

North Dakota

DEPARTMENT OF COMMERCE



CENTERS OF EXCELLENCE annual report | 2010



— State of —
North Dakota
Office of the Governor

Jack Dalrymple
Governor



North Dakota's Centers of Excellence program is a real success story. The Centers program is built on the concept of partnering the research capacities found in our public colleges and universities with private-sector companies to generate jobs and new business opportunities.

Much like our nation's transportation system was the economic infrastructure for the 20th Century, the North Dakota Centers of Excellence program is building the economic infrastructure of the 21st Century that is based on research, technology and intellectual capacity.

The program, now in its fifth year, is having a significant impact in our state. According to a fall 2010 study by North Dakota State University Professor Larry Leistritz, the North Dakota Centers of Excellence program has leveraged \$26.2 million in state funding into an economic impact of \$406.5 million through June 30, 2010.

The Centers program is built on the concept of partnerships. Our colleges and universities are filled with intellectual resources, high-tech equipment and training capacity that are valuable for private-sector companies. As a testament to this, 190 companies have formed partnerships with North Dakota Centers of Excellence. These partnerships have leveraged \$152.9 million of matching funds, an amount far exceeding the \$33.9 million of state funds disbursed to the Centers.

These partnerships are generating results. The Centers of Excellence program has helped create a total of 1,017 direct jobs at an estimated annual payroll of \$53.4 million, with direct employment increasing more than 240 percent since 2007.

By aggressively pursuing research in all of our state's targeted industries, the Centers of Excellence program is nurturing the pioneers of our future. Initiatives like this will help our private-sector businesses uncover the promising new opportunities that will continue to build a strong future for North Dakota.

Sincerely,

A handwritten signature in cursive script that reads "Jack Dalrymple".

Jack Dalrymple
Governor

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The Centers of Excellence are hubs of research and development on the campuses of North Dakota’s colleges and universities, partnering with private companies to commercialize new products and services. The Centers explore research in the fields of energy, agriculture, life sciences, electronics, aerospace and manufacturing.

North Dakota legislators authorized funding for several pilot Centers of Excellence projects in the 2003 session before authorizing the full program. These include the UND Center for Innovation in Grand Forks, the NDSU Technology Incubator and the NDSU Beef Systems Center of Excellence in Fargo.

In 2005, the Legislature expanded this concept into the current competitive grant program. Since then, the Legislature has approved a total of \$60 million for the program. Of these funds, the Centers of Excellence Commission has awarded \$54.1 million, launching 20 new Centers of Excellence. In 2009, the Legislature established Centers of Excellence Enhancement Grants. The Enhancement Grants have been allotted \$10 million of the program funds, which are available to the state’s research universities, UND and NDSU, during the 2009-11 biennium.

So far, \$26.2 million of the awarded funds have been spent by the Centers which have leveraged over \$150 million from the private sector and other sources. Due to careful due diligence and project requirements on the part of the program and the university system, projects are funded and dollars spent only when the required match is available and the project is ready to move forward. With only one-third of the total available program dollars spent as of June 30, 2010, the Centers of Excellence program had the following economic benefits:

\$406.5 MILLION ECONOMIC IMPACT

The Centers of Excellence program has had \$406.5 million in estimated total economic impact to North Dakota’s economy. This includes a direct impact of \$141.2 million generated by the centers and their partners.

190 PRIVATE SECTOR PARTNERS

The Centers have formed partnerships with 190 companies. These include companies in target industries such as advanced manufacturing, energy, technology, and value-added agriculture, as well as emerging industries such as life sciences and unmanned aircraft systems.

1,017 NEW DIRECT JOBS

The Centers of Excellence program has lead to the creation of 1,017 direct jobs at an estimated annual payroll of \$53.4 million created by the centers themselves or by partnering companies. Direct employment resulting from the Centers increased more than 240 percent since 2007. Over the same period, hundreds of secondary jobs were also supported by the Centers.

18 NEW OR EXPANDED BUSINESSES

Eighteen new or expanded businesses have resulted from the Centers of Excellence program. This includes seven new spinoff companies, six companies that expanded to North Dakota, and five companies that have expanded within the state.

CENTER STATUS

These Centers are still in the early stages of development. Each competitively awarded Center of Excellence has its progress monitored for six to ten years. During this time period, it is anticipated that each center will produce the results proposed at the outset of its project.

No Center has yet reached its maturity. Three Centers have yet to be launched. Twenty Centers are currently in operation:

- + 7 Centers have been in operation for 2 fiscal years or less
- + 3 Centers have been in operation for 3 fiscal years
- + 9 Centers have been in operation for 4 fiscal years
- + 1 Center has been in operation for 5 fiscal years

STATUS OF CENTERS OF EXCELLENCE INVESTMENT		June 30, 2010
Spent		\$26.2 million
Disbursed to Centers (not yet spent)		\$7.70 million
Approved (waiting disbursement)		\$23.1 million
Available for awards		\$5.30 million
Total		\$62.3 million

EXAMPLES OF OTHER KEY BENEFITS

- The NDSU Center for Surface Protection is investigating coatings and polymers technologies that may have applications in North Dakota's energy industry, including increasing the efficiency of electrical generation from coal.
- Intelligent InSites is involved in the healthcare asset and people tracking market. The NDSU Center for Integrated Electronic Systems has partnered with Intelligent InSites to enhance its current product and assists with design and development of its new product releases.
- A new Center, the NDSU Center for Advanced Technology Development and Commercialization, will partner with Triton Systems, Inc. to develop product applications based upon proprietary and patented liquid silicon technology developed at NDSU.
- The UND Unmanned Aircraft Systems Center of Excellence is working to resolve the "sense and avoid" issue which is a critical barrier to opening national airspace to unmanned aircraft systems. The Center is developing the Automatic Dependent Surveillance-Broadcast (ADS-B) transceiver, a communication device for small UAS vehicles.
- The UND Energy and Environmental Research Center's National Center for Hydrogen Technology is teaming with industry and government clients to demonstrate advanced clean coal gasification to produce hydrogen-rich gas from a variety of coals, with a special emphasis on North Dakota lignite. These projects are bringing together numerous players in the North Dakota energy industry.
- The BSC National Energy Center of Excellence has seen enrollment in its energy programs increase by 27 percent since the fall 2008 semester.
- The WSC Petroleum Safety and Training Center provides training for 171 companies in the oil and gas industry. Over 4,000 individuals were trained in fiscal year 2010 alone.
- The UNDRF Center of Excellence for Passive Therapeutics and partner Avianax are performing pre-clinical trials to advance therapeutic antibody products. The first product targeted is an antibody to the West Nile Virus.
- NDSU Technology Incubator graduate Appareo Systems was named the 2010 Outstanding Incubator Graduate - Technology Category by the National Business Incubation Association.



CENTER FOR ADVANCED ELECTRONICS DESIGN & MANUFACTURING North Dakota State University

1805 NDSU Research Park Drive North • Fargo, ND 58102 • 701.231.8956
www.ndsu.edu/caedm



The Center for Advanced Electronics Design and Manufacturing (CAEDM) performs research and development for private sector partners and collaborators specializing in areas including wireless sensors, electronic systems, miniaturized electronics and prototype development. The Center's efforts help partners and collaborators meet product and technology needs while enabling and promoting commercialization opportunities of new products and technologies.

STATE FUNDS

Launch Date: February 2006
Award: \$3,000,000
Disbursed to the Center: \$3,000,000
Spent by the Center: \$1,744,255

MATCHING & LEVERAGED FUNDS

Received: \$13,022,112

PRIVATE SECTOR PARTNERS

Deceleration Technologies, Pacific Northwest National Laboratories, Pedigree Technologies, Phoenix International, PPG Industries, Reitz Consulting, Starkey Labs, Tessara

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the CAEDM and its partners have created six new jobs.
- PPG Industries and the CAEDM collaborated to improve adhesion processes for an electronics substrate product line and are jointly working to identify commercialization opportunities for the technology.
- The CAEDM provided support to Starkey Labs in testing and evaluating new hearing aid products.
- The CAEDM has worked with North Dakota companies such as Aldevron on a unique robotic manufacturing product prototype, Phoenix International on engineering activities regarding wave soldering, and Deceleration Technologies on testing their brake illumination product.

PRODUCTS GIVE NEW MEANING TO THE WORDS "REMOTE CONTROL"

In any economy, businesses that respond to customers' needs quickly gain an edge over their competitors. A home-grown North Dakota company, Pedigree Technologies, is partnering with North Dakota State University's Center for Advanced Electronics Design and Manufacturing to do just that, using the Center's electronics expertise to grow its business as well as the businesses of its customers.

Pedigree Technologies specializes in wireless technologies that monitor, track and control companies' assets with what is known as machine-to-machine solutions or smart technology.

"Fuel tanks call you up and let you know it's time to be refilled. Your vehicles report in and say 'I just made it to my customer location,'" said Alex Warner, president and founder of Pedigree Technologies. "It's really about making your equipment talk, making your machines help deliver your service and manage your operations more efficiently."

Through the CAEDM, NDSU researchers provide expertise on electronics and manufacturing projects. Pedigree Technologies contracted with the CAEDM to work on some of Pedigree's own projects.

*Alex Warner, president and founder
of Pedigree Technologies*



"The CAEDM provided assistance in new embedded hardware, subsystem development and integration capabilities that were important for a new product rollout," Warner said. "The CAEDM was able to provide us with expertise and resources in areas that would have been difficult and expensive to find elsewhere and most likely would have had to be found out-of-state."

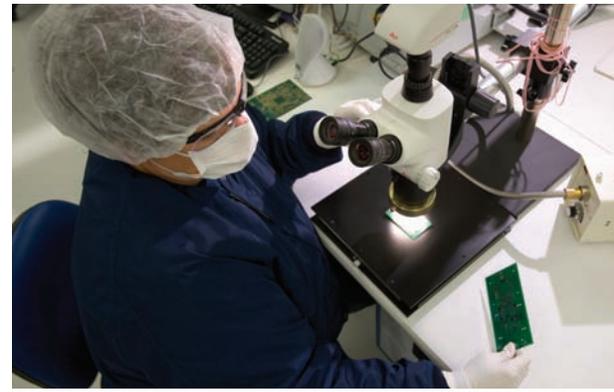
Philip Boudjouk, vice president for research, creative activities and technology transfer at NDSU, said the Center's research capabilities are a huge resource for businesses.

"NDSU's CAEDM plays a unique role in helping companies achieve success," Boudjouk said. "Coupled with NDSU's wide range of research expertise, the Center provides companies such as Pedigree Technologies additional advantages as they compete in the marketplace."

CENTER FOR INTEGRATED ELECTRONIC SYSTEMS
 North Dakota State University

1735 NDSU Research Park Drive North • P.O. Box 6050 – Dept. 4000
 Fargo, ND 58108-6050 • 701.231.6542
www.ndsu.edu/cies/

The Center for Integrated Electronic Systems (CIES) will perform research and development projects to integrate electronic hardware and software systems. Such projects will enable private sector partners to create and manufacture new products, improve existing products, increase profitability and become more competitive in the global marketplace.



STATE FUNDS

Launch Date: June 2009
 Award: \$2,050,000
 Disbursed to the Center: \$1,366,171
 Spent by the Center: \$370,550

MATCHING & LEVERAGED FUNDS

Received: \$700,372
 Total Anticipated: \$4,100,000

PRIVATE SECTOR PARTNERS

Datacom International Inc.
 Intelligent InSites
 Pedigree Technologies

PROJECT NOTES AND HIGHLIGHTS

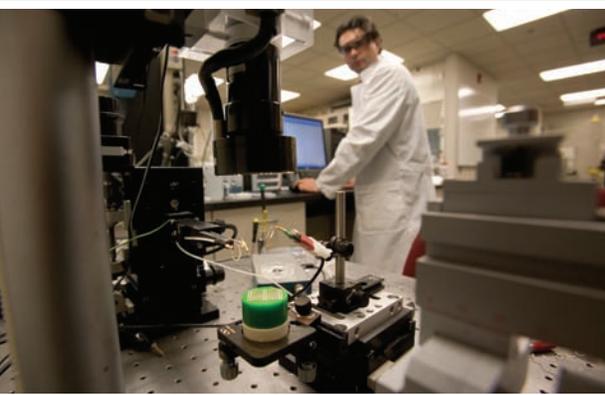
- As of June 30, 2010, the CIES and its partners have created 11 new jobs.
- Datacom International Inc. is an enterprise resource planning software company which specializes in the sign industry market. The CIES worked with Datacom on major enhancements to its current product's user interface, making it faster, easier to use and more feature-rich. The Center also helped Datacom develop a prototype of a new product for estimating and quoting work for sign companies.
- Intelligent InSites is involved in the healthcare asset and people tracking market. The CIES has partnered with Intelligent InSites to enhance its current product as well as design and development of new products.
- The CIES has teamed with Pedigree Technologies, a software design and development company, to enhance its user interface and management of its server software.

“Datacom plans to continue to build its employment in North Dakota as its business grows, and key to that growth is the continued enhancement of its products and the advancement of its technologies, both of which are being directly aided by its technology partnership with the Center for Integrated Electronic Systems. Some of the work done by the Center was included in our latest dataSIGN product release, and it was very well received by our customers.”

-Don Roepke, CEO of Datacom International.

CENTER FOR SURFACE PROTECTION
North Dakota State University

1735 NDSU Research Park Drive North • Fargo, ND 58102 • 701.231.6219
www.ndsu.edu/csp



The Center for Surface Protection (CSP), in collaboration with private sector partners, performs research, development and testing of surface protecting coatings and application methods. The Center and its partners work to improve product durability; to reduce corrosion, erosion, and wear properties; and to develop new and improved products and processes.

STATE FUNDS

Launch Date: May 2006
Award: \$4,000,000
Disbursed to the Center: \$2,776,661
Spent by the Center: \$1,919,798

MATCHING & LEVERAGED FUNDS

Received: \$5,281,301
Total Anticipated: \$8,000,000

PRIVATE SECTOR PARTNERS

Akzo Nobel Aerospace Coatings; Arkema, Inc.; Elinor Specialty Coatings; IntegenX; Invista; PPG Industries; SpaceAge Synthetics; Technology Applications Group

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the CSP has created seven new jobs.
- A new spin-off company, Elinor Specialty Coatings, has been established in North Dakota. The company focuses on developing advanced, environmentally friendly technologies in the polymers and coatings field.
- The Center is investigating coatings and polymer technologies that may have applications in North Dakota’s energy industry, including increasing the efficiency of electrical generation from coal.
- The CSP is working with Arkema, Inc. and SpaceAge Synthetics to develop durable surface materials and improve the reliability of wind turbine blades.
- The Center, in conjunction with the U.S. Automotive Partnership, is studying the use of magnesium alloys to reduce car body weight and potentially increase fuel efficiencies.
- The center is working with IntegenX to develop coatings used in components for advanced rapid DNA identification.

EXTREME TESTING PROVIDES IMPORTANT AND QUICK RESULTS TO GRAND FORKS COMPANY

If you’re in a business dependent upon key metal parts, you want to ensure that they don’t wear out too soon or lead to catastrophic failure – particularly when it comes to airplane or helicopter parts.

Technology Applications Group, Inc. (TAG) of Grand Forks developed and markets Tagnite, a coating used on metal equipment and parts that must withstand demanding and extreme environments. TAG developed Tagnite for a simple reason: existing magnesium coatings were inadequate for the demanding environments in which the metal was being used.

“Coatings such as these are often used in aerospace and power tool industries, including parts such as gearboxes, transmission cases and covers, and sump and oil pump housings,” said Bill Elmquist, president of TAG.

North Dakota State University’s Center for Surface Protection (CSP), a North Dakota Economic Development Center of Excellence, provided the expertise TAG sought to independently test the performance of

its products. Specialized equipment at the Center allows weathering to occur in a compressed amount of time for accelerated, corrosive atmosphere testing.

“Having a well-respected independent organization such as the CSP analyze and validate our coating’s performance allows us to approach new customers with hard data that backs up our claims of Tagnite being the best anodized coating for magnesium metal,” Elmquist said.

Sikorsky Aircraft, Boeing Helicopter, Orenda Aerospace and Pratt & Whitney are among the many global companies that have chosen TAG’s Tagnite coating for their magnesium castings.

Philip Boudjouk, vice president for research, creative activities and technology transfer at NDSU, said the Center for Surface Protection and TAG represents a winning partnership. “Using the research and technical expertise of NDSU to help a North Dakota company succeed with international clients is just one beneficial outcome of this program,” Boudjouk said.

**CENTER FOR ADVANCED TECHNOLOGY DEVELOPMENT
& COMMERCIALIZATION** North Dakota State University

1735 NDSU Research Park Drive North + P.O. Box 6050 – Dept. 4000
 Fargo, ND 58108-6050 + 701.231.6660

The Center for Advanced Technology Development and Commercialization (CATCOM) will help private sector partners in commercializing new inventions, technologies and other intellectual property discovered or created by NDSU faculty, staff, students and/or private sector partners. The CATCOM will help private sector partners in a number of ways including conversion of inventions and technologies into commercial products and making product enhancements leading to better market penetration and market share.



STATE FUNDS

Launch Date: N/A
 Award: \$3,900,000
 Disbursed to the Center: \$0
 Spent by the Center: \$0

MATCHING & LEVERAGED FUNDS

Received: \$0
 Total Anticipated: \$7,800,000

PRIVATE SECTOR PARTNERS

Triton Systems, Inc.

PROJECT NOTES AND HIGHLIGHTS

- This Center was approved by the Budget Section on June 22, 2010. As of June 30, 2010, the Center had not yet requested its initial disbursement of state funds.
- The CATCOM's initial project will be a partnership with Triton Systems, Inc. to develop product applications in solar energy, printable/flexible electronics and energy storage based upon NDSU's proprietary and patented liquid silicon technology.

CENTER FOR SENSORS, COMMUNICATIONS, AND CONTROL
North Dakota State University

1735 NDSU Research Park Drive North • P.O. Box 6050 – Dept. 4000
Fargo, ND 58108-6050 • 701.231.8956



The Center for Sensors, Communications and Control (CSCC) will provide much-needed expertise in core areas of JAVA programming, sensor integration and systems engineering that its partners are lacking. These areas of expertise are needed not only by the current partners, but also by other businesses in the region. The CSCC will be a product development partner with goals of stimulating job growth and economic development.

STATE FUNDS

Launch Date: N/A
Award: \$2,800,000
Disbursed to the Center: \$0
Spent by the Center: \$0

MATCHING & LEVERAGED FUNDS

Received: \$0
Total Anticipated: \$5,600,000

PRIVATE SECTOR PARTNERS

Intelligent InSites
Pedigree Technologies
PureChoice Inc.
SNAPS Holding Company

PROJECT NOTES AND HIGHLIGHTS

- This Center was approved by the Budget Section on June 22, 2010. As of June 30, 2010, the center had not yet requested its initial disbursement of state funds.
- The CSCC and Intelligent InSites will partner on a number of projects including development of software to support an “applications store” where current InSites customers can view, purchase and download the available certified applications into their implementations.
- The Center will work with Pedigree Technologies to integrate sensors into the company’s OneView commercial software platform, which is an asset tracking and monitoring solution.
- The CSCC will partner with PureChoice, Inc. to develop an updated version of its Nose hardware, an indoor air quality monitoring device, and to continue development of PureTrac, a building performance software application.
- The Center will work with SNAPS Holding Company on a project that includes developing a suite of software solutions for transportation, financial, insurance, public safety and contact center businesses. This software will be customized for rapid deployment in the fastest developing economies of the world.

UNMANNED AIRCRAFT SYSTEMS CENTER OF EXCELLENCE

University of North Dakota

John D. Odegard School of Aerospace Sciences
3980 Campus Road, Stop 9007 • Grand Forks, ND 58202-9007 • 701.777.2615
www.uasresearch.org

The Unmanned Aircraft Systems Center of Excellence (UAS COE) performs research and development on UAS technologies, applications and UAS human factors issues. The UAS COE encourages commercialization of new UAS-related products and services and also focuses on education and training for UAS integration into national airspace.



STATE FUNDS

Launch Date: May 2006
Award: \$2,500,000
Disbursed to the Center: \$2,500,000
Spent by the Center: \$2,158,668

MATCHING & LEVERAGED FUNDS

Received: \$11,520,144

PRIVATE SECTOR PARTNERS

AAI Corporation, Aerovironment Inc., American Crystal Sugar Company, Appareo Systems, Boeing, BoldMethod, Cirrus Design Corporation, Composite Engineering Inc., Diamond Aircraft, Draganfly Innovations Inc., Evergreen International Aviation Inc., General Atomics, General Dynamics, Goodrich, Ideal Aerosmith, Killdeer Mountain Manufacturing, L3 Communications, Laserlith Corporation, Lockheed Martin, Machine Visionaries LLC, Mayo Clinic, Northrop Grumman, Science Applications International Corporation, SEO Precision, Statistical Methodology & Research Design Consultants

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the UAS COE and its partners have created 34 new jobs.
- The UAS COE provides cold weather testing ground for unmanned aircraft systems. Research in these cold weather climates must take place before UAS can be operated for civilian applications in the northern U.S. airspace.
- The Center is working to resolve the “sense and avoid” issue which is a critical barrier to opening national airspace to unmanned aircraft systems. The Center is developing the Automatic Dependent Surveillance-Broadcast (ADS-B) transceiver, a communication device for small UAS vehicles.
- UND is currently the only university in the world offering an undergraduate UAS degree. The program was initiated in fall 2009 and enrollment is growing rapidly as 68 students are enrolled in the program for fall 2010.
- The Center has developed the Air Drop payload for use in search and rescue operations which drops a half pound object at a target within a radius of 100 feet.
- Another product under development by the Center is the Laser Communications payload, a small UAS payload capable of laser communications with a ground-based receiver. Video captured by the payload will be transmitted to the ground via laser, which is very difficult to electronically jam in the battlefield.
- In addition to payload development, the Center is also researching the effects of human factors on UAS flight performance. Research focuses on how factors such as fatigue impact the performance of UAS pilots and sensor operators. This area is largely unexplored.

CENTER OF EXCELLENCE IN SPACE TECHNOLOGY AND OPERATIONS University of North Dakota



UND Center for People and the Environment

4149 University Avenue, Stop 9011 • Grand Forks, ND 58202-9011 • 701.777.3543

The Center of Excellence in Space Technology and Operations will conduct research using a network of satellites that take atmospheric measurements simultaneously in hundreds of places around the world on a continuous basis. This technique is new, yet well demonstrated, and will dramatically improve weather forecasts and provide valuable information to the military and other users of long-range radio communications.

STATE FUNDS

Launch Date: June 2009

Award: \$1,000,000

Disbursed to the Center: \$115,510

Spent by the Center: \$42,507

MATCHING & LEVERAGED FUNDS

Received: \$120,000

Total Anticipated: \$3,220,001

PRIVATE SECTOR PARTNERS

Broad Reach Engineering Inc.

GeoOptics LLC

PROJECT NOTES AND HIGHLIGHTS

- A fleet of spacecraft known as CICERO is under development by Broad Reach Engineering and GeoOptics. CICERO will use radio occultation (RO), a remote sensing technique, to observe radio signals from Global Positioning System (GPS) satellites as they pass through the Earth's atmosphere. The resulting data will be used by the Center and other researchers to improve the accuracy of weather forecasts.
- A full-scale prototype of the CICERO spacecraft structure and related systems is anticipated to be completed in fiscal year 2011.
- The Center's initial efforts have focused on performing a comparative analysis between GPS-RO derived weather data and data obtained from standard radiosondes. The purpose of the comparison was to determine whether the quality of GPS-RO data from an existing prototype system was accurate and could be used in the Center's research activities. The GPS-RO data was found to be sufficient and will be integral for future research aimed at improving medium-range forecasts for the continental region and the upper Midwest.
- The Center also operates the International Space Station Agricultural Camera (ISSAC) aboard the International Space Station. Students perform ground operations control tasks, including interacting with NASA, that will develop the skills necessary to operate CICERO. During the last year, ISSAC experienced a sensor malfunction which halted its operations. However, a new ISSAC sensor is expected to be launched to the International Space Station in January 2011 allowing full operations to resume.
- Once fully operational, CICERO will generate data products that may be sold on a worldwide market with customers such as the U.S. government, international government agencies and private sector entities. Additionally, a CICERO mission operations and analysis center will be established in Grand Forks creating new, high-tech jobs.

DAKOTA CENTER FOR TECHNOLOGY-OPTIMIZED AGRICULTURE
 Lake Region State College

1801 College Drive North • Devils Lake, ND 58301-1598 • 701.662.1600
www.lrsc.edu/programs/default.asp?id=655

The Dakota Center for Technology-Optimized Agriculture (DCTOA) focuses on technological applications in agriculture and their effectiveness on the plains of North Dakota. Products generated by this Center are designed to help North Dakota farmers and ranchers lower input costs and increase profitability while having a positive impact on the environment.



STATE FUNDS

Launch Date: February 2006
 Award: \$850,000
 Disbursed to the Center: \$652,730
 Spent by the Center: \$450,000

MATCHING & LEVERAGED FUNDS

Received: \$1,293,080
 Total Anticipated: \$1,900,028

PRIVATE SECTOR PARTNERS

Agri ImaGIS Technologies Inc., AGVISE Laboratories, Farmers Edge Precision Consulting Inc., Twete Inc., Verdi-Plus

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the DCTOA and its partners have created 11 new jobs.
- The DCTOA has completed four years of trials on variable rate application of synthetic fertilizer at area “answer farms.” Earlier results indicated farmers could save up to 16 percent on fertilizer costs by implementing these practices. A final report from the Center on its findings is expected.
- The Center is designing a slurry manure injection tool for use in its research on site-specific control technologies for manure application. In addition to the useful data that will be generated by the research, there may be market opportunities for the injection tool developed by the Center.
- DCTOA partner Agri ImaGIS, with contributions from the Center, has developed new precision agriculture imaging resources that have been implemented by agronomy service firms to the benefit of North Dakota agricultural producers.
- The Center contributed to the development of Verdi-PLUS, a spin-off company.
- The Center has developed precision agriculture educational/training modules that will be available in 2011 using the eCollege platform.

FARMERS BENEFIT FROM FARGO-BASED FIRM'S SKY-HIGH AG TECHNOLOGY

Agri ImaGIS has become a worldwide leader in using satellite technology to help farmers and others involved in agriculture be more efficient.

The company's products help farmers apply the right amount of seed, fertilizer and other crop inputs throughout a field. This holds down expenses for producers while also increasing yields. Agri ImaGIS products also can be used by insurance companies and their adjusters to map and manage crop loss claims.

The Fargo-based company offers customized services to a wide range of other organizations, including government agencies and engineering firms. The Dakota Center for Technology Optimized Agriculture is a partner with Agri ImaGIS.

Agri ImaGIS's newest product, Satshot3D, is an online system that allows customers to take a three-dimensional look at their crops, and then to apply inputs at variable rates. Satshot Mobile allows customers to make and view maps from any Internet-capable cell phone.

Agri ImaGIS has 14 employees and is growing rapidly. The company has its main office in Fargo, and a smaller branch office in Maddock, N.D.

According to company owner Lanny Faleide, farms of all sizes can use Agri ImaGIS products successfully. “Size is irrelevant to this technology. It's all based on attitude (and) how curious you are,” he said.



This story was adapted with permission from the Fargo Forum.

CENTER OF EXCELLENCE FOR AGBIOTECHNOLOGY: OILSEED DEVELOPMENT North Dakota State University

P.O. Box 5636 • Fargo, ND 58105-5636 • 701.231.7472
www.ag.ndsu.edu/research/OilseedDevCE.htm



The Center of Excellence for Agbiotechnology focuses on expanding canola production and processing in North Dakota. The Center aims to improve oilseed genetics and develop enhanced processing techniques that increase efficiency in manufacturing products made from canola, such as biodiesel. The Center will also develop business strategies to improve profitability for canola producers, handlers and processors.

STATE FUNDS

Launch Date: May 2006
Award: \$3,500,000
Disbursed to the Center: \$2,367,500
Spent by the Center: \$1,757,315

MATCHING & LEVERAGED FUNDS

Received: \$12,000,000

PRIVATE SECTOR PARTNERS

Archer Daniels Midland Inc.
Monsanto Company

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the Center of Excellence for Agbiotechnology has created six new jobs.
- The Center's objective of releasing canola varieties with enhanced oil content per acre is one key to making canola production more profitable. This is especially important as rising demand has led to a 35 percent increase in canola acreage this past summer.
- The Center has transitioned from an open-pollinated breeding program into a hybrid breeding program which is the major form of canola breeding today.
- In 2010, the Center approved one open-pollinated canola line for release. The line will be highly competitive with hybrids currently in production and is expected to help reduce production costs for North Dakota farmers. The Center is working to identify additional canola lines with improved performance.
- The Center is working to expand the traditional canola growing areas within the state to include central and southwestern North Dakota by identifying new canola lines that are suited for the growing conditions of these regions

NDSU AND MONSANTO COLLABORATE FOR HIGHER CANOLA YIELDS

The NDSU Center of Excellence in Agbiotechnology is a collaborative effort between plant breeders and geneticists at NDSU and Monsanto Company.

"The goal of the Center is to increase the wealth of North Dakota producers by developing new canola varieties that are better suited to our agricultural production environment," said Phillip McClean, professor of plant sciences. "We are also looking to increase the yield of oil per acre which will benefit the canola oil production industry."

The first test involved a large screening of advanced breeding lines provided by Monsanto Company in the major canola growing regions of North Dakota. This test was done primarily in the northeast and north central parts of the state. In the first year researchers identified two promising lines.

"These new canola varieties consistently showed higher yield," McClean said. "And just as importantly, the oil content is three percentage points higher than the standard checks. Both of these performance traits are of value. The canola producer realized a higher yield, while the oil producer yields a greater volume of oil per truckload."

The modern canola industry is now using hybrids rather than open pollination, which requires pollination by insects, birds, wind, or other natural mechanisms. Because of this trend, the Center is now converting to a hybrid program.

"By working with our corporate partner, the hybrid program is ensuring that the newest traits will be incorporated into the first hybrid releases," McClean said. "This will ensure that North Dakota growers will continue to benefit from a traditional breeding program and the best new traits available on the market."



BEEF SYSTEMS CENTER OF EXCELLENCE
North Dakota State University

Department of Animal Sciences • 100 Hultz Hall • Fargo, ND 58105 • 701.231.7660
www.ag.ndsu.edu/research/BeefSystemsCE.htm

The Beef Systems Center of Excellence (BSCE) was established to create a model for a coordinated meat processing industry that could be implemented in other parts of the state, region or country. The BSCE enhances NDSU’s ability to provide leading research in meat science and also provides training, education and outreach opportunities for students, businesses and beef cattle producers.



STATE FUNDS

Launch Date: October 2007
Award: \$800,000
Disbursed to the Center: \$800,000
Spent by the Center: \$800,000

MATCHING & LEVERAGED FUNDS

Received: \$2,000,000

PRIVATE SECTOR PARTNERS

North Dakota Natural Beef LLC
North American Bison Cooperative

PROJECT NOTES AND HIGHLIGHTS

- A meat processing model has been developed where North Dakota-raised beef is slaughtered, processed and distributed all within the state.
- The BSCE is co-located at North Dakota Natural Beef’s processing plant in Fargo which provides unique advantages such as availability and proximity of animal carcasses for research and educational purposes.
- The research being conducted by the BSCE includes studies on predicting meat tenderness and whether hormones in meat contribute to early puberty in children who eat meat.
- The 2009 Legislature determined the BSCE has met its funding requirements and is not subject to the accountability requirements of the Centers of Excellence program.

ENTREPRENEURIAL CENTER FOR HORTICULTURE
Dakota College at Bottineau

#22 Molberg Center • 105 Simrall Boulevard Bottineau, ND 58318 • 701.228.5649
www.dakotacollege.edu/ech.shtml



The Entrepreneurial Center for Horticulture is designed to grow the organic and specialty vegetable industry in North Dakota. The Center will research and demonstrate production methods and provide new opportunities for product commercialization and distribution in North Dakota and the region. This Center is pursuing its objectives, but has not yet received its first disbursement of state funds. The Center is working on securing the necessary matching funds to allow for the initial disbursement.

STATE FUNDS

Launch Date: N/A
Award: \$400,000
Disbursed to the Center: \$0

MATCHING & LEVERAGED FUNDS

Received: \$0
Total Anticipated: \$830,854

PRIVATE SECTOR PARTNERS

North Star Organic Farm, North Dakota
Farmers Market and Growers Association

NATIONAL CENTER FOR HYDROGEN TECHNOLOGY

University of North Dakota – Energy & Environmental Research Center

15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • 701.777.5000
www.undeerc.org/NCHT

The National Center for Hydrogen Technology (NCHT) conducts research, development, demonstration and commercialization projects for the production and use of hydrogen for power, fuels and chemicals. In conjunction with private sector partners, the NCHT developing technologies such as hydrogen on-demand fueling stations, hydrogen production from fossil and renewable fuels, and hydrogen usage in fuel cells, combustion engines and turbines.



PROJECT NOTES AND HIGHLIGHTS STATE FUNDS

Launch Date: February 2006
Award: \$2,500,000
Disbursed to the Center: \$2,500,000
Spent by the Center: \$2,500,000

MATCHING & LEVERAGED FUNDS

Received: \$50,333,060

PRIVATE SECTOR PARTNERS

Aboriginal Cogeneration Corporation, Advanced Biomass Gasification Technologies Inc., Agricultural Utilization Research Institute, Air Products and Chemicals Inc., Basin Electric Power Cooperative, Biomass Energy Solutions Inc., BMC Construction, Catacel Corporation, CH2M Hill Inc., Chippewa Valley Ethanol, Clean Earth Solutions Inc., Conoco Phillips, Diversified Energy Corporation, Electric Power Research Institute, Energy Conversion Devices Inc., EP Minerals, ePower Synergies, Franklin Fuel Cells, Great Point Energy, Great River Energy, IdaTech, Minnesota Corn Research Council, North American Coal Corporation, North Dakota Corn Utilization Council, PL Gasification, Porvair plc, Pratt & Whitney Rocketdyne Inc., Resurface Corporation, Rio Tinto, SGL Carbon Group, Siemens Power Generation Inc., Stelios Arvelakis, ThermoChem Recovery International Inc., TXU Generation Company, United Technologies Research Center, Westmoreland Coal Sales Company, Xcel Energy, Xethanol Corporation

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, research demands at the NCHT have led to the creation of 29 jobs. These positions are funded by hydrogen-related contracts – none of the jobs are supported by state funds.
- The Center is working to commercialize a variety of technologies including on-demand hydrogen, renewable fertilizers, biomass gasification and materials for hydrogen turbines.
- The Center is teaming with industry and government clients to demonstrate advanced clean coal gasification to produce hydrogen-rich gas from a variety of coals, with a special emphasis on North Dakota lignite. These projects are bringing together numerous players in the North Dakota energy industry and focus on providing efficiency, environmental and cost improvements for the production of power, fuels and chemicals from the hydrogen-rich gas.

ON-DEMAND HYDROGEN FUELING SYSTEM IN SCALE-UP

The EERC is scaling up its on-demand hydrogen fueling system for fuel cell vehicles and industrial applications. The system, designed and built with a variety of private sector partners, will be capable of full integration with existing gas station infrastructure, making refueling a fuel cell automobile as easy as refueling a combustion engine-powered car.

The system can produce high-purity, high-pressure hydrogen from a variety of hydrocarbon feedstocks, including alcohols and petroleum-based fuels such as military jet fuel. The technology operates at high pressure and mixes water into the hydrocarbon feedstock to increase hydrogen yield.

The system process occurs in two steps. First, in the reformation step, a high pressure, H₂-rich gas is produced from the pressurized liquid feedstock. Next, in the purification step, the high pressure gas is stripped of impurities, in particular CO₂, to yield greater than 99.9 percent pure H₂ at high pressure.

This EERC hydrogen on-demand technology overcomes the infrastructure challenges associated with competing technologies by minimizing or eliminating hydrogen compression, storage and transport. Hydrogen can be produced on-site at the gas station or on the battlefield as needed, rather than being compressed and then shipped from a separate location. This EERC Foundation patented technology is moving toward commercial deployment.

“This state-of-the-art process has the potential to significantly reduce the cost of a new nationwide H₂ production and distribution infrastructure, so that H₂ refueling will be accessible and affordable,” said Ted Aulich, EERC senior research manager.

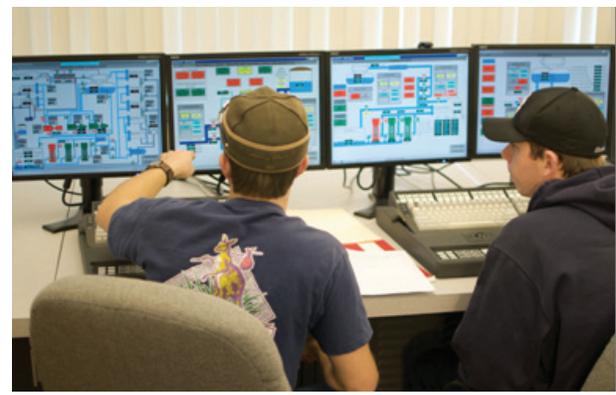
NATIONAL ENERGY CENTER OF EXCELLENCE

Bismarck State College

1200 Schafer Street • P.O. Box 5587 • Bismarck, ND 58506 • 800.852.5685

www.bismarckstate.edu/energy

The National Energy Center of Excellence (NECE) is a worldwide leader in energy education and training for the energy industry. Partnerships with the North Dakota energy industry allow the NECE to build a pipeline of multi-skilled workers to meet the 21st century demands of this industry. The efforts of this Center enable students and energy companies to succeed in a competitive, ever-changing industry.

**STATE FUNDS**

Launch Date: February 2006

Award: \$3,000,000

Disbursed to the Center: \$3,000,000

Spent by the Center: \$3,000,000

MATCHING & LEVERAGED FUNDS

Received: \$6,622,000

Total Anticipated: \$7,342,000

PRIVATE SECTOR PARTNERS

Archer Daniels Midland Co., Basin Electric Power Cooperative, Great Northern Power Development, Great River Energy, Headwaters Inc., Montana Dakota Utilities, North Dakota Biodiesel, Red Trail Energy, Spiritwood Station, Tesoro

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the NECE has contributed to the creation of 101 jobs.
- The NECE has seen enrollment in its energy programs increase by 27 percent since the fall 2008 semester.
- In 2009, BSC awarded its first bachelor of applied science degrees in the energy management program. Currently there are over 150 students enrolled in the program which is designed for energy employees preparing for supervisory and management positions.
- In response to industry request, a Renewable Generation Technology program will be offered beginning in fall 2010. The program, available on campus and online, is designed to provide students with a broad background in the electrical generation industry and prepare them for employment in areas of wind, solar, geothermal, fuel cell, biomass, hydro and tidal generation.
- The NECE was awarded funding from the Department of Energy to establish a smart grid laboratory. The new lab is designed to assist education and training efforts in the areas of smart grid technology, distributed generation, demand response and consumer integration of smart technologies.
- BSC continues to find new ways to serve military personnel. BSC was recently approved to provide online education to military personnel serving in the U.S. Coast Guard. BSC now has agreements in place to provide its energy programs to members of the Army, Navy, Marines, Air Force and Coast Guard.
- The NECE is making energy education available around the world through its online programs. BSC recently established an agreement with a university in Istanbul to provide its online energy programs to students of Turkey. BSC is also exploring partnerships in Africa.

PETROLEUM SAFETY AND TECHNOLOGY CENTER

Williston State College

1410 University Avenue • Williston, ND 58801 • 1.866.938.6963
www.wsc.nodak.edu/Classes/TrainND/Petroleum-Safety-and-Technology-Center.html



The Petroleum Safety and Technology Center (PSTC) trains workers for the oil and gas industry. The Center works closely with its industry partners to develop and maintain state-of-the-art training programs. The hands-on training sessions are designed to help oil and gas production workers work safely and efficiently.

STATE FUNDS

Launch Date: May 2006
 Award: \$400,000
 Disbursed to the Center: \$400,000
 Spent by the Center: \$400,000

MATCHING & LEVERAGED FUNDS

Received: \$1,183,044

PRIVATE SECTOR PARTNERS

Baker Oil Tools, Capital Safety, GC Products, Halliburton Energy Services, Hess Corporation, Hickman Sales and Service, Howard Supply, Interstate Powersystems (aka Interstate Detroit Diesel), Key Energy, Marathon Oil Company, Modern Machine, Nabors Drilling, Nabors Well Service, Nance Petroleum, National Oilwell Varco, Schlumberger, Stewart and Stevenson, VetcoGray, Weatherford Completion, Williston Fire and Safety¹

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the PSTC has contributed to the creation of 167 jobs.
- The PSTC provides training for 171 companies in the oil and gas industry.
- The Center conducted 498 oil and gas-related training sessions in the last year, training over 4,000 individuals.
- The COE grant initially allowed the PSTC to partner with industry companies to develop the floorhand program. Through this partnership, additional program needs were identified and new training courses were implemented including commercial drivers license training, well control classes, additional safety training classes, aerial lift training and lease operator training.
- The PSTC partners with several out-of-state colleges, sharing instructors and curricula. These partnerships allow the Center to provide more diverse training courses to North Dakota oil and gas companies.
- The Center has also partnered with Bismarck State College and Dakota College at Bottineau to deliver additional oil training programs within the state.

“The purpose of the Petroleum Safety and Technology Center is to provide the oil and gas industry with a trained and skilled workforce. This program allows the college to expand technical training programs for the industry. Ultimately, the impact is additional employees in the region, a skilled workforce for the oil and gas industry and economic growth for North Dakota.”

- Deanette Piesik, WSC Train ND Executive Director

¹ The private sector partners listed are companies that helped establish the PSTC training program. Many, but not all, of these companies are included in the 171 oil and gas companies for which the PSTC provides training.

**PETROLEUM RESEARCH, EDUCATION, AND ENTREPRENEURSHIP
CENTER OF EXCELLENCE** University of North Dakota

81 Cornell Street, Stop 8358 • Leonard Hall Room 101
Grand Forks, ND 58202-8358 • 701.777.4449
www.und.nodak.edu/org/preec

The Petroleum Research, Education, and Entrepreneurship Center of Excellence (PREEC) focuses on improving understanding of the Williston Basin oil deposits with special attention to the Bakken Formation. The Center aims to develop enhanced oil recovery techniques as well as address other challenges and opportunities relating to petroleum exploration and production such as CO₂ sequestration and geothermal energy.



STATE FUNDS

Launch Date: June 2009
Award: \$3,000,000
Disbursed to the Center: \$1,110,369
Spent by the Center: \$1,110,369

MATCHING & LEVERAGED FUNDS

Received: \$6,537,171
Total Anticipated: \$7,958,373

PRIVATE SECTOR PARTNERS

Calnetix, Inc., Continental Resources, Hess Corporation, Marathon Oil Corporation, Presco, LLC, St. Mary Land & Exploration Company, Whiting Petroleum Corporation

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the PREEC has created four new jobs.
- The U.S. Geological Survey estimates the Bakken Formation contains as much as 400 billion barrels of oil of which only 3.65 billion barrels are recoverable with today's technology. Researchers at the PREEC are investigating enhanced oil recovery techniques that could be used to increase the recovery rate of oil in the Bakken Formation as well as other formations in the Williston Basin.
- The PREEC has received a major grant from the U.S. Department of Energy to demonstrate the feasibility of geothermal power systems. The demonstrations will take place in western North Dakota oil fields. Goals of the grant are to demonstrate the technology can be replicated within a wide range of physical parameters and to allow for long-term operation of the original geothermal sites.
- The Center is collaborating with the University of Minnesota to develop CO₂ sequestration in concert with electricity-producing Enhanced Geothermal Systems (EGS). The concept is to use CO₂ rather than water as the working fluid in the EGS.
- The PREEC has applied for a patent on its Ballistic Ordinance Seismic Source (BOSS), a seismic shot gun mounted on a dolly for mobility. The BOSS is used as a seismic source in reflection and refraction surveying.
- The Center is working to improve understanding of the geology, geophysics and petroleum engineering characteristics of the Williston Basin. Potential benefits of such work may include optimizing development planning and identifying future targets for oil production or CO₂ storage.
- A petroleum engineering degree program has been implemented at the University of North Dakota. The program advances the PREEC's goal to educate North Dakota students in petroleum disciplines. Enrollment in this new program is growing.

SUNRISE BIOPRODUCTS: A CENTER OF EXCELLENCE FOR CHEMICALS, POLYMERS, & COMPOSITES FROM CROP OILS University of North Dakota

241 Centennial Drive, Stop 7101 • Grand Forks, ND 58202-7101 • 701.777.2958
www.und.edu/org/sunrise/index.html



The purpose of the SUNRISE BioProducts Center of Excellence is to invent, develop and commercialize green industrial chemicals, polymers and fiber composites using crop oils as the primary raw material. This Center of Excellence is administered by the North Dakota Sustainable Energy Research Initiative and Supporting Education (ND SUNRISE) program. The mission of ND SUNRISE includes conducting research that helps solve energy-related problems and enhance economic development in North Dakota.

STATE FUNDS

Launch Date: June 2009
 Award: \$2,950,000
 Disbursed to the Center: \$983,333
 Spent by the Center: \$983,333

MATCHING & LEVERAGED FUNDS

Received: \$2,885,450
 Total Anticipated: \$9,165,132

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the SUNRISE BioProducts Center of Excellence has created 10 new jobs.
- The Center aims to use crop oils to produce products that are nearly identical to existing petroleum-based products and accepted as green replacements for those existing products.
- The Center is conducting a considerable amount of research on lab and bench-scales. The objectives of this research are to optimize cracking conditions, develop extraction and recovery processes for the chemicals and by-products, and develop conversion processes to convert materials into high value by-products.
- The research performed by the Center produces a considerable number of chemicals and by-products. A market study was performed to identify those that have the greatest commercialization potential. This data contributes to the Center's overall development and commercialization strategy.
- The Center is also preparing for the scaling-up of its research projects. Design planning has commenced for pilot and demonstration-scale facilities. These facilities may be located in Grand Forks or Northwood, N.D.
- The activities of this Center combine the efforts of researchers at UND, NDSU and Mayville State University.

PRIVATE SECTOR PARTNERS

AbsoluteEnergy, Advanced Ceramics Manufacturing, Bayer Crop Science, Bayer Material Science, Chemera, Guardian Energy, Heartland Corn Products, Homeland Energy Solutions, Kadrmass Lee and Jackson, Karges-Faulconbridge, Inc., Kuehnle Agrosystems, LM Glassfiber, Marvin Windows, Menon & Associates, Northwood Oilseed Processing Company, Ogden Engineering & Associates, RPMG, SUNRISE Renewables, Sustainable Oils, Tecton Products

Center of Excellence in Life Sciences & Advanced Technologies
University of North Dakota Research Foundation

4201 James Ray Drive • Grand Forks, ND 58202 • 701.757.5100
www.undrf.org

The Center of Excellence in Life Sciences and Advanced Technologies (COELSAT) focuses on commercializing research and intellectual property. The facility provides research laboratories including Biosafety Level 3 (BSL-3) enhanced laboratories, “wet” laboratories, and office and production space to tenants. The COELSAT provides the necessary infrastructure to serve North Dakota life science and technology companies, and to attract new companies to the state.



STATE FUNDS

Launch Date: March 2007
Award: \$3,500,000
Disbursed to the Center: \$3,500,000
Spent by the Center: \$3,500,000

MATCHING & LEVERAGED FUNDS

Received: \$11,911,286

PRIVATE SECTOR PARTNERS

Alion Science and Technology, Avianax, Dakota Harvest, DMD, Ideal Aerosmith, Intraglobal Biologics Laserlith Corporation, Novadigm, SUNRISE Renewables

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the COELSAT and its partners have created 16 new jobs.
- The COELSAT, also known as Research Enterprise and Commercialization 1 or REAC1, is a state-of-the-art facility which boasts the only BSL-3 labs in North Dakota. The BSL-3 labs will allow tenants to perform research on infectious diseases, such as West Nile Virus and Avian Influenza, once the biological safety program is completed in early 2011.
- The Center has contributed to the establishment of a new spin-out business, Avianax, which is developing therapeutic antibody treatments against the West Nile virus. Another start-up company working in biofuels research is currently being fostered and in the final stages of incorporation.
- Alion Science and Technology, a REAC1 tenant, is an existing company that expanded into North Dakota. Alion uses industrial laser and other technologies to improve the reliability and function of engineered surfaces.
- Ideal Aerosmith, another REAC1 tenant, expanded into Grand Forks from Minnesota. The company uses its space in the facility to accelerate its research capability, a key to maintaining its technical leadership.
- NovaDigm Therapeutics, another REAC1 tenant, is developing innovative vaccines to protect patients from fungal and bacterial infections, which can be life-threatening and drug resistant. Novadigm is another existing company that has expanded into North Dakota.

CENTER OF EXCELLENCE FOR PASSIVE THERAPEUTICS
University of North Dakota Research Foundation

4201 James Ray Drive • Grand Forks, ND 58202 • 701.757.5100
www.undrf.org



The Center of Excellence for Passive Therapeutics (COEPT) will develop passive (antibodies) therapeutics from agriculture products for people exposed to or infected with viral infections or diseases. Once shown effective in pre-clinical and clinical trials, therapeutic products using antibodies from goose sera or eggs will be produced in their entirety in North Dakota.

STATE FUNDS

Launch Date: June 2009
Award: \$2,650,000
Disbursed to the Center: \$2,134,236
Spent by the Center: \$1,657,429

MATCHING & LEVERAGED FUNDS

Received: \$6,556,472
Total Anticipated: \$8,400,000

PRIVATE SECTOR PARTNERS

Avianax, Intraglobal Biologics, Mayo Clinic,
Schiltz Goose Farms-North, Schiltz Goose R&D

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the COEPT and its partners have created 22 new jobs.
- The COEPT and partner Avianax are performing pre-clinical trials to advance therapeutic antibody products. The first product targeted is an antibody to West Nile Virus.
- The Center will collaborate with NDSU's Center for Biopharmaceutical Research and Production, which will provide quality assurance and quality control for the therapeutic antibody products that are being developed.
- One objective of the grant was to complete lab space within the REAC1 facility at UND. Construction was completed on a BSL-3 enhanced lab and a BSL-3 suite comprised of three labs and an animal facility. Such labs are needed for research on infectious diseases that pose an elevated risk for humans, such as the West Nile Virus.

CENTER FOR BIOPHARMACEUTICAL RESEARCH AND PRODUCTION

North Dakota State University

1401 Albrecht Blvd • Fargo, ND 58105 • 701.231.7609

The Center for Biopharmaceutical Research and Production (CBRP) will design, develop and produce biopharmaceutical product candidates including vaccines. The Center will work with biopharmaceutical and life sciences sectors in North Dakota to discover and develop new vaccines and other biopharmaceuticals to treat some of the most challenging diseases facing humankind. The Center's long-term goal is to develop vaccines and biopharmaceutical products as well as advance product candidates through pre-clinical and clinical studies in conjunction with its private sector partners.



STATE FUNDS

Launch Date: June 2009
Award: \$2,000,000
Disbursed to the Center: \$1,151,350
Spent by the Center: \$51,654

MATCHING & LEVERAGED FUNDS

Received: \$2,120,268
Total Anticipated: \$4,742,000

PRIVATE SECTOR PARTNERS

Aldevron, Altravax, Avianax, Cetero, Clinical Supplies Management Inc., SamahLution, Sanford Health

PROJECT NOTES AND HIGHLIGHTS

- Center partner Altravax is working on developing vaccines against HIV and Hepatitis-B.
- Avianax has partnered with the Center of Excellence for Passive Therapeutics to develop passive immunotherapy against the West Nile Virus, pandemic influenza virus infections and others. Avianax will now also partner with the CBRP, which will assist in the development of product concepts and the FDA approval processes. The collaboration extends to UND's School of Medicine.
- The CBRP is collaborating with SamahLution to develop RNAi-based products for use in transplant medicine.
- The Center is developing partnerships with companies such as Aldevron, Clinical Supplies Management, Sanford and Cetero in the manufacture, clinical supply and clinical trials of products developed through the collaborative efforts of the CBRP and its partners.

PFIZER SCIENTIST JOINS NDSU CENTER OF EXCELLENCE

A former high-ranking Pfizer biotechnologist will bring immediate recognition to a new North Dakota State University Center of Excellence.

Dr. Satish Chandran will direct NDSU's Center for Biopharmaceutical Research and Production, which will focus on identifying and producing DNA vaccines and other biopharmaceuticals.

Dr. Chandran is the former chief technology officer of the Nucleic Acid-Based Therapeutics Unit of the Biotherapeutics Division at Pfizer Inc. "This is great addition for our program," said Charles Peterson, NDSU dean of pharmacy, nursing and allied sciences. "Satish will immediately bring international and national expertise and distinction to our program and to North Dakota."

According to Peterson, Dr. Chandran is known worldwide for his expertise in biopharmaceuticals, nucleic acid based therapeutics and vaccines and brings with him opportunities to work with pharmaceutical companies and other private sector partners.



Dr. Satish Chandran

CENTER FOR INNOVATION
University of North Dakota

4200 James Ray Drive • Grand Forks, ND 58203 • 701.777.3132
www.innovators.net



The Center for Innovation operates two technology incubators, the Skalicky Tech Incubator and the Ina Mae Rude Center, which was constructed using Centers of Excellence funds. The Center for Innovation supports entrepreneurs by helping launch new ventures, commercialize new technologies and secure access to capital from private and public sources. The Center's primary goals include growing entrepreneur ventures and fostering innovation.

STATE FUNDS

Launch Date: January 2005
Award: \$800,000
Disbursed to the Center: \$800,000
Spent by the Center: \$800,000

MATCHING & LEVERAGED FUNDS

Received: \$3,565,000

PROJECT NOTES AND HIGHLIGHTS

- Since January 2005, the Center for Innovation has contributed to the creation of 195 jobs.
- The Center currently houses and services 38 businesses and student ventures. The Center has an average occupancy rate of 85-90 percent.
- The Center has assisted in the development of nine angel funds around the state engaging more than 110 angel investors.
- Each year since 2006, the Center has been designated as a Soft Landings International Incubator by the National Business Incubation Association. The designation identifies incubators that provide a "soft landing" for international firms wishing to expand into new markets.
- The Center provides educational content for the Innovate ND program and assists program participants with entrepreneur development.

SOFTWARE COMPANY IMPROVING AND RE-INVENTING ITS TECHNOLOGY

Ntractive was launched in 2003 when co-founder Justin Bartak of Grand Forks designed a software product to boost enterprise productivity. In 2006, Bartak teamed up with fellow programmer Dale Jensen, now the CEO of Ntractive, to turn the innovation into a business venture.

After assembling a talented team and preparing to enter the market, they moved their business to the UND Center for Innovation's Ina Mae Rude Entrepreneur Center, the state's first Center for Excellence for Economic Development. This high-tech incubator provides entrepreneur coaching, advanced server room technology, and turnkey office space to ventures like Ntractive. The incubator specializes in high-tech start-ups that can benefit from its IT infrastructure, wet labs and access to entrepreneur coaches and other talent from the University of North Dakota.

Ntractive's software product, Elements Customer Relationship Management (CRM), enables Mac users to communicate and operate more efficiently. Customers use these seamless, streamlined applications to manage clients, orders, email, calendars and much more with their iPhones or Apple computers. The information is stored in a cloud computing system which allows users to access Elements CRM virtually anywhere.

Bartak and Jensen have reached many successful milestones as their company has grown. They entered North Dakota's InnovateND



Justin Bartak & Dale Jensen of Ntractive

competition to develop their business plan, taking home one of five \$5,000 awards in 2007. Also in 2007 they gave their first investment pitch to Dakota Venture Group (DVG). Four other angel funds joined the DVG student-managed venture fund and the North Dakota Development Fund as investors in Ntractive.

In July 2009, Ntractive unveiled the latest version of the product, Elements CRM 2.0, and sales soared. This Grand Fork's enterprise has gained recognition at an astounding rate because of the strong appeal Elements CRM brings to Mac-based businesses.

TECHNOLOGY INCUBATOR

North Dakota State University

1854 NDSU Research Circle North • Fargo, ND 58102 • 701.499.3600
www.ndsuresearchpark.com/incubator

The Technology Incubator is located in the NDSU Research & Technology Park and provides technical and business assistance to high-growth start-up companies. The goal of the Technology Incubator is to provide a wide range of programs and services that foster the formation of technology ventures, accelerate their time to market, and ultimately increase their chance for long-term success.



STATE FUNDS

Launch Date: March 2007
 Award: \$1,250,000
 Disbursed to the Center: \$1,250,000
 Spent by the Center: \$1,250,000

MATCHING & LEVERAGED FUNDS

Received: \$5,037,600

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, Technology Incubator clients and graduates have created 191 jobs.
- To operate in the Technology Incubator, a company must advance and develop new technology, establish a working relationship at NDSU, and work in one or more of the following technology fields: material sciences, biosciences and life science technology, information technology/nanotechnology, advanced manufacturing or sensors/microelectronics.
- Examples of current incubator tenants include Triton Systems, an advanced materials and systems engineering product development firm; Larada Sciences, which markets a breakthrough medical device that offers the fastest way to cure the global problem of head lice; and Avenue Right, which is building a platform that will change the way online and offline advertising is bought and sold.
- Three clients - Appareo Systems, Intelligent InSites, and Pedigree Technologies - have graduated from the Technology Incubator and have greatly expanded their operations in Fargo.
- Technology Incubator graduate Appareo Systems was named the 2010 Outstanding Incubator Graduate - Technology Category by the National Business Incubation Association.
- The Technology Incubator partners with the North Dakota Department of Commerce to host Innovate ND, a statewide innovation competition. The Technology Incubator provides technical assistance on business planning, financial projections and pitching to investors.

ENTERPRISE UNIVERSITY
Valley City State University

101 College Street SW • Valley City, ND 58702 • 800.532.8641



Enterprise University specializes in customized training curricula designed to meet the specific needs of its business partners. Enterprise University focuses on SAP, Microsoft Dynamics, Microsoft SharePoint and Oracle Siebel training but has the capacity to develop and deliver training for any other major enterprise software. The training delivered by Enterprise University is designed to enhance employees' skills and efficiencies, and increase company profitability. Students who complete the training have the skills to pursue careers in high-demand technology fields.

STATE FUNDS

Launch Date: May 2006
Award: \$1,000,000
Disbursed to the Center: \$1,000,000
Spent by the Center: \$819,929

MATCHING & LEVERAGED FUNDS

Received: \$5,140,039

PRIVATE SECTOR PARTNERS

Eagle Creek Software Services²

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the Enterprise University has helped create 64 new jobs.
- Enterprise University helped launch Eagle Creek Software's Valley City location by training employees on Siebel Customer Relationship Management software.
- The VCSU Division of Business Information Technology has implemented enterprise systems and project management classes in its business administration degree as well as its computer information system degree. This will provide students with a strong background in enterprise systems to make them productive employees right out of college.
- Certificate programs in customer relationship management and enterprise applications have been established and are available to the public through Valley City State University.
- The Center belongs to the America's SAP Users Group. Among the benefits this group provides are student internship and employment opportunities.

“This partnership with the community and VCSU provided support to our customers who immediately embraced the new model. The VCSU partnership helped the company to develop critical mass and a core group of highly competent, globally competitive consultants who serve Fortune 2000 companies, these consultants deliver service excellence within a competitive cost structure demanded by our customers. As a result, Eagle Creek is the largest Tier II software service company providing CRM services. We are the dominant company in this market, while nearly half of our competition has gone out of business since we opened the Center.”

- Ken Behrendt, president of Eagle Creek Software Services

² Eagle Creek Software Services was an initial Enterprise University partner. Eagle Creek now performs its own training.

**STROM CENTER FOR ENTREPRENEURSHIP & INNOVATION -
INSTITUTE FOR TECHNOLOGY AND BUSINESS Dickinson State University**

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The Strom Center for Entrepreneurship and Innovation – Institute for Technology and Business is focused on helping businesses start or expand in rural North Dakota. The Institute offers services in marketing, human resources, and business technology with an emphasis on helping area businesses adapt and implement new technologies. The Institute is equipped to assist companies ranging from manufacturers to small businesses and entrepreneurs.



STATE FUNDS

Launch Date: October 2006
Award: \$1,150,000
Disbursed to the Center: \$1,150,000
Spent by the Center: \$887,242

MATCHING & LEVERAGED FUNDS

Received: \$5,106,186
Total Anticipated: \$5,299,686

PRIVATE SECTOR PARTNERS

Badlands Integrity, Cedar Canyon Spa, DLN Consulting, Faith Expressions, Kadrmas Lee and Jackson, Killdeer Mountain Manufacturing (KMM), Patriot Trucking, Rhustic Photography, Spa Studio, WildInspire

PROJECT NOTES AND HIGHLIGHTS

- As of June 30, 2010, the Center and its partners have created 160 new jobs.
- The Center offers a wide range of services to regional companies including website development, feasibility studies, leadership training, marketing plans, branding, social networking and advertising.
- The Center is well suited to work with companies of any size, but a regional survey conducted by the center has identified start-ups, aspiring entrepreneurs and small businesses as target markets. The Center is working to provide an “incubator” atmosphere in western North Dakota.
- In the past year, the Center has seen a considerable growth to its client/partner base. This can be attributed to the Center’s initial successes and a focused effort by the Center to increase awareness of its services within western North Dakota.
- The Institute has helped KMM implement supply chain transparency technology which allows for efficient coordination of KMM’s five facilities in rural North Dakota
- The Institute’s efforts have helped KMM create 150 jobs and open facilities in Dickinson, Hettinger and Regent, N.D.



CENTERS OF EXCELLENCE ENHANCEMENT GRANTS

In 2009, the Legislature directed that \$10 million of the funds appropriated to the Centers of Excellence program be used for Centers of Excellence Enhancement Grants during the 2009-11 biennium. The Enhancement Grants are available to the state's research universities for use in infrastructure or enhancement of economic development and employment opportunities.

Appropriate use of funds include a grant to enhance economic development and employment opportunities associated with the Grand Forks Air Force Base; infrastructure and economic development projects or programs to accommodate growth in proximity to or at the Grand Forks Air Force Base; and infrastructure and economic development projects or programs to enhance the capacity of a research university to interface and collaborate with private industry on research, development, demonstration and commercialization of technology.

The Centers of Excellence Commission approves proposals based on the extent to which they meet the following criteria:

- Use university or college research to promote private sector job growth and expansion of knowledge-based industries or use university or college research to promote the development of new products, high-tech companies, or skilled jobs in this state.
- Create high-value private sector employment opportunities in this state.
- Leverage other funding.
- Create infrastructure and economic development projects or programs to enhance the capacity of a research university to interface and collaborate with private industry on research, development demonstration, and commercialization of technology.
- Positively impact economic development in the state.

Additional criteria to be considered for applications relating to the Grand Forks Air Force Base:

- Enhance economic development and employment opportunities associated with the Grand Forks Air Force Base resulting from action by the federal defense base closure and realignment commission.
- Provide infrastructure and economic development projects or programs to accommodate growth in proximity to or at the Grand Forks Air Force Base.

The approval process for Enhancement Grants does not include the Board, Foundation or Budget Section. The approval process concludes with the Centers of Excellence Commission.

As of June 30, 2010, the Centers of Excellence Commission has approved four Enhancement Grant applications totaling \$7,954,000. Three of the projects – Grand Forks Air Force Base Realignment Business Transition Program, the Research 1 Expansion, and the Materials and Nanotechnology Center – are in the development process and have not yet made their initial disbursement request. All three are expected to request their initial disbursement of award funds in fiscal year 2011. A fourth grant, the Center for UAS Research, Education, and Training, did receive its initial disbursement in June 2010 with activities expected to commence in fiscal year 2011.

Research 1 Expansion

North Dakota State University

Award: \$4,000,000

Disbursed: \$0

Summary: NDSU will build a facility adjacent to the existing Research 1 building with the primary function of expanding research, development and technology transfer capabilities in core competency areas with demonstrable success and that have significant growth potential for commercialization. This project will also receive \$5 million in federal funding.

Materials and Nanotechnology Center at NDSU

North Dakota State University

Award: \$1,000,000

Disbursed: \$0

Summary: Research at the Materials and Nanotechnology Center (MNT) will focus on nanoscale properties of soft materials. In addition to increasing the fundamental understanding of the nanoscience that underpins all advances in nanotechnology, such research has potential for applications in areas such as biosensing, biomaterials, nanotribology and solid polymer batteries.

Center for UAS Research, Education, and Training Enhancement Grant

University of North Dakota

Launch Date: June 2010

Award: \$2,754,000

Disbursed: \$2,120,000

Spent: \$0

Summary: This grant will facilitate the initial steps toward building a cutting-edge UAS training and research facility at the Grand Forks Air Force Base. The program will include the new Predator Mission Aircrew Training System (PMAT) which will be used to train new UAS pilots to fly the Predator and Reaper style aircraft. The Center will be the first civilian operator of the PMAT system and will place them at the forefront of the UAS training arena.

Grand Forks Air Force Base Realignment Business Transition Program

University of North Dakota

Award: \$200,000

Disbursed: \$0

Summary: This grant will serve as matching funds for a U.S. Small Business Administration grant intended to provide technical assistance services to businesses in states affected by military base realignment or closure. In North Dakota, this will entail preparing and training businesses wanting to pursue subcontract opportunities presented as a result of the Grand Forks Air Force Base realignment.



The Centers of Excellence program is overseen by a Commission comprised of members from the State Board of Higher Education and the North Dakota Economic Development Foundation. The Centers of Excellence Commission, with assistance from the North Dakota Department of Commerce, manages the application process, makes funding recommendations for projects and oversees the post-award monitoring of the centers.

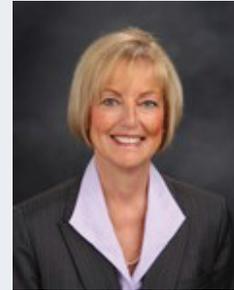
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FUNDING PROCESS

Funding requests are made to the Centers of Excellence Commission which determines whether applicable funding requirements and conditions have been met before approving requests. In order to receive its initial disbursement, a Center must demonstrate private sector participation in the project and availability of the statutorily required matching funds.

As of 2008, award funds were distributed in disbursements consistent with a Center's budget and timeframe outlined in the approved award. This process allows the Commission to review a Center's progress and level of matching funds received prior to distributing subsequent disbursements, thus increasing the accountability of the program. Prior to 2007, award funds were distributed to a Center in one lump sum at the outset of the project.

SELECTION PROCESS

Each proposed Center must complete an extensive application and approval process. The Centers of Excellence Commission reviews each proposal first, recommends whether or not it should be funded and stipulates any conditions for funding. The Centers of Excellence Commission approves proposals based on the extent to which they meet the following criteria:

- Uses university or college research to promote private sector job growth and expansion of knowledge-based industries or use university or college research to promote the development of new products, high-tech companies, or skilled jobs in this state.
- Creates high-value private sector employment opportunities in this state.
- Provides for public and private sector involvement and partnerships.
- Leverages other funding, including cash from the private sector.
- Increases research and development activities that may involve federal funding from the National Science Foundation & Experimental Program to Stimulate Competitive Research.
- Fosters and practices entrepreneurship.
- Promotes the commercialization of new products and services in industry clusters.
- Becomes financially self-sustaining.
- Establishes and meets a deadline for acquiring and expending all public and private funds specified in application.
- Has community support.
- Includes collaboration among institutions.

Proposals must include detailed documentation of private sector participation and the availability of \$2 in matching funds for each \$1 of state funds. Of the \$2 of matching funds, at least one dollar must be cash, of which at least fifty cents must be from the private sector. Matching funds may include dollars raised in collaboration with private sector partners and other funding entities and may include cash and in-kind assets with itemized value. Private sector participation may be established through equity investments or through contracts for services with private entities. In making recommendations, the Commission, Board, Foundation and Budget Section will give major consideration to the portion of the matching funds provided in cash by the private sector.

Each approved proposal is passed to the North Dakota Economic Development Foundation Board, the State Board of Higher Education, and the Legislature's Budget Section for approval.

ACCOUNTABILITY

A Center must use the funds to enhance capacity and leverage state, federal and private funding sources. A Center may not use the funds for infrastructure, to supplement funding for current operations or academic instructions, or to pay indirect costs. Each Center is allowed only one award per biennium.

The Centers of Excellence Commission is responsible for monitoring the Centers with assistance from the North Dakota Department of Commerce. The process includes site visits, third party audits and an in-depth annual review of each Center. Additionally, the Centers provide quarterly reports on major developments, timelines and substantial variations from their proposal to the Department of Commerce.

The University of North Dakota Center for Innovation in Grand Forks and the North Dakota State University Center for Technology Enterprise and the Beef Systems Center of Excellence in Fargo were approved and appropriated funds prior to the creation of the Centers of Excellence Commission. These Centers do not fall under the jurisdiction of the Centers of Excellence Commission but have voluntarily submitted information to be included in this report in order to provide a more complete picture of the Centers of Excellence program.

ECONOMIC IMPACT OF NORTH DAKOTA CENTERS OF EXCELLENCE PROGRAM, 2007-2010

F. Larry Leistritz, Dean A. Bangsund, and Nancy M. Hodur¹

In recent years, economic development has become increasingly linked to technology and information. As a result, policy makers have attempted to facilitate partnerships between universities and private sector businesses. The success of public-private partnerships in areas like the Silicon Valley of California, the Research Triangle of North Carolina, and the Austin, Texas area offers support for the concept of technology-based development. The Centers of Excellence program is North Dakota's initiative to participate in technology and information-based economic development.

The 2003 Legislative session authorized funding for three pilot Centers of Excellence projects. In 2005, the Legislature approved Senate Bill No. 2032 expanding the concept into the Centers of Excellence in Economic Development program. The legislation called for a \$50 million state investment over multiple biennia, to be leveraged on a 2-to-1 basis with private sector and other funds. Additionally, \$10 million has been authorized for enhancement grants at the research universities including projects associated with the realignment of the Grand Forks Air Force Base. As of June 30, 2010, 20 Centers had been approved by the COE Commission through a competitive process since 2005.

The purpose of this report is to estimate the economic impacts of the Centers of Excellence program for the period January 1, 2007–June 30, 2010. The analysis is based on payroll and associated expenditures reported by each Center.²

METHODS

The initial task in any impact assessment is estimating the direct impacts (or “first-round effects”) of the activity being studied. In this study, information on in-state expenditures as well as direct employment, were drawn from reports submitted by each Center. The North Dakota Input-Output Model was used to estimate the secondary economic impacts based on these data.

The North Dakota Input-Output Model consists of interdependence coefficients or multipliers that measure the level of business activity generated in each economic sector from an additional dollar of expenditures in a given sector. (A sector is a group of similar economic units, e.g., the firms engaged in retail trade make up the retail trade sector.) For a complete description of the input-output model, see Coon and Leistritz (1989). The model estimates the changes in gross business volume (gross receipts) for all sectors of the area economy resulting from the direct expenditures associated with the Centers of Excellence program. The increased gross business volumes are used to estimate secondary employment and tax revenues based on historic relationships. The procedures used in the analysis are parallel to those used in estimating the impact of other facilities and activities (Leistritz and Coon 2008; Bangsund and Leistritz 2004 & 2007, Hodur et al. 2006). Empirical testing has confirmed the model's accuracy in estimating changes in levels of economic activity in North Dakota. Over the period 1958-2006, estimates of statewide personal income derived from the model averaged within four percent of comparable values reported by the U.S. Department of Commerce (Leistritz et al. 1990, Coon and Leistritz 2008).

¹ The authors are respectively professor, research scientist, and research assistant professor in the Department of Agribusiness and Applied Economics, North Dakota State University, Fargo.

² In 2009, the Centers reported their expenditures for the period January 1, 2008 to June 30, 2009. This was because of a change in reporting period from calendar to fiscal years.

RESULTS

Period Review (July 1, 2009 - June 30, 2010)

The economic impacts associated with the Centers of Excellence program for July 1, 2009-June 30, 2010 are summarized in Table 1. The direct economic impacts of Center and partner activities total \$25.7 million, based on expenditures from 18 centers.³ The total economic impact (contribution) was \$77 million. Direct employment by Centers and partners totaled 1,017.2 full time equivalent positions.

Cumulative Review (January 1, 2007 - June 30, 2010)

The cumulative economic impacts of the program for January 1, 2007- June 30, 2010 are summarized in Table 2. The total direct impact was \$141.2 million and the gross business volume (direct and secondary effects) was \$406.5 million. Direct employment increased over 240 percent in 2.5 years from about 296 positions in 2007 to about 1,017 jobs in fiscal year 2010 (Table 2). Over the period, a number of secondary jobs also were supported as outlined in Table 2.

DISCUSSION

The Centers of Excellence program is North Dakota's major initiative to participate in technology and information-based economic development. Although the stage of development varies for many of the Centers, the economic effects of the program to date are encouraging. With a direct economic impact of \$141 million and total impact of \$406 million for the period January 1, 2007-June 30, 2010, the program's contribution to the North Dakota economy is already considerable. Further, the jobs resulting from Center activities are relatively high paying. The Centers reported direct employment totaling 1,017 and a payroll of \$53,359,023, for an average of \$52,467 per job – substantially above the state average. Another measure of the Centers' success is their ability to obtain matching and leveraged funds. To date, the Centers have obtained \$152.9 million of matching and leveraged funds, an amount far exceeding the state funds dispersed to the Centers to date. As of June 30, 2010, the centers had spent \$26.2 million of the state funds that have been disbursed.

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³ No expenditures were reported for the NDSU Beef Systems Center of Excellence as that center was specifically exempted by the 2009 Legislature from reporting requirements of the COE program. The UND Center for Innovation did not provide information for this economic analysis.

TABLE 1 **Period Review – Direct, Secondary, and Total Impacts of North Dakota Centers of Excellence and Partner Activities July 1, 2009 - June 30, 2010**

Economic Sector	Expenditures/Receipts		
	Direct	Secondary	Total
	----- \$000 -----		
Construction	2,696	2,137	4,833
Communications & public utilities	266	2,580	2,846
Retail trade	618	17,626	18,244
Finance, insurance & real estate	339	3,952	4,291
Business & personal services	689	1,430	2,119
Professional & social services	527	2,279	2,806
Households	20,605	14,935	35,540
Other ¹	0	6,284	6,284
Total	25,740	51,223	76,963
Employment	1,017.2	318	1,335.2

¹ Includes agriculture, mining, transportation, manufacturing, and government.

TABLE 2 **Cumulative Review – Direct, Secondary, and Total Impacts of North Dakota Centers of Excellence and Partner Activities January 1, 2007 - June 30, 2010**

Economic Sector	Expenditures/Receipts		
	Direct	Secondary	Total
	----- \$000 -----		
Construction	38,211	9,985	48,196
Communications & public utilities	2,277	13,036	15,313
Retail trade	8,713	83,253	91,966
Finance, insurance & real estate	12,563	23,631	36,194
Business & personal services	4,926	6,998	11,924
Professional & social services	2,679	10,197	12,876
Households	70,986	85,314	156,300
Other ¹	850	32,869	33,719
Total	141,205	265,283	406,488
Employment Review ²	----- full-time equivalent positions -----		
July 1, 2009 — June 30, 2010	1,017.20	318	1,335.2
January 1, 2008 — June 30, 2009	921.50	492	1,413.5
January 1, 2007 — December 31, 2007	296.25	408	704.25
Estimated State Tax Collections	----- \$000 -----		
Personal Income Tax	1,065	1,280	2,345
Sales and Use Tax			4,258
Corporate Income Tax			701
Total			7,304

¹ Includes agriculture, mining, transportation, manufacturing, and government.

² Employment cannot be summed across years. Employment figures were presented for each analysis period for sake of comparison over time. Secondary employment for the January 1, 2008-June 30, 2009 figure represents an annualized estimate for the period.

the concept:

The **Centers of Excellence** program is built on the concept of **partnering** the research capacities of public colleges and universities with private sector companies to **generate** jobs and new business opportunities.

As of June 30, 2010, the **Centers of Excellence** had spent \$26.2 million of the awarded funds, resulting in the following economic benefits:

\$406.5 million
total economic impact

18
new or expanded
businesses

1,017
direct jobs
created

190
private sector
partners



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