialized tools of its utilization to the scientific and engineering community

- Two patents have been issued, two are allowed, and several are pending
- The capture surface identification technology selectively bind bacterial cells, spores, toxins, and viruses [many from the CDC select agent list] using molecular engineering methods.
- DARPA is currently funding a team effort on self decontamination surfaces.
- The optical reader technology was demonstrated for the detection of microbial contamination in public water supplies for the Department of Public Health of Utah, the EPA and the Office of Public Health of the State of Louisiana in the aftermath of hurricane Katrina.

USU
Funded 1988-1994

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Spin Out Companies

- Envirol
- Whetstone
- MicroBioSystems, LP

Benefiting Companies

- CSA of Provo, Utah

Center for DEVELOPMENTAL AND MOLECULAR BIOLOGY	
Technologies are being developed for the high efficiency production of valuable proteins, not normally found in animal milk, by producing transgenic animals. A specific gene (DNA sequence) that codes for a specific protein is placed under the genetic control of a promoter that is expressed in mammary cells during lactation. The "genetically engineered DNA" is introduced into the embryo of selected animal species which, when successful, express the desired protein in the milk producing cells. The expression of the foreign protein in the milk in relatively high quantities provides a cost-effective method of producing the valuable proteins.	*USU* *Funded 1992-1998*
	Kenneth White & John Morrey (435) 797-2194 kwhite@cc.usu.edu
• Genes for specific proteins have been sequenced and prepared for injection into animal embryos. • Transgenic nature of newborn animals confirmed • Expression of a valuable protein has been confirmed in these animals' milk	**Spin Out Companies** • Pangenics, Inc.

Center for ENVIRONMENTAL TECHNOLOGIES

Established to support Utah's environmental technologies industry through focused research and development in monitoring and sensing technologies, waste-stream reduction technologies, pollutant destruction and remediation, technology transfer, and advanced technical training. The center focused on the following:

- Knowledge-based expert system for Waste-fed Cement Kilns.
- Environmental applications of Time-of-Flight Mass Spectrometry
- Environmental applications of the Air-Sparged Hydrocyclone (radionuclide separations, oil-water separations, VOC stripping).
- HydroPur industrial wastewater recycling system.

- A subcontract was signed with Thiokol Corp. For development of an electrolytic process to recycle industrial wastestreams. A pilot plant is in place at Thiokol.
- The Center has formed strategic partnerships with twelve companies and federal installations.

USU
Funded 1992-1995

Russ Price
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russ.price@usu.edu

Benefiting Companies

- Thiokol
- Dugway Proving Ground

Center for GENETIC IMPROVEMENT OF LIVESTOCK

Established to identify genetic markers for economically important traits of livestock. The first trait for which genetic markers were identified, was for callipyge gene in sheep, responsible for heavy muscling. Sheep carrying the callipyge gene have 8% more muscle, 8% less fat and 2% less bone, when compared to sheep that do not express the gene. The center also identified a genetic marker for Spider Lamb Syndrome (SLS), which results in severe bone deformities of the legs and back.

- The center determined that the callipyge gene provides an additional 10.3% to the value of each marketed sheep.
- Developed a test that is 97% accurate in identifying the callipyge gene and 100% accurate in identifying the SLS gene.

USU
Funded 1993-1997

Noelle Cockett
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Spin Out Companies

- Livestock Molecular Research and Development, Inc.

Center for GENOME TECHNOLOGIES

The Center's main focus was on developing and refining technologies for large scale sequencing and genotyping of DNA, the genetic material involved in inheritance of every organism. The Center was also developing technology for gridded DNA array detection.

The Center developed novel technologies in three areas:

- Molecular reagents and techniques
- Automated sequencing devices
- Computer software.

UU
Funded 1996-1998

Robert Weiss
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Spin Out Companies

- Cimarron Software Inc.

Center for HOMOGENEOUS DNA ANALYSIS

This new center was formed to commercialize a novel suite of fast, user-friendly and inexpensive DNA sequence analysis tools that could be fielded in a doctor's office rather than requiring the services of an expensive reference laboratory, and which will reach markets including cancer testing, the diagnosis of inherited diseases, and rapid bioterrorism detection.

The central innovation involves a new, high-resolution twist on a very old technique for DNA sequence analysis: thermal denaturation profiles. A fluorescent dye, added before amplification via polymerase chain reaction (PCR), allows the melting transition of the PCR product to be continuously monitored without ever moving it from the same tube. Data processing allows even minute sequence changes to be readily identified through their effect on the melting profile.

- The Center's first product has been licensed to a Utah firm, Idaho Technologies, Inc., which has commenced commercial sales.

UU
Funded 2003-

Carl Wittwer
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carl.wittwer@path.utah.edu

Benefiting Companies

- Idaho Technologies, Inc.

Center for IN SITU OZONATOR	
The powerful oxidizing power of ozone is harnessed in a safe, effective mechanism wherein sediments are processed and redeposited in a minimally invasive manner – immediately arresting contaminant release into the water, capping deeper contaminated layers, and promoting the onset of natural biodegradation.	*UU* *Funded 2003-2004*
• Center has already completed laboratory treatment tests on PCBs and DDT • International patent pending • Funding from both government and industry partners	P.K. Andy Hong (801) 581-7232 hong@civil.utah.edu

Center for LASER INSTITUTE	
The main focus is the development of cardiac surgical laser devices, drugs (photosensitizers), fluorescence sensors, laser fibers and laser power sources in the photodynamic therapy of cancer, and multiple wavelength treatment capabilities for Laser surgery. • Fiber optic lasers • Light activated drugs • Metal vapor laser applications • Laser angioplasty • Cardiac surgical laser devices • Fluorescence sensors	*UU* *Funded 1988-1989*
	Richard C. Straight
• Six patent applications	**Benefiting Companies** • Benefiting Co • HGM Corp.

Center for MEAT PROCESSING TECHNOLOGY	
The center focused on the development of new meat products and processing technologies, including: • Ultra-High Temperature (UHT) pasteurization of meat surfaces. • Low-fat lamb chops, beef steaks, pork chops, and bacon. • Processing technology to reduce fat content of raw meat. • Processing technology to bond meat to bone. • Combining UHT with electron beam radiation technology to produce sterile meat products. • UHT pasteurization combined with High-Temperature Aging (HTA) to produce tender steaks and roasts from the cheaper, less tender primal cuts of beef carcasses.	*USU* *Funded 1991-1996* Von T. Mendenhall, Ph.D. **Spin Out Companies** • Mountain Lamb Co-op • Timpanagos Meats • Canyon Rayas **Benefiting Companies** • B.V. Holland • Agri-Products, Inc. • ConAgra • E.A. Miller & Sons • NUTEK, Corp. • Stone Meats
• Four patents issued • Two license agreements: B.V. Holland and Agri-Products Inc.	

Center for MICROARRAY TECHNOLOGY	
Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.	*UU* *Funded 2005-* Steve Blair (801) 585-6157 blair@ece.utah.edu **Spin Out Companies** • Sigma Technology Holding Company
• Six patent applications in process for molecular diagnostics technologies	

Center for NEURAL INTERFACES	
It is only by recording the activity patterns of large groups of neurons that we can begin to understand how sight, hearing, touch and volitional information are encoded and processed by the brain. The center for Neural Interface has created a tool that makes this investigation possible. The center is focused on the development of technologies that will permit bi-directional (i.e. stimulation and recording) communication with large numbers of neurons in the central and peripheral nervous systems. The center has developed silicon-based arrays of microelectrodes that can either listen in on or talk directly to hundreds of neurons simultaneously. The center has also developed the surgical tools and techniques that allow these high-density arrays to be implanted in central and/or peripheral nervous systems. The long range goal is to use these neural interfaces as therapies for disorders of the nervous system e.g. limited, but functional sensory restoration in individuals with blindness or deafness, and enhanced motor function to individuals with high spinal cord injuries.	*UU* *Funded 1995-2000* Richard A. Normann, Ph.D. (801) 581-8528 normann@cc.utah.edu **Spin Out Companies** • Bionic Technologies **Benefiting Companies** • Cyberkinetics

Center for NUCLEAR, MEDICAL & ENVIRONMENTAL TECHNOLOGIES	
The commercial strategy of the Center for Nuclear, Medical, and Environmental Technology (CNMET) is to acquire selected spin off facilities and consolidate existing niche markets into a single, well-managed and licensed entity that can provide a convenient source for a full range of nuclear services. Large companies are currently downsizing, outsourcing, and eliminating risky and costly nuclear research and development (R&D) capabilities, and are teaming with universities with established nuclear engineering programs and research facilities to perform key services. An additional market trend is for companies to off-load ownership and operation of their nuclear testing, diagnostic, and irradiation facilities, and to contract with new owners for specific access and services. Others are simply decommissioning their nuclear facilities without replacement. The result is a decrease in availability of licensed facilities. That, in combination with an increasing demand for services from the private sector, provides the basis for a solid commercial opportunity. E-Cubed and Nuclear Labyrinth will assume commercial production to reduce costs, implement uninterrupted production cycles, and achieve economies of scale. Appropriate R&D functions then will be merged and contracted to universities with nuclear facilities, such as the University of Utah's TRIGA reactor, to promote innovation, train co-operatively, and supply a steady stream of knowledgeable and seasoned potential employees to the workforce.	*UU* *Funded 2001-2003* David M. Slaughter (801) 585-0759 slaughter@nuclear.utah.edu
• Nuclear Labyrinth is a newly formed company under CNMET that will engage in commercial nuclear services beginning in 2006.	**Spin Out Companies** • Nuclear Labyrinth

Center for RAPID MICROBE DETECTION

The focus of this center is the development of technologies which lead to the real-time detection of pathogenic micro-organisms. This involves the development of novel pathogen capture molecules, platform development, prototype development, and commercialization. Industries where this technology is useful include pharmaceuticals, biomedicine, biotechnology, veterinary, production agriculture, food processing, public health, defense, and water and sewage treatment. To date, four technologies have been developed:

- ImmunoFlow
- ImmunoDNA
- GlycoBind
- TissueTag

- The Center has licensed the ImmunoFlow technology to Stellar Technologies.
- 5 international patents issued, several more pending
- Seeking commercialization partners

USU
Funded 1998-2003

Bart Weimer &
Marie Walsh
(435) 797-3356
milkbugs@cc.usu.edu
mkwalsh@cc.usu.edu

Spin Out Companies

- Bio Matrix Solutions
- Finite Technologies

Benefiting Companies

- Stellar Technologies

Center for SIGNAL PROCESSING

BYU
Funded 1988-1990

Richard W. Christiansen
(801) 422-6317
richard_christiansen@byu.edu

Rarely is a technology developed that is still valid 15+ years after it was first introduced. The Center for Digital Signal Processing was the first to create a way to accurately simulate digital imaging and digital sound.

The technology is comprised of three elements. Digital signal processing is the first. It has been marketed primarily to the military for use in creating accurate simulations for pilot training or military treasure hunts.

Digital signal hearing is the second. It has been used to create a better hearing aid.

The third, multi-spectral imaging is the technology being used to read ancient damaged scrolls. Script reading is just one of the applications for multi-spectral imaging.

Spin Out Companies

- Deseret Digital Design
- Sonic Innovations
- Vector Technology
- ASTECH

Benefiting Companies

- Eyring Research Institute
- Softsolutions
- Space Dynamics Laboratory
- Unisys Corp.

Center for THERAPEUTIC BIOMATERIALS

UU
Funded 2004-

Glenn Prestwich
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gprestwich@pharm.utah.edu

The Center for Therapeutic Biomaterials (CTB) prepares and uses new biomaterials for reparative medicine for the 3-D culture of human cells. The Center Develops applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs as well as permitting evaluation of cell response to various compounds. The compounds also have application in a variety of non-medical applications, such as cosmetics.

Spin Out Companies

- Sentrx Surgical
- Sentrx Animal Care
- Glycosan Biosystems

Center for VALUE ADDED SEED TECHNOLOGY	
The center was established to produce value-added crops: • Drought resistant turf grasses for roadways, lawns, golf courses (require 30-40% less water • Forage grasses with superior yield under arid land conditions • Hybrid vigor in wheat using molecular biology.	*USU* *Funded 1991-1997*
	H. Grant Vest grant@usu.edu
• A new forage grass, crested wheatgrass variety CD-2, has been released and licensed to 6 companies. • The DNA based genetic markers for apomixis (asexual seed formation) genes are being used to tag apomictic Australian wheat grasses. • Proprietary tissue culture media and procedures are being refined and show promise for use in the mass cloning and genetic engineering of agronomic, horticultural, and forestry plants.	**Spin Out Companies** • F1 Technologies

Center for VASCULAR BIOTHERAPEUTICS	
The Center for Vascular Biotherapeutics is focused on commercializing medical strategies and devices that target blood vessel formation for the treatment of cancer and obstructive vascular diseases such as atherosclerosis. This Center capitalizes on a robust scientific program aimed at deciphering the molecular blueprint for vessel regeneration using human genetics and transgenic mice technologies; these technologies were pioneered at the University of Utah. The "Functional Vascular Genetics" program established at the University of Utah is identifying genes that are essential for vascular development.	*UU* *Funded 2001-*
	Dean Y. Li (801) 585-5505 dean.li@hmbg.utah.edu
• Negotiations for a licensee are in progress and we have designed and tested a first generation elastin sheath-stent and showed it to be effective in preventing restenosis in a porcine model.	**Spin Out Companies** • Hydra Biosciences

Center for VENTRICULAR ASSIST DEVICE	
The goals of the center are to develop a magnetically suspended centrifugal blood pump to be used as continuous-flow ventricular assist device for nearly all sizes of human patients. A prototype continuous flow ventricular assist device (CVAD2), which has all-electromagnetic bearings has been designed and developed. The centrifugal blood pump is gentle to the blood and is suspended in magnetic bearings. The pump output (rotor speed) is readily controlled to meet the physiologic needs of the patient. This device can pump blood over a wide range of cardiac output from 1 to 10 liters/min, effectively satisfying the physiological needs and excellent blood flow dynamics.	*UU* *Funded 1995-1996*
	Donald Olsen, Ph.D. (801) 581-6991 don.b.olsen@m.cc.utah.edu
• The center received the Sezai Innovative Research Award at the International Society for Rotary Blood Pumps in 1995.	**Benefiting Companies** • MedQuest

Center for X-RAY IMAGING	
This center has successfully commercialized x-ray research by carving a product niche among the biggest manufacturers in the analytic instrument business. The ability to reflect and focus x-rays permit scientists to achieve remarkably high resolution when measuring minute objects. Experiments should begin soon on the compact x-ray laser, an instrument necessary for the success of the Strategic Defense Initiative. In addition to defense applications, advanced x-ray technology is used to detect trace materials in substances and would provide simpler, safer medical testing. Applications include: • Atomic Layer Epitaxy (ALE) • MultiLayer X-ray Optics • Leading edge technology in X-ray imaging • X-ray laser technology • Thin film technology and diagnostics • Bright x-ray sources • Electronic x-ray detectors • Damage resistant nano structures • Pure silicon production	*BYU* *Funded 1988-1992*
	Larry Knight larry_knight@byu.edu
	Spin Out Companies • MOXTEK **Benefiting Companies** • TechniScan

Software Development and IT Cluster

Center for 3D COMPUTER GRAPHICS / 3D SOFTWARE	
In the early stages of computer graphics technology, a software library of three dimensional shapes and textures in a computer environment was created by the Center for 3-D Computer Graphics. Though this does not seem "amazing" in today's world, at the time it was cutting edge technology. The center studied the practical applications of three dimensional modeling for the graphic arts industry. It created one of the first web pages in Utah.	*Dixie State College* *Funded 1991-1996* Eric Pederson (435) 652-7977 pedersen@dixie.edu **Spin Out Companies** • Illustrative Impressions • Infowest • NetEx • Paintbrush Productions • AK International **Benefiting Companies** • Mira Imaging • Strata, Inc.

Center for ACCOUSTICS RESEARCH	
Commercializing active sound control technology with superior ability to both reduce noise in varied settings (vehicle cabins, computer fans and telecommunications, e.g.) and modify sounds for commercial benefit.	*BYU* *Funded 2005-* Scott Sommerfeldt (801) 422-2205 scott_sommerfeldt@byu.edu

Center for ADVANCED COMMUNICATIONS TECHNOLOGY	
The Center for Advanced Communications Technology was formed to commercialize multi-antenna wireless communications: the main focus is using multiple antennas for robust wireless links to maneuvering air vehicles (tactical aircraft and UAV's). A secondary focus is in applying multi-antenna technology to improvement of commercial wireless communications. The Center has forged strong links with industry and with government as they've developed and refined the technology.	*BYU* *Funded 2004-* Michael Jensen (801) 422-5736 jensen@ee.byu.edu

Center for ASYNCHRONOUS CIRCUITS	
The Center for Asynchronous Circuit and Systems Design was established in 1997 to complete the development of software design tool that will allow engineers to efficiently design digital circuits that do not require a global clock in order to operate. While most of today's digital systems use a synchronous global clock to coordinate operations within an integrated circuit, the challenge of distributing such global clock signals becomes increasingly difficult as circuit densities increase. Asynchronous circuits do not require a global clock and therefore do not require clock distribution lines as traditional synchronous circuits do. Industry has not moved to asynchronous design in large part owing to a lack of computer aided design (CAD) tools supporting this technology. Meeting this need is the direct target of this Center. This Center is working with companies such as Intel and IBM not only to help solve their future asynchronous design problems, but also their current difficulties in the analysis and verification of high-speed integrated circuits.	*UU* *Funded 1997-2000* Chris Myers (801) 581-6490 myers@ee.utah.edu
• Significant design verification work was completed at IBM's Austin Research Laboratory, which has resulted in a non-exclusive license agreement with IBM to evaluate the Center's analysis tool in IBM's design flow. • The center worked in collaboration with Sonic Innovations, a spin-out of another Center, designing digital hearing aids. The Center is designing an asynchronous version of their hearing aid that will significantly reduce circuit size and power consumption.	

Center for BASE EDUCATION TECHNOLOGIES	
The center focused on creating new base education technologies.	*UU* *Funded 1987-1988*
	Carol Weller
• Two companies were formed out of this center, one focused on assessments, the other on developing software	**Spin Out Companies** • Assessment Co. • Software Co.

Center for COMMUNICATIONS RESEARCH	
The Center focused on the following technologies: • Multiple access communications • Coded modulation systems • High performance medical imaging • Vector quantization • Adaptive digital filters • Neural networks	*UU* *Funded 1987-1990*
	Craig Rushforth ckrush1@msn.com
	Spin Out Companies • Techniscan
• 2 patents granted on decoding algorithms • Unisys using products for expansion of Utah operations • Spin-out Techniscan awarded Phase II SBIR for $500K	**Benefiting Companies** • Unisys

Center for COMPUTER BASED EDUCATION	
Established as a center in 1987. State-of-the-art computer-based systems have been designed to improve foreign language and computer science instruction. These programs, currently being adopted by industry and education, are training those from kindergarten through adult education. Improved tools for the design, development and delivery of computer instruction systems are revolutionizing teaching and learning methodology.	*BYU* *Funded 1987-1991*
	Jerry Larson (801) 422-6529 jerry_larson@byu.edu
	Spin Out Companies • Cali, Inc. - Now Ellis
	Benefiting Companies • LinguaTech

Center for COMPUTER GRAPHICS AND SCIENTIFIC VISUALIZATION	
Established in 1991 to develop integrated computer aided solutions to problems in computer graphics, scientific visualization, computer aided geometric design and computer-aided manufacturing for industrial applications. Computer design, modeling, graphics, and manufacturing technology for automating the whole "art-to-part" process, scalable from a small job shop to a large advanced industrial shop, national televideo infrastruction and learning via the national information highway.	*UU* *Funded 1990-1996* Risenfeld and Cohen, Ph.D.'s (801) 581-8235 cohen@cs.utah.edu **Spin Out Companies** • Engineering Geometry Systems
• Spin-out Engineering Geometry Systems (EGS) • EGS has created and delivered a custom product to Hill Air Force Base to increase its manufacturing productivity	

Center for COMPUTER INTEGRATED MANUFACTURING	
The focus of the center is on the development and application of software, hardware and courseware, required for manufacturing systems integration; including software for variant and generative process planning, knowledge based systems, electronic component selection and a shop-floor data collection system.	*BYU* *Funded 1987-1989* Dr. Dell K. Allen **Spin Out Companies**
• IBM donated money to assist with research applications	• CIM Training Center • EDGE Foundation • EDGE Inc. • Ozone Saver Industries • Smartware • Utah PODS Manufacturing Co-op • CAM Software

Center for COMPUTER NETWORKS	
The main focus of the Center was to develop computer assisted methods for the design analysis, and simulation of large computer information networks. • Computer assisted methods for design analysis • Research for local area & large computer networks including network optimization software, network traffic models and verification software	*USU* *Funded 1987-1989*
	Dr. Bruce R. Peterson
• Assisted in creating ICOMP • Strong relationship with Novell	**Benefiting Companies** • ICOMP • Novell

Center for DESIGN SYSTEMS	
The Center focuses on researching, designing, developing and commercializing software that brokers information in a time critical way for manufacturing, distribution and design companies.	*UU* *Funded 1995-1996*
	Don R. Brown, Ph.D. dbrown@part.net
• Provision patent application in August 2006	**Spin Out Companies** • ErgoWeb • PartNet

Center for ELECTRONIC MEDICAL EDUCATION	
The objective of the Center for Electronic Medical Education was to develop software technology for use by physicians and scientists who require images as the primary means of communication and consultation. Initially the software consisted of tools to help medical professionals make diagnoses in real time using a database of images as a reference. The center extended development into three markets: 1) consultation, 2) medical and scientific imaging and 3) telehealth. The goal was to improve the process of delivering healthcare and scientific discoveries for the purposes of consistent communication and collaboration and by linking visual annotations and clinical notes to images without altering the images. By maintaining a consultation record, two physicians could have a consultation about the same patient in geographically distant locations. Both physicians could review clinical information (images and text) at the same time, discuss aspects of the clinical review and maintain an auditable record of the consultation.	*UU* *Funded 1999-2004* H. Ric Harnsberger, MD (801) 231-0637 Rharnsberger@amirsys.com **Spin Out Companies** • Amirsys • VisualShare • Globalmatics

Center for ELECTRONIC SYSTEMS TECHNOLOGY	
The Center for Electronic Systems and Technology combined the expertise, resources, and capability of three universities--the University of Utah, BYU, and Utah State University--to serve the industrial community in electronic systems technology. The goal of the Center is to ensure that Utah industry can compete more effectively in the global market and to enhance the opportunities for Utah researchers to develop and commercialize their technologies Electronic systems technologies include microelectronics, digital electronics, RF, microwave, millimeter wave electronics, as well as optoelectronics. The Center provides research, design, evaluation, and prototyping services to Utah businesses that need specialized help in developing new products or enhancing market strengths. Services provided to industry include access to test equipment, laboratory testing, fundamental research and technology development, market analysis, personnel, information, and strategic planning.	*UU* *Funded 1995-1999* R. Jennifer Hwu, Ph.D. and Benjamin V. Cox, Ph.D.
• Research contracts with a large number of technology-based companies were executed • The Center also provided a stream of new commercializable technologies that were patented and offered for licensing to Utah companies	**Spin Out Companies** • Bonneville Technologies • HDG

Center for GLOBAL KNOWLEDGE MANAGEMENT	
This Center was formed to effect the commercialization of software tools representing the next generation of data mining technology, with the potential to leapfrog competing approaches by enabling customers to both quickly and inexpensively discover useful knowledge from databases and efficiently manage that knowledge over time as the underlying data or conditions of use change.	*UU* *Funded 2003-2006*
• New Software Acculink in validation process	Olivia Sheng (801)-585-9071 olivia.sheng@business.utah.edu

Center for HIGH SPEED INFORMATION PROCESSING

USU
Funded 2002-2005

Tamal Bose
(435) 797-7227
tamal.bose@ece.usu.edu

The Center for High Speed Information Processing, focuses on miniaturizing digital devices by using faster algorithms (multiplier free technology), which allows the manufacturing of smaller, faster and cheaper chips.

Echo cancellation technology is the first application. It eliminates the echo that is created on a speaker phone or cell phone when two people talk at the same time. Two patents for this technology have been issued. This same technology can also make it possible for a person with hearing aids to hear someone (s)he is talking to when there is background noise. For hearing impaired people, this is revolutionary. With current hearing aids, when there is background noise, voices are canceled out, producing empty static.

Another area is building encoders and decoders for error correction that are compliant with emerging standards for low density parity check codes. This technology is in a commercialization phase.

- First spin out company, SP Communications was formed.
- Smaller, faster, cheaper chips are being developed by this center.
- A large Utah based company currently has licensing with the University for the technology connected to hearing-aid feedback

Spin Out Companies

- SP Communications

Center for INDUSTRIAL IMAGING

UU
Funded 1995-1999

Robert Ehrlich, Ph.D.
801-581-5906
behrlich@egi.utah.edu

The Center was established to commercialize image analysis, data analysis, and artificial intelligence technologies developed in the geosciences. Research at the University on fluid flow through porous media (i.e., aquifers, petroleum reservoirs) has resulted in generally useful image processing, image analysis, data analysis, and artificial intelligence techniques with commercial applications in geosciences and engineering.

Center technologies include Petrographic Image Analysis (PIA), which comprises four components: image acquisition, image processing, pattern recognition/data analysis, and linking to physical models. Each component involves specialized hardware, software, and expertise. The pattern recognition procedure within PIA has also proven useful in chemical fingerprinting in a variety of geoscience/environmental applications. The Center has begun to explore areas outside geoscience applications, including the application of PIA to medical imaging, and especially to automated screening of prostate biopsies. The Center also has been granted ownership of Integrated Paleontological System (IPS) software for further research, development, and commercialization. The Technical Alliance for Computational Stratigraphy (TACS), a consortium of nine petroleum companies, has been established to fund a three year commercialization and development initiative.

- GeoChem Metrix, Inc. was spun-off in September 1998. The company specializes in analysis of chemical data in the context of environmental and toxic tort litigation support.
- Two new software license agreements were signed with BP-Amoco Upstream Technology and Elf Exploration Production for the TACS consortium.

Spin Out Companies

- GeoChem Metrix, Inc.

Benefiting Companies

- BP-Amoco Upstream Technology
- Elf Exploration Production

Center for INFORMATION TECHNOLOGY - HANDICAPPED EDUCATION	
The Center for Information Technology—Handicapped Education was funded with two purposes in mind: first, to meet a federal requirement that government and education offices provide closed captioning for training videos, and second, to promote information technology in public schools. K-SAR captioning software was developed, as well as reading and other software for educators.	*USU* *Funded 1989-1991* Alan Hofmeister hofa@cc.usu.edu **Spin Out Companies** • Effective Instructional Tech

Center for INTELLIGENT COMPUTER TOOLS	
The Center focuses on interactive image segmentation, composition and digital image editing, automated creation/browsing of digital (microfilm) libraries, semiautomated creation of virtual environments, especially with Virtual Venues for the 2002 Winter Olympics. • The Center teamed up with a CA company to produce media for the 2002 Olympics which was featured on big screens along with individual event media.	*BYU* *Funded 1996-2001* William A. Barrett (801) 378-7430 barrett@cs.byu.edu **Benefiting Companies** • Virtual Venues • Adobe Systems • Park City Entertainment.

Center for INTERACTIVE RAY TRACING & PHOTOREALISTIC VISUALIZATION	
Producing a commercial form of two programs that can process 3-D graphics based on large data sets found in CAD, film animation and scientific models, which existing GPUs cannot handle	*UU* *Funded 2005-* Steven Parker (801) 585-1504 sparker@cs.utah.edu

Center for INVERSE PROBLEMS, IMAGING & TOMOGRAPHY

The Center for Inverse Problem, Imaging and Tomography (CIPIT) is the result of research efforts conducted at the University of Utah's Advanced Imaging Methods Laboratory (AIM lab). The AIM lab was developed to study medical ultrasound imaging. Further research was then introduced in advanced sonar and geographical/environmental imaging methods based on common mathematics. In 1990, the AIM lab submitted a proposal for independent support as the CIPIT and initial funding was received in February of 1991. Some of CIPIT's technical accomplishments are in the areas of:

- MEDICAL ULTRASOUND
- HAZARDOUS SITE IMAGING
- 3-D MICROSCOPE

UU
Funded 1989-1993

Steven A. Johnson
johnson@ee.utah.edu

Spin Out Companies

- Monolithic Tech
- Techniscan Medical Systems

Center for MAGNETISM IN INFORMATION TECHNOLOGY

The center was established in 1995 to produce superior magnetic materials including permanent magnets and magneto-resistive materials, which
would have applications in numerous markets including products such as motors, sensors, magnetic storage media, and electromagnetic circuitry.

- An agreement has been signed between the center and a Utah company, for the company to manufacture high corrosion resistance rare-earth materials using center technology.
- The center is collaborating with the Idaho National Engineering Laboratory (MEL) to develop efficient processing for permanent magnetic materials.
- The center is also working with a Utah company to manufacture flexible magnetic materials.
- The center is working with a Utah company to develop a new type of sensor for applications in the automotive industry.

USU
Funded 1995-1996

C.Y. Pan

Benefiting Companies

- Starsys

Center for MTV FLAT PANEL DISPLAY TECHNOLOGY	
Established in 1995 to study new technologies in producing flat panel displays for the information (e.g. computer monitors) and entertainment (e.g. television sets) markets. The main focus is to conduct proof-of-principle research on new and emerging potential flat panel display technologies and to evaluate new and existing flat panel display technologies. An additional focus is to create and support applications needed by flat panel display manufacturers especially those located in the State of Utah.	*UU* *Funded 1995-1997*
• Developed a new, enhanced flat panel display for which a patent application has been submitted. • Established a close working relationship with a local company involved in flat panel display development. A new company has been established with an option to license the flat panel display technology. • Received Department of Energy funding to investigate another spin-off technology for micro-energy converters under a collaborative development effort with Sandia National Laboratories.	Laurence P. Sadwick sadwick@ee.utah.edu

Center for MULTI-DIMENSIONAL INFORMATION - CROMDI

The Center for Multi Dimensional Information—CROMDI was established to commercialize audio-visualization technology that facilitates the rapid and accurate analysis of large quantities of quickly changing data. By visually displaying multiple variables using various objects and colors, a wide range of information is clearly presented. IntuInfo, the patented technology, enables the processing of events significantly faster and more accurately, while requiring less training from those who use the software. The areas of application are broad: finance programs, homeland security systems, DOE contacts, medicine, and entertainment. The most successful application at this time is in finance and networking.

- Licensing agreements with several existing companies have been negotiated.
- This center can quickly process large amounts of data and generate easy-to-interpret results.

UU
Funded 2000-2004

Stefano Foresti
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stefano@chpc.utah.edu

Spin Out Companies

- Applied Medical Visualization, Inc

Benefiting Companies

- GE Medical Systems
- Draeger Medical

Center for MULTIMEDIA EDUCATION AND TECHNOLOGY

Established in 1993 to develop state-of-the-art, interactive multimedia technology and also to author and produce with industrial partners a wide range of commercial training and education applications.

Interactive multimedia computer-based authoring systems. Some authoring technologies will be copyrighted, held, and owned by WSC and the Center while others will be developed with external corporate partners.

UVSC
Funded 1992-1995

Gary L. Phelps

Spin Out Companies

- Cela Solutions Inc.
- MC2
- Memory Lane Productions
- Utah Valley On-Line

Center for MULTIMEDIA EDUCATION AND TECHNOLOGY	
Established in 1993 for the development of interactive multimedia software modules for science, mathematics, and engineering education. Software and hardware interactive multimedia products for education including simulation software, virtual laboratories, software and hardware for data acquisition and analysis, inexpensive virtual reality applications. Production and distribution of interactive multimedia educational modules on CD-ROM.	*UU* *Funded 1993-1997*
• Two CD-ROM products have been developed: a multiplatform "Calculus Castle and "Engineering Electromagnetics." Another CD-ROM in genetics, "History of the Human Gene," is also completed. The Center is actively pursuing commercialization of these products. • The center manages the Conceptual Learning of Science (CoLoS), USA project, which is a consortium of eleven universities and is sponsored by Hewlett-Packard Company. • In collaboration with John Wiley & Sons, the center continues to publish the award-winning journal, "Computer Applications in Engineering Education." • The center hosted an international conference "1996 Frontiers in Education" in Salt Lake, which had 617 attendees from 14 countries.	Richard W. Grow (801) 581-7634

Center for ORGANIC ELECTRONICS	
Development of new polymers for the creation of OLEDs (Organic Light Emitting Diodes) resulting in the commercialization of organic semiconductors with superior luminescence efficiency and color spread, for multicolor displays and white light illumination.	*UU* *Funded 2006-*
	Valy Vardeny (801) 581-8372 val@physics.utah.edu

Center for PARALLEL SUPERCOMPUTING	
The Center was focused on Phase I Beta Testing including training, software porting, performance and development. There was potential for the center to become unique nationally in comparing supercomputer architectures.	*UU* *Funded 1988-1989*
• IBM provided a 3090 ($11.7MM) • Convex donated upgrading components for a C-120 and a C-220 to supercomputer status with a $100K donation • CSA donated a 16 processor system systolic processor for supercomputer at smaller workstations	Dr. Douglas Chabries

Center for SCIENTIFIC COMPUTING AND IMAGING	
The Center for Scientific Computing Imaging, SCI, developed the SCIRun technology, which provides scientists and engineers with a new model for scientific computing. The model uses graphic interfaces and 3D graphics to provide a visual program for solving complex problems. Previously three separate programs had to be used. SCIRun incorporated the programs into one	*UU* *Funded 1996-2000*
	Chris Johnson (801) 581-7705 crj@cs.utah.edu
• The SCI Center has become the SCI Institute, which has a huge impact on Utah's economy.	**Spin Out Companies** • Visual Influence, Inc.

Center for SOFTWARE SCIENCE

The Center for Software Science created a complete integration capability to enable a Unix based program to be run in a Windows Operating System. The product allowed for compatibility between PC and Unix workstations throughout the country, running approximately 150 functions.

This was an especially useful software during the transition from Unix to a Windows based environment. At that time the center was well funded. However once Windows became the standard, the need for this technology almost completely disappeared.

- This technology was critical during the transition from Unix to Windows Operating Systems.
- While funded this center had a 17 to 1 match in funding.
- The technology enabled Unix based programs to be run in Windows Operating Systems.

UU
Funded 1989-1994

Robert R. Kessler
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kessler@cs.utah.edu

Spin Out Companies

- Hippo Software

Center for SUPERCOMPUTING

The mission of the Center was to establish a High Performance Computing Center to serve as a computational resource for Utah companies and universities. This partnership among industry and education was a unique resource for solving scientific and engineering problems that required unusually large memory and visualization requirements.

The Center for Parallel Supercomputing, now the Center for High Performance Computing provides large scale computer sources to facilitate advances in the field of computational science.

The projects supported by CHPC come from a wide array of disciplines requiring large capacity computing resources, both for calculating the solutions of large-scale, two and three dimensional problems and for graphical visualization of the results.

The published results of research supported by CHPC facilities are maintained in the CHPC Bibliography (PDF).

- IBM contracted for $13M in matching funds
- Signed a new 3 year agreement with IBM regarding visualization

UU
Funded 1988-1992

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julio.facelli@utah.edu

Benefiting Companies

- 3M Health Systems
- Eden Solutions
- Hercules
- IBM
- Kennecott
- Relational Technology Products
- SyncSort
- Thiokol
- WordPerfect

Center for VLSI DESIGN

The Center was established to explore a new technology called Path Programmable Logic (PPL), an innovative design approach for compact integrated circuits. This technology has been developed in response to an identified market niche for a less expensive, more user-friendly design program. The ability to interface PPL with other commercial software packages makes this design program attractive to smaller engineering firms needing custom integrated circuits.

- Joint venture was formed with a European company to sell center products in Europe

UU
Funded 1990-1992

Kent F. Smith
kjsthree@gmail.com

Spin Out Companies

- Bonneville Microelectronics

Benefiting Companies

- Cirque Corp.
- IOMEGA Co.
- Phoenix
- Softeze

Appendix B – Benefiting Companies (by center)

CENTER	COMPANY
3D Computer Graphics	Mira Imaging
	Strata, Inc
ACERC	Ford, Bacon, Davis
	Geneva Steel
	Hercules
	IOMED
	Pacific Corp.
	Questar
	Sarcos Research Corp
	Sarcos, Inc
	Thiokol
	UP&L
Advanced Composites	AeroTrans
	American Polymer
	Ashton Aerospace
	Automated Process Control
	B&M Enterprises
	Beckwith Technology Group
	Bemsco
	BGA
	Blue Cow, Inc.
	Bradley Instruments
	ClayTech
	Controlled Composite Technology
	CRP/Springlite
	Curecrete
	DAH, Inc.
	Delta Fiberglass
	Dimensional Research
	DMS
	DPE
	EDO
	Evolution Skis
	Fiber Tek
	Futura Propulsion Systems
	H K Corporation
	Haelan Medical
	Hexatron
	Ideas to Products
	INCO VaporFab
	International Biokenetics
	LCC Fabrications
	Legends Technologies
	MATCO
	Medilight
	Mountain High Engineering
	Mountain Land Support
	Performance Composites
	Potter Management
	Pro Design Corporation
	Red Hawk, Inc.
	Rotomolding of Utah

Advanced Composites	Sound Composites
	Terra Tek
	TRA
	Ultralite of America
	UP International
	Utah Rocketry
	Van Patten Corporation
	Wasatch Engineering
Advanced Imaging LADAR	Wasatch Technology Group
	RapidMapper
Advanced Materials & Microelectronics	Bonneville Microelectronics
	Ceramatec
	Concoyle Oilfield Tools, Inc
	Evans & Sutherland
	Fisher Company
	Hercules
	Nova Tech
	Space Systems Engineering
	Thiokol
	Westcot Co.
Aerospace Technology	Intraspace Inc.
	R & D Inc.
	Wasatch Research & Engineering
Biocatalysis	Computer Systems Architects
	Hyclone Labs
Biopolymers	Becton Dickinson Critical Care Monitoring
	Cardiopulmonics, Inc
	Hyclone Labs
	Research Industries
	Silicon Graphics
Bioremediation	Non-invasive Geotracking
	AgriDyne Technologies
Biotechnology	EarthFax
	Thiokol
	UP&L
CAEDM	AgriDyne Technologies
	Albion Technologies
	Arrow Dynamics
	Artistic Precision Enterprises
	Bel Viso Labs
	Buena Ventura
	Bureau of Mines
	C.T. Film Inc.
	Cache Valley Cheese
	Chromalox
	Del Med, Inc
	Evans & Sutherland
	Great Basin Brine Shrimp
	Great Salt Lake Mineral
	Hercules
	Hewlett-Packard
	Hill AFB
	Industrial Research
	IOMEGA Co.
	KEMGAS
	Miller Labs

CAEDM	Monarch Labs
	Morton Automotive
	Reily Wendover
	Schreiber Foods, Inc
	Solaray
	Susumu Construction
	Thiokol
	Trysan
	VALTEK
	Viewpoint Animation
	Western Zirconium
	Williams International
Chemical Reactors	EIMCO
	Kennecott
Chemical Separations	ASARCO
	Cascade Refining
	DataChem
	GalTech Semiconductor
	Johnson Matthey
	Parish Chemical
	Tronac, Inc.
Coal Research	Advanced Processing Technology
	ATL (Springville)
	Flowserve (Springville)
Compliant Mechanisms	Grandway USA (Salt Lake City)
	ICON (Logan)
	MityLite (Orem)
	Recreation Systems (Kaysville)
Computer Based Education	LinguaTech
	MacroMed
Controlled Chemical Delivery	Research Medical Inc
	TheraTech Inc. (Watson Labs)
	Gossner Foods, Inc
Dairy Foods Technology	Nichols Research
	NutriScience, Inc
	R-Con International
Design of Molecular Function	CSA
Engineering Design	Sarcos Research Corp
Homogeneous DNA Analysis	Idaho Technologies
	Digitran
Information Technology (Handicapped)	SkiHi
	Systems Inpact Inc.
	Alta Technologies
	Computer Systems Architects
Inverse Imaging & Tomography	Evans & Sutherland
	MOXTEK
	TechniScan
	Unisys Defense Systems
	HGM Corp.
	Innovative Imaging Services
Laser Institute	MetaLaser Corp.
	Primemed
	QLT, Inc.
	ConAgra
Meat Processing Technology	E.A. Miller & Sons
	NUTEK Corp.
	Stone Meats

Novel TiB Surface Hardening	Ortho Development Corporation, Draper, UT
Pyrometallurgical	Kennecott
Quality and Integrity Design	Technology Mgt. Associates, Inc.
Rapid Microbe Detection	Stellar Technologies
Rapid Product Realization	Accuserve
	American International
	Bolick Co.
	CellTek, International
	GWH
	Hatch Biomedical
	Tile Roof Associates
	Youth Reclamation Inc.
Signal Processing	Eyring Research Institute
	Softsolutions
	Space Dynamics Laboratory
	Unisys Corp.
Space Engineering	Hercules
	Thiokol
Supercomputer	3M Health Systems
	Eden Solutions
	Hercules
	IBM
	Kennecott
	Relational Technology Products
	SyncSort
	Thiokol
	WordPerfect
VLSI Design	Cirque Corp.
	IOMEGA Co.
	Phonix
X-RAY Imaging	Softeze
	TechniScan
Supercritical Fluid	Process Engineering Resources
Solid Oxide Fuel Cells	Dionex
Profitable Uses of Agricultural Byproducts	FuelCell Energy (FCE) of Danbury, CT
	Agrimass – Cali – licensing
	Inrepid – ITR Idaho
Green Hill Recycling	Advanced Construction Materials
Soil Stabilization Inc.	Advanced Construction Materials
uniAMS	Advanced Construction Materials
Advanced Composites	ACI Technology
	Behavioral Technology Inc.
	Ridgeway & Fautz
	Springlite
Advanced Materials & Microelectronics	Beta Power Inc.
	Edo Western
Advanced Structural Composites	Patterned Fiber Composites, Inc.
Biotechnology	Natural Product Sciences
Composites in Construction	EDO Fiber Science
	Hydrotech
	Monroc, Inc. (Eagle Precast Co.)
	Sika
	Thiokol
	Waterpoint
Engineering Design	Animate Systems
	MicroJect, Inc.

Harsh Environment Electronics (formerly MTV Flat Panel)	Innosys
Profitable Uses of Agricultural Byproducts	HHE
Rapid Product Realization	UniFoods
Scientific Computing & Imaging	Manufacturing Extension Partnership
Self Organizing Intelligent Systems	Visual Influence Inc.
Solid Oxide Fuel Cells	Kuchera Defense Systems
	Fuel Cell Energy
	Versa Power Systems

Funding Recipients for the 2007-08 Centers of Excellence Program

Funding Recipients which are Licensees (Companies) of Center Supported, University Developed Technologies

Licensee / Center (University)	Years Funded to Date	Award Amount

Dynamic Screening Solutions (Formerly Universal Application System) (USU)
NEW **$150,000**

Commercialization of a web-based system that processes applications for multiple agencies in the government services industry. This technology is at the basis of "UtahClicks" and is also in production in Oregon and Indiana. Plans to adapt this software for other industries are underway.

Flying Sensors (Licensee of Miniature Unmanned Air Vehicles) (BYU)
1 **$125,000**

Developing commercial (non-military) applications for miniature unmanned air vehicles (UAVs) including Real Estate, Insurance Industry, EPA - Multi-Source Air Quality Sampling, Random Testing, Pipeline/Remote Facility Surveillance and Emergency Response/Fire Monitoring – Forest & Commercial.

Glycosan BioSystems, Inc. (Licensee of Therapeutic Biomaterials) (U/U)
1 **$75,000**

Commercializing the compounds from Therapeutic Biomaterials for 3-D Cell Culture, Tissue Engineering, Drug Toxicity Testing, & Skin Care.

Larada Sciences (Licensee of Alternate Strategies of Parasite Removal) (U/U)
NEW **$170,000**

Preparing to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers.

Philotek (Licensee of Microarray Technology) (U/U) **NEW** **$100,000**

Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Licensee / Center (University)	Years Funded to Date	Award Amount

Navigen, Inc. (Licensee of Center For Vascular Biotherapeutics) (U/U)
NEW **$190,000**

Proof of concept in animal models of stabilizing vasculature in macular degeneration and acute lung injury based on a new signaling pathway that regulates the balance between vascular regeneration and stabilization.

Nano-Oxides (Licensee of Nanosize Inorganic Material Powders By Molecular Decomposition) (UU) **NEW** **$150,000**

Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

State of RT (Licensee of Interactive Ray-Tracing & Photo-Realistic Visualization) (U/U)
NEW **$175,000**

Commercializing a software module to deliver real time ray tracing to existing graphics modeling tools and to deliver next generation game development tools based on ray tracing to the market.

VisualShare (Licensee of Center of Excellence for Electronic Medical Education (CEME) (U/U) **NEW** **$150,000**

Commercializing multi-user real-time image conferencing using the Software as a Service (SaaS) Model. This technology provides the remote convergence of images & text for distributed user populations and permits knowledge capture for legal and compliance purposes. First application is for child abuse situations in rural/remote areas to involve specialists in diagnosis of consequences.

University Centers of Excellence

Center (University)	Years Funded to Date	Award Amount

Center for Cellular Therapy and Regenerative Medicine (UU)
NEW **$100,000**

Capabilities to build a "bank" for stem cells derived from umbilical cord blood (so-called "cord blood") which can be used for many clinical applications in regenerative medicine and tissue engineering. Providing GMP and regulatory support for processing, development and commercialization of cord-derived stem cells, biologics and combinational products.

Center for Clean Coke Technology (CEU) **NEW** **$125,000**

This team, led by the College of Eastern Utah's Western Energy Training Center, aims to commercialize research to create Clean Coke from coke fines and waste products and to develop process control expertise by developing a pilot scale facility. This Center also intends to use the pilot plant and related expertise to enhance the training and expertise of employees throughout the area served by CEU.

Center for Control of Flows in Manufacturing (USU)
1 **$ 175,182**

Applying Computational Fluid Dynamics to improve manufacturing processes including particle sorting and Electrical Discharge Machining (EDM). This Center was assigned a business team in 2005-06.

Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials (U/U) **1** **$125,000**

Developing advanced composite materials with predictable wear and failure characteristics designed for demanding applications such as mining, drilling, and grinding.

Center for High End Pharmaceutical and Biomedical Process Optimization (SUU)
NEW **$ 59,760**

Southern Utah University has established a high performance supercomputing facility to enable high fidelity computer modeling of topics of importance to regional industry. The goal of this Center is to partner with a regional pharmaceutical business to develop a 3-dimensional model of a fluidized bed reactor to help optimize their multiphase production processes using computational fluid dynamics. Obviously of interest is to determine if such modeling could be expanded from a single partner to broader applications.

Center (University)	Years Funded to Date	Award Amount

Center for Hybrid & Adaptive Multimedia Processors (CHAMP) (USU) NEW **$50,000**

Commercializing tools and software systems to accelerate time to market of new features for multimedia consumer devices.

Center for Microarray Technology (U/U) **2** **$50,000**

Companion Licensee Philotek also Funded

Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Center for Miniature Unmanned Air Vehicles (BYU) **3** **$75,000**

Companion Licensee Flying Sensors also Funded

Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies. An autopilot design has been licensed to Procerus, Inc. in Utah.

Center for Nanopore Sensor Technologies (UU) **NEW** **$125,000**

A nanopore sensor relies on molecule and particle transport through a single conical-shaped pore that is synthesized in glass. The glass surfaces of the pore interior and exterior can be modified by numerous chemical methods to impart molecular selectivity and high sensitivity in designing sensors for different applications. These tiny sensors can detect extremely small numbers of molecules of specific compounds which is extremely useful in such applications as DNA sequencing, drug screening, nanoparticle counting and sizing.

Center for Therapeutic Biomaterials (U/U) **4** **$70,000**

Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs. Three companies, 1 in California (Carbylan) and 2 in Utah (Sentrx Animal Care and Glycosan Biosciences) have been spun out of the Center to date.

Center for Thermal Management Technologies (USU) **NEW** **$154,376**

Technologies for extremely high performance thermal management in the context of physical and vibration isolation, in collaboration with Utah State University's Space Dynamics Lab.

Business Team Centers (Assigned a Business Team Only) for 2007-08

A Business Team is an investment of approximately $25k each unless otherwise noted

Biomolecular Nanophotonics (U/U)
Develops chemically engineered micro/nanosystems to dramatically improve the performance of Nucleic Acid Amplification and Detection, one of the key processes used in genetic engineering. The team expects that these improvements can radically improve diagnosis of gene disorders and development of gene therapies, including ribonucleic acid interference (RNAi).

Center for Management of Provenance & Exploratory Workflows (U/U)
($50k Business Team)
VisTrails is a new "workflow management system" that provides support for data exploration and visualization for tasks that have very little repetition. Some example tasks that are suitable for this new system include: calibrating simulations for hedge funds, for locating oil wells and radiation treatment planning.

MIMO Communication System (U/U)
New algorithms for signal detection and reception that significantly improve the performance and throughput of MIMO (Multiple-Input Multiple-Output) wireless communication systems. The developed algorithms offer low complexity and near optimal performance, and are adaptable to any standard.

Center for Nanomedicine Applications in Cancer (U/U)
The Center has designed and developed novel biomaterials with precisely defined molecular architecture for targeted delivery of image probes and therapeutics. These novel nanomaterials based imaging agents and therapeutics have many advantages as compared to other available drug delivery technologies because of their well-defined structure.

Center for The Production of Nanometer Sized Metals, Alloys, Metal Oxides & Mixed-Metal Oxide Powders (BYU)
A unique solid-state method of synthesizing metal oxide and metal nanoparticles has been discovered which is simple, requires comparatively little energy and is easily scalable for production. It produces products up to 99.9999% pure, as small as 1 nm, with size distributions of typically ±10% and can be used for particle or coating production.
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Center for Resveratrol Technology (BYU)
Resveratrol is a compound that occurs in red wine, leading to the "French Paradox" where moderate alcohol consumption has been consistently associated with 20-30% reductions in coronary heart disease. The compound is well-absorbed in humans when taken orally, but it is not very stable. The Center proposes to commercialize stable analogs of resveratrol in order to commercialize novel applications such as topical (skin and hair), nutritional supplements and pharmaceutical products.

Center for Water Treatment Technology (U/U) (formerly Tero Technologies)
Developing robust, low cost ways to remove common pollutants such as nitrates from lagoon wastewater treatment systems. The core prototype product, the "poo-gloo" is simple to build, easy to install and maintain and very effective. This may dramatically enhance the effectiveness of lagoon systems around the world.

Web IDEA*SIS (USU)
The web-based solution will assist educators in tracking, serving, organizing, and evaluating children with disabilities while being compliant with state and federal regulations. The system will include: WYSIWYG web pages; content wizards; legal compliance review tools; customized organizational, procedural, and student progress reports; tools for tracking and allocating resources; communication tools for parents and educators; and tools for technical and content support.

Graduating Centers June 30, 2007 (Completed)

Advanced Imaging LADAR (USU) **4**
Commercializing land-based and airborne high-resolution, laser-based 3D color-imaging platforms for both military and civilian use. One license to RappidMapper, Inc. (now Intelisum), a Utah company.

Homogeneous DNA Analysis (U/U) **4**
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office. One application licensed to Idaho Technologies, Inc. (a Utah company).

Titanium Boride Surface Hardening (U/U) **4**
Commercializing harder, longer-lived components and devices – ranging from armor to bearings and orthopedic implants - for the military, biomedical and industrial markets.

Governor's Office of
Economic Development
Centers of Excellence

Utah Centers of Excellence Program
Description of Centers Selected for Funding in Fiscal 2006-2007
(Dollar amounts subject to minor revision)
List of recommendations for all proposals

Proposals Selected for Funding for the 2006-07 Centers of Excellence Program

Center (University) **Years Funded to Date**

Acoustics Research (BYU) **1**
Commercializing active sound control technology with superior ability to both reduce noise in varied settings (vehicle cabins, computer fans and telecommunications, e.g.) and modify sounds for commercial benefit.

Advanced Communications Technology (BYU) **2**
Improved wireless communications and data transmission for both military and commercial markets is achieved through the use of MIMO (multiple-input multiple-output) technology with multiple antenna elements.

Advanced Imaging LADAR (USU) **3**
Commercializing land-based and airborne high-resolution, laser-based 3D color-imaging platforms for both military and civilian use. One license to RappidMapper, Inc. (now Intelisum), a Utah company.

Advanced Thermal Management Technologies (USU) **NEW**
Technologies for extremely high performance thermal management in the context of physical and vibration isolation, in part from collaboration with Utah State University's Space Dynamics Lab.

Biomedical Microfluidics (U/U) **2**
Engineering technology that controls the movement of fluids in channels smaller than a human hair; micropumps that can deliver tiny quantities of drugs and improved devices for DNA screening are some product examples. Wasatch Microfluidics, Inc., is being spun out. Companion Spinout funding was proposed but was not funded

Control of Flows in Manufacturing (USU) **New**
Applying flow control technology to improve manufacturing processing including particle sorting and thermal sprays. This Center was assigned a business team in 2005-06.

Functionally Graded…Cemented Tungsten Carbide **New**
(Functionally Graded and Designed Cemented Tungsten Carbide and Polycrystalline Diamond Composite Materials) Advanced composite materials with predictable wear and failure characteristics designed for demanding applications such as mining, drilling, and grinding.

Homogeneous DNA Analysis (U/U) **3**
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office. One application licensed to Idaho Technologies, Inc. (a Utah company).

Interactive Ray-Tracing & Photo-Realistic Visualization (U/U) **1**
Producing a commercial form of two programs that can process 3-D graphics based on large data sets found in CAD, film animation and scientific models, which existing GPUs cannot handle.

Microarray Technology (U/U) **1**
Developing a superior microarray platform for the molecular diagnostics and research markets with improved sensitivity, specificity and throughput.

Miniature Unmanned Air Vehicles (BYU) **2**
Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies. An autopilot design has been licensed to Procerus, Inc. in Utah. A new Companion Spinout, Flying Sensors, is recommended for a Companion Grant.

Companion Spinout – Flying Sensors **New**
Developing Commercial (non-military) applications for miniature unmanned air vehicles (UAVs) including Real Estate, Insurance Industry, EPA - Multi-Source Air Quality Sampling, Random Testing, Pipeline/Remote Facility Surveillance and Emergency Response/Fire Monitoring – Forest & Commercial

Modified Activated Carbons Technology(U/U) **1**
Developing improved products for gas and water treatment, as well as metal recovery or removal, based on modifications to granular activated carbon. This also was a Super Center proposal in combination with SLCC/Innovabio and SUU. The concept was well received, but was not ultimately approved.

Nanosize Inorganic Material Powders (U/U) **3**
Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for myriad nanotechnology applications, as well as nanostructured ceramic membranes and other devices.

Organic Electronics (U/U) **New**
Development of new polymers for the creation of OLEDs (Organic Light Emitting Diodes) resulting in the commercialization of organic semiconductors with superior luminescence efficiency and color spread, for multicolor displays and white light illumination

Therapeutic Biomaterials (U/U) **2**
Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs. Three companies, 1 in California (Carbylan) and 2 in Utah (Sentrx Animal Care and Glycosan Biosciences) have been spun out of the Center to date.

Companion Spinout – Glycosan Biosciences **New**
Commercializing the compounds from Therapeutic Biomaterials for 3-D Cell Culture, Tissue Engineering, Drug Toxicity Testing, & Skin Care.

Titanium Boride Surface Hardening (U/U) **3**
Commercializing harder, longer-lived components and devices – ranging from armor to bearings and orthopedic implants - for the military, biomedical and industrial markets.

Pre-Center Candidates (Assigned a Business Team) for 2006-07 (New Applicants to the COE program)

Cell Therapy (UU)
Capabilities to build a "bank" for stem cells derived from umbilical cord blood (so-called "cord blood") which can be used for many clinical applications in Regenerative Medicine and tissue engineering. Providing GMP and regulatory support for processing, development and commercialization of cord-derived stem cells, biologics and combinational products.

Electronic Mathematics Education (eMath@USU)
Creation and world-wide dissemination of dynamic, computer-based instruction software for K-16 mathematics, including the award winning National Library of Virtual Manipulatives.

MIMO Communications System (UU)
New algorithms for signal detection and reception that significantly improve the performance and throughput of MIMO (Multiple-Input Multiple-Output) wireless communication systems. The developed algorithms offer low complexity and near optimal performance, and are adaptable to any standard.

Solar Biofuels Technology (USU)
Developing a solar powered photobioreactor using minimal land and water resources to efficiently grow high-oil-content microalgae as a feedstock for biofuels such as biodiesel.

Universal Application System (USU)
Commercialization of a web-based system that processes applications for multiple agencies in the government services industry. This technology is at the basis of "UtahClicks" and is also in production in Oregon and Indiana. Plans to adapt this software for other industries are underway.

Graduating Centers as of June 30, 2006

Alternate Strategies of Parasite Removal (U/U) 2 years completed
Preparing to commercialize a safe, nontoxic and rapid treatment for Pediculosis (head lice), a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers.

High-Speed Information Processing (USU) 4 years completed
Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices. An echo cancellation application enabled the creation of SP Communications, Inc. to make improved speaker phones in Logan, Utah.

Governor's Office of
Economic Development
Centers of Excellence

Utah Centers of Excellence Program

Description of Centers Awarded additional Funding in Fiscal 2008-2009 Part B solicitation

The purpose of the Centers of Excellence Program is to accelerate the commercialization of promising technologies that have strategic value for Utah. The end goal of the COE Program is to help drive economic development and job creation.

"Our Job is Jobs"

2008-09 Licensee Grants

After the primary 2008-09 solicitation was over, the COE program still had $340,000 in funds that were uncommitted. This funding, combined with one contract that was awarded, but not signed by the grant recipient, plus a small amount of funding that was carried in from previous years, a total of $500,000, was designated to be put to work in a 2008-09 Part B solicitation. This solicitation was limited only to existing 2008-09 Licensee grant recipients, and was designed to help accelerate the progress of the most promising teams.

Of the 22 original teams which were granted awards in 2008-09, one was a university team, which was not eligible for the Part B funding, one declined their contract, and three others were not eligible either due to the total amount of funding they had received from the Centers of Excellence program (in excess of $500,000 per technology), or had received equity funding in excess of $2 million. Of the remaining 17, 10 submitted a proposal for the Part B solicitations. Others who did not propose generally did not have sufficient matching funds in place to be received on or before June 30, 2009, a requirement of the Part B solicitation.

2008-09 Part B Selection Process

For the 2008-09 Part B solicitation, the majority of the Members of the COE Advisory Council who participated in the primary 2008-09 solicitation also participated in reviewing the Part B teams. Teams were asked to submit a 2 page proposal demonstrating their progress to date, as well as various letters of support and a summary of key items such as equity and grant funding received to date.

The COE team conducted sub-committee reviews by conference call due to the relatively small number of proposals to review: 2 in Information Technology, 3 in Life Sciences and 5 in Materials/ Manufacturing/Energy/Environment. After each proposal was reviewed by the sub-committee, on Thursday April 16, 2009, the group met in person at the Capitol to do a final review and prioritization.

Of the 10 proposing teams, 6 teams were recommended to receive awards ranging from $50,000 to $100,000 and totaling $500,000. Four other proposing teams were not recommended for additional funding. In one case this was because the company already had significant revenue from the licensed technology, in the other cases, the Council members were concerned that the companies had not made enough significant commercial progress to warrant further funding.

All licensees are required to provide a 1:1 match in funds from non-loan sources.

Distribution of Grants by University

	Licensees
BYU	**1**
USU	**1**
UU	**4**
Total Supported Teams	**6**

Funding Recipients for the 2008-09 Part B Solicitation Centers of Excellence Program

Licensee (Center -University)
CEO or Principal Years Funded to Date Initial Award Amount
2008-09 Part B Award Amount:

COSMAS, Inc. (Licensee of Center for the Production of Nanometer Sized Metals, Alloys, Metal Oxides & Mixed-Metal Oxide Powders - BYU)
Lynn Astle, CEO New as company $100,000
$75,000

Cosmas, Inc. will commercialize a solid state process to produce a nearly unlimited array of high-quality, well-defined metal oxide, mixed metal oxide, metal and metal alloy nanoparticles. The process is simple, requires comparatively little energy (i.e., low cost) and is easily scalable for production. It produces products up to 99.999% pure, as small as 1 nm, with size distributions of typically ±10%. Applications include protective coatings, catalysts, batteries & fuel cells, electronics and ceramics.

GlycoMira, Inc. (New Licensee – U/U)
Tim Miller, CEO and Thomas P. Kennedy, MD and Glenn D. Prestwich, PhD, Co-founders and Co-inventors New as company $100,000
$75,000

GlycoMira ("Amazing Sugars") is a development stage pharmaceutical company targeting the topical treatment of inflammatory skin diseases affecting over 100 million Americans. GlycoMira's motto is "From Life. For Life." Our proprietary sulfated compounds are derived from the natural sugar hyaluronic acid to make remarkably potent drugs that block inflammation. Our topical therapeutics have the potential to restore health and quality of life to those suffering from disfiguring diseases such as rosacea, psoriasis, eczema, acne, and actinic keratosis.

NeuroAdjuvants, Inc. **(New License – U/U)**
Theodore Stanley, M.D., Pres. & CEO **New as company** **$100,000**
$100,000

NeuroAdjuvants, Inc. will develop and commercialize a proprietary platform technology enabling multiple "first-in-class" neuropeptide-based therapeutics for a wide variety of neurologic and psychiatric disorders. This platform provides a breakthrough ability to harness therapeutic potential of neuropeptides and provides both stability & blood-brain-barrier permeability. The initial focus is to identify novel therapies for pain and epilepsy with future potential applications to other neurologic and psychiatric disorders.

STEDI, LLC **(New License – USU)**
Geoffrey G. Smith (Key contact) **New as company** **$100,000**
$50,000

STEDI is licensing from Utah State University's Substitute Teaching Institute a training solution and materials to train substitute teachers. 70% of substitutes in the U.S. are not trained and STEDI provides the only university-based training program for Substitutes. Via the university, STI/USU has sold materials for 13 years, and sales last year were $900,000. The system currently reaches 900 of the nation's 16,000 school districts, but only 38 have sales of $5,000 or more. STEDI, LLC will allow significant expansion of the reach for this system to help train America's substitute teachers.

Thermimage, Inc. **(New License – U/U)**
Douglas Turnquist, President & CEO **New as company** **$100,000**
$100,000

Thermimage, Inc. has invented a non-invasive, painless and less costly way to produce deep-tissue temperature measurements. The device will first be used to diagnose Vesicoureteral Reflux (VUR) in children, a dangerous condition that allows urine to backflow into the kidneys of young children. The current procedure is painful and requires the use of catheters and ionizing radiation, where this new technique will heat the bladder contents and then detect any increase in temperature in the kidneys signaling reflux.

Wastewater Compliance Systems, Inc. (Licensee of Center for Water Treatment Technology -U/U) Fred Jaeger, President 1st Year as Licensee $100,000 $100,000

The company addresses the need of wastewater lagoon operators, generally municipalities, who seek to comply with state and federal environmental regulations by improving efficiency and capacity of existing systems without dramatically increasing capital or operating costs. The company provides robust, low cost ways to remove common pollutants such as nitrogen compounds from lagoon systems with a submergible, domed-shaped aeration device that resembles an igloo. The patented "poo-gloo" is simple and inexpensive to build and easy to install and maintain.

Governor's Office of
Economic Development
Centers of Excellence

Proposals Selected to receive Business Team Support in Preparation for a COE proposal for 2007-08 GOED Board Meeting Nov. 2006

Recommendation Process Meeting Held Oct 26, 2006 Approved by the GOED Board Nov 17, 2006

In the June 2006 GOED Board meeting, the Board approved the recommendation to hold back approximately $75,000 to help fund "pre-proposal" business teams for university teams which want to apply for the next Centers of Excellence funding cycle. The intent of this was to help university teams that want to apply to the COE program by assigning them business team assistance to help them with the business portion of their proposal.

2006-07 Funds Allocated by the Legislature	$3,000,000
2006-07 Direct Center Funding (Technical Funding to Centers)	$ 2,300,069
2006-07 Companion Spinout Funding	$ 135,000
2006-07 Business Team Funding*	**$** 490,000
Funding for 2007-08 pre-proposal Business Teams	**$ 74, 931**

In addition to helping these prospective Centers prepare their proposals, it is the intent of the COE Advisory Council that this pre-proposal business team process will enhance the overall quality and depth of business information available to the COE Advisory Council as they perform their reviews and work through the recommendation process, resulting in ever better funding recommendations.

This is the first time a specific solicitation has been conducted for this purpose. A new solicitation was released on September 7, 2006 and proposals were due October 16, 2006 and this opportunity was communicated to our COE community, and a wide range of contacts at the colleges and universities throughout the state both electronically and through personal visits by the Director. The number of proposals from non-doctoral granting schools (4 out of the 9 submitted) indicates that the message is getting out about modifications made by the legislature last year to encourage participation by these schools with a 1:1 matching funds requirement (instead of the 2:1 matching requirement at the doctoral-granting institutions).

Eleven (11) members of the COE Advisory Council, including GOED Board Member, Mark Howell, and SAC Member, and former SAC Chair, Mike Brehm, participated in the review on October 26, 2006. Of the 9 proposals, 7 were recommended to receive $10,000 in business team assistance. These business team members will be assigned out of the COE program's existing group of business team members and will be responsible for assisting the university team in assessing the economic development potential of their technology and opportunity. These 7 recommendations of $10,000 each total $70,000 out of the nearly $74,931.

In addition, the remaining $4931 was recommended to be allocated for travel expenses for COE participants, with first priority of these funds going to the pre-proposal business teams, particularly to accommodate travel to SUU and CEU, with a secondary priority for use with existing approved Centers and their business teams.

	Proposed	Recommended
Total Number of Proposals for Pre-Proposal Business Team Assistance in preparation for 2006-07	**9**	**7**
Proposals from the University of Utah	**3**	**3**
Proposals from Utah State University	**2**	**2**
Proposals from Southern Utah University (SUU)	**3**	**1**
Proposals from College of Eastern Utah (CEU)	**1**	**1**
For Comparison: 2006-07 Centers with full funding		16
For Comparison: 2006-07 Business Team Centers		5

Pre-Center Candidates Recommended to Receive Business Team Support (University)

Biomolecular Nanophotonics (UU)
Principal Investigator – Keith Roper

Biomolecular Nanophotonics uses chemically engineered micro/nanosystems to dramatically improve the performance of Nucleic Acid Amplification and Detection, one of the key processes used in genetic engineering. The team expects that these improvements can radically improve diagnosis of gene disorders and development of gene therapies, including ribonucleic acid interference (RNAi).

Recommendation for $10,000 to fund Business Team assistance for the upcoming proposal year.

Center for Nanopore Sensor Technologies (UU)
Principal Investigator – Henry White; co- Principal Investigators– Eric N. Ervin, Ryan J. White

A nanopore sensor relies on molecule and particle transport through a single conical-shaped pore that is synthesized in a robust glass support (piece of glass). The glass surfaces of the pore interior and exterior can be modified by numerous chemical methods to impart molecular selectivity and high sensitivity in designing sensors for different applications. Essentially these tiny sensors can detect extremely small numbers of molecules of specific compounds which is extremely useful in such applications as DNA sequencing, drug screening, nanoparticle counting and sizing.

Recommendation for $10,000 to fund Business Team assistance for the upcoming proposal year.

Center for Clean Coke Technology (CEU)
Principal Investigator – Robert Topping

This team, led by the College of Eastern Utah's Western Energy Training Center, aims to commercialize research done in the late 1980's at BYU's Advanced Combustion Engineering Center (ACERC), by bringing together an array of industry and university partners to develop pilot scale concepts in the forming of carbon-containing products from low quality materials, wastes, and fines through a patent-pending product called Clean Coke.

Recommendation for $10,000 to fund Business Team assistance for the upcoming proposal year.

Center for High End Computer Modeling for Multiphase Chemical Process Optimization (SUU)
Principal Investigator – Nicholas Winowich

Southern Utah University has established a high performance supercomputing facility to enable high fidelity computer modeling of topics of importance to regional industry. The goal of this Center is to partner with a regional pharmaceutical business to develop a 3-dimensional model of a fluidized bed reactor to help optimize their multiphase production processes using computational fluid dynamics. Obviously of interest is to determine if such modeling could be expanded from a single partner to broader applications.

Recommendation for $10,000 to fund Business Team assistance for the upcoming proposal year.

Center for High Speed Machining (USU)
Principal Investigator - Ning Fang

The goal is to commercialize a software package to assist manufacturers in using new high-speed machining techniques. This software depends upon past and ongoing efforts develop fundamental mechanics models for the high speed machining environment. This will be of value both to Utah's manufacturing industry as well as the potential to create a software product or business.

Recommendation for $10,000 to fund Business Team assistance for the upcoming proposal year.

Center for Intelligent Service Coordination (USU)
Principal Investigator – Supratik Mukhopadhyay

The technology industry faces a challenge as new sensor and device networks arrive is how to manage the appropriate level of service for a given piece of information. Some information must be in "real time", other information can tolerate delays and variances in arrival time. The Center for Intelligent Service Co-ordination will develop new techniques and architectures for intelligent on-demand co-ordination of service delivering and service-receiving entities in heterogeneous networks connected through wired/wireless networks.

Recommendation for $10,000 to fund Business Team assistance for the upcoming proposal year.

Center for Management of Exploratory Workflows (UU)
Principal Investigator - Juliana Freire;

VisTrails is a new "workflow management system" that provides support for data exploration and visualization for tasks that have very little repetition, in contrast with traditional workflow products. Some example tasks that are suitable for this new system include: calibrating simulations for hedge funds, for locating oil wells and radiation treatment planning.

VisTrails is at the forefront of workflow management technology and the new functionalities it provides are badly needed in exploratory tasks that use workflows. A substantial, well-tested code base has been developed. The proposed Center aims to improve the code base so that it can be commercialized and licensed.

Recommendation for $10,000 to fund Business Team assistance for the upcoming proposal year.

Utah Centers of Excellence Program
Description of Centers Selected for Funding Fiscal 2004-2005

For information on a specific Center
please contact the respective Technology Transfer Office.

BRIGHAM YOUNG UNIVERSITY
Technology Transfer Office
3760 Harold B. Lee Library
Provo, UT 84602-6844
801-422-6266
801-422-0463 fax
www.byu.edu
www.techtransfer.byu.edu

Direct Machining And Control (BYU)
Developing method that allows a manufacturing machine controller to directly interpret CAD/CAM models, resulting in superior resolution for complex shapes.

Compliant Mechanisms (BYU)
Accelerates and streamlines commercial applications of devices that obtain their motion from the deflection of flexible parts rather than from pin joints.

Miniature Unmanned Air Vehicles (BYU)
Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies.

Advanced Communications Technology (BYU)
Improved wireless communications and data transmission is achieved through the use of MIMO (multiple-input multiple-output) technology with multiple antenna elements.

Advanced Structural Composites (BYU) **Graduated**
Developed manufacturing technology and commercial products based on the IsoTruss structures formed from lightweight composite materials.

Advanced Joining of Materials (BYU) **Graduated**
Now a National Center; developed new friction stir welding tools and materials capable of joining a wide range of metals, now being transferred to industry for aerospace, military and other manufacturing.

UNIVERSITY OF UTAH
Technology Transfer Office
615 Arapeen Drive, Suite 310
Salt Lake City, UT 84108
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www.utah.edu
www.tto.utah.edu

Global Knowledge Management (U/U)
Developing Knowledge Fusion and Dynamic Knowledge Refreshing software to enable next-generation data mining technology.

Homogeneous DNA Analysis (U/U)
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office.

Petroleum Research (U/U)
Develops cost-effective solutions for liquid hydrocarbon production, handling and transportation. Optimizes petroleum recovery; process control and production automation in oil and gas fields.

Therapeutic Biomaterials (U/U)
Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs.

Alternate Strategies of Parasite Removal (U/U)
Currently refining a safe, nontoxic and rapid treatment for Pediculosis, a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers

Nanosize Inorganic Material Powders (U/U)
Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for nanotechnology applications.

Biomedical Microfluidics (U/U)
Technology that controls the movement of fluids in channels smaller than a human hair; micropumps that can deliver tiny quantities of drugs are just one product example.

CROMDI (U/U)
Developed new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data, with applications in medicine, finance…

Smart Sensors (U/U)
Engaged in the development and commercialization of sensor-based products, such as an application for the detection of faults in aircraft wiring.

Titanium Boride Surface Hardening (U/U)
Developing harder, longer-lived components and devices for the aerospace, biomedical and industrial markets.

Electronic Medical Education (U/U) **Graduated**
Commercialized tools used to create medical education products, and selling them as a component based medical information management and processing system. Now commercializing distance medical record annotation software.

Acoustic Cooling Technology (U/U) **Graduated**
Developing novel miniature acoustic cooling and power conversion devices without moving parts for applications ranging from computers to refrigerators.

Rapid Prototyping and Manufacturing (U/U) **Graduated**
Has developed the capability of building very large prototypes and techniques for a large number of molded parts from CAD design in a short period of time.

UTAH STATE UNIVERSITY
Utah State University Research Foundation
570 Research Park Way, Suite 101
Logan, UT 84341
435-797-9607
www.usu.edu
www.usu.edu/techcomm

Advanced Imaging LADAR (USU)
Developing an airborne high-resolution, laser-based 3D color-imaging platform for both military and civilian use.

High-Speed Information Processing (USU)
Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices.

Advanced Satellite Manufacturing (USU)
Leveraging the capabilities of Utah's Space Dynamics Laboratory to develop and commercialize a low cost, modular small satellite platform for research, science and military missions.

Profitable Uses of Agricultural Byproducts (USU)
Develops cost-effective technologies to treat animal wastes, generating “biogas” that can be used to produce energy, and nutrients to be used in soil amendments.

Univ.	Cluster	Status	Project Name	Technology Description
U of U	LS	Licensee	Aciont	This novel Visulex system combines an ocular iontophoresis device (a method of delivering drugs to the eye using a mild electrical field) and a drug formulation that delivers large drug molecules (also known as macromolecules) to the back of the eye. The device resembles a contact lens which touches the white part of the eye, which is simple to use and can be administered by a nurse. With our current prototype, we were able to show the delivery of several macromolecule drugs in therapeutically relevant levels to the rabbit eye within a 20 minute treatment. This project intends to show that the non-invasive delivery of macromolecules such as Avastin® can safely and effectively treat age related macular degeneration.
U of U	IT	Licensee	ADD.it	ADD.it software runs on mobile devices where game-like animation and points are given to students with attention deficit disorder (ADHD) when the target school related tasks (organizing & tracking) are actually completed. When children earn points they are validated via wireless links to teachers. During after school hours, points are converted to minutes for play (games, videos, music) on the mobile device. ADD.it will integrate the learning management system (LMS) used by the teacher in order to validate student activities and assignments. Parents will have access to daily information related to their child□s assignments and grades via their own mobile handhelds or computer. ADD.it will help students with ADHD succeed at school related
UVU	MMEE	University	Closed-Loop	Utah is second only to Nevada in discovered geothermal sources and has been described as the Saudi Arabia of geothermal energy. Today□s open geothermal power generation sites use steam coming up through a bore hole to turn turbines at the surface. The release of steam and its re-injection back into the thermal dome create operational inefficiencies and pollution. The Closed Loop Geothermal System (CLGS) is a much-improved platform to enable existing geothermal wells to increase efficiency and reduce pollution. The CLGS seals off the thermal dome and pumps a special type of heat transfer food grade oil through a closed loop piping system that flows down through the dome and up into a water tank at the surface to produce clean steam. CLGS is
U of U	IT	Licensee	Granite Mtn.	Chip power is today's primary challenge in semiconductor design. Applying GMT's "Relative Timing" technology reduces the power consumption of semiconductor chips by a factor of 3 to 10 times. This is the only known methodology today that offers considerable energy reduction. If applied in today's use of semiconductors, GMT's technology would save 9 billion dollars in energy production, and its associated greenhouse gas production. Reductions are accomplished using GMT's relative timing technology that only moves data as needed at the minimal power and required frequency. GMT's relative timing technolgy supports significant chip power reduction contrasted with current design methods that have operations occurring each clock cycle.
U of U	MMEE	Licensee	Heavystone	HSL has developed a tungsten carbide (WC) material technology for improving the performance of tools for drilling Carbon Fiber Reinforced Polymer (CFRP) composites. Conventional WC tools for metal machining suffer from short tool life when used for drilling holes in CFRP due to the presence of cobalt on the surface, insufficient thermal conductivity and the poor wear resistance of the tool material. Unlike conventional WC with microstructure prone to abrasive attack by carbon fibers, HSL's technology increases the wear resistance of the drill by using nanocrystalline grain microstructure and eliminating metal content on the surface. HSL□s WC material technology will potentially improve the tool life of carbide drills for drilling CFRP by

U of U	MMEE	Licensee	Mercury Detection	The Metallosensors, Inc. (MSI) sensing system licensed from UUtah in July 2011 provides both ultrahigh sensitivity and selectivity for detection of mercury ions. The fluorescent light from the sensor dims in the presence of mercury ions. The amount of dimming as measured with a hand-held detector gives concentration of mercury. For the first time, this method allows real-time, in-field monitoring of mercury in natural and man-made water environments. Although MSI's first focus is monitoring water in the US and China, a press release on MSI brought us an unexpected and potentially much larger market opportunity --- mercury monitoring in natural gas and petroleum industries. In partnership with Provo-based Wiltec Research Company, Inc. (WRCI)
U of U	MMEE	University	Nanocrystal Mfg.	Semiconductor nanocrystals (1-100 nm in size), commonly referred to as quantum dots, have enormous potential to improve a wide array of electronic devices. It can function as an excellent light emitter (ex. Quantum dot LEDs and displays), as well as a light absorber (ex. solar cells). However, quantum dots are challenging to produce in commercial quantities due to current expensive and small-scale fabrication methods requiring high temperatures. This impedes their use into real life applications. In contrast to existing techniques, our more cost effective patented manufacturing process operates at lower reaction temperatures. This enables easier upscaling of the synthesis while keeping high product quality and reproducibility.
U of U	LS	Licensee	Navigen	Navigen is developing D-peptide drugs that block entry of the virus HIV into human cells, thereby preventing infection. Our lead candidate called PIE12-trimer is very potent, long-lived in the bloodstream, and demonstrates a best-in-class profile against the virus developing resistance. Navigen is developing derivatives of PIE12-trimer that will persist in the bloodstream for even longer periods of time, thereby further enhancing patient compliance (willingness to take a drug on a chronic basis). In addition to being used to treat infected individuals, such a drug is well-suited for the prophylaxis market to prevent initial viral infection.
U of U	MMEE	Licensee	USBRI	We are commercializing a cost-effective, biological means to remediate acid mine drainage (AMD) wastewaters using a proprietary microbe isolated from a Montana SuperFund site. The acid-loving microbe can be readily cultured on standard media and secretes a slime that rapidly flocculates suspended iron fines in lab studies. A scaled microbial product presents a clear competitive advantage over current methods that use vast quantities of energy-intensive chemicals to neutralize and precipitate metals. Harvested slime represents a cheap, mass produced, stable, non-toxic, biological product that works below pH 4 to address challenging remediation needs in a $500 million/year addressable market. Initial proof-of-concept activities were success
U of U	LS	University	xHA Vaccine	Influenzas evolve constantly. Seasonal flu vaccine (SFV) protection is limited to viruses that are closely related to current vaccine strains, and must therefore be updated and re-administered annually. We have developed broadly cross protective xHA universal flu vaccine (UFV) antigens to circumvent inherent SFV limitations and offer the value-added advantages of extended duration and broad protection against a wide spectrum of circulating & future influenzas. In addition to these significant medical improvements, xHA UFVs will eliminate SFV strain prediction, tight manufacturing schedule and shelf life problems. The xHA UFV broad protection and extended half-life properties will also enable opening of a large new global flu vaccine marke
U of U	LS	Licensee	Viropan	AquaRing, to be marketed as an OTC product, is a novel intravaginal ring (IVR) that is self-inserted and delivers a continuous amount of fluid to the vaginal mucosa for up to 5 days to provide lubrication and moisture to treat vaginal dryness in peri- and menopausal women, and other conditions. It is designed to remain in place for several days, and during intercourse and other activities to replenish the personal moisture needs in the woman's vagina. No other product can provide such personalized vaginal dryness treatment. This product addresses all of the negatives of the current therapies of estrogen replacement, with their risk of cancer and heart disease, and OTC gels, with their messiness and short duration.

U of U	LS	University	Using DNA	ERSA (Estimating Recent Shared Ancestry) is a technology that uses the results of a single-nucleotide polymorphism (SNP) based genetic test along with a proprietary software tool to determine how closely two individuals are related. ERSA is the most powerful and accurate method currently available for detecting relationship between people. It uses a mathematical model of genetic inheritance to interpret high-density DNA genotype data, which are collected using SNP microarrays. ERSA can accurately detect relationships as distant as fifth cousins. ERSA has been published in a peer-reviewed scientific journal and is now being used in biomedical research. Sorenson Genomics intends to offer the ERSA technology as part of a DNA testing service.
USU	MMEE	University	Smart Occupancy	The Smart Occupancy Sensor is a hardware device (CMOS electro-optical/IR LED array) that can be mounted on a ceiling in an office room, where it reliably and near-instantaneously turn lights on when the room becomes occupied and turns them off when it becomes unoccupied. The unique features are: (a) ~5 second response time (compared to 15-20 minutes for motion sensors), (b) It can be configured and setup via software using a graphical user interface, (c) It does not suffer from the infamous 'hand waving' problem that motion sensors do, when users quietly sitting in a room must periodically wave their hands to reactivate the lighting system and (d) It can be upgraded via software updates for daylight aware lighting control and task control.
USU	MMEE	Licensee	WAVE	The Utah State University Research Foundation (USURF), in coordination with Wireless Advanced Vehicle Electrification, Inc. (WAVE) and international R&D institutions, has developed a wireless energy technology for vehicles. This wireless energy technology, known as Wireless Power Transfer (WPT), allows stationary or in-motion vehicles to be charged from an infrastructure embedded under the roadway. Because inductively charged vehicles can receive battery charging en route, there is a significant reduction in the required vehicle battery size. Until now, battery size has been the primary impediment towards the successful market penetration of electric vehicles (EVs). USURF's Energy Dynamics Laboratory (EDL) is the technical body conductin

TCIP FY2013 Round 1 - Grant Awardees

Project Name	Univ.	Cluster	Status	Award Amount	Contact	Description (Summary)	Detailed Description
BlackBox	USU	MMEE	Licensee	$40,000	Zac Humes	Black Box Engineering is developing a solenoid-actuated coanda assisted spray manipulation (CSM) technology that works to change the flow direction of a thermal spray	Black Box Engineering is developing a solenoid-actuated coanda assisted spray manipulation (CSM) technology that works to change flow direction of a thermal spray. Thermal spray devices are used in many industries from clean energy to defense aviation, but they all use a line-of-site process, spraying the process flow in a limited range and requiring manual repositioning for directional change of the flow. Black Box's CSM is unique for its ability to change the direction of the process flow itself as it leaves the nozzle, rather than by moving the entire device which provides precise, rapid control of spray angles over complex geometries, limits over-spray, and increases the efficiency of the process.
BrandHub	WSU	IT	Licensee	$40,000	T Hughes	The BrandHub platform utilizes software that collates and coordinates various social networks into a seamless web page that can be used to augment and manage a brand's social networking presence online.	The BrandHub platform utilizes proprietary software that collates and coordinates various social networks into a seamless web page that can be used to augment and manage a brand's social networking presence online. Clients using BrandHub can easily host and manage all of their individual personalities' content being posted to social media. BrandHub provides tools tailored to the client and their personalities to seamlessly create, post, manage and distribute their content across Twitter and Facebook. BrandHub's design and utility set it apart from our competitors who are primarily concentrated in offering services that encourage end-user interaction exclusively versus social network management. BrandHub allows each user from a Brand to access their accounts both online and mobile to interact with all of their accompanying social networks. Set-up for their white-labeled platform is simple and only requires registering a social network once; Login is remembered and secured through the BrandHub platform. The BrandHub design takes work from our programming team to establish a portal for each brand that is unique and conveys a layer of customization to it. BrandHub plans to make each customer get a portal for their social networking that is consistent with their overall brand look and feel. Thus, we deliver a technology that solves several major problems while providing a consistent end-user experience that is great looking.
DAISI	WSU	IT	University	$40,000	Trevor McKendrick	DAISI is an optical laser technology that counts and measures in-air microscopic suspended particles.	DAISI is an optical laser technology that counts and measures in-air microscopic suspended particles. Real-time analysis of DAISI imagery simultaneously characterizes particle shape, concentration, motion, and optical contrast. Applied to aerosols, DAISI enables more comprehensive characterization of individual particles than is possible with any combination of existing tools.
DecipherGenX	UU	LS	Licensee	$40,000	Dennis Farrar	Decipher is developing the first objective diagnostic tests for CFS, FM & MDD.	Decipher is developing the first objective diagnostic tests for CFS, FM & MDD. Preliminary gene expression results suggest the ability to distinguish between these often overlapping disorders (70% of CFS patients meet FM criteria). A test for FM will be developed initially since the FM patient population is two to three times larger than CFS. There are three current FDA-approved therapeutics to treat FM: Pfizer's Lyrica, Lilly's Cymbalta, Forest's Savella, and it may be possible to identify patients most responsive to a particular treatment using Decipher's biomarkers. Future objectives are to monitor individual patient drug response and predict drug benefit for targeted disorders.
Elute	UU	LS	Licensee	$40,000	Mary Campos	ElutiBone™ is an antibiotic polymer that will aid in resolving associated with orthopedic surgeries.	An antibiotic-releasing degradable polymer coated on widely-used synthetic bone grafts, ElutiBone™, licensed from UofU, seeks to resolve infections associated with orthopedic surgeries. ElutiBone's release kinetics enable sustained antibiotic delivery to orthopedic surgical sites over a clinically relevant 6 to 8 weeks. This is a major advance over currently available bone grafts that release antibiotics over short durations at sub-therapeutic levels, often promoting growth of drug-resistant bacteria. ElutiBone mitigates the threat of costly infections related to joint replacement revision, $50,000 procedures can have up to 15% infection rates and infectious recurrence of 20 to 30%.

TCIP FY2013 Round 1 - Grant Awardees

Project Name	Univ.	Cluster	Status	Award Amount	Contact	Description (Summary)	Detailed Description
ImmViz	UU	LS	University	$40,000	Leonard F. Pease	ImmViz is developing a radioimmunodiagnostics to image and diagnose eosinophilic esophagitis (EoE), an allergenic condition of the esophagus.	We seek support to develop radioimmunodiagnostics to image and diagnose eosinophilic esophagitis (EoE). EoE is an allergenic condition of the esophagus due to invasion and degranulation of eosinophils (a white blood cell) in the esophageal lumen, leading to esophageal occlusion, unexpected emergency room visits, multiple endoscopies and failure to thrive in children. Our noninvasive radioimmunodiagnostic approach combines orally delivered heparin, which binds preferentially to eosinophil granule proteins (negligible in healthy subjects), with radiolabels (negibilble background radiation at energies of interest) to create 3D molecular maps of the entire esophagus. Such maps are unavailable using current techniques, which are invasive.
Jade	UU	LS	Licensee	$40,000	Barbara Wirostko	Jade Therapeutics has invented a novel, locally administered, sustained-release, drug-eluding, bioresorbable product to help address severe, persistent corneal damage associated with ocular injury, disease, or surgery.	Jade Therapeutics has invented a novel, locally administered, sustained-release, drug-eluding, bioresorbable product to help address severe, persistent corneal damage associated with ocular injury, disease, or surgery. The initial biologic being delivered is marketed recombinant human growth hormone, which has already been proven safe and efficacious when used systemically for enhancing and activating growth. Preliminary data indicate that Jade's solution has the potential to meet the need of corneal epithelial surface repair for non-healing corneal defects, improve patient compliance, decrease frequency of topical administration/office visits, and improve visual function and overall quality of life. Currently no approved therapies exist specifically to heal the cornea and no compounds in development are focused on activating cellular healing.
Lazarus	UU	LS	Licensee	$40,000	Harrison Lazarus	Lazarus Medical is developing a moving chest tube that will traverse the thoracic cavity to improve evacuation of fluid without additional surgery.	Stationary chest tubes have been the norm since 1875 and remove only what is in their immediate vicinity. Frequently, additional tubes have to be placed to provide adequate drainage. The moving chest tube will traverse the thoracic cavity to improve evacuation of fluid without additional surgery. Surgically it is expected that a moving chest tube will speed resolution of the patient's problem allowing earlier patient discharge and few complications due to fewer surgical interventions. A prototype built from available chest tubes to demonstrate feasibility is capable of moving in a 180-degree arc. The grant will be utilized to finalize our prototype as well as move forward with testing and development towards commercialization.
Microsurgical	UU	LS	Licensee	$40,000	Jay Agarwal	Microsurgical Innovation is developing a vascular anastomotic device, that will replace the hand suturing technique currently used to connect vessels in microsurgery and macrovascular end-to-end vascular repair surgeries.	The objective of this proposal is to develop a commercially viable vascular anastomotic device, referred to as a vascular coupling device (VCD), which would replace the hand suturing technique currently used to connect vessels in microsurgery and macrovascular end-to-end vascular repair surgeries. This device would consist of a barbed cap that would be placed at the end of each vessel and then connected together to attach the two vessel ends. This approach would reduce the time required in the surgery suite, reduce costs associated with surgery, and reduce the likelihood of failure of the anastomoses, by minimizing human error and stenting open the anastomosis. There are currently no anastomotic devices available that work for both arteries and veins. This technology has the ability to simplify technically challenging microvascular repair and to expand the scope of microsurgery by facilitating these types of procedures in third world countries and in battlefield hospital settings.
NanoSynth	UU	LS	Licensee	$40,000	Swomitra Mohanty	NanoSynth's sensing device is an inexpensive and new rapid sensing methodology for detection of tuberculosis (TB).	The sensing device is an inexpensive and new rapid sensing methodology for detection of tuberculosis (TB) at the point of care based on volatile biomarkers given off by mycobacterium that cause TB. This technology utilizes a solid-state sensor based on functionalized 3D TiO2 nanotube arrays that bind the volatile biomarkers. When the volatile biomarkers bind to the functionalized nanotube, a large change in current (orders of magnitude change) is measured using a potentiostat. The readout is a simple yes/no answer based on the change in current. It is a simple non-invasive diagnostic platform that can be applied to any disease that has a volatile biomarker. The detection is fast (minutes) portable, and requires minimal training to operate.

TCIP FY2013 Round 1 - Grant Awardees

Project Name	Univ.	Cluster	Status	Award Amount	Contact	Description (Summary)	Detailed Description
Navillum	UU	MMEE	Licensee	$40,000	Jacqueline Siy-Ronquillo	Navillum's Semiconductor nanocrystals utilizes a more cost effective manufacturing process which operates at significantly lower reaction temperatures.	Semiconductor nanocrystals (1-100 nm in size), which includes quantum dots, have unique size-dependent optical and electronic properties, enabling never before seen applications to science and technology. Despite their potential to improve a wide array of electronic devices including lighting, display and solar cells, nanocrystals are challenging to produce in commercial quantities. This is due to current expensive and small-scale fabrication methods requiring high temperatures. In contrast to existing techniques, our more cost effective patent-pending manufacturing process operates at significantly lower reaction temperatures. This enables scale-up of the synthesis while keeping high product quality and reproducibility.
TheraTarget	UU	LS	Licensee	$40,000	Darwin Cheney	TheraTarget is developing a degradable, water-soluble, polymer drug carrier to which is attached an anti-cancer drug that is inert while attached to the polymer so it circulates through the bloodstream in an inactive form.	Our polymer drug carrier is constructed of a degradable, water-soluble copolymer (patented), to which is attached an anti-cancer drug. The drug is inert while attached to the polymer so it circulates through the bloodstream in an inactive form. This decreases non-specific toxicity. The drug carrier is small enough to be cleared by the kidneys, yet large enough to remain in circulation for a sufficient time to be concentrated at the solid tumor site. The linkages between the polymer and the drug have been designed to be cleaved only within the cell where the highly toxic drug is released--killing only the targeted cells. The drug carriers that do not reach the tumor cells travel in an inert form to the kidneys and are cleared from the body.
Vaporsens	UU	MMEE	Licensee	$40,000	Benjamin Rollins	Vaporsens, is developing a detector to help public safety officials "sniff" out explosives and narcotics using a patented sensor that is more sensitive than any other on the market.	Vaporsens, is developing a detector to help public safety officials "sniff" out explosives and narcotics using a patented sensor that is more sensitive than any other on the market. What makes the sensor unique are highly absorbing nanowire “nets” that catch chemical vapors from the air. Different nanofibers are responsive to different chemical threats such as narcotics, explosives, or toxic chemicals. The sensor has exceptional speed (milliseconds), sensitivity (parts per trillion), and selectivity. Multiple nanofibers are placed on a single sensor in order to detect multiple targets. The patent pending sensor is based on years of materials science research at the University of Utah and has been partially funded by Homeland Security.
Veristride	UU	LS	Licensee	$40,000	Stacy Bamberg	Veristride is developing a instrumentation worn on the shoes and a phone application (app) interface that provides real-time feedback to physical therapists on a patient's foot measurement and symmetrty	Our "Real-Time Rehab" consists of two components: instrumentation worn on the shoes and a phone application (app) interface that provides user feedback. The phone app provides feedback corresponding to the symmetry of gait, which is a ratio of the left foot's measurement to the right foot's measurement; one represents perfect symmetry (no limp). The user (i.e. with guidance from his/her physical therapist) can set the target symmetry along with an allowed range. The phone app provides feedback that is visual, auditory, or vibrotactile, or a combination. Our solution is unique because other options are orders of magnitude more expensive and require a laptop or commercial motion equipment in order to provide real-time feedback.
XoomPark	WSU	IT	Licensee	$40,000	Ken Frei	XoomPark has created an online marketplace where event goers can conveniently reserve front-row parking at events in advance.	XoomPark creates an online marketplace where event goers can conveniently reserve front-row parking at the hottest events in advance from the closest parking providers. By reserving in advance, event goers eliminate the frustration of finding a quality spot and eliminate the long walk to the venue. Parking vendors are able to increase revenues by up-selling their best parking spaces and electronically collect payment from customers, thus eliminating any cash management problems. XoomPark also helps parking providers create more online awareness about their lots, leading to a decreased vacancy rate.

FY 2013 Round 2 - TCIP Grant Awardees

Univ.	Cluster	Application Title	Type	Technology Description
UU	IT	Add.it 2	Licensee	Add.it software runs on mobile devices where game-like animation and points are given to students with attention deficit disorder (ADHD) and high functioning autism (HFA) when the target school related tasks (organizing & tracking) are actually completed. When children earn points they are validated via wireless links to teachers. During after school hours, points are converted to minutes for play (games, videos, music) on the mobile device. Add.it will integrate the learning management system (LMS) used by the teacher in order to validate student activities and assignments. Parents will have access to daily information related to their child's assignments and grades via their own mobile devices. Add.it will help students with ADHD succeed at school related tasks and will significantly improve communication between teachers and parents.
UU	LS	AdvanceCath	University	AdvanceCath is a urinary catheter designed by a urologist and four engineers at the University of Utah. It is intended to replace Foley catheters, which are notorious for causing urinary tract infection (UTI), for patients requiring catheterization for longer than one day. We believe our new design will reduce the rate of UTI by allowing urine to flow external to the catheter, using the body's natural mechanism for flushing infection-causing bacteria from the urethra. This device will also offer improved safety and comfort for patients due to its significantly smaller diameter and a safe-release bladder retention mechanism.
UU	MMEE (Energy)	Black Wax Fix	Licensee	Newport's chemical formula makes Black Wax from the Uinta Basin flow at ambient temp, thereby allowing it to flow within pipelines. This solution is proprietary and currently no others have been able to duplicate it to our knowledge. Newport will work with UofU to develop a full end to end solution utilizing our chemicals enabling us to sell this total solution to the oil and gas refineries in Salt Lake City.
WSU	IT	BreathAdvisor	Licensee	We've created a touch screen operated breathalyzer that is wall mounted in alcohol serving venues. Our breathalyzer kiosk is the most accurate on the market because we have partnered with LifeLoc technologies to use the same breathalyzer that police agencies use. Because our software development is done in house, we are very agile in our deployment and can quickly adapt to changes. We've created new and innovative ways for advertisers to advertise to the 21+ drinking audience.
USU	IT	CityGro!	Licensee	CityGro technology consists of using Ipad's and Android Tablets to help business create their own network of customers and communicate with them. Marketing is turning digital and our technology allows all SMB's to compete in the digital world. The way this is done is by having consumers "check-in" on the Ipad/Android Kiosk with their phone number. Each customer instantly creates a "user profile" with that businesses. Businesses then send relevant mobile communication to that customer based on what information they have asked for. Businesses are currently using the technology to replace their loyalty program, redeem coupons, track customer buying habits, and save money from "shotgun" approach marketing.
UU	LS	DBS Electrode	University	This new electrode, the DBS10k, will allow for complete control over the electric field's shape and direction. No longer will the field center be limited to the electrode axis, and no longer will it be limited to a spherical shape. Using a unique cross shaped electrode with 10,000 individually controllable contacts, this device is able to shape the field to fit the particular region of the brain that requires stimulation, without crossing over into undesired regions. DBS treatment with this device will be more effective and safe, and more flexible, as it can make complex geometrical stimulation fields that better match deep brain target structures. A better fit means improved efficacy and fewer side effects.
UU	LS	Glaucoma Drugs	University	The UU-AshaVision team has a new approach to treat glaucoma, the most common sight threatening disease in the US. In glaucoma, the inner retinal tissue is destroyed, and the pressure inside the eye (IOP) increases. Current treatments slow disease by lowering IOP, but do not protect the inner retina. We developed topically active drugs that both lower IOP and protect the retina. Moreover, our drugs lower IOP for twice as long as current medications and block the disease in an animal model of glaucoma. The Trioptrx™ compounds and mechanism of action are novel and proprietary. This TCIP will be used to protect and improve the compounds, perform toxicity and pharmacokinetic tests, and advance the drops to primate studies.
UU	LS	iVeena	Licensee	The Bioerodible Ophthalmic Delivery System (BODS) is an annular shaped ophthalmic implant that is designed to fit in the anterior segment of the eye. It is being designed to safely and effectively deliver anti-angiogenic protein drugs to combat age-related macular degeneration for 9 months to a year during which the BODS will slowly degrade until it is entirely eliminated by the body. The manufacturing process allows for superb drug stability with one step mixing & extrusion at low temperatures (< 42° C) with no organic solvents necessary. All of the materials used in manufacturing have safely been used in the body previously and will be GMP quality. To date, there are no FDA approved large molecule sustained release products for the eye.

UU	MMEE	Metallosensors	Licensee	The MSI technology licensed from the UUtah provides a portable, easy-to-use chemical sensor with high sensitivity and selectivity for detection of mercury ions (Hg2+). Decreased fluorescent light from the chemical sensor-Hg2+ complex gives fast quantitation. The QuikChek-Hg™ system has a re-usable hand-held fluorimeter and single-use sensor solutions. This razor/razor blade model has five pending patents. The 1st TCIP grant tested MSI's system with hydrocarbons that require pre-treatment to convert total mercury into mercuric ions. A 2nd TCIP grant would give MSI short- and long-term impact: (1) simplify Hg detection for WRI to speed work flow, and (2) develop an MSI-Thales device to reduce long, toxic lab work for total mercury analysis.
UU	LS	MFI	Licensee	MultiFunctional Imaging (MFI) is a development stage University of Utah healthcare technology start-up that improves the efficiency and accessibility of Myocardial Perfusion Imaging (MPI), via PET/CT scanners. MFI's patented technology increases patient throughput and scanner utilization, reduces costs, increases image quality and delivers patient safety through the reduction of radiation exposure.
UVU	LS	PBIT	Licensee	Optimize sensitivity of hair peptide MS delivery. The DNA in hair is very informative, but it is often absent or degraded. Hair however, has one major advantage: the proteins are stable. The proteins in hair persist in the environment well after DNA is degraded. Proteins however, contain evidence of DNA variation, and therefore can be used to identify crime victims and / or suspects. We have established a proof-of-concept technology, that uses less than a mg of hair protein to identify individual peptide fingerprints with up to a 1 in 200,000 probability for an individual. A racial likelihood of 700-fold (for a European Background) was also calculated. We seek in this proposal to protect the intellectual property, develop a graphic user interface and do R&D to increase the sensitivity of the analysis.
WSU	MMEE	Plane Winglets	University	The Vortex Winglet Technology provides up to a 12% increase (from 3 years of Vortex test data) in either operational efficiency or air speed for no additional increase in engine power for the aircraft owner. Current general aviation winglet designs are expensive and only marginally efficient. Due to patented, proprietary technology, the Vortex winglet design dramatically reduced the drag created by a typical wing as it flies through the air. This reduction in drag equates to the improvement in either operational efficiency or air speed for the aircraft owner / pilot.
UU	LS	Veristride	Licensee	"Rapid Rehab" is an instrumented insole worn in the shoes and a phone application (app) to provide user feedback. The proprietary insole measures forces, timing, and movement of each foot. The phone app provides real-time adaptive feedback about how the user is walking. Feedback is visual, auditory, or vibrotactile, or a combination. Amputees can use the system to reduce how much they limp, by setting a target symmetry for timing and force within an allowed range (with guidance from a physical therapist). Our solution is unique because other options are orders of magnitude more expensive and require a laptop or commercial motion equipment. Our product is designed for at-home use for a variety of activities compared to current clinical use.
BYU	LS	XOJO	Licensee	The XOJO technology developed at BYU and exclusively licensed to XoomDrinx is a novel nutritional technology and method of manufacture which finally allows consumers to take protein during exercise without the negative gastric problems associated with other protein products that are restricted for use before and after exercise. Independent studies show that protein taken during exercise enhances aerobic endurance and improves muscle recovery. Consumers must binge on high levels of protein before and after exercise and don't get the full benefits of protein during exercise. Using a new method of manufacture, XOJO delivers iso-osmotic proteins which can be taken during exercise without the negative effects. In addition, XOJO offers consumers the 3-in-1 benefits of hydration, performance and recovery in a single bottle.

Governor's Office of
Economic Development
Centers of Excellence

Gary R. Herbert

Governor

ANNUAL REPORT

Centers of Excellence Program
(renamed)
Technology Commercialization and Innovation Program

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Fiscal Year: July 2010 – June 2011

Fiscal Year 2010-11
GOED Centers of Excellence Program becomes the Technology Commercialization and Innovation Program

"Smaller, Lighter, Faster"

The Utah Centers of Excellence program, now renamed the Technology Commercialization and Innovation Program, is a state-funded grant program developed by the Utah Legislature in 1986 to accelerate the commercialization of promising technologies that have strategic value for Utah. The end goal of the COE Program, now TCIP, is to help drive economic development and job creation by supporting the transition of the valuable technologies out of the lab and into industry.

The state of the startup and technology commercialization markets has changed significantly over the past 3-5 years, both nationally and in Utah. In response to these changes, including changes in regulatory environments and challenges in the capital markets for new technology ventures, the COE Program Director and GOED management felt that a review of the program's effectiveness was needed. GOED convened a wide array of colleagues form the community to discuss the program and identify opportunities for continuing improvement. This program transition led the legislature to rename the program to the Technology Commercialization and Innovation Program, in March of 2011.

Under the review process, GOED adopted the following Vision Concept:

Improving the velocity and quality of university/college-related startup deal flow.

The following items were identified as needed to foster success:

- Capital
- Human Capital
- Collaboration

The following items were identified as Key Trends in the private startup economy:

- Invest in Entrepreneurial Talent
  - Training and Mentoring startups
  - Key trend around the country in for-profit and government groups
- Funding Programs
  - Small, Light, Fast
- A Broad Embrace of university driven technologies

From this vision and insights from the private sector, the following principles were identified as a framework for evaluating the COE program:

- Smaller funding amounts than existing COE program
- Lighter overhead than existing COE process
- Faster turnaround with multiple grant opportunities each year
- Broad embrace of university/college driven technologies
    - Ranging from professors with technologies preparing to emerge from lab, to licensees of a university developed technology, to companies with an affiliation with a university or regional institution of higher education.

The vision for the updated program included an "affiliate" program, and this was piloted during the both reviews of the 2010-11 fiscal year. However, after the pilot testing of the affiliate program, it was decided that better statutory clarification would strengthen that portion of the program and it was put "on hold" for the 2011-12 fiscal year.

The final plan for 2010-11 fiscal year for the updated program, which emerged from broad consensus about these principles, was to offer smaller, shorter solicitations three times during each fiscal year (July 1 to June 30th). In order to facilitate the selection of more teams, more often, the COE program is no longer an open solicitation. Instead, there is now a prescreening mechanism to the application process which is performed by the following entities:

- PhD granting colleges and universities (Utah State University, U of U, and Brigham Young University) which have commercialization offices (TTO/TCO)
- Utah Science Technology and Research (USTAR) Technology Outreach and Innovation program (TOIP)

These organizations pre-screen applicants and recommend those that they believe are prepared to take maximum advantage of the COE program.

Other changes in the 2010-2011 solicitation include:

- Simplified application form for quicker submission and review
- Maximum grant funding for each proposal is $40,000. If successful, a team may apply for future funding one additional time (maximum of $80,000 total)

The frequency of the solicitations combined with the smaller total funding amounts constituted a significant change for the program, but these reflect the successes in the private sector of "smaller, lighter, faster" entrepreneurial support programs. In addition, the vision for the program includes an "entrepreneur in residence" program that will

provide for entrepreneurs with significant experience in raising funds and successfully building companies around sophisticated technologies to assist grant recipients. This "EIR" portion of the new program was not implemented in 2010-11 due to staffing constraints, but is expected to be implemented in 2011-12.

The measuring stick for the TCI program is still quality jobs, with an emphasis on both the value and pay of jobs created and the number of jobs created in Utah. Many of the teams that are applying for COE/TCIP funding either are or will lead to startup companies. The intention of the program is that these startups will begin and stay in Utah and this is also a key measure of the success of the program.

These changes were launched on a pilot basis in the fall of 2010. During the 2011 Legislative session, the Legislature formally changed the name of the COE Program to the Technology Commercialization and Innovation Program, which better represents the vision and focus of the program.

Awardee Review

The TCI Program offered 2 grant opportunities in FY 2010-11, referred to as "round 1" in November of 2010 and "round 2" in April of 2011.

Round 1

The first round of the 2010-11 funding reviews was conducted during fall of 2010. The deadline for proposals for this round of funding was Monday, November 22, 2010. The review process was conducted in early December.

For this round of funding, 45 applications were received, for a total funding request of over $1.7 million. Of these 45 applications, 21 were awarded a TCIP grant. Recipients included 12 Licensee companies, 5 Affiliate companies, 2 University of Utah teams, and 2 Utah State University teams. 10 Awardees are from the Cluster category of Manufacturing, Materials, Energy and Environmental (MMEE) technologies, with 7 in Life Sciences and 4 in the Information Technology Cluster. Five technologies emerged from Brigham Young University, eleven from the University of Utah and five from Utah State University. Total funding awarded during this round was approximately $787,500.

Round 2

The second round of the 2010-11 funding reviews was conducted during early summer of 2011. The deadline for proposals for this round of funding was Monday, May 30, 2011. The review process was conducted in early June.

42 applications were received for a total funding request of just under $1.7 million . Of these, 22 were awarded a TCIP grant, of which 2 were 2nd time applicants - 14 Licensee companies, 5 Affiliate companies, 2 University of Utah teams, and 1 Utah State University team. 3 Awardees are from the Cluster category of Manufacturing, Materials, Energy and Environmental (MMEE) technologies, with 9 in Life Sciences and 10 in the Information Technology Cluster. The funding total in Round 2 was $879,000

The technologies are emerging from the following universities:

12 of 22 from University of Utah
5 of 7 from Brigham Young University
3 of 9 from Utah State University
1 of 2 from Salt Lake Community College
1 of 1 from Utah Valley University
0 of 1 from Weber State University

SUMMARY

With 87 grant applications totaling approximately $3.4 million in funding requests, a budget and 43 grants awarded this year, providing a total of $1,666,500 in funding, the TCI program is clearly filling a significant need in the process of converting college and university developed technologies into products, companies and jobs for Utah.

Funding Recipients for the 2010-11 Centers of Excellence Program – Round 1 Solicitation November - December 2010

Total proposals submitted: 45

Total awarded funding: 21

12 Licensees
5 Affiliates
2 Internal University of Utah teams
2 Utah State University internal teams

The technologies are emerging from the following universities:

Brigham Young University – 5
University of Utah – 11
Utah State University - 5

LICENSEES

Anaerobic Digestion Technologies, Inc.

CEO/Principal: Jason Miller **University:** Brigham Young University

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 – Company

Cluster: Life Sciences

A patent-pending, low-cost, low-maintenance, scalable methane filtration solution. The system is comprised of multiple filter cylinders and gas routing hardware, with an automated electronic control system. The BCS is skid-mounted for easy delivery and installation. The System removes corrosive contaminants and impurities from well-produced and waste-generated methane gas streams at 1/10th to 1/15th the cost of currently marketed technologies. Hydrogen sulfide, water, and other destructive agents are extracted to negligible levels by the BCS, significantly prolonging the life of pipeline infrastructure and electrical generation equipment associated with gas resources. Ground-breaking innovation is manifest in the thermal management system of the BCS. Low levels of excess system heat are utilized to replenish the filter beds and release contaminants in a concentrated gas stream. Successful management of this process makes the system unique and industry-changing in character.

Aviradyne Technologies, Inc.

CEO/Principal: Ronald D. Jones **University:** Utah State University

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 – University

Cluster: Materials, Manufacturing, Energy, Environment

Hybrid rockets are significantly safer than Liquid and Solid counterparts. Hybrid motors can be stored and operated without risk of explosion. This makes hybrids ideal for commercial spaceflight except for two significant short-comings attributable to current manufacturing processes: motor-to-motor variability that precludes motor clustering, and lack of a for volume production method to support the required flight rates for the growing commercial space launch industry. The proposed production method uses robotic manufacturing technologies to effectively remedy both of these deficiencies: Digital-Direct Manufacturing to fabricate hybrid rocket fuel grains that are uniformly produced, and Filament/Tape Winding systems to form the composite case and assemble the motor in a single process. Factory automation and application of advanced polymer materials will significantly reduce motor-to-motor performance variability, enable FAA certification, and cut production costs by more than 50%.

Black Box Engineering, Inc.

CEO/Principal: Zac Humes **University:** Utah State University

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 – Company

Cluster: Materials, Manufacturing, Energy, Environment

Coanda Assisted Spray Manipulator (CSM) gives the user the ability to change the direction of the flow of flame and particles leaving existing flame spray guns. The CSM will be designed as an add-on to existing flame spray gun technology. These flame spray guns are used for coating the interior of pipes, cylinders, and other surfaces using different materials. The coatings are used to improve performance of the substrate and reduce maintenance costs. Current technology limits this process to being performed on large diameter pipes, usually greater than 48 inches in diameter, because it requires a person to be inside the pipe to control the direction of the flow. The CSM device will allow the process to be completed on smaller diameter pipes and surfaces without the need for human labor to control the direction of the flow. This process will also be completed more quickly, accurately, and affordably as it removes the need for such intensive manual labor as is currently necessary.

CAT-Credibility Assessment Technologies

CEO/Principal: Donald R. Sanborn **University:** University of Utah

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 – Company

Cluster: Information Technology

Oculomotor Deception Detection© (ODD) holds significant promise for numerous security screening and intelligence applications. This revolutionary technology, based on five years of scientific research, provides a powerful new methodology for detecting deception. The ODD measures cognitive responses to deception as detected by a highly accurate eye tracking system that records eye movements and pupil diameter changes as a subject reads true/false questions presented by a computer. The current standard for lie detection technology is the polygraph which takes up to 3 hours to administer, requires a highly skilled examiner, costs about $970 and is 85% accurate. The ODD test takes only 25 minutes, is easily-administered by minimally trained examiners and costs a fraction of the polygraph with the same accuracy.

Crocker Spinal Technologies

CEO/Principal: David Hawkes **University:** Brigham Young University

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 - University

Cluster: Life Sciences

The FlexSuRe™ is a spinal implant developed at Brigham Young University and licensed by Crocker Spinal Technologies, Inc. The FlexSuRe™ was designed to restore stability to the spine after surgeries such as discectomy or laminectomy. It shares load with other spinal structures, maintaining healthy motion while providing mechanical resistance to painful, nonphysiologic motion. The existing FlexSuRe™ is already market-separated due to its unique compliant-mechanism design. However, based on recommendations by the surgeon advisor board advising Crocker Spinal Technologies, the implant can be improved to increase its market acceptance. The COE award will be used to change the existing design to decrease size, modify orientation, and restore height to the segment. As a result, the device will restore nutrient flow to the disc while biomechanically mimicking the motion of a healthy segment. These characteristics make the device forward-looking to complementary technologies for spinal disc regeneration.

E-Sens (Formerly Sensicore China)

CEO/Principal: Jack Buchanan **University:** University of Utah

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 – Company

Cluster: Materials, Manufacturing, Energy, Environment

Sensicore has developed a silicon-based chemical sensing technology to address the world's water monitoring needs. The company's lab-on-a-chip sensors monitor multiple chemicals with an array of sensors selective to different analytes. The sensor array takes advantage of the mass fabrication manufacturing technology of the semiconductor industry to produce a low cost per test solution. The sensor array chip will be replaced periodically, eliminating the need for constant maintenance of the sensors. Its small size reduces the need for calibration solution, making it practical to produce small hand-held sensing systems, and to implement remote, unattended sensor network nodes.

HOT Water Global

CEO/Principal: Brandon Lloyd **University:** University of Utah

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 – University

Cluster: Materials, Manufacturing, Energy, Environment

This new technology involves repeated pressure cycles each consisting of a compression stage and a venting stage. The compression stage reaches 100-150 psi in the headspace of a closed vessel by use of a compressor, saturating the water being treated with an ozone/air mixture. The venting stage (to ambient pressure) produces rapidly expanding gas bubbles of all sizes from nano, micro, and centimeter sizes that provide abundant reactive interfacial ozone for ozone and contaminants. Repeated pressure cycles result in conversion of dispersed and dissolved oil into forms that can be removed by conventional sand filtration or biodegradable products. This project will use a pilot reactor (200 L) to demonstrate treatment of produced water and flow-back water from the oil and gas industry. The process represents an application of University Technology (U-3996).

Microsurgical Innovations

CEO/Principal: Jay Agarwal **University:** University of Utah

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $20,000 – Company; $20,000 – University **Cluster:** Life Sciences

An arterial anastomotic device, referred to as an arterial coupling device (ACD), which will replace the hand suturing technique currently used to connect arteries in microsurgery and macrovascular end-to-end arterial repair surgeries. This device would consist of a barbed cap that would be placed at the end of each artery and then connected together to attach the two arterial ends. This approach would reduce the time required in the surgery suite, reduce costs associated with surgery, and reduce the likelihood of failure of the anastomoses, by minimizing human error and stenting open the anastomosis. There are currently no arterial anastomotic devices available. This technology has the ability to simplify technically challenging microvascular repair and to expand the scope of microsurgery by facilitating these types of procedures in third world countries and in battlefield hospital settings.

TranquilMed

CEO/Principal: Jared Edgel **University:** Brigham Young University

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 - Company

Cluster: Life Sciences

RestEasy will be the only non-drug treatment for Restless Legs Syndrome (RLS) on the market. It uses patent pending treatment of near-infrared light that penetrates the skin deep into the tissue. Dr Mitchell's studies show 52% reduction in RLS symptoms in 12 treatments and give a p-value less than 0.001. Our device consists of a neoprene pad with adjustable straps. The back of the pad has an array of LEDs that when applied to the lower leg emits near-infrared light that penetrates the skin. This releases Nitric Oxide which then causes the blood vessels to dilate. Vasodilation in turn increases blood flow, satisfying the urge to move and mitigating RLS symptoms. Features for safe home-use and convenience include: a lithium-ion battery that allows free movement during treatment and a control interface that is simple to use. Additionally the device has thermocouples in place to shut the device down if the temperature of the leg gets too high.

Solan LLC

CEO/Principal: Brandon Lloyd **University:** University of Utah

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 – Univ

Cluster: Materials, Manufacturing, Energy, Environment

A technology that will fabricate solar cells based on lithographically defined graphite, so-called carbon nanoribbons (CNRs). The electronic properties of CNRs exhibit a dependence on the ribbon dimension. Reducing ribbon width to nanometer scale can turn graphite into a semiconductor, and with the proper selection of metal contacts with different work functions (ϕ), one can form Schottky barrier solar cells. Upon excitation of the incident light, free electrons and holes will be generated within CNRs. Due to device building-in potential, which equals to the difference in ϕ between the two metal leads, free electrons and holes will be extracted to the electrodes, generating electricity. Due to the abundance of graphite material and convenience to tune the material bandgap, we expect to fabricate low-cost and high-efficiency solar cells. A patent, filed on this invention jointly by University of Utah and University of Wisconsin-Madison, has been allowed and licensed to Solan.

Veritract, LLC

CEO/Principal: Arlo McGinn **University:** University of Utah

Affiliate/Licensee/Univ.: Licensee **Award Amt.:** $40,000 - Company

Cluster: Life Sciences

Nasogastric feeding tubes are the most commonly placed gastrointestinal devices in hospitals today. Over 80% of ICU patients and many more patients in general hospital floors (1.25 million total US patients) receive nutrition via these tubes. Because most of these feeding tubes are placed blindly, without any guidance, many thousands of these tubes are misplaced to the lung causing serious injury and even death. To verify proper placement, most hospitals require X-ray confirmation of tube placement but incur significant extra expense as a result.

Veritract leverages the advancements made in endoscopic technology to allow these technologies to be built into an inexpensive disposable device. Our design integrates optics for vision, and steering for guidance, allowing feeding tubes to be guided and placed into the intestinal tract under direct visualization. This allows for a much quicker,

safer, and economical placement and improves patient care while streamlining hospital procedures.

AFFILIATE COMPANIES

Cajun Archery

CEO/Principal: David White

University: Utah State University

Affiliate/Licensee/Univ.: Affiliate

Award Amt.: $12,500 – University

Cluster: Materials, Manufacturing, Energy, Environment

Through a market analysis, Cajun Archery, a manufacturer and supplier of bowfishing equipment, has identified a need for a bowfishing reel. Currently, there are two bowfishing reels that dominate the bowfishing market. One of these reels releases line very efficiently, while the other retrieves line well. Neither reel excels at performing both of these tasks. This project is to design a bowfishing reel that is able to both release and retrieve line efficiently, is easy to operate, requires minimal maintenance, and is cost effective to manufacture. Through the use of computer-aided design (CAD) rapid prototyping, and computer numerical control (CNC) machining the Research Group for Product Engineering and Prototyping at Utah State University is able to quickly design, test and develop products to meet market demands. Through the engineering design process we will be able to meet design criteria and reduce commercialization risks for Cajun Archery.

Domain Surgical, Inc.

CEO/Principal: David J. McNally

University: University of Utah

Affiliate/Licensee/Univ.: Affiliate

Award Amt.: $40,000 – Company

Cluster: Life Sciences

Surgery requires the cutting and coagulation of bleeding tissues and vessels, as well as the re-attachment of tissues or their destruction. Because of this, a large market has evolved based upon the promise of improved outcomes related to the excision, dissection, hemostasis, and healing of tissue. Many innovations have been introduced in recent years, but many surgeons are still dissatisfied that there is not a tool that meets all the criteria. Our patent-pending ferromagnetic inductive heating technology holds the promise of producing surface-only tissue effects with energy that does not pass through the patient; frictionless cutting with elimination of tissue distortion and sticking; on-demand rapid onset and offset of effect as various tissues or bleeding are

encountered; and easy cleaning and disposability. These attributes position our technology as an ideal energy modality for cardiothoracic surgical procedures.

Enerlyte, LLC

CEO/Principal: Seth M Phillips **University:** Brigham Young University

Affiliate/Licensee/Univ.: Affiliate **Award Amt.:** $40,000 - Univ

Cluster: Materials, Manufacturing, Energy, Environment or Information Technology

Enerlyte's intelligent, clean technology, energy conservation program is a revolutionary web-based software for tracking energy efficiency & conservation. The software tracks both user activity and results of utility conservation programs. Using system data, Enerlyte software makes recommendations to users and utilities for improving energy usage. Users get graphs and customized tips on their monthly utility bill. Utilities get an online dashboard providing usage analysis that maximizes utility ROI for each dollar spent on efficiency & conservation. Enerlyte groups users into peer groups (households with similar size/age of home, family size, location, etc.) and monitors changes in energy use when users take specific actions to conserve. Enerlyte's product uniquely addresses both user & utility demand for energy usage information that can lead to improved efficiencies in energy usage & conservation.

Euclid Timber Frames LLC

CEO/Principal: Kip Apostal **University:** University of Utah

Affiliate/Licensee/Univ.: Affiliate **Award Amt.:** $7,500 – Company;
$7,500 – University

Cluster: Materials, Manufacturing, Energy, Environment

Interlocking Cross Laminated Timber (ICLT) is a prefabricated cross-laminated solid wood wall and roof panel fabricated from 2-5 layers of alternating direction 3” x 6” to 3” x 8” pine stock milled from beetle kill trees. ICLT utilizes no fasteners and no adhesives, removing the reliance on volatile organic compound (toxic) adhesives, allowing the panel to be disassembled at end of life to be repurposed in the building material supply chain. Layering gives the panel strength, allowing low-grade wood to be used in a high value structural situation, estimated to last upwards of 100 years. ICLT can be built up to nine stories in some cases, efficient in speed of construction, and given the availability of material, potentially affordable for both production home building and large commercial structures. This proposal is for ICLT commercialization research between university and industry in preparation for market acceptance in the next two years.

Fusion Diagnostics

CEO/Principal: Ben Rollins **University:** University of Utah

Affiliate/Licensee/Univ.: Affiliate **Award Amt.:** $40,000 – Company

Cluster: Life Sciences

Developing glasses with a novel coating that blocks the light spectrum that triggers migraines and other neurological disorders such as blepharospasm. By wearing these coated glasses, migraine sufferers may experience significant reduction in the frequency and severity of their migraine attacks. These coatings can be applied to spectacle lenses, contact lenses, and various types of light sources.

Linear Signal, LLC

CEO/Principal: Greg Mockett **University:** Brigham Young University

Affiliate/Licensee/Univ.: Affiliate **Award Amt.:** $40,000 – University

Cluster: Information Technology

Traditional satellite dish antenna technology suffers from quality of service problems due to poor mount installation, wind loading, rain, roof sag, and satellite orbital wobble. Smart electronically steered phased array feed antennas adjust the antenna beam adaptively to maintain maximum signal quality. Linear Signal has developed a critical enabling part for smart antennas, an integrated beamformer chip, which will be combined with high efficiency, low noise phased array antenna technology developed for radio astronomy by Prof. Warnick at Brigham Young University to produce smart antenna feeds for commercial satellite antennas on buildings, aircraft, vehicles, and ships.

UNIVERSITY TEAMS

Large-Scale Semiconductor Nanocrystal Fabrication

CEO/Principal: Michael H. Bartl **University:** University of Utah

Affiliate/Licensee/Univ.: University of Utah **Award Amt.:** $40,000 – Univ

Cluster: Materials, Manufacturing, Energy, Environment or Information Technology

Nanocrystals (1 to 100 nm in size) are considered cornerstones of emerging energy, information, and biomedical technologies due to their unique size-dependent electronic and optical properties. However, their widespread use is severely limited by current high-cost and small-scale fabrication methods requiring high temperatures. In contrast to existing techniques, we have developed a novel synthesis method for high-quality nanocrystals that operates at low reaction temperatures (patents pending). Our method promises enormous impact for commercial applications, since low-temperature synthesis enables easier scale-up (high throughput fabrication) with reduced engineering requirements while keeping high product quality and reproducibility. Moreover, our method uses inexpensive, industry-tested and reusable reaction components (e.g. solvents) and therefore should not only result in significantly reduced manufacturing costs, but also in environmentally-friendlier "greener" fabrication.

Smart Antenna Technology

CEO/Principal: Bedri A. Cetiner **University:** Utah State University

Affiliate/Licensee/Univ.: Utah State University **Award Amt.:** $40,000 – Univ

Cluster: Information Technology

The technology developed at Utah State University is an adaptive smart antenna technology that enables a single antenna element to dynamically change its properties such as operation frequency, beam direction, and polarization. An adaptive antenna is an indispensible part of the next generation wireless communications systems such as upcoming 4G systems in order to achieve targeted system performances, i.e., higher data rate, capacity, etc. With the existing technologies for a system to provide dynamically adaptive features, a large number of antennas in conjunction with ancillary electronic components need to be used. The existing technology, therefore, is cost and size prohibitive for commercial wireless systems. On the other hand, our technology provides a superior performance with a single antenna element which can be realized at low cost and size. The microfabrication technology developed by the PI’s research

group, which will be patented by the Utah State University TCO, is based on a novel microfluidic technology

Smart Occupancy

CEO/Principal: Aravind Dasu **University:** Utah State University

Affiliate/Licensee/Univ.: Utah State University **Award Amt.:** $40,000 – Univ

Cluster: Information Technology

The Smart Occupancy Sensor is a dual mode hardware device (Passive IR + Video camera) that can be mounted on a ceiling in an office room, and expected to reliably and near-instantaneously turn lights on when occupied and turn them off when unoccupied. The uniques features are: (a) Its response time is ~5 seconds compared to 15-20 minutes for motion sensors, (b) It can be configured and setup via software using a graphical user interface, (c) It does not suffer the infamous 'hand waving' problem that motion sensors do, and (d) It can be upgraded via software updates for daylight aware lighting control and task control.

Trace Explosives Detection

CEO/Principal: Ling Zang **University:** University of Utah

Affiliate/Licensee/Univ.: University of Utah **Award Amt.:** $40,000 - Univ

Cluster: Materials, Manufacturing, Energy, Environment

Portable devices that are suited for infield explosives detection. The sensory materials are composed of well-defined nanofibers fabricated from different building-block molecules. As covered in our five IPs, the nanofibers are highly efficient for vapor detection of explosives, via optoelectronic modulation upon interaction with the targeted explosives. Upon integration into a small chip, the entangled nanofibers form a mesh-like, highly porous film, providing maximal sampling of explosives, enabling expedient vapor detection with unprecedented efficiency (down to ppt range). This is superior to the common solid film-based sensory materials, for which the sampling of trace analysts remains difficult due to the limited surface area. Compared to conventional electronic detection systems like those based on MS or IMS, the nanofibers represent a class of simple, small and adaptable detection system.

Funding Recipients for the
2010-11 Technology Commercialization and Innovation Program
Round 2 Solicitation - April – May 2011

Total proposals reviewed: 42
Total recommended for funding: 22
- **Licensees: 14**
- **Affiliates: 5**
- **University of Utah Internal teams: 2**
- **Utah State University internal teams: 1**

The technologies are emerging from the following universities:
- **12 of 22 from University of Utah**
- **5 of 7 from Brigham Young University**
- **3 of 9 from Utah State University**
- **1 of 2 from Salt Lake Community College**
- **1 of 1 from Utah Valley University**
- **0 of 1 from Weber State University**

FUNDED

Licensees

Aciont

CEO/Principal: John Higuchi **University:** University of Utah

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Life Sciences

The project is a preclinical proof of concept research plan as a premise to create the ultimate achievement in ophthalmic therapy: to treat non-invasively, age related macular degeneration (AMD) and diabetic retinopathy. The project intends to develop a safe and an effective, an approximate 20 minute iontophoresis treatment for the delivery of macromolecules such as Avastin® to the posterior section of the eye, which can be administered by a nurse or paraprofessional or potentially, patients themselves. This Visulex® system is a combination novel ocular iontophoresis device - an eye applicator resembling a scleral lens - and enhancement formulation capable of delivering large, antibody agents to the posterior segment of the eye. Iontophoresis is a method of delivering drugs through body tissue using the aid of a mild electrical current. Visulex offers a customized, localized controlled release therapy designed to minimize unnecessary patient exposure to the drug.

Akadi Technologies

CEO/Principal: Wes Christiansen **University:** University of Utah

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Information Technology

Akadi digital signage is unique in that it creates a network of displays, organized by time, geographic location and demographic audience which can be managed by any user from any web enabled device. Value in the network increases as the reach of the network grows, enabling advertisers and diverse interest groups to target unique audiences with specific and relevant information. For advertisers to be successful today they have to stand out! Success in business today is less about advertising and more about connecting through social media, viral messaging and other meaningful interactions. Targeted messaging and information that is personalized and relevant is the only way to reach through the clutter of messages we are bombarded with on a daily basis. Akadi Technologies is perfectly positioned to be able to leverage a number of technologies, existing and currently under development, to redefine digital signage and targeted and interactive messaging.

AnalySwift

CEO/Principal: Allan Wood **University:** Utah State University

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Materials, Manufacturing, Energy, Environment/Information Technology

VABS is a unique technology capable of rigorously modeling 3D slender solids with complex microstructures, such as wind turbine blades, helicopter rotor blades, bridges, and other beam-shaped structures. VABS has been consistently demonstrated to be much better than other technologies regarding accuracy, efficiency, and versatility. This technology can save several orders of magnitude in computing time with little loss of accuracy and is gaining an international reputation in rotorcraft and wind power industries. Major companies such as Boeing, Siemens, AeroVironment have licensed VABS. All the other competitive technologies have a very limited set of capabilities and few of them can treat composites which are extensively used now. Furthermore, none of the existing tools have a strong endorsement from the research-oriented community as

VABS has. We strongly believe that VABS will become a very competitive product and the tool of choice for modeling composite beam structures.

Credibility Assessment Technologies

CEO/Principal: Donald R. Sanborn **University:** University of Utah

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Information Technology

Ocular-motor Deception Test (ODT) is the first major breakthrough in deception detection technology in 20 years, with numerous security screening and intelligence applications. This revolutionary technology provides a powerful new methodology for detecting deception. The ODT measures cognitive consequences of deception with a highly sensitive eye tracking system that records eye movements and pupil diameter changes as the subject reads true/false questions presented by a computer. The ODT compared with other technologies like the polygraph, it is more competitive: It is easily-administered, takes only 25 minutes, is cost effective, achieves the same accuracy (85%), can be administered in multiple languages and settings, facilitates high volume testing, and is customizable to different needs. In conclusion, the ODT reduces the need for time-consuming and expensive polygraph examinations and brings simplicity, speed, and convenience to screening process.

Epitel

CEO/Principal: Mark Lehmkuhle **University:** University of Utah

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Information Technology/Life Sciences

A small, user friendly, wireless device for human EEG monitoring is currently lacking. We propose an individual-use patch-type telemetry device for simplified EEG recording from human patients. This device will enable user-friendly application of the EEG electrode and real-time recording of the EEG signal either in the ICU, in an out-of-hospital setting (e.g., the home or work environment), or for research (e.g., antiepileptic drug testing). The device will consist of a small EEG electrode/transmitter unit that both wirelessly transmits EEG signals to a receiver and “logs” EEG data for later retrieval. The only component placed on the patient will be a small unit that is roughly the size of a Band-Aid™ and will have the look and feel of a “patch.” Our primary objective is to create a user-friendly, unobtrusive device that can be used to reliably record acute

and/or chronic electrographic seizures under conditions where traditional ambulatory EEG is not feasible or practical.

H2O TECH

CEO/Principal: Timothy Nelson **University:** Brigham Young University

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Life Sciences/Materials, Manufacturing, Energy, Environment

The Neptune Water Drill provides a scientifically engineered jet stream of water that is less than the thickness of a piece of paper, mixed with tiny particles of abrasive that removes dental caries. It is the most precise cutting device in the dental industry (the Neptune water drill stream diameter is 1/7 the thickness of the most used dental drill bits), which improves the art of dentistry and increases patient satisfaction.

It is a patented invention of Dr. Robert Todd, Professor of Mechanical Engineering at Brigham Young University and Scott C. Hansen. Major benefits include: (1) precision-cutting dentistry, (2) no heat from friction, (3) natural matte finish eliminates phosphoric acid etchings in the drilled out cavity, (4) no drilling sound or vibrations, (5) less irritation of the nerves, (6) reduced need for anesthesia, (7) less post operative pain, discomfort and chance for infection, (8) and lower risk of reoccurring dental caries.

Knudra Transgenics

CEO/Principal: Chris Hopkins **University:** Salt Lake Community College

Affiliate/Licensee/University: Licensee **Award Amt.: $20,000 – Company; $20,000 – University Cluster:**

Life Sciences

Knudra makes biosensors detecting toxicities in our environment, food, and medicines. The nematode worm's capacity to detect toxins is harnessed by genetic engineering the worm to turn green upon exposure to toxin. The observation of turning green is a biosensor of toxicity. We make many types of worm biosensors to detect different types of toxins. We arrange the worm biosensors into arrays where every array well contains a different type of biosensor. Different toxins create different patterns of biosensor activation. A digital readout of toxicity is achieved. This simplifies data interpretation. Data sets are inherently normalized allowing the most important toxic mechanism to be easily identified. Our competition has a wide variety of methods with very little standardization between tests, which leads to confusion in data interpretation. Our method is faster, cheaper, and more reliable than current methods and it uniquely reveals which toxicity mechanism is of highest concern.

Linear Signal

CEO/Principal: Greg Mockett **University:** Brigham Young University

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Information Technology

Traditional satellite dish antenna technology suffers from quality of service problems due to poor mount installation, wind loading, rain, roof sag, and satellite orbital wobble. Smart electronically steered phased array feed antennas adjust the antenna beam adaptively to maintain maximum signal quality. Linear Signal has developed a critical enabling part for smart antennas, an integrated beamformer chip, which will be combined with high efficiency, low noise phased array antenna technology developed for radio astronomy by Prof. Warnick at Brigham Young University to produce smart antenna feeds for commercial satellite antennas on buildings, aircraft, vehicles, and ships.

Sera Prognostics

CEO/Principal: Andrew Sauter **University:** Brigham Young University

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Life Sciences

Sera has licensed from Brigham Young University and UofU the development and commercial rights to newly discovered biomarkers for multiple pregnancy complications that are measurable in blood samples. Sera is currently developing a commercial test for biomarkers to predict preterm birth that were identified using this proteomic discovery technology. Sera and Brigham Young University believe this approach could be used to identify proteomic biomarkers for Endometriosis and would like to pursue a New Project to develop a commercially useful test that would be an alternative to laparoscapies.

SMEDiagnostics

CEO/Principal: Brad Bertoch **University:** Brigham Young University

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Information Technology

HSG allows a new venture's effectiveness at commercializing products to be graphically captured by integrating with a New Venture Template™ ("NVT") analysis of 15 quantifiable attributes and a database of hundreds of successful ventures. HSG statistically analyzes large amounts of industry/performance data and a large number of variables (multi-variate analysis) and graphically represents all of the objects, data points and correlations on a single screen. The NVT determines the likelihood of venture success based on 15 specific business attributes and a comprehensive database of NAICS coded companies that have been analyzed for venture success. The output delivers a comprehensive analysis of clients' resource capacity and how they compare with success within their industry. Only large consulting firms use sophisticated analytical tools and manpower to generate the results of HSG, which brings the power of an Accenture-type analysis to SMEs at a fraction of the cost.

SpeakWorks

CEO/Principal: Ken Meyers **University:** Brigham Young University

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Information Technology

Web-based presentation feedback management software. In general, the software allows for live web recording of an oral presentation of any kind, and captures feedback synchronized to the video. The software also provides management for the recordings and feedback, including participants, groups, sessions, and feedback providers.

TheraTarget

CEO/Principal: Darwin L. Cheney **University:** University of Utah

Affiliate/Licensee/University: Licensee **Award Amt.: $20,000 – Company; $20,000 – University Cluster:**

Life Sciences

Theratarget plans to develop a water-soluble, biodegradable co-polymer that combats cancer. The technology will target solid-cancer tumors (through antibody technology) and release anti-cancer drugs specifically to the cancer site. The attached drug is inert and non-toxic while it circulates through the blood stream, but once the polymer attaches to the solid tumor it becomes engulfed and the anti-cancer drugs become activated thus killing the tumor. The drug carrier when degraded is small enough to be cleared by the kidneys, yet large enough in a non-degraded form to remain in circulation for a sufficient time to be concentrated at the solid tumor site.

ViroPan

CEO/Principal: Tyler McCabe **University:** University of Utah

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Life Sciences

Aqua-Ring is a novel medical grade polyurethane intravaginal ring (IVR) that steadily delivers ~5 mL of natural vaginal-like fluid over 5 days to treat vaginal dryness in peri- and post-menopausal women. It is a “smart” device that is self-inserted weekly and has the ability to sense the moisture need in the vagina and release fluid on-demand to supplement the lubricating fluids of the vaginal mucosa. Since women experience very different levels of vaginal dryness, Aqua-Ring has a truly unique design and is woman-specific personalized therapy that will not under treat or over treat the vaginal dryness symptoms. There is no other product that can provide this natural and personalized remedy. This product addresses all of the negatives of current estrogen replacement therapies, with their risk of cancer and heart disease, and OTC gels, with their messiness and short duration. The regulatory strategy is to seek market clearance through the Premarket Notification 510(k) pathway in 2013.

Vutara

CEO/Principal: Stan Kanarowski **University:** University of Utah

Affiliate/Licensee/University: Licensee **Award Amt.: $40,000**

Cluster: Information Technology/Life Sciences

Vutara has coupled cutting-edge breakthroughs in photophysics and computation to create a new super-resolution microscope, the SR-200. The SR-200 microscope is a super-resolution fluorescence microscope that combines new hardware (microscope and peripherals) and software (operational and analytical tools). Vutara SR-200 Bi-plane Technology - For over a century the work defining light microscopy resolution limits has stood to affirm that resolutions below the diffraction would be inherently out of reach, relegating science to postulate as to the localization of small objects. Today, however, we find ourselves in the midst of an optical revolution, with the introduction of several new lens based, light microscopes capable of smashing the diffraction limit, approaching single molecule resolutions. These systems have redefined light microscopy and been termed “Super-Resolution” or “Sub-diffraction” microscopes, with recent commercial introduction to the global scientific market.

Affiliate Teams

Distal Access

CEO/Principal: Shawn P. Fojtik **University:** University of Utah

Affiliate/Licensee/University: Affiliate **Award Amt.: $40,000**

Cluster: Life Sciences/Materials, Manufacturing, Energy, Environment

Doctors spin needles, catheters, and wires to access deep inside organs or clear catheters and vessels. Spinning by hand gives surgeons feel & control but lack power & speed. Electrical powered 'drill-like' devices give power & speed, but are bulky, expensive, and lack feel & control. Clinicians need a device that combines power & speed with feel & control. The SPINR is a hand-held, mechanical, cost-effective device that spins needles, catheters, and wires when the doctor squeezes their hand. SPINR's simple 6-piece molded design includes a helical gear that coverts the squeeze of the handles into axial rotation. Gearing can be adjusted for high-rotation or high-torque applications. Connecting guidewires to the SPINR helps wires vibrate and advance through narrowings or blockages. Oscillating shaped wires and catheter with the SPINR

creates a powerful device to macerate blockages in catheters and vessels. SPINR: the speed of a motor with the feel of the hand.

Domain Surgical

CEO/Principal: David J. McNally **University:** University of Utah

Affiliate/Licensee/University: Affiliate **Award Amt.: $40,000**

Cluster: Life Sciences

Surgery often requires the cutting and coagulation of vascularized tissues and blood vessels, including the sealing of individual large arteries, veins, and lymphatics. A large market has evolved based upon the promise of improved outcomes related to the sealing and cutting of blood vessels. Innovations intended to improve the speed and integrity of sealing vessels have been introduced in recent years, but many surgeons are still dissatisfied with the performance and security of those devices. Our patent-pending ferromagnetic inductive heating technology holds the promise of producing surface-only tissue effects with energy that does not pass through the patient; uniform sealing with elimination of tissue distortion and sticking; minimizing of collateral or adjacent tissue injury or thermal damage; on-demand rapid onset and offset of effect as various tissues or bleeding are encountered; and easy cleaning and disposability. These attributes position our technology as an ideal energy modality for surgical procedures requiring the sealing of blood vessels of a wide range of sizes.

Holorad

CEO/Principal: Stephen J Hart **University:** Utah Valley University

Affiliate/Licensee/University: Affiliate **Award Amt.: $39,000**

Cluster: Information Technology

Holorad's technology prints animated interactive color holograms from Computer Graphics scenes designed in animation programs such as Autodesk Maya. This provides glasses-free 3D holograms for entertainment, advertising, and medical applications. These are holographic prints, projecting out in front of the observer with true depth. No other technology provides this rich combination of visual stimuli, and the resulting holograms are very compelling. Hologram production and replay requires custom optical systems, and for cost-effective commercial applications these need to use highly-divergent beams which inherently produce highly distorted holograms. To correct this, Holorad pre-distorts the printed data so that the distortions cancel, producing an undistorted result. The general mathematical basis for this is known in the geometrical optics literature, but has not been extended to the required 3D formulation and implementation, so Holorad currently uses a slow iterative fine-tuning.

Natural Asphalt Solutions

CEO/Principal: Kimball Young **University:** University of Utah

Affiliate/Licensee/University: Affiliate **Award Amt.: $40,000**

Cluster: Materials, Manufacturing, Energy, Environment

Today's commercial/conventional asphalt products represent the tail end of the crude oil refining process. Simply, they are what's left after the best parts of the crude are dedicated to other uses. Naturally occurring Utah oil sands are crude oil before refining. Utah oil sands, based on anecdotal and scientific review, are much better performing road surfacing material in durability and resilience. This technology replaces commercial/conventional asphalt in road surfacing hot mixes with oil sands based on a UDOT specification now in the final stages of development.

Thermal Management Technology

CEO/Principal: J. Clair Batty **University:** Utah State University

Affiliate/Licensee/University: Affiliate **Award Amt.: $40,000**

Cluster: Materials, Manufacturing, Energy, Environment

Water flow metering is being mandated in more applications including secondary water use. Needed are low-cost/durable flow and “excessive-use” meters (as alarms for breakage) that tolerate sedimentary flow. Modern flow meters are expensive, complex, easily fouled, and impractical for silt-laden secondary water. The proposed non-obtrusive flow meter (NFM) is low cost, has no moving parts, no fowling potential. Small thermal/optical sensors strategically placed within the circumference of and nearly flush with the internal walls of NFM react to flow across and around their surfaces. Convective heat transfer and optical diffusion algorithms, combined with lab calibrations yield volumetric flow. Because NFM flow is determined from brief pulses of power without attaining steady state, a smaller power source—low voltage AC/DC—is required. Compact, solar and battery-assisted options exist. External logic modules provide continuous or intermittent data uploads to Bluetooth or wireless devices

University Teams

DBS Electrode Array

CEO/Principal: Alan Dale Dorval II **University:** University of Utah

Affiliate/Licensee/University: University of Utah **Award Amt.: $40,000**

Cluster: Information Technology/Life Sciences

Massive-Multielectrode, Cross-Hatched Planar Arrays for Deep Brain Stimulation. This device will allow the user to control the direction and shape of the electric field.

The proposed device will allow for complete control over the electric field including its shape and direction. No longer will the field center be limited to the electrode contact, and no longer will it be limited to a spherical shape. By using a unique cross shaped electrode with approximately 10,000 contacts, this device will be able to shape the field to fit the particular region of the brain that requires stimulation, without crossing over into undesired regions. DBS treatment with this device will be more effective and safe, and more flexible, as different regions of the brain would not require specially shaped electrodes.

Motion Sensor Suit

CEO/Principal: Carlos Mastrangelo **University:** University of Utah

Affiliate/Licensee/University: University of Utah **Award Amt.: $40,000**

Cluster: Information Technology

We are developing a wireless sensor “suit” that measures the exact movement of the body. This is a superior method to the industry standard motion capture cameras and can be used in 3D animation, life sciences, and sports science. Our sensor system is will be the first of its kind and will overcome the major drawbacks of cameras which require a direct line-of-site and a studio. It is based on state-of-the art MEMS inertial sensors and a local wireless network.

Synthetic Spider Silk Fibers

CEO/Principal: Randolph V. Lewis **University:** Utah State University

Affiliate/Licensee/University: Utah State University **Award Amt.: $40,000**

Cluster: Life Sciences

There are over 100,000 anterior cruciate ligament and 75,000 rotator cuff repair/replacements in the US costing over $3 billion. Hence, there is a critical need for new repair strategies that provide effective mechanical reinforcement of ligament tears and rotator cuff repair as well as to stimulate and enhance the patient's own intrinsic healing potential. Our goal is to develop spider silk protein fibers for the repair/replacement of ligaments and tendons. The specific aim is to identify the best fiber processing methods to achieve the necessary mechanical properties. The innovation is the use of different "synthetic" spider silk proteins whose properties can be tuned to the planned biomedical application both by the sequence of the protein and the fiber processing methods. The expected outcome is developing materials with superior in vitro characteristics for use as tendon and ligament repair/replacement.

TCIP FY2104 Round 1 - Grant Awardees

Institution	Licensee/ University	Cluster	Application Title	DESCRIPTION OF TECHNOLOGY
BYU	Licensee	Energy	PWTS	The Portable Waste Treatment System (PWTS) is a patented technology designed to treat human waste and mitigate disease proliferation while providing small-scale power generation at a minimal financial cost. Mounted on a portable platform (truck trailer) for humanitarian, disaster, or military applications or permanently installed to treat animal waste and produce energy at confined animal operations, the System functions both as a human waste treatment plant and a small-scale renewable energy system. The System facilitates waste transformation into biomethane, which is then filtered for small-scale energy production or heating. Compost, a valuable soil amendment, is the only byproduct created by the process.
U of U	Licensee	LS	SC Reprogramming	This technology reprograms adult human and animal cells into stem cells which are pluripotent in a process that takes days to perform. The current standard approach for this process currently takes months. In addition, because of the our improved process, the cells that are obtained are much more uniform and provide improved quality over current approaches. Also because of the improvements provided by our process, researches and clinicians can perform many more cell line reprogramming procedures; our process even allows patient specific cell line development which currently is not po. Such individual cell lines potentially enables new approaches to the implementation of personalized medicine in a manner that is not currently feasible.

USU	Licensee	IT	CityGro	CityGro produces customer interactive kiosks for business using both IOS and Android platform technology. With the relatively recent emergence of Tablet Technology, it was only a matter of time before tablets would be utilized to help businesses interact with their customers. CityGro has found itself on the forefront of this wave and now has the most customizable interactive kiosk on the market. The technology works by placing an IOS or Android tablet near a businesses point of sale system. From their it can be customized for capturing customer data, digital loyalty programs, digital signature waivers, coupon distribution, advertising, and much much more.
USU	Licensee	IT	ISQ Inc.	ISQ has a technology licensed from Utah State Univ. that collects student feedback about events related to the learning environment in the classroom. This feedback is at the teacher level and rolls up to subject matter in middle and high school settings. New accountability mandates going into effect 2014 in Utah and other states require specific student and parent feedback about each teacher in K12 schools. These mandates and measures are a response to federal regulations. This creates a unique need for collection of perceptions and events data on classrooms.
BYU	Licensee	MMEE	Open Air Compos	We are utilizing BYU's patented IsoTruss structure in a carbon fiber bike application to create a bike that is lighter, stronger, and more compliant than any other bike on the market. The properties of the IsoTruss design are unique and are what allow us to achieve these functional results that result in superior bike. These claims are all confirmed by world and Olympic champion bike racers.

U of U	Licensee	LS	IJ-180	Our team has developed a prototype of a direction-reversing clamp for a central venous catheter (CVC) placed in the internal jugular of a patient. Our device, called the "IJ-180," is a "U"–shaped catheter-holding clamp. The catheter is placed into the lumen of the clamp immediately at the point at which it exits the skin, and the clamp is sutured onto the patient's skin. The IJ-180 reveres the direction of the IJ catheter 180 degrees and places the catheter ports on the chest of the patient away from the hair and neck, which reduces catheter infections, increases patient comfort, and makes access and dressing maintenance easier.
U of U	Licensee	IT	Asthma Tracker	Asthma Tracker ("AT") is patent-pending technology that reduced recurring ER visits by 98% among child asthmatics in a clinical study. AT reduces recurring emergency room visits and hospitalizations by tracking symptoms and closing the surveillance treatment gap and notifying physicians of progress for patients suffering from asthma. AT helps patients take control of their disease, which reduces the chance that they will need expensive and often-life threatening ER visits and hospitalization. AT is the only available technology that seamlessly integrates tracking, notification, and scoring, and is based on clinical research conducted at the U of U and Primary Children's Medical Center.
U of U	University	IT	THz Technology	"Terahertz technology is an emerging field that promises to improve a host of useful applications, ranging from passenger scanning at airports to huge digital data transfers. Terahertz radiation sits between the frequency bands of microwaves and infrared radiation, and it can easily penetrate many materials, including biological tissue." Graphene is in ideal material for this application and can be grown or cut to specifications in the Terahertz range.

U of U	University	MMEE	MultispecImager	Most imaging applications only utilize the visible red-green-blue spectrum while absorbing the remaining electromagnetic radiation into the lens. This methodology wastes the majority of available information, which renders a RGB image useless in many common conditions such as low light, dust, clouds, vegetative obstruction, etc. DARPA has set a cost goal of $3,300/unit at 120,000 units/year for high quality versions of these multispectral filters. However, we can also address simpler applications like cell phone cameras, which opens up a huge $15 B market in addition to another $3 B in industrial/agricultural inspection applications.

FY 2104 Round 2 - TCIP Grant Awardees

Institution	Licensee/ University	Cluster	Application Title	DESCRIPTION OF TECHNOLOGY
U of U	Licensee	LS	CoNextions Med	A novel tendon repair device for flexor and extensor tendons of the hand. The innovative design of the CoNextions repair device confers a number of advantages. It is easy to apply, which may lead to reduced surgical time and a decrease in complications associated with surgeon error. The finger trap behavior of the tendon results in pressure only being exerted on the tendon when it is under tendon. This allows the resting tendon to heal with limited interference. The plurality of micro-hooks evenly distributes the load across the tendon end, reducing the stress concentrations associated with suture repairs. This may not only prevent cell death, but result in a stronger repair. Sutures repair tendons from the “inside-out” (via passing the suture into the tendon with a needle). The CoNextions tendon repair device repairs tendons from the “outside-in”, and this is the core innovation.

U of U	Licensee	LS	Fast Diagnostic	Espira has developed an automated pathogen detection system with water quality testing and food pathogen testing as initial targets. Using a unique combination of advanced technologies, the pathogen detection system goes beyond lab culturing of indicator coliforms and E.coli by detecting a suite of specific bacteria, protozoa and viruses in the same test. Total organisms and viable organisms are separately reported for each pathogen with an additional electrochemical scan. All the analysis steps including automated sample collection, concentration, and detection can be operated by minimally trained personnel in less than 30 minutes. The limit of detection for our technology is 3cfu/100 ml which is 33 times better than that of minimum reported in literature (1 cfu/ml) and 200 times better than that of commercial kits 600 cfu/100 ml).
U of U	Licensee	LS	MFI	MultiFunctional Imaging, LLC is an emerging medical software device company providing patented technologies for obtaining and quantifying multiple diagnostic imaging results in a single scan. These technologies include systems and methods for single-scan rest+stress myocardial perfusion imaging, single-scan multi-tracer cancer imaging for quantification and assessment of tumor function, and fast and robust kinetic modeling of dynamic images. The technology has five distinct value propositions: 1) Improved patient throughput 2) Improved patient and healthcare worker safety 3) Raises standard of care through image quality 4) Reduces costs of diagnostic imaging 5) Increases accessibility of procedure to more patients.

U of U	Licensee	IT	NeuroVersity	NeuroVersity leverages SketchUp Make (a free 3D drawing/design tool) in our unique and evidence-based educational curriculum that is strengths-based, family-focused, and matches the visual-spatial abilities of youth on the autism spectrum. There is no other existing educational training program like Neuroversity in the US/world in relation to serving youth on the autism spectrum that focuses on talent and ability in a virtual 3D environment. Our unique and proven training model facilitates both social and occupational skill development for youth with ASD. Our educational model prepares youth for transition to adulthood and vocational opportunities in computer-based design programming. Our partnership with Columbus Community Center will create job opportunities for youth on the autism spectrum.
BYU	Licensee	MMEE	Open Air Compos	Open Air Composites manufactures carbon fiber bicycles using Isotruss tech. We are utilizing BYU's patented IsoTruss structure in a carbon fiber bike application to create a bike.
U of U	Licensee	IT	Asthma Tracker	Asthma Tracker (“AT”) is patent-pending technology that reduced recurring ER visits by 98% among child asthmatics in a clinical study. AT reduces recurring emergency room visits and hospitalizations by tracking symptoms and closing the surveillance treatment gap and notifying physicians of progress for patients suffering from asthma. AT helps patients take control of their disease, which reduces the chance that they will need expensive and often-life threatening ER visits and hospitalization. AT is the only available technology that seamlessly integrates tracking, notification, and scoring, and is based on clinical research conducted at the U of U and Primary Children’s Medical Center.

U of U	University	LS	ATLAS	Rehabilitation of lower extremity fractures relies on the ability of patients to repeatedly place a certain percentage of their weight on the injured limb. Studies have shown that patients are unable to do so even when they believe they are compliant. Currently, there are no monitoring devices that are capable of recording and reporting limb loading between follow up clinical visits. To address this unmet market need we have designed the Ambulatory Tibia Load Analysis System (ATLAS). The ATLAS uses a novel load sensing technology to continuously record limb loading and is coupled with consumer electronics that can store and report limb loading data wirelessly to a smartphone. Thus enabling patients to improve their rehabilitation.
U of U	University	LS	6S Troclosure	6S Medical's Troclosure™ incorporates a suture deployment mechanism that is integrated into the trocar and facilitates rapid and accurate suture placement for effective closure of intra-abdominal defects. This device will improve patient outcomes, reduce operating room procedure time, decrease the incidence of suture related injuries to medical staff, and lower the rate of post-surgical herniation through the trocar port site. The device provides an unprecedented solution to trocar port closure. The solution is mechanically simple, reliable, and effective. Other devices have been developed to address this problem, but they are either too complex and cumbersome, or require the purchase of an additional costly device.

U of U	University	LS	Glaucoma Drugs 2	We developed a series of new small molecule prodrug molecules that is just as effective in lowering IOP as are current clinically used drugs. They have 2 additional advantages: First, in contrast to the standard IOP-lowering drugs such as timolol which are effective for 4-7 hours and need to be applied at least twice a day, some of our compounds are effective for 24-27 hours. This is important because patient compliance has been a major impediment for effective glaucoma therapy. Secondly, and crucially, the drugs do not only lower the IOP but also protect against pressure-induced RGC death under in vitro (isolated RGCs) and in vivo conditions. Our basic science research that is conducted in parallel to translational/glaucoma research uses biophysical, genetic, physiological and whole-animal approaches to characterize the properties of the glaucoma targets in ocular cells and to test the efficacy of the antagonist drugs in blocking RGC degeneration in animal glaucoma models. The new generation of eye drops ameliorate glaucoma by simultaneously depressing IOP and protecting RGCs. Importantly, these highly selective, high-affinity non-toxic compounds do not affect other types of channels. We developed these drugs as an eye drop formulation, which exempts us from the FDA standards used for systemically applied drugs and will speed up both the clinical testing and federal approval.

WSU	Licensee	MMEE	Vortecx	The Vortecx Winglet technology provides up to a 12% increase (from 3 years of vortex test data) in either operational efficiency or air speed for no additional increase in engine power for the aircraft owner. Current general aviation winglet designs are expensive and only marginally efficient. Due to patented, proprietary technology, the Vortecx winglet design dramatically reduced the drag created by a typical wing as it flies through the air. This reduction in drag equates to the improvement in either operational efficiency or airspeed to the aircraft owner.
U of U	Licensee	LS	Laparoscope	Xenocor is developing a low cost surgical camera (laparoscope) that can readily be used throughout the world. Our state-of-the-art, proof of principle prototype was designed by Dr. Brooks and was recently used by Dr. Langell to operate in a pig for animal model simulation. The current system is readily portable because of a built-in LED light source, is compatible with both iPad and Android platforms, and will cost less than $7,000. Contrast that with current technology, which includes an independent light source, large monitor, and recording system. These systems more than 200 lb of equipment, are not readily transportable, and cost nearly $100,000, which prohibit their use in outpatient surgical centers and developing countries.

FY 2014 Round 3 - TCIP Grant Awardees

Institution	Licensee/ University	Cluster	Application Title	DESCRIPTION OF TECHNOLOGY
U of U	Licensee	LS	Applied Biosensors	This technology merges two highly established techniques (smart hydrogels and magnetic sensing) for the first time to create a novel microsensor that can continuously monitor almost any biomarker (e.g. glucose, pH, CO2, O2, trace metals, etc.) in liquid media. Researchers have known for over a decade that smart-hydrogels are bound to revolutionize the sensing techniques and will (1) over come the limitations of current commercial continuous sensors (2) address the untouched market need in several industries such as bioprocess control, animal research, water quality management, etc. The biggest limitation has been in the methods to transduce the response of hydrogels into readable values. Groups around the world have used several transduction techniques without much success. We have successfully proven for the first time (& IP protected) that when smart hydrogels are embedded with magnetic particles, the response of the hydrogels can be accurately measured using a low-cost magnetometer.

USU	Licensee	LS	FNC Aquaponics	This technology is a sustainable food production system utilizing an aquaponics approach. Aquaponics is the combination of Aquaculture and Hydroponics for a closed loop system that minimizes inputs and maximizes both land usage and food production rates. As the fish eat and grow, they generate waste that must be filtered from their water. This water is sent through a series of properly design plant grow beds. Not only does the fish waste provide the necessary nutrients for plant growth, but the plants effectively filter the water so it may be returned to the fish tanks. This approach uses 10% of the water required in traditional farming, as well as a 4-5x greater yield due to efficient space usage and nutrient availability. A greenhouse is incorporated in the design to allow for year round productivity.
U of U	Licensee	IT	Sentius	Using principles of real-time systems and data analysis on existing data, Sentius provides customers with up to date, actionable information and forecasting designed to increase company profitability. Delivered via an online SaaS-based solution, this will initially target independent dental and healthcare practices. Raw event, transactional, operations, financial, and marketing data is extracted from existing sources and input in real-time into Sentius, where it is then analyzed, producing outputs that propose changes to company operations, marketing, and finance to increase profitability. In addition, customers are given industry and demographic specific benchmarks to help them better compete in their respective markets. This data is currently nearly impossible to obtain for many SMBs. For example, for medical/dental providers, understanding insurance reimbursements and fee schedules for other providers in their geographic area will allow them to compete much more effectively.

U of U	University	MMEE	SolaPur Device	Our technology removes contaminants and disease-causing agents in water using solar irradiation. It is a portable water purification device that removes all necessary contaminants without an external energy source or additional replacement components.
BYU	Licensee	IT	SVWI	Our technology is a genetic algorithm, ECO Feature (Patent Pending), that sorts based on different classifications. It was developed by our principles during their Ph.D program at BYU, and we just completed a licensing agreement to license the technology for commercial use. It is incorporated into our custom Vision Automation System, and attached to an assembly line. In testing we applied the algorithm to a variety of applications including but not limited to people (sorting male vs. female), fish (sorting protected or invasive fish from a general population), oysters (grading shell size and quality), and apples (distinguishing insect infestation). At the end of 2013 we incorporated as Smart Vision Works International LLC, and in 2014 we licensed and launched the technology for commercialization. It is currently being used by two customers of ours, DatePac to sort dates, and Laitram Machinery where it is used for shrimp peeling and de-veining quality control.

U of U	University	LS	Vessel Coupling	Our product is a vascular coupling device designed to join blood vessels. Our device works for both arteries and veins and can rapidly connect the two vessel ends together in a watertight seal without leaving any foreign material in the lumen to come in contact with flowing blood. We have manufactured prototype devices using biodegradable poly (lactic acid) (PLA) with no moving or metallic parts in multiple sizes to accommodate varying vessel size in a range of transplant scenarios. Our proposed vascular coupling device (VCD) would replace the manual suturing technique, reduce the time required to complete the anastomosis, and reduce error. VCD will have less chance of tearing the vessel wall by misplacement of the pins compared with Synovis Coupler.

Univ.	Cluster	Type	Project Name		Technology Description
BYU	MMEE	Licensee	AD-Tec	$ 40,000.00	The BCS is a patent-pending, low-cost, minimal-maintenance, scalable methane and biomethane filtration solution. The system consists of filter cylinders linked by gas routing hardware. It is completely automated and remote-operable via solid-state electronic controls. The BCS is also pallet-mounted for simplified delivery and installation. The system filters gas to industry-leading standards with a proprietary zeolite. Once saturated, the zeolite is regenerated using an innovative, patent-pending heating system. This intellectual property is being licensed from BYU.The extensive life of the zeolite, minimal energy consumption, low-cost, and top-quality output gas distinguish the BCS from all currently-available competing systems.
U of U	LS	University	ATLAS	$ 40,000.00	Rehabilitation of lower extremity fractures relies on the ability of patients to repeatedly place a certain percentage of their weight on the injured limb. Studies have shown that patients are unable to do so even when they believe they are compliant. Currently, there are no available monitoring devices that are capable of recording and reporting limb loading between follow up clinical visits. To address this unmet market need we have designed the Ambulatory Tibia Load Analysis System (ATLAS). The ATLAS uses a novel load sensing technology to continuously record limb loading and is coupled with consumer electronics to store and report limb loading.
U of U	LS	University	BioVis	$ 40,000.00	Visualization tools are essential for deriving meaning from the deluge of data we are faced with today. We design visualization systems that support exploratory, complex data analysis tasks for scientific research. These systems allow scientists to validate their computational models to understand their underlying data in detail, and to develop new hypotheses. We take a problem-driven approach relying on a detailed understanding of the needs of, and a close collaboration with, domain experts to guide the design of algorithms, visual encodings, and interaction mechanisms. Our visualization builds upon principles and methodologies from perception, design, and human-computer interaction, and combines novel mathematical models with algorithms.
U of U	LS	University	Down-Syndrome	$ 40,000.00	Down syndrome is the major cause of intellectual disability, resulting in a lifetime cost of $4.5B for the US families. There are currently no cures or treatments. We have identified a molecular target in the brain that, when blocked by antagonists, increases cognitive function in a genetically modified mouse model of Down Syndrome (DS). Our previous work with this class of compounds combined with an improved mouse model of DS suggests that, by testing a set of such compounds carefully chosen to represent the chemical diversity of the larger class, we can be the first to demonstrate proof of concept for the use of this class of molecules in cognitive enhancement in Down Syndrome.
U of U	IT	Licensee	Enclavix	$ 40,000.00	This project is a core component of ResearchEx™, America's Research Exchange, a Machine Intelligence-based system to help intellectual property (IP) owners, such as universities and companies, automatically assign IP (patents) to a structured IP ontology (framework) to assess the relevance and uniqueness of a patent, and to provide a naturally searchable, online system at ResearchEx.net to match entrepreneurs and businesses with licensable technologies. There are currently no solutions that provide sophisticated, comprehensive information on a patent's relevance in the marketplace and the availability of related or competing IP. Enclavix is licensing a research based semantic network from the Univ. of Utah to take this vision to market.
U of U	LS	University	EndoShield	$ 40,000.00	The Endoshield is a novel approach to protecting the corneal endothelium during cataract surgery using a solid lens-type barrier. Currently, ophthalmologists inject viscoelastic gels into the eye to protect the cornea and other surrounding tissues but, these materials tend to trap debris and air bubbles which reduce the ophthalmologists visibility during the surgery. During complex cataract surgery, viscoelastics break down and need to be reinjected yet damage to the cornea still often results. In contrast, the Endoshield will not break down under the increased energy needed to break down dense cataracts and its design allows it to float up to the cornea and block thermal energy and debris from damaging the delicate tissues.
U of U	LS	Licensee	Fixes4Kids	$ 40,000.00	The Fixes4Kids' "Elbow Fix" standardizes the practice of orthopedic surgery on kids' elbows. The technology minimizes surgical error. The F4K system consists of an operating room fixture used to reduce the fracture and a disposable orthotic which replaces a typical cast. Together, this system produces a more efficient and cost effective method for fixing pediatric fractures. The technology standardizes fracture reduction, decreases re-operations and open surgeries, which are costly to the hospital and insurance system. Radiation exposure for the surgeons hands is decreased. The orthotic provides a clinical device than current casting methods improving post-operative vascular assessment.
U of U	LS	Licensee	InsuGen	$ 40,000.00	Insugen is (IG) patented technology is designed to permanently correct the insulin deficiency in patients with type I & late stage type II diabetes (DM1,DM2), and diabetic dogs and cats. Adult Mesenchymal Stem Cells (MSCs) are engineered into insulin producing cells. Such cells reproduce in culture, are not rejected, and release insulin physiologically when glucose levels change. When used in DM1 animal models, IG s therapy cures DM1. If used in humans, it is expected to restore blood sugar control and eliminate/reverse diabetic complications. Since engineered MSCs are not rejected, they can be obtained from unrelated donors and used off-the-shelf.
U of U	LS	Licensee	Jade	$ 40,000.00	Jade Therapeutics, has invented a novel, sustained release, biologic eluding, ocular bio resorbable product to address corneal damage and severe dry eye by stimulating cells to proliferate, migrate and heal then defects. In vivo data indicates that the Jade solution can produce corneal epithelial surface repair for non healing corneal defects. This will improve patient compliance, reduce burden of illness, decrease frequency of office visits, and improve visual function with improved quality of life. The therapeutic target is a one week, drug eluding, ocular delivery product to improve the re-epithelization of the corneal surface. No approved therapies exist to heal the cornea. No products in development target a wound healing mechanism.

U of U	LS	University	Laproscope	$ 40,000.00	We are developing a mobile (wireless) laparoscope (camera used during general surgery or minimally invasive surgery) that transmits an image wirelessly to tablets, displays, and monitors in the operating suite. Existing technology requires a laparoscopic tower, which consists of a light source, recording system, and monitor. Laparoscopic towers can weigh up to 200lbs making it difficult to move in the operating room especially with cords strewn all over the floor. Our technology is different because we are consolidating the laparoscopic tower into a hand held device that eliminates cumbersome wires and connectors. Our mobile system is particularly unique because it will interface with tablets, monitors, and pcs for software integration.
U of U	LS	Licensee	MESO	$ 40,000.00	Examination of slide mounted tissue sections has been a corner stone of anatomical pathology for over a century and is the primary technique for evaluating and diagnosing tissue samples such as tumors. The MESO SystemTM dissects slide mounted tissue sections at a meso level of resolution (50 microns to 1 millimeter) for further biochemical testing. The MESO system is essentially a precision mill with a disposable bit termed the xScisor that simultaneously dispenses liquid, cuts tissue, and recovers the suspended tissue fragments. This technology is affordable, easy to use, and the only alternative either imprecise manual macrodissection methods and very expensive Laser Capture Microdissection(LCM) equipment.
U of U	LS	University	Segmentation	$ 40,000.00	We propose a novel method for the segmentation of haematopoietic cells in bone marrow from scanned slide images. A bone marrow evaluation helps to evaluate blood cell production, diagnose leukemia, bone marrow disorder and variety of other types of cancer that may have spread into the marrow. Image segmentation is a difficult and challenging problem due to the complex appearance of these cells. Our method is different from existing approaches. We differentiate clumped cells from single cells so that our circle detection and cell splitting algorithm is only applied to clumped cells. Furthermore, in our method, we eliminate the red blood cells before detecting the haematopoietic cells.
USU	IT	University	Smart-WiFi	$ 40,000.00	The proposed technology is a high-gain intelligent antenna array to be used for mobile cellular and wi-fi applications. Our technology will enable to develop a reliable wireless network providing the required high data rates for Wi-Fi, LTE and 4G systems. The main advantages are: 1)To cover a service area with much smaller number of base stations and access points provides a significant cost reduction. 2)The battery life of wireless hand-held devices can be extended in multiple folds 3)Our antenna array provides higher gain and significantly better pattern agility with smaller size as compared to the existing arrays. The existing antenna array solutions are either cost or size prohibitive for commercial wireless systems
U of U	IT	University	SmoothCAP	$ 40,000.00	The motion capture (mocap) suit is worn on the body during movement to collect spatial information from 60 different sensors. This data can then be digitally refined for use in feature film and video game animation in addition to other applications like sports training, physical therapy and research. Our Mocap suit is unique in its ability to capture finger movement, which has traditionally been an obstacle in realistic motion capture. Our suit is more accurate and has more data points than the industry leading inertial motion capture suit (Xsens). Our suit will approach the accuracy of the industry leading camera mocap system (Vicon), and is much cheaper to use, easier to set up, and allows for much greater creative freedom.
WSU	MMEE	Licensee	Torq	$ 40,000.00	We re-engineer axle and drive train technology for maximum performance. Torq utilizes OEM drive train technology and packages key architectural elements into improved proprietary axle and drive train packages. Our approach allows us to build on existing technology yet make dive train components lighter and stronger. The approach facilitates more efficient vehicle power transmission.
U of U	LS	Licensee	TruClinic	$ 40,000.00	TruClinic developed an internet portal that provides patients with access to healthcare providers through a user-friendly virtual clinic that simulates an in-person office experience via webcam allowing for 24/7 patient access from a remote location through a secure desktop connection that meets federal standards. Service models include: psychotherapy (TruClinic s market entry point), medical and preventive lifestyle counseling, and patient monitoring. Our competitive advantage is that the portal is accessible to networks of healthcare service providers (third party providers, private practices, government services, and consumer advocacy groups); incorporates the largest number of product features; and allows for diverse revenue models.
BYU	LS	Licensee	WaterJet	$ 40,000.00	Our technology consists of a pain-free, super quiet water drill, a breakthrough in dental care aligned with attracting and retaining more patients. Dentists are seeking minimally invasive, lower cost procedures that enable higher production. The waterjet will increase office production with a net reduction in the use of anesthetics, and substantially improve patient outcome and experience. We accomplish this through the use of a pressurized water stream that is mixed with an abrasive and used to remove cavities instead of a traditional drill. Waterjets are used to cut industrial materials everyday and now that same technology can safely be applied to dentistry.
USU	MMEE	Licensee	WAVE	$ 40,000.00	USURF, in coordination with WAVE, has developed a wireless energy technology for vehicles. Wireless Power Transfer (WPT), allows vehicles to be charged from infrastructure embedded under the roadway. Because inductively charged vehicles can receive battery charging en route, there is a significant reduction in the required vehicle battery size. Until now, battery size has been the primary impediment towards the successful market penetration of EVs. USURF's Energy Dynamics Laboratory (EDL) is conducting the WPT research. WAVE, a for-profit entity owned partially by USURF, is commercializing EDL s technology and leading the efforts to launch demonstration projects.

U of U	MMEE	Licensee	Xandem	$ 40,000.00	Xandem s Tomographic Motion Detection (TMD) sensor is unlike any motion detection sensor and provides key new features for building security and automation systems. We surround an area with our low-power wireless transceivers which create a mesh of radio signals within the area. Unlike infrared, video, or thermal, these radio signals see through walls and obstructions and detect any person in the area. Other sensor technologies perform poorly (false alarm, missed detections) in difficult environments like warehouses. Our sensor doesn t false alarm, and can be hidden from view. TMD is, in short, precise, reliable, and undefeatable.