North Dakota®
DEPARTMENT OF COMMERCE

Centers of Excellence

annual report 2011

State of
North Dakota
Office of the Governor

Jack Dalrymple
Governor

North Dakota's Centers of Excellence 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.

The program, now in its sixth year, has had a significant impact in our state. According to a 2012 study by North Dakota State University, the Centers of Excellence program has leveraged $32.9 million in state funding into an economic impact of $538.8 million through June 30, 2011.

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 extremely valuable for private-sector companies. As a testament to this, 185 companies have formed partnerships with North Dakota Centers of Excellence. These partnerships have leveraged $157 million of matching and leveraged funds, an amount far exceeding the $39.6 million of state funds disbursed to the Centers.

These partnerships are generating results. The Centers of Excellence program has helped create a total of 973 direct jobs at an estimated annual payroll of $52.1 million.

By aggressively pursuing research in all our state's targeted industries, the Centers of Excellence program is nurturing the pioneers of our future. Initiatives like this help our private-sector businesses uncover the promising new opportunities that keep North Dakota's economy vibrant and prosperous for future generations.

Sincerely,

Jack Dalrymple

Jack Dalrymple
Governor

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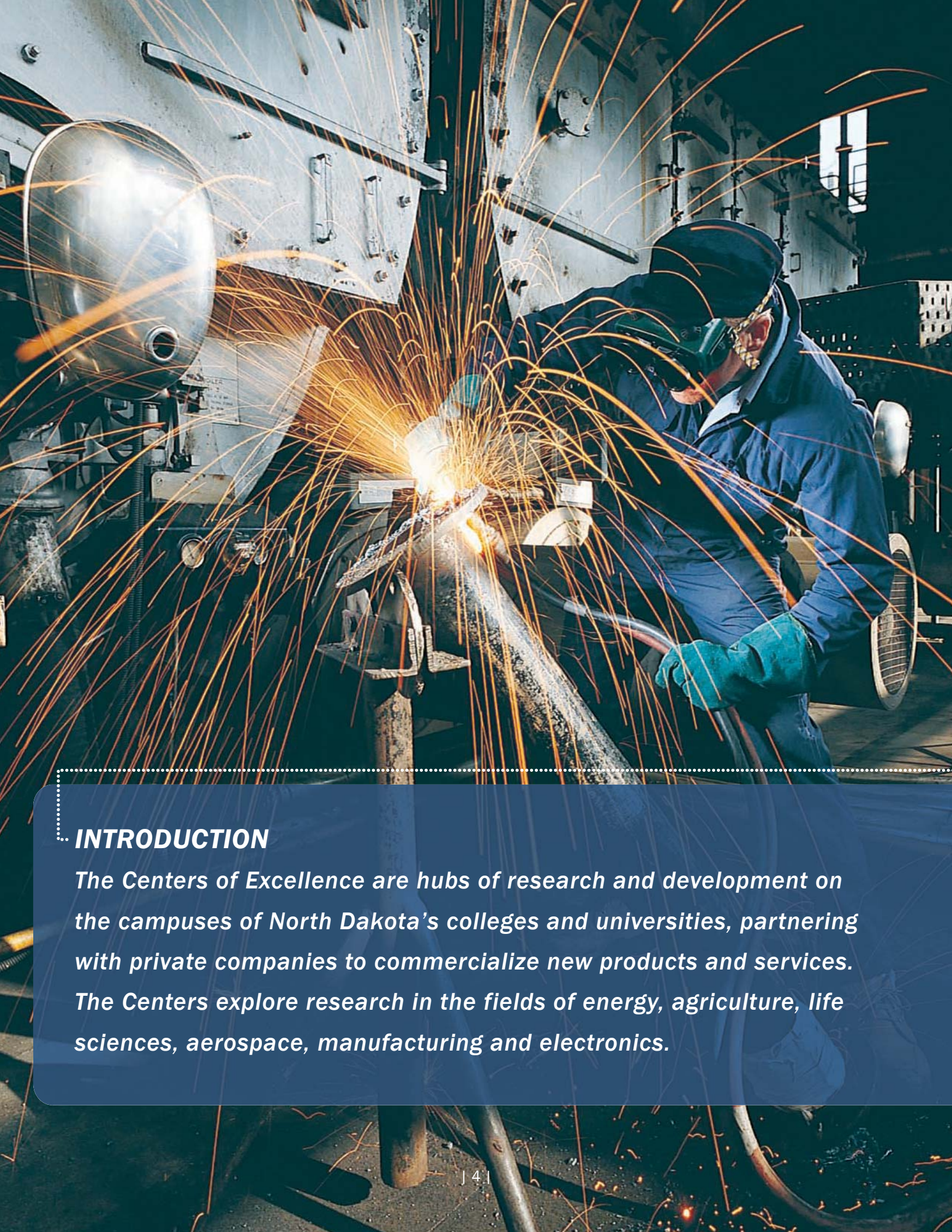


INTRODUCTION

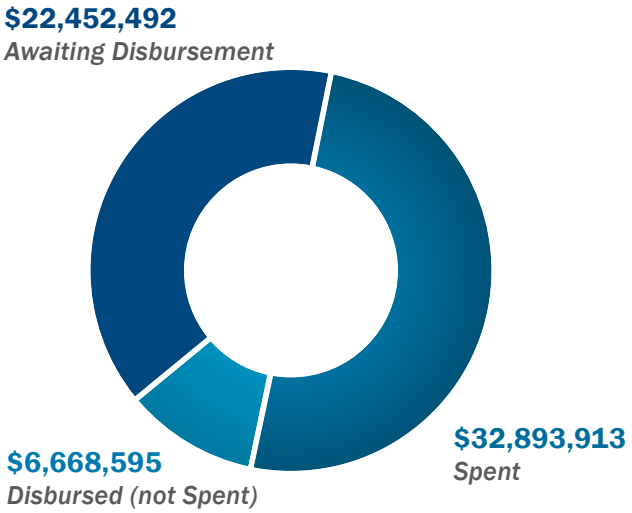
The Centers of Excellence are hubs of research and development on the campuses of North Dakota's colleges and universities, partnering with private companies to commercialize new products and services. The Centers explore research in the fields of energy, agriculture, life sciences, aerospace, manufacturing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

FUNDS INVESTED TO DATE

Since the first Centers of Excellence were approved by the State Legislature in 2003, a total of $62.015 million of state funds have been invested in 23 Centers of Excellence and nine Enhancement Grants. Of these funds, $32.9 million has been spent by the Centers and grant recipients as of June 30, 2011.

CENTERS OF EXCELLENCE INVESTMENT

$62.015 million awarded through June 30, 2011



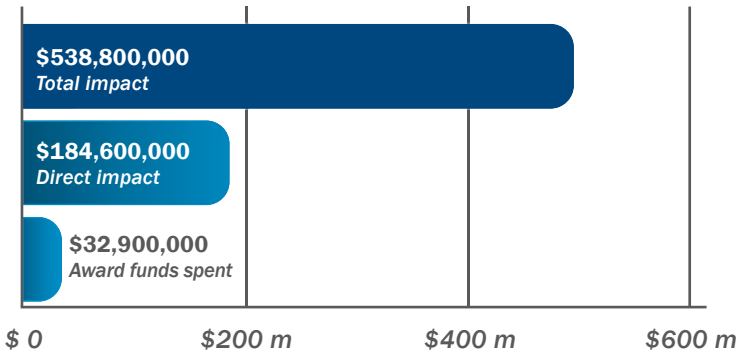
"I would most definitely suggest entrepreneurs to take a look at the program, because it's been highly successful for us."

– Alex Warner, CEO and President of Pedigree Technologies

ECONOMIC IMPACT

The Centers of Excellence program has had **$538.8 million** in estimated total economic impact to North Dakota's economy. This includes a direct impact of **$184.6 million** generated by the Centers, grant recipients and their partners.

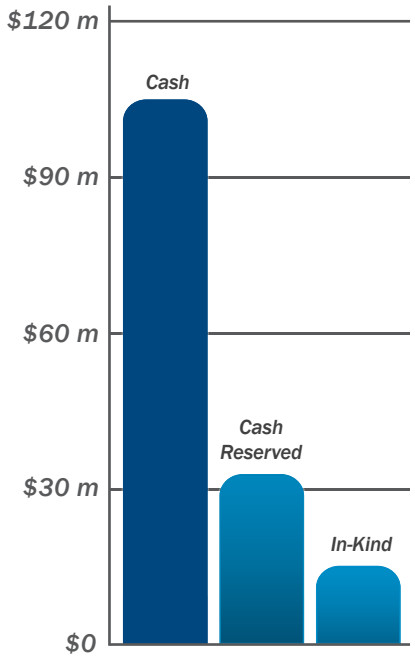
ECONOMIC IMPACT



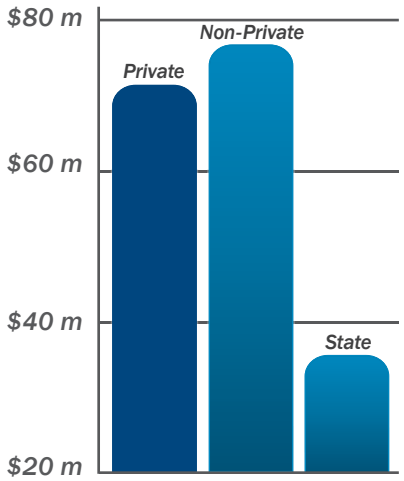
MATCHING FUNDS

As of June 30, 2011 the Centers and grant recipients have obtained over **$157 million of matching and leveraged funds,** a ratio of nearly $5 raised for every $1 of award funds spent.

MATCHING & LEVERAGED FUNDS RECEIVED



SOURCES OF FUNDING



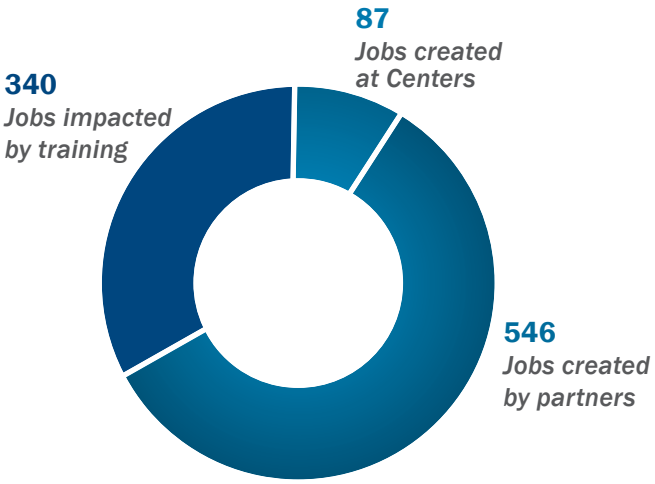
JOBS IMPACTED

Centers and grant recipients impact North Dakota jobs in several ways:

1) Jobs are created at the Centers themselves;

2) Private sector partners create new jobs as a result of their projects with a Center; and

3) Centers facilitate job growth by providing workforce training.



Centers, grant recipients and their partners have created or contributed to the creation of **973 jobs** at an estimated annual payroll of **$52.1 million**[1] as of June 30, 2011.

"The Center for Surface Protection has directly contributed to the success and business goals of Triton Systems, Inc., North Dakota facility, in every stage of our development."

- David Zupi, Director of Operations for Triton Systems, Inc. / North Dakota

[1] The UND Center for Innovation was approved directly by the legislature and is not subject to the post-award monitoring of the Centers of Excellence Commission. All data submitted by the Center is done so on a voluntary basis. The Center did not provide cumulative job creation data as of June 30, 2011; instead it provided a partial data set including current incubator tenants and two recent incubator graduates.

EXCELLENCE AT WORK

- NDSU's Center for Advanced Electronics Design & Manufacturing provides testing, characterization and analysis capabilities for partners such as Packet Digital, Phoenix International, and Tecton Products.

- The NDSU Center for Surface Protection partnered with Triton Systems to develop and test prototypes and system components to enhance Triton's atmospheric plasma deposition technology.

- UND's Unmanned Aircraft Systems (UAS) Center of Excellence is leading an effort to demonstrate "sense and avoid" technology in North Dakota airspace. The ability of UAS to "sense and avoid" other aircraft while in the air is a safety concern and a critical barrier to integrating UAS into the national airspace.

- The LRSC Dakota Precision Agriculture Center has found that adopting precision agriculture technologies may result in annual savings of up to 15 percent on synthetic fertilizer inputs when raising hard red spring wheat or canola.

- NDSU's Center for Agbiotechnology is working to expand the traditional canola growing areas within North Dakota by identifying new canola lines that are suited for the various growing conditions found across the state.

- The DCB Entrepreneurial Center for Horticulture and its partners have expanded the market for wholesale vegetables, enabling producers to sell in quantity to customers across the state.

- Over the past three fiscal years, the BSC National Energy Center of Excellence has provided energy education and noncredit training to more than 5,100 individuals.

- The WSC Petroleum Safety and Technology Center provides training for over 200 companies in the oil and gas industry. Over 4,800 individuals (duplicated count) were trained during fiscal year 2011.

- UND's Petroleum Research, Education and Entrepreneurship Center is researching a new technology that may significantly improve oil recovery from shale rocks.

- The UND SUNRISE BioProducts Center of Excellence has developed a suite of technologies that allow crop oils to be efficiently and economically converted into a wide range of fuel, chemical, polymer and composite material products.

- The NDSU Center for Biopharmaceutical Research and Production has contributed to the creation of two start-up companies: Somahlution, Inc. and Polar Biotech. Both companies are located in Fargo and are part of a growing biotech industry in eastern North Dakota.

- The Business Incubation Program hosted by the DSU Strom Center's Institute for Technology and Business enhances regional entrepreneurship by providing education training events, a virtual resource library, business coaching and consulting services.

NEW OR EXPANDED BUSINESSES

*The Centers of Excellence Program has contributed to the creation or expansion of **21 businesses**. This includes **eight new spinoff companies, eight companies that expanded to North Dakota,** and **five North Dakota companies that have expanded within the state.***

CENTERS OF EXCELLENCE	University, College or related Foundation	Launch Date	Awards (in millions)	Match & Leveraged Funds Received (in millions)
Center for Innovation	UND	Jan 2005	$0.80	$3.565
Center for Advanced Electronics Design & Manufacturing	NDSU	Feb 2006	$3.00	$13.875
Dakota Precision Ag Center	LRSC	Feb 2006	$0.85	$1.550
National Center for Hydrogen Technology	UND EERC	Feb 2006	$2.50	$51.165
National Energy Center of Excellence	BSC	Feb 2006	$3.0	$6.822
Center for Surface Protection	NDSU	May 2006	$4.00	$7.508
Center of Excellence for Agbiotechnology: Oilseed Development	NDSU	May 2006	$3.50	$12.000
Enterprise University*	VCSU	May 2006	$1.00	$5.140
Petroleum Safety & Technology Center	WSC	May 2006	$0.40	$1.183
Unmanned Aircraft Systems Center of Excellence	UND	May 2006	$2.50	$13.354
Institute for Technology & Business	DSU Strom Center	Oct 2006	$1.15	$5.153
Center of Excellence in Life Sciences & Advanced Technologies	UNDRF	March 2007	$3.50	$3.349
Technology Incubator	NDSU	March 2007	$1.25	$5.038
Beef Systems Center of Excellence	NDSU	Oct 2007	$0.80	$2.000
Center for Biopharmaceutical Research & Production	NDSU	June 2009	$5.015	$4.022
Center for Integrated Electronic Systems	NDSU	June 2009	$2.05	$2.135
Center of Excellence for Passive Therapeutics	UNDRF	June 2009	$2.65	$6.554
Center of Excellence in Space Technology & Operations	UND	June 2009	$1.00	$0.120
Petroleum Research, Education & Entrepreneurship Center	UND	June 2009	$3.00	$6.750
SUNRISE BioProducts Center of Excellence	UND	June 2009	$2.95	$3.842
Center for Sensors, Communications & Control	NDSU	Jan 2011	$2.80	$0.000
Entrepreneurial Center for Horticulture	DCB	June 2011	$0.40	$0.735
Center for Advanced Technology Development & Commercialization	NDSU	n/a	$3.90	$0.000
ENHANCEMENT GRANTS				
Center for UAS Research, Education & Training	UND	June 2010	$2.754	$1.100
Research 1 Expansion	NDSU	Jan 2011	$4.00	$0.000
North Dakota UAS Air Space Initiative	UND	March 2011	$0.10	$0.007
UAS Software & Curriculum Development	UND	March 2011	$0.60	$0.031
Certificate Programs for Full Motion Video and Activity-Based Intelligence Analysis	UND Center for Innovation	June 2011	$0.746	$0.025
Grand Forks Air Force Base Realignment Business Transition Program	UND	June 2011	$0.20	$0.000
Materials & Nanotechnology Center	NDSU	Sept 2011	$1.00	$0.000
V2 Aerospace, Inc. Technical Assistance	UND Center for Innovation	Sept 2011	$0.37	$0.000
Law Enforcement and Public Safety Agency Small UAS Course	UND	n/a	$0.23	$0.000
TOTALS			**$62.015**	**$157.023**

* Enterprise University has concluded its operations and has returned $200,545.51 of its original $1 million Centers of Excellence award to the North Dakota general fund.

CENTERS OF EXCELLENCE SUMMARY

The concept behind a Center of Excellence is simple: Partner North Dakota campuses with business. Invest in the infrastructure and research capacity at our state's colleges and universities and then unleash our world-class students and scientists to find ways to commercialize new ideas into products, skills and services that can create and attract new businesses and career-path jobs.

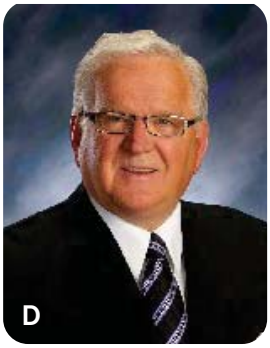
CENTERS OF EXCELLENCE COMMISSION MEMBERS

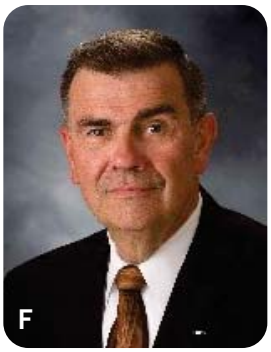
North Dakota Economic Development Foundation Members

A. Mark Nisbet, Chairman
North Dakota Principal Manager
Xcel Energy, *Fargo*

B. Tim Hennessy, Vice Chairman
Regional President – US Bank, *Bismarck*

C. Jim Traynor
Direector of Integration Partnerships
Intelligent InSites, *Fargo*





State Board of Higher Education Members

D. Duaine Espegard
Retired Regional President
Bremer Bank, *Grand Forks*

E. Richie Smith
Attorney – Smith, Strege &
Fredericksen, Ltd., *Wahpeton*

F. Michael Haugen
President – M.J. Haugen &
Associates, Inc., *Fargo*

SELECTION PROCESS

The Centers of Excellence are approved 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, 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;
- Provide for public-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;
- Foster and practice entrepreneurship;
- Promote the commercialization of new products and services in industry clusters;
- Become financially self-sustaining;
- Establish and meet a deadline for acquiring and expending all public and private funds specified in application;
- Has community support; and
- Includes collaboration among institutions.

ACCOUNTABILITY

The Centers of Excellence Commission, with assistance from the North Dakota Department of Commerce, oversees the post-award monitoring of the Centers. The process includes site visits, third party audits and an in-depth annual review of each Center. Additionally, the Centers provide quarterly updates on major developments, timelines and substantial variations from their proposal. Centers are measured against the results proposed in their respective applications for funding.

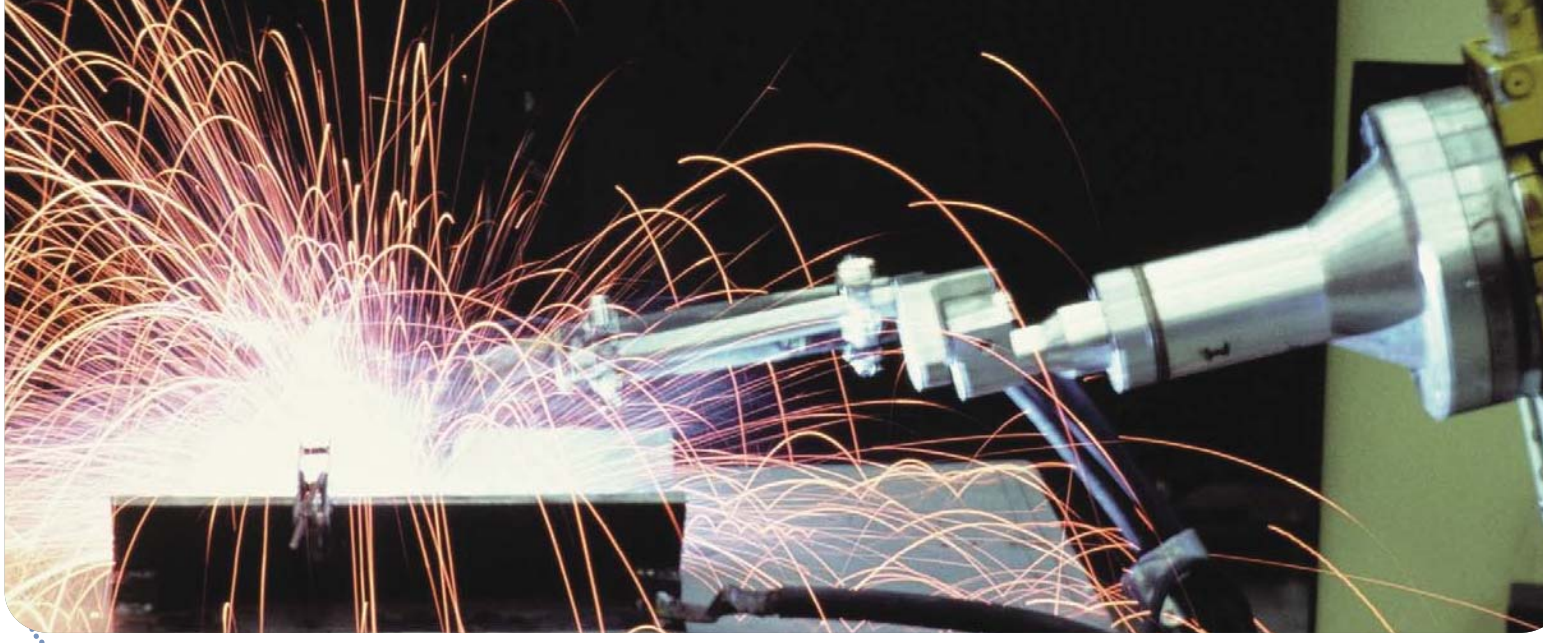
Three Centers of Excellence were approved and appropriated funds prior to the creation of the Centers of Excellence Commission. Those Centers are:

- University of North Dakota Center for Innovation
- North Dakota State University Center for Technology Enterprise (Technology Incubator)
- North Dakota State University Beef Systems Center of Excellence

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.

FUNDING PROCESS

Centers must provide detailed documentation of private-sector participation and the receipt or 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.
A Center that meets the match requirement is funded in stages, according to the project budget that was approved as a part of its application for funding. Award disbursements are made based upon the receipt and availability of matching funds.



ADVANCED MANUFACTURING

Center for Advanced Electronics Design and Manufacturing
North Dakota State University

Launch Date: February 2006 **Award:** $3 million **Match & Leveraged Funds:** $13.875 million

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

Center for Surface Protection
North Dakota State University

Launch Date: May 2006 **Award:** $4 million **Match & Leveraged Funds:** $7.508 million

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

Center for Integrated Electronic Systems
North Dakota State University

Launch Date: June 2009 **Award:** $2.05 million **Match & Leveraged Funds:** $2.135 million

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

Center for Sensors, Communications, and Control
North Dakota State University

Launch Date: January 2011 **Award:** $2.8 million **Match & Leveraged Funds:** $0

The Center of Excellence for Sensors, Communications and Control provides expertise in core areas of JAVA programming, sensor integration, and systems engineering to its private sector partners. The Center will be a product development partner with goals of stimulating job growth and economic development.

Center for Advanced Technology Development and Commercialization
North Dakota State University

Launch Date: TBD – not funded yet **Award:** $3.9 million **Match & Leveraged Funds:** $0

The Center for Advanced Technology Development and Commercialization will help private sector partners in commercializing new inventions, technologies and other intellectual property discovered or created by North Dakota State University faculty, staff, students and/or partners. The Center 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.

> *"The partnership with Center for Integrated Electronic Systems has led to a number of accomplishments, and we are optimistic this will continue. We have been able to release a beta version of our software and install it at eight customer sites this year because of the assistance of NDSU developers. We are very excited to release the RapidEngines Applications Analytics software early next year and hope to continue to build on our successful relationship."*
>
> *– Tom Grabowski, CEO of RapidEngines, Inc.*

AEROSPACE

Unmanned Aircraft Systems Center of Excellence
University of North Dakota

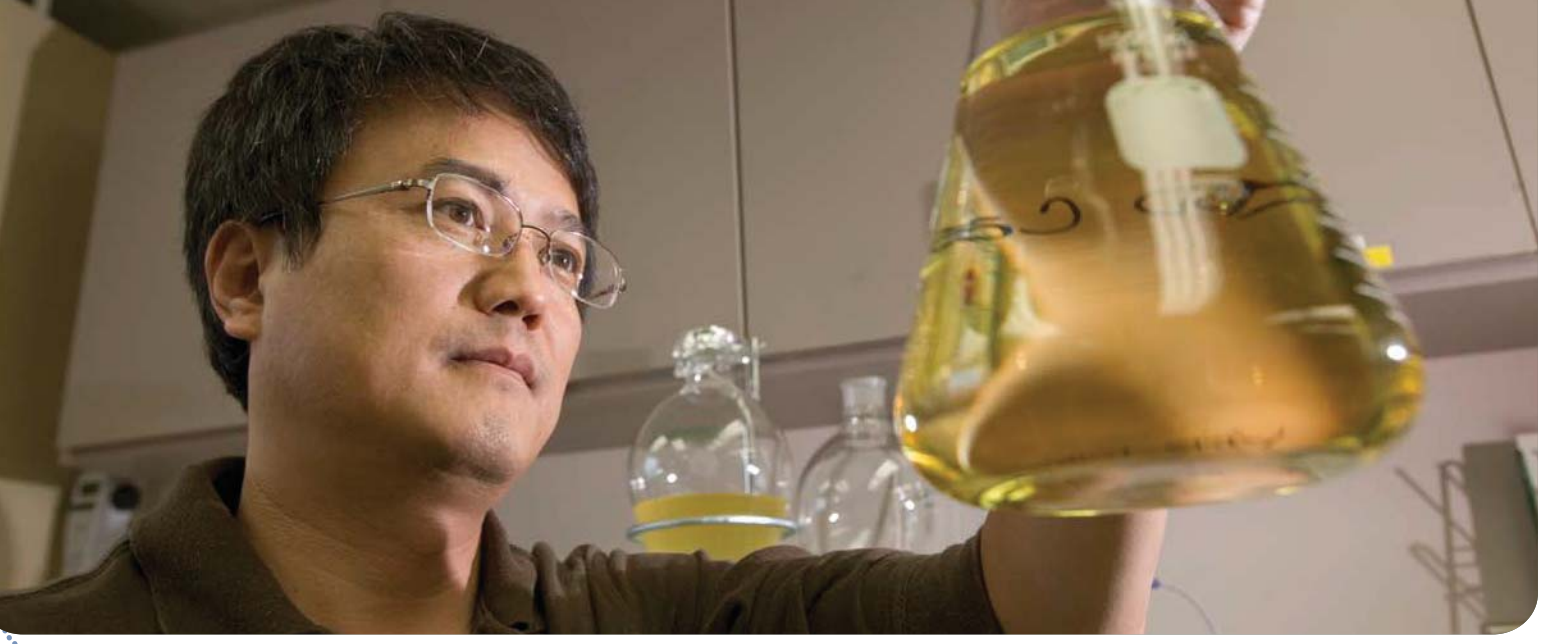
Launch Date: May 2006 **Award:** $2.5 million **Match & Leveraged Funds:** $13.354 million

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

Center of Excellence in Space Technology and Operations
University of North Dakota

Launch Date: June 2009 **Award:** $1 million **Match & Leveraged Funds:** $120,000

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



AGRICULTURE

Dakota Precision Ag Center
Lake Region State College

Launch Date: February 2006 **Award:** $850,000 **Match & Leveraged Funds:** $1.55 million

The Dakota Precision Ag Center (formerly the Dakota Center for Technology Optimized Agriculture) focuses on technological applications in agriculture and their effectiveness on the plains of North Dakota. Outcomes 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.

Center of Excellence for Agbiotechnology: Oilseed Development
North Dakota State University

Launch Date: May 2006 **Award:** $3.5 million **Match & Leveraged Funds:** $12 million

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, such as biodiesel made from canola.

Beef Systems Center of Excellence
North Dakota State University

Launch Date: October 2007 **Award:** $800,000 **Match & Leveraged Funds:** $2 million

The Beef Systems Center of Excellence 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 Center enhances North Dakota State University's ability to provide leading research in meat science and also provides training, education and outreach opportunities for students, businesses and beef cattle producers.

Entrepreneurial Center for Horticulture
Dakota College at Bottineau

Launch Date: June 2011 **Award:** $400,000 **Match & Leveraged Funds:** $735,000

The Entrepreneurial Center for Horticulture is designed to grow the organic and specialty vegetable industry in North Dakota. The Center researches and demonstrates production methods and provides new opportunities for product commercialization and distribution in North Dakota and the region.

"Since its recognition as a Center of Excellence in 2008, the Entrepreneurial Center for Horticulture has seen a marked increase in the number of producers using season extension production techniques, distribution of locally grown product, and profitability of small to mid-size producers."

– Holly Mawby, Director of the Entrepreneurial Center for Horticulture at Dakota College at Bottineau

ENERGY

National Center for Hydrogen Technology

University of North Dakota – Energy & Environmental Research Center

Launch Date: February 2006 **Award:** $2.5 million **Match & Leveraged Funds:** $51.165 million

The National Center for Hydrogen Technology conducts research, development, demonstration and commercialization projects for the production and use of hydrogen as a practical fuel as well as for the production of power, fuels and chemicals. Hydrogen has the potential to decrease U.S. dependence on foreign oil while decreasing the environmental impact of energy technologies. In conjunction with a large array of private sector partners, the Center is leading the way in developing and demonstrating hydrogen production and utilization technologies such as the hydrogen on-demand fueling station, production of hydrogen from fossil and renewable fuels, and the use of hydrogen in fuel cells, combustion engines and turbines.

National Energy Center of Excellence

Bismarck State College

Launch Date: February 2006 **Award:** $3 million **Match & Leveraged Funds:** $6.822 million

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

Petroleum Safety and Technology Center
Williston State College

Launch Date: May 2006 **Award:** $400,000 **Match & Leveraged Funds:** $1.183 million

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

Petroleum Research, Education, and Entrepreneurship Center of Excellence
University of North Dakota

Launch Date: June 2009 **Award:** $3 million **Match & Leveraged Funds:** $6.75 million

The Petroleum Research, Education, and Entrepreneurship Center of Excellence 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 CO_2 sequestration and geothermal energy.

SUNRISE BioProducts Center of Excellence
University of North Dakota

Launch Date: June 2009 **Award:** $2.95 million **Match & Leveraged Funds:** $3.842 million

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 is administered by the North Dakota Sustainable Energy Research Initiative and Supporting Education (ND SUNRISE) program, whose mission includes conducting research that helps solve energy-related problems and enhance economic development in North Dakota.

> *"The interest in energy-related training continues to increase in North Dakota, as well as beyond our borders. The National Energy Center of Excellence at Bismarck State College is able to provide the high-demand energy programs that meet the growing needs of the industry."*
>
> *– Kari Knudson, Vice President of the National Energy Center of Excellence.*

LIFE SCIENCES

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

Launch Date: March 2007 **Award:** $3.5 million **Match & Leveraged Funds:** $3.349 million

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, also known as REAC1, provides the necessary infrastructure to serve North Dakota life science and technology companies, and to attract new companies to the state.

Center of Excellence for Passive Therapeutics
University of North Dakota Research Foundation

Launch Date: June 2009 **Award:** $2.65 million **Match & Leveraged Funds:** $6.554 million

The Center of Excellence for Passive Therapeutics is working to 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.

Center for Biopharmaceutical Research and Production

North Dakota State University

Launch Date: June 2009 **Award:** $5.01 million **Match & Leveraged Funds:** $4.022 million

The Center for Biopharmaceutical Research and Production works 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.

"Because of the dedication and hard work of the Avianax research team, and the critical funding provided by the Center for Passive Therapeutics, Avianax is now ready to begin ending its pre-clinical phase of developing therapeutic and prophylactic treatments for such deadly diseases as West Nile virus, avian influenza, rabies and dengue fever, and begin the process of gaining FDA approval to bring these products to market."

– Richard Glynn, Chief Operating Officer, Avianax LLC

TECHNOLOGY & ENTREPRENEURSHIP

Center for Innovation
University of North Dakota

Launch Date: January 2005 **Award:** $800,000 **Match & Leveraged Funds:** $3.565 million

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.

Technology Incubator
North Dakota State University

Launch Date: March 2007 **Award:** $1.25 million **Match & Leveraged Funds:** $5.038 million

The Technology Incubator located in the NDSU Research & Technology Park 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.

Strom Center for Entrepreneurship & Innovation - Institute for Technology and Business

Dickinson State University

Launch Date: October 2006 **Award:** $1.15 million **Match & Leveraged Funds:** $5.153 million

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.

Enterprise University Update

Valley City State University (VCSU) and the ND Department of Commerce completed work and monitoring on the Enterprise University Center of Excellence at the end of 2011. The Enterprise University Center of Excellence, which is the only center in Valley City, helped create 63 new jobs and also helped launch Eagle Creek Software's Valley City location by training employees on Siebel Customer Relationship Management software.

The Center influenced and supported an effort at VCSU to add enterprise software applications to the curriculum and the addition of two certificate programs. These enhancements have allowed students to gain valuable experience and enhance their ability to meet the needs of North Dakota businesses.

The remaining Centers of Excellence award funds, over $200,000, were returned to the state general fund in December 2011.

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 Enhancement Grants during the 2009-11 biennium. The Enhancement Grants were available to the state's research universities for use in infrastructure projects or enhancement of economic development and employment opportunities, especially those related to the Grand Forks Air Force Base.

SELECTION PROCESS

Proposals were approved by the Centers of Excellence Commission based on the extent to which they met 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; and
- Positively impact economic development in the state.

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

- 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.

FUNDING PROCESS

Unlike regular Centers of Excellence grants, Enhancement Grants do not have a matching funds requirement. Grant recipients are funded in stages, according to the project budget that was approved as a part of its application for funding.

ACCOUNTABILITY

Enhancement Grants have the same post-award monitoring requirements as regular Centers of Excellence grants.

CENTERS OF EXCELLENCE ENHANCEMENT GRANTS

Materials and Nanotechnology Center
North Dakota State University

Launch Date: September 2011 **Award:** $1 million **Leveraged Funds:** $0

Research at the Materials and Nanotechnology Centre (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.

Research 1 Expansion
North Dakota State University

Launch Date: January 2011 **Award:** $4 million **Leveraged Funds:** $0

North Dakota State University 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 growth potential for commercialization.

North Dakota Unmanned Aircraft Systems Airspace Initiative
University of North Dakota

Launch Date: March 2011 **Award:** $100,000 **Leveraged Funds:** $7,000

This project will help facilitate the development and coordination of an airspace access strategy that will include a detailed action plan to better position North Dakota to have its airspace opened to Unmanned Aircraft Systems (UAS). Another objective of the project is to provide visibility of the North Dakota initiative to senior federal government leadership at entities such as the Federal Aviation Administration (FAA) and Department of Defense.

Center for UAS Research, Education and Training
University of North Dakota

Launch Date: June 2010 **Award:** $2.754 million **Leveraged Funds:** $1.1 million

This grant facilitates the initial steps toward building a cutting edge UAS training and research facility at the Grand Forks Air Force Base. The program includes the Predator Mission Aircrew Training System (PMATS) which will be used to train new UAS pilots and sensor operators to fly the Predator MQ-1 and MQ-9 aircraft.

UAS Software and Curriculum Development
University of North Dakota

Launch Date: March 2011 **Award:** $600,000 **Leveraged Funds:** $31,000

This grant allows the University of North Dakota Unmanned Aircraft Systems Center of Excellence to partner with Bold Method, a supplier of interactive courseware and software development located in Grand Forks, to create curriculum to train Predator MQ-1 and MQ-9 pilots and sensor operators. The training curriculum will complement UND's Predator Mission Aircrew Training System.

Certificate Programs for Full Motion Video and Activity-Based Intelligence Analysis

University of North Dakota Center for Innovation Foundation

Launch Date: June 2011 **Award:** $746,000 **Leveraged Funds:** $25,000

The Center for Innovation Foundation will partner with Unmanned Applications Institute International (UAII) to develop and market an imagery analyst training program. The program will include courses on security clearances, full motion video, and activity-based intelligence. Program graduates will be qualified to work for defense contractors or serve in civilian positions within the military or federal agencies. Once completed, the program will be marketed to colleges, universities and contract training institutes.

V2 Aerospace, Inc. Technical Assistance Request

University of North Dakota Center for Innovation Foundation

Launch Date: September 2011 **Award:** $370,000 **Leveraged Funds:** $0

V2 Aerospace, Inc. aims to capitalize on a growing and underserved Unmanned Aircraft Systems (UAS) maintenance market and to contribute to the growth of the UAS industry in the Grand Forks area. The Center for Innovation Foundation will provide technical assistance to V2 Aerospace as it ramps up its operations and pursues a number of UAS maintenance contracts with entities such as the U.S. Air Force and the Customs and Border Patrol.

"One measure of the positive benefits to the North Dakota economy is how effectively the Centers have leveraged state appropriations with non-state funds. As of June 30, 2011 the Centers have collectively obtained $157 million in matching and leveraged funds."

– Dean Bangsund, NDSU Research Scientist

Law Enforcement and Public Safety Agency Small Unmanned Aircraft Systems Course

University of North Dakota

Launch Date: TBD **Award:** $230,000 **Leveraged Funds:** $0

Summary: University of North Dakota will develop training in Small Unmanned Aircraft Systems (sUAS) for law enforcement and public safety agencies. sUAS have great potential for public safety missions because of the low acquisition and operating costs. The course will allow first responder agencies to quickly integrate sUAS into their tactical operations once the Federal Aviation Administration approves their usage.

Grand Forks Air Force Base Realignment Business Transition Program

University of North Dakota

Launch Date: June 2011 **Award:** $200,000 **Leveraged Funds:** $0

The purpose of this grant is to prepare and train North Dakota businesses wanting to pursue subcontract opportunities presented as a result of the Grand Forks Air Force Base realignment. The program will leverage funds from the U.S. Small Business Administration and will be implemented by the North Dakota Small Business Development Center, a division of the UND College of Business and Public Administration.

PROGRAM PARTNERS

1. AAG, Inc.
2. Aboriginal Cogeneration Corp.
3. ADM
4. Advanced Biomass Gasification Technologies, Inc.
5. Aggie's Sunshine Café
6. Agri ImaGIS Technologies, Inc.
7. Agricultural Utilization Research Institute
8. Air Products and Chemicals, Inc.
9. Akzo-Nobel Aerospace Coatings
10. Aldevron
11. Altravax
12. American Bank Center
13. American Crystal Sugar
14. Arkema, Inc.
15. Avenue Right
16. Avianax, LLC
17. Baker Boy
18. Baker Oil Tools
19. Basin Electric Power Coop.
20. Bayer Crop Science
21. Benchmark Energy Corp.
22. Biomass Energy Solutions, Inc.
23. Blue Flint Ethanol
24. BMC Construction
25. Bobcat Company
26. Boeing/Insitu
27. Bold Method
28. Bolder Thinking
29. Broad Reach Engineering, Inc.
30. Bush Foundation
31. Calnetix Technologies, LLC
32. Capital Safety
33. Catacel Corp.
34. Caterpillar Remanufacturing Drivetrain, LLC
35. CertainTeed
36. CH2M Hill, Inc.
37. Champion Technologies
38. Chippewa Valley Ethonal
39. Clean Earth Solutions, Inc.
40. Clear Spring
41. Clinical Supplies Management
42. CoalTek
43. Computer Modeling Group
44. Conoco Phillips
45. Continental Resources, Inc.
46. Corsair Engineering
47. Crew Training International
48. Datacom International
49. Denbury, Inc.
50. Diversified Energy Corporation
51. DLN Consulting
52. Draper Laboratory
53. Electric Power Research Institute
54. Elinor Specialty Coatings
55. Energy Conversion Devices, Inc.
56. EP Minerals
57. ePower Synergies
58. Ergologistics, LLC
59. ESP Computers
60. Feed Management Systems
61. Field of View, LLC
62. Fisher & Associates
63. Fisher Industries
64. FM Angel Investment Fund
65. FormulaNow
66. Franklin Fuel Cells
67. Frasca International, Inc.
68. GC Products
69. General Atomics Aeronautical Systems, Inc.
70. Genosys
71. GeoOptics, Inc.

72. Goodrich
73. Great Northern Power Development
74. Great River Energy
75. Great Plains, The Camelina Company
76. GreatPoint Energy
77. Halliburton Energy Services
78. Headwaters
79. Hess Corporation
80. Hickman Sales & Service
81. Howard Supply
82. IdaTech
83. Image Group
84. InnerGeo, LLC
85. IntegenX
86. Intelligent InSites
87. Interstate Powersystems
88. Intraglobal Biologics, Inc.
89. Invista
90. Karges-Faulconbridge, Inc.
91. KBR Technologies
92. KBW Associates
93. Key Energy
94. Killdeer Mountain Manufacturing
95. Kuehnle Agrosystems
96. Kuraray America
97. L3 Com
98. Larada Sciences
99. LM Wind Power Group
100. Lockheed Martin
101. M International, Inc.
102. Marathon Oil Corp.
103. MDU
104. Menon & Associates
105. Merlin RAMCo, Inc.
106. Microbeam Technologies
107. Minnesota Corn Research Council
108. Modern Machine
109. Monsanto
110. Myriad Devices
111. Nabors Drilling
112. Nabors Well Service
113. Nance Petroleum
114. National Oilwell Varco
115. NDSU RFID & Wireless Censor Laboratory
116. Nissan Chemical America Corp.
117. North American Coal Corp.
118. North Dakota Biodiesel
119. North Dakota Corn Utilization Council
120. North Dakota Farmers Market & Growers Association
121. North Dakota Natural Beef, LLC
122. North Star Organic Farms
123. Northrop Grumman Company
124. NovaDigm Therapeutics
125. Oil Chem Technologies, Inc.
126. Packet Digital
127. Pedigree Technologies
128. Phoenix International
129. PL Gasification
130. Pollard Banknote
131. Porvair plc
132. PPG Industries
133. Pratt & Whitney Rocketdyne, Inc.
134. Praxis Strategy Group
135. Presco, LLC
136. Rapid.IO
137. Red Trail Energy
138. Resurfice Corporation
139. RIC Coatings
140. Rio Tinto
141. Schiltz Foods, Inc.
142. Schlumberger
143. SDS International, Inc.
144. SGC Energia
145. SGL Carbon Group
146. Shell Chemicals
147. Siemens Enrgy
148. Siemens Power Generation, Inc.
149. SK Energy
150. Solar Bee, Inc.
151. Somahlution, Inc.
152. Space Age Synthetics
153. Spiritwood Station
154. St. Mary Land & Exploration Co
155. Starkey Labs
156. Steffes Corporation
157. Stelios Arvelakis
158. Stewart & Stevenson
159. Systems Engineering & Technology, LLC
160. Technology Applications Group
161. Tecton Products
162. Tesoro
163. Textron Defense Systems
164. The SPECTRUM Group
165. ThermoChem Recovery International, Inc.
166. Tiorco-Stephan
167. TMI Systems Design
168. Triton Systems, Inc.
169. TXU Generation Company
170. UAI International
171. United States Automotive Partnership
172. United Technologies Research Center
173. URS Corporation
174. V2 Aerospace, Inc.
175. VetcoGray
176. WC Jordan Enterprises
177. Weatherford Completion
178. Western Research Institute
179. Westmoreland Coal Sales Co.
180. Whiting Petroleum Corporation
181. Wholesale Supply Company, Inc.
182. Williston Fire & Safety
183. WoWiWe
184. Xcel Energy
185. Xethonal Corporation AAG, Inc.

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Economic Impact of North Dakota Centers of Excellence Program, 2007-2011 – Final Report

Dean A. Bangsund, Randal C. Coon, and Nancy M. Hodur[1]

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. Then 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 was 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, 2011, 20 Centers had been approved by the COE Commission through a competitive process since 2005. Three centers were legislatively approved in 2003. Also, the COE Commission has approved 9 COE Enhancement Grants. 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, 2011. 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

[1] The authors are research scientist, research specialist, and research assistant professor, respectively, 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.

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 2010, 2011; 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 et al. 2012).

Results

Period Review (July 1, 2010 - June 30, 2011)

The economic impacts associated with the Centers of Excellence program for July 1, 2010-June 30, 2011 are summarized in Table 1. The direct economic impacts of Center and partner activities totaled $43.4 million, based on expenditures from 20 Centers[3] and disbursements from 4 Enhancement Grants that begun operations prior to June 30, 2011. The total economic impact (contribution) was $132.3 million. Direct employment by Centers and partners totaled 973 full-time equivalent positions.

Cumulative Review (January 1, 2007 - June 30, 2011)

The cumulative economic impacts of the program for January 1, 2007- June 30, 2011 are summarized in Table 2. The total direct impact was $184.6 million and the gross business volume (direct and secondary effects) was $538.8 million. Direct employment increased over 229 percent in 4.5 years from about 296 positions in 2007 to about 973 jobs in fiscal year 2011 (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 a major initiative of the State of North Dakota to facilitate the development of technology and information-based businesses and industries. The program partners the research and development expertise of North Dakota's colleges and universities with private companies to commercialize new products, services, and technologies.

The economic effects of those partnerships vary among the Centers and over time as the incubation of ideas, processes, and technologies evolve. Many of the Centers have only recently been created, while others have been operational for several years. Over time, it is anticipated that state investment in these initiatives will produce positive economic benefits to the regional economy.

[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.

One measure of the positive benefits to the North Dakota economy is how effectively the Centers have leveraged state appropriations with non-state funds. As of June 30, 2011 the Centers have collectively obtained $157 million in matching and leveraged funds. Over that same period, the Centers collectively spent $32.9 million in state funds. The Centers have leveraged about $4.75 in additional non-state funds for $1 of state funds.

Another measure of the effects of the Centers of Excellence program is job creation. Since 2008, the Centers have created an average of 971 direct jobs in the state. When secondary employment is included, the Centers have supported nearly 1,360 jobs per year. Further, the direct jobs created by the Centers are relatively high paying. The Centers reported direct employment of 973 jobs with wages and benefits totaling $52,064,929 in fiscal year 2011. Salaries and benefits averaged about $53,510 per job, over 10% higher than the state average for the same period (U.S. Bureau of Economic Analysis 2012).

The gross business volume attributable to the Centers is considerable. With a direct economic impact of $184.6 million and total impact of $538.8 million for the period January 1, 2007-June 30, 2011, the economy-wide effects are encouraging especially considering that several Centers have only recently been established.

Clearly the Centers of Excellence program has produced positive economic outcomes for the state. Matching and leveraged dollars indicate that the Centers have been successful in creating valuable partnerships with private companies. These partnerships have resulted in job creation, growth in economy-wide business volume, and additional state-level tax revenue. The economic effects of the Centers of Excellence program to date are encouraging.

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TABLE 1

Period Review – Direct, Secondary, and Total Impacts of North Dakota Centers of Excellence and Partner Activities

July 1, 20010 - June 30, 2011

Economic Sector		Expenditures/Receipts		
		Direct	Secondary	Total
		$000		
Construction		557	3,502	4,059
Communications & public utilities		887	4,514	5,401
Retail trade		3,909	29,144	33,053
Finance, insurance & real estate		5,474	6,512	11,986
Business & personal services		1,417	2,482	3,899
Professional & social services		1,188	3,760	4,948
Households		29,981	28,017	57,998
Other [1]		0	10,977	10,977
	Total	43,413	88,908	132,321
Employment		973	355	1,328

[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, 2011

Economic Sector		Expenditures/Receipts		
		Direct	Secondary	Total
		$000		
Construction		38,786	13,487	52,255
Communications & public utilities		3,164	17,550	20,714
Retail trade		12,622	112,397	125,019
Finance, insurance & real estate		18,037	30,143	48,180
Business & personal services		6,343	9,480	15,823
Professional & social services		3,867	13,957	17,824
Households		100,967	113,331	214,298
Other [1]		850	43,846	44,696
	Total	184,618	354,191	538,809
Employment Review[2]		full-time equivalent positions		
July 1, 2010 — June 30, 2011		973.00	355.00	1,328.00
July 1, 2009 — June 30, 2010		1,017.20	318.00	1,335.20
January 1, 2008 — June 30, 2009		921.50	492.00	1,413.50
January 1, 2007 — December 31, 2007		296.25	408.00	704.25
Estimated State Tax Collections		$000		
Personal Income Tax		1,515	1,700	3,215
Sales and Use Tax				5,788
Corporate Income Tax				906
	Total			9,909

[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 Centers of Excellence program is a key component of North Dakota's technology-based economic development strategy. It has generated significant economic benefits by leveraging the research and intellectual capabilities of the state's universities and colleges with the resources of private sector companies.

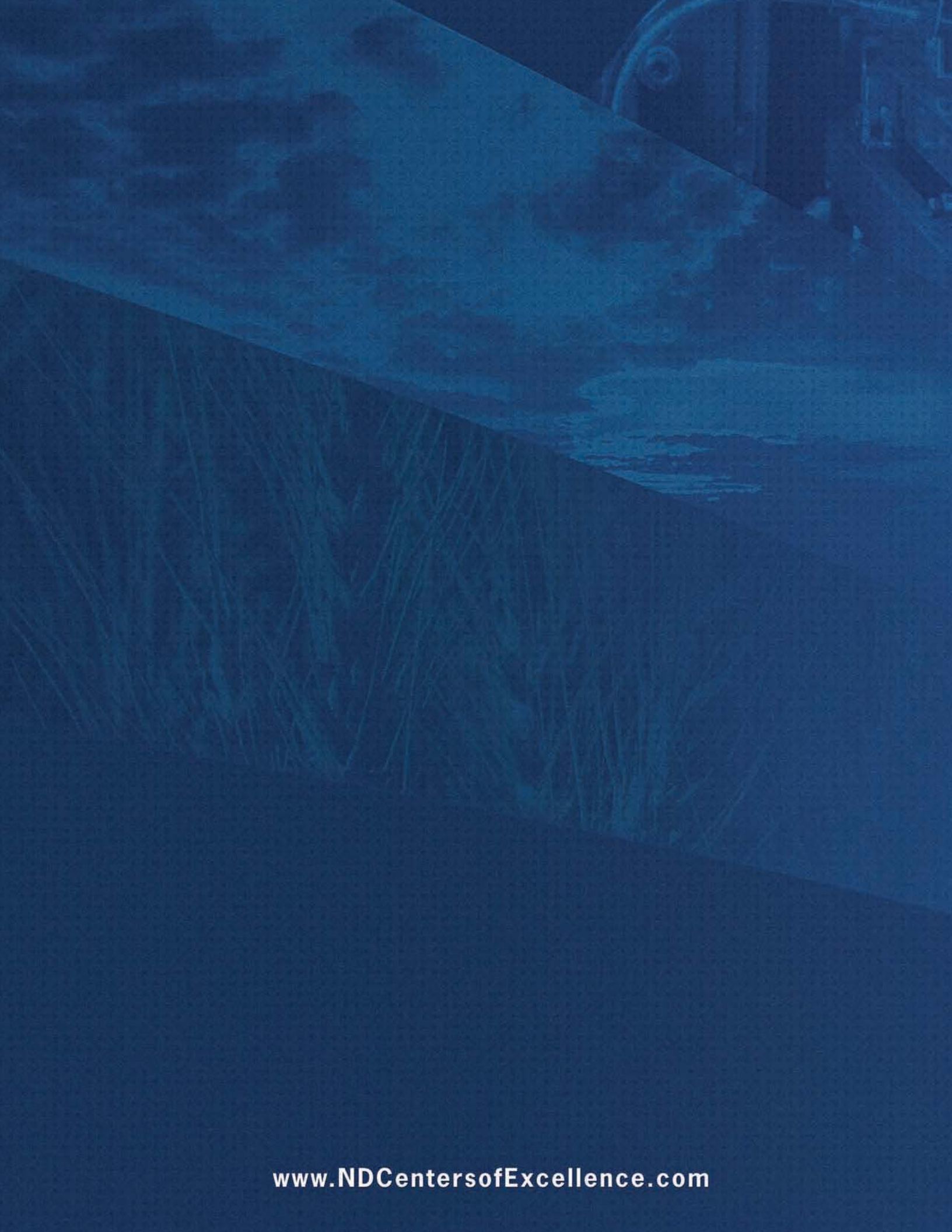
Total economic impact:
$538.8 million

Nearly **$5** raised for every **$1** of awarded funds spent

973
jobs created

185
private sector partners

21
businesses created or expanded



www.NDCentersofExcellence.com