North Dakota®
DEPARTMENT OF COMMERCE

Centers of excellence & research excellence

annual report 2012

State of
North Dakota
Office of the Governor

Jack Dalrymple
Governor

North Dakota's Centers of Excellence and Centers of Research Excellence are partnering with our research institutions and private sector companies to generate jobs and new business opportunities.

The Centers program is one based on partnerships. It seeks to build on the intellectual resources, high-tech equipment and training capacities of our colleges and universities by allowing the private sector access to these valuable assets. Currently, 115 companies have formed partnerships with the Centers of Excellence and Centers of Research Excellence. These partnerships have leveraged $190 million of matching funds for the state's investment of $52.4 million in the Centers.

Overall, the Centers program has had an economic impact of $634.6 million since its creation in 2005. As of June 30, 2012, the Centers program has produced over $14 in economic impact for every $1 of state funds invested since their creation according to a 2012 North Dakota State University study.

The Centers program and its partners generate results, having created over 1,080 direct jobs and an estimated payroll over $69.2 million.

North Dakota must continue to aggressively pursue research in our state's target industries. The Centers of Excellence and Research Excellence are key factors in helping private sector businesses uncover promising new opportunities to keep North Dakota's economy growing and prosperous for future generations.

Sincerely,

Jack Dalrymple

Jack Dalrymple
Governor

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Cover image of Global Hawk aircraft courtesy of Ben Trapnell, reprinted with permission.

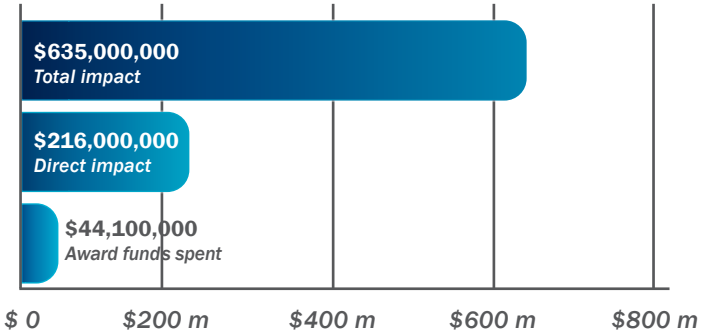
INTRODUCTION

The Centers of Excellence & Research 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.

ECONOMIC IMPACT

The Centers of Excellence program has had **$635 million** in estimated total economic impact to North Dakota's economy. This includes a direct impact of **$216 million** generated by the Centers, grant recipients and their partners.

ECONOMIC IMPACT

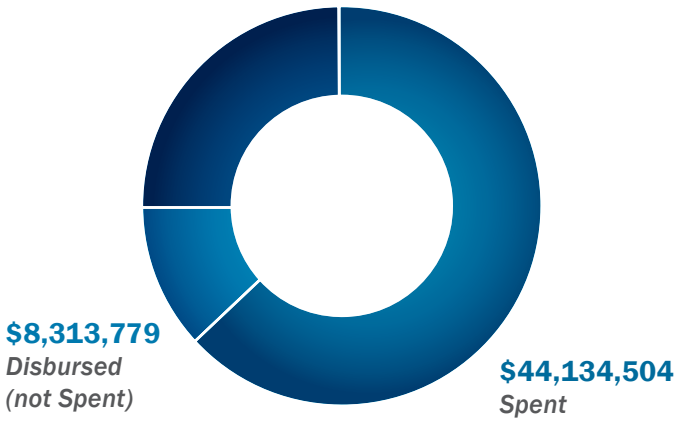


FUNDS INVESTED TO DATE

Since the first Centers of Excellence were approved by the State Legislature in 2003, a total of $69.9 million of state funds have been invested in 25 Centers of Excellence & Research Excellence and an additional 16 research, infrastructure and economic development projects. Of these funds, $44.1 million has been spent by the Centers and grant recipients as of June 30, 2012.

CENTERS OF EXCELLENCE INVESTMENT

$69.9 million awarded through June 30, 2012

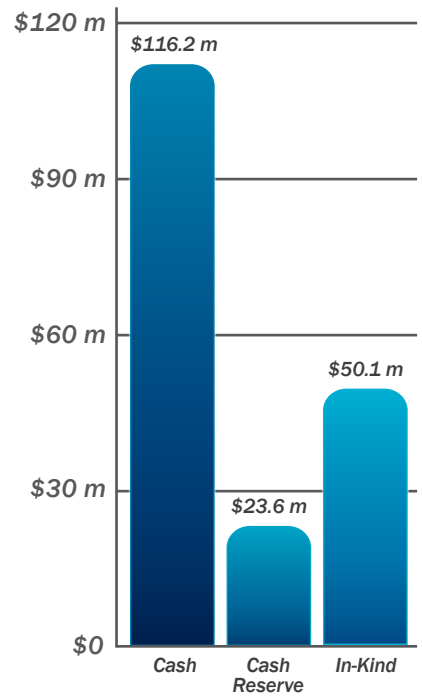


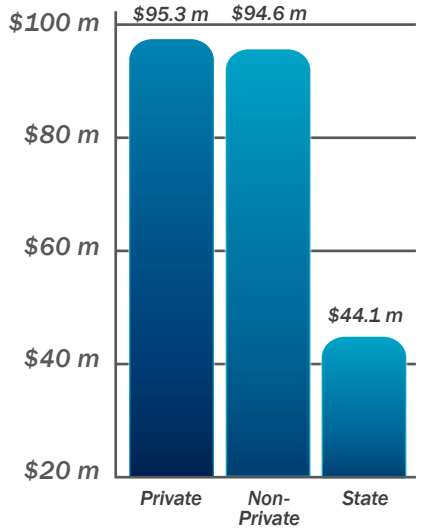
The Centers of Excellence Program has contributed to the creation or expansion of 24 businesses. This includes nine new spinoff companies, ten companies that expanded to North Dakota, and five North Dakota companies that have expanded within the state.

MATCHING FUNDS

As of June 30, 2012 the Centers and grant recipients have obtained over **$189 million of matching and leveraged funds.** When comparing matching and leveraged funds received to award funds spent, a ratio better than 4:1 is realized.

MATCHING & LEVERAGED FUNDS RECEIVED

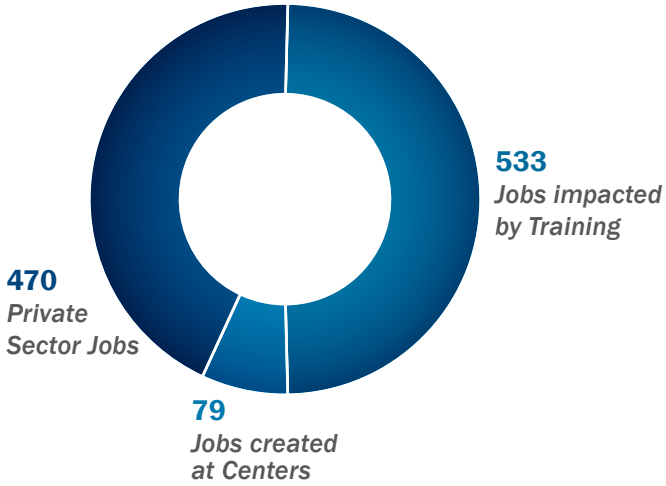




JOBS IMPACTED

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.



As of June 30, 2012, Centers, grant recipients and their partners have created or contributed to the creation of **1,082 jobs** at an estimated annual payroll of **$69.2 million**.

In FY12 the Williston State College Petroleum Safety and Technology Center provided training to over 6,900 individuals (duplicated count) for 338 oil and gas companies operating in North Dakota.

The following pages detail new awards approved in Fiscal Year 2012. For details on previously approved Centers of Excellence and Centers of Excellence Enhancement Grants, visit **www.NDCentersOfExcellence.com.**

Photo courtesy of the North Dakota State University Research and Technology Park – Research II Building.

CENTERS OF EXCELLENCE COMMISSION MEMBERS

The Centers of Excellence Commission oversees the selection process and administration of Centers of Excellence, Centers of Excellence Enhancement Grants, Centers of Research Excellence, Base Realignment Grants, and Limited Deployment Cooperative Airspace Projects (LDCAP).

The Centers of Excellence Commission, with assistance from the North Dakota Department of Commerce, oversees the post-award monitoring of all Centers and grant recipients. The process includes quarterly updates, site visits, third-party audits and an in-depth annual review of each award. All grant recipients are required to complete at least six years of post-award monitoring.

One objective of the post-award monitoring activities is to measure the progress of an award against the results proposed in its respective application for funding. Another objective of the post-award monitoring activities is to ensure grant recipients are spending award funds in compliance within the scope of their project and in accordance with program requirements. Centers and grant recipients that demonstrate progress and compliance with program requirements are funded in stages according to their respective Centers of Excellence Commission-approved budget.


A


B


C

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
Director of Client/Channel Management
Intelligent InSites, Fargo


D


E


F

State Board of Higher Education Members

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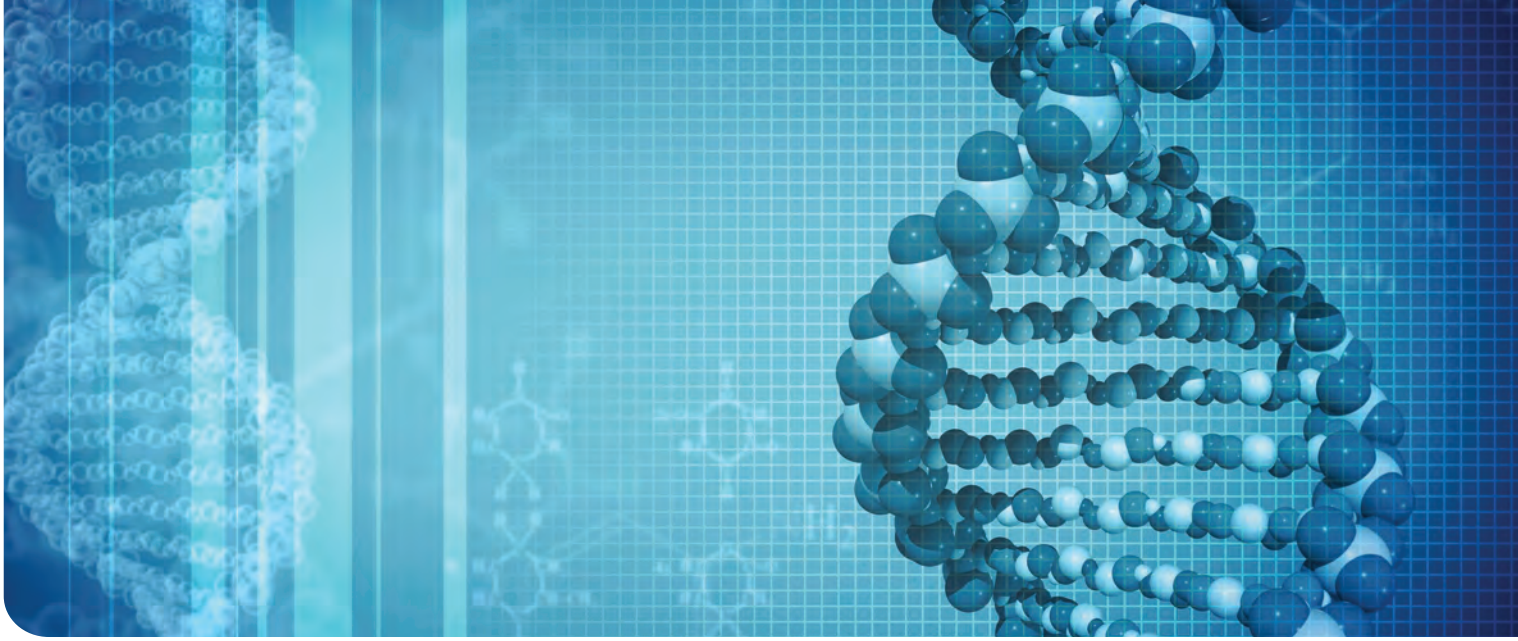
Retired Regional President
Bremer Bank, Grand Forks

E. Terry Hjelmstad
Retired School Administrator
Minot Public Schools, Grand Forks

F. Don Morton
Senior Director
Microsoft, Fargo



Centers of Research Excellence

Beginning in 2011, the Centers of Excellence program sharpened its focus on research, development and commercialization activities. The program was retitled Centers of Research Excellence and is now only accessible by the University of North Dakota, North Dakota State University or related non-profit foundations working in partnership with the private sector.

Although many of the criteria for approval are similar, a significant change was made to the matching funds requirements. Under Centers of Research Excellence, a Center must obtain $2 of matching funds for every $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. The 2011 Legislature allocated $5 million for new Centers of Research Excellence. Centers and grant recipients that demonstrate progress and compliance with program requirements are funded in stages according to their respective Centers of Excellence Commission-approved budget. All numbers reflected in this report are as of June 30, 2012.

As of June 30, 2012 the Centers of Excellence Commission has approved two new Centers.

Center for Technologically Innovative Processes and Products
North Dakota State University

Launch Date: August 2012 **Award:** $320,000 **Matching & Leveraged Funds:** $0

The Center will collaborate with private sector partners to perform research and development focused on key stages of product development and production. The research and development activities are aimed at identifying new materials and process that will generate higher quality, lower production costs and improved profit margins. These outcomes may lead to new or improved products, new markets and new technologies for future product development.

Center for Life Sciences Research and Applications
North Dakota State University

Launch Date: November 2012 **Award:** $1.35 million **Matching & Leveraged Funds:** $0

The Center will partner with Sanford Health to perform human genomics and bioinformatics research focused initially on breast cancer, behavioral genetics and certain rare diseases in children. The Center will also collaborate with other partners to research DNA-based forensics and other DNA-based applications.

The potential outcomes of the Center's research may be creation, development and testing/evaluation of new diagnostics, treatments and related healthcare services that have commercial potential in North Dakota and elsewhere.

Base Realignment Grants

The 2011 Legislature allocated $3 million for Base Realignment Grants which are to be used for infrastructure and economic development projects or programs to accommodate growth in proximity to, or at, the Grand Forks Air Force Base. As of June 30, 2012 the Centers of Excellence Commission has approved five Base Realignment Grants.

Global Hawk Sensor Operator Part Task Trainer

University of North Dakota

Launch Date: December 2011 **Award:** $878,204 **Matching & Leveraged Funds:** $9.787 million

This project teams the University of North Dakota Unmanned Aircraft Systems (UAS) Center of Excellence with Northrop Grumman Corporation on the development of a training simulator prototype for Global Hawk Block 40 sensor operators. This project also includes development of a business capture plan and an unsolicited proposal to the U.S. Air Force to establish a Global Hawk Block 40 training program in Grand Forks. The proposed training program is expected to increase the number of sensor operators trained and provide significant cost avoidance for the U.S. Air Force.

The Global Hawk is a high altitude long endurance UAS used for surveillance and as a communications relay. The Grand Forks Air Force Base has been designated by the U.S. Air Force as the main operating base for the Block 40 version of the Global Hawk. Six Global Hawk Block 40 aircraft are currently based out of Grand Forks, with that number expected to grow to eleven.

Integrating UAS into the National Airspace, Phase II

University of North Dakota

Launch Date: December 2011 **Award:** $255,440 **Matching & Leveraged Funds:** $151,000

This grant continues funding for an effort to position North Dakota as the prime location to research, develop and deploy UAS, as well as accelerate UAS integration into the national airspace. An Airspace Integration Team of North Dakota aviation professionals and experts was formed to facilitate these efforts, initially focusing on the development of an unsolicited proposal to the Federal Aviation Administration (FAA) to establish a UAS test site in North Dakota. The proposed test site would provide a place for industry to research, develop and deploy UAS while demonstrating that UAS can operate safely in the national airspace. The Airspace Integration Team has transitioned its efforts toward answering a solicited request by the FAA for applications for National Test Sites.

Currently, UAS usage is dominated by military applications occurring in other parts of the world. However, there is broad potential for civilian applications should the FAA approve their usage in the national airspace. UAS is estimated to be a multi-billion dollar industry.

Joint Distributed Common Ground System

University of North Dakota Center for Innovation Foundation

Launch Date: December 2011 **Award:** $125,706 **Matching & Leveraged Funds:** $46,000

This grant provided funding for a study examining the feasibility of establishing a joint Distributed Common Ground Station (DCGS) at the Grand Forks Air Force Base. A DCGS is a large, secure facility where data from manned and unmanned aircraft are analyzed for various intelligence purposes. Other opportunities such as establishing training and maintenance facilities at the Grand Forks Air Force Base were also explored under the study. The overarching goal of the study was to identify promising initiatives that align with Air Force needs that also provide cost savings and bolster activity at the Grand Forks Air Force Base.

The University of North Dakota UAS Center of Excellence opened a MQ-1/9 UAS Training Center at the Grand Forks Air Force Base in August 2011. The training center will be used to train instructors, pilots and sensor operators for both civil and military customers. Customs and Border Patrol is currently using the program for recurrent pilot training.

Enhanced Use Lease for Grand Forks Air Force Base

University of North Dakota Center for Innovation Foundation

Launch Date: August 2012 **Award:** $486,750 **Matching & Leveraged Funds:** $0

This grant provides funding to advance opportunities identified in the "Joint Distributed Common Ground System" feasibility study by submitting an Enhanced Use Lease application to the U.S. Air Force. If the application is approved, the U.S. Air Force and Grand Forks County will enter into negotiations for an Enhanced Use Lease at the Grand Forks Air Force Base.

Obtaining an Enhanced Use Lease would allow Grand Forks County to begin development activities on approximately 200 acres of underutilized land at the Grand Forks Air Force Base, which could include training and maintenance facilities as part of a UAS business park at the Grand Forks Air Force Base. This base realignment grant provides funding for the Enhanced Use Lease application process as well as the negotiation process, should the U.S. Air Force approve the initial application.

Airspace Integration Team UAS National Test Site Application

University of North Dakota

Launch Date: November 2012 **Award:** $500,000 **Matching & Leveraged Funds:** $0

Congressional language in a defense spending bill and the Federal Aviation Administration (FAA) Reauthorization bill require the FAA to create six UAS test sites in the United States. The test sites will provide a controlled environment where limited integration of UAS into the national airspace will occur. The six test sites will serve as a blueprint for full integration of UAS into the national airspace.

In addition to providing considerable scientific benefits, the six national test sites are sure to become economic engines that attract significant private sector activity. The UAS industry is estimated to be a multi-billion dollar annual industry. As a result of the Congressional action, North Dakota's Airspace Integration Team has refocused its efforts on successfully navigating the formal selection process administered by the FAA. The Airspace Integration Team will remain committed to establishing a compelling case for North Dakota as a national test site, and this grant provides funding to facilitate those efforts.

Limited Deployment Cooperative Airspace Project

Unmanned Aircraft Systems (UAS) have had a tremendous impact on U.S. military strategy and operations. There is also vast potential for UAS applications in civilian industries such as energy and agriculture. Before UAS can be fully integrated into the national airspace for civilian usage, it must be demonstrated that UAS can operate safely and in harmony with other aircraft in the national airspace.

The 2011 Legislature allocated $4 million for Limited Deployment Cooperative Airspace Projects (LDCAP) that bring the University of North Dakota and North Dakota State University together in partnership with MITRE, the research arm of the Federal Aviation Administration; NASA-Langley Research Center; Draper Laboratory; the North Dakota National Guard; and Appareo Systems. As of June 30, 2012 the Centers of Excellence Commission has approved two projects.

The goals of LDCAP include establishing a controlled experimental environment where live field tests may be performed and evaluated. The data generated from the field tests will be used to identify and address critical safety concerns regarding the full integration of UAS into the national airspace.

Limited Deployment Cooperative Airspace Project
University of North Dakota

Launch Date: October 2011 **Award:** $2.7 million **Matching & Leveraged Funds:** $3.2 million

The University of North Dakota is collaborating with MITRE, NASA-Langley, Draper Laboratory and the North Dakota National Guard to investigate the viability of Automatic Dependent Surveillance-Broadcast (ADS-B) "sense and avoid" capability for UAS. The ability of a UAS to "sense and avoid" other aircraft is a critical safety concern. ADS-B technology allows an aircraft, manned or unmanned, to broadcast essential information about its location and to gather similar data from other nearby aircraft, allowing pilots to make necessary adjustments to safely avoid other air traffic.

The University of North Dakota and its collaborators are also testing whether radar data can be used to feed Traffic Information Service-Broadcast (TIS-B), which provides "ADS-B-like" surveillance for aircraft not equipped with ADS-B technology.

Automatic Dependent Surveillance-Broadcast Miniaturization Program
North Dakota State University

Launch Date: November 2011 **Award:** $1.3 million **Matching & Leveraged Funds:** $2.424 million

North Dakota State University is collaborating with Appareo Systems to research and design a miniaturized radio chip that uses ADS-B technology to broadcast an aircraft's GPS position, altitude and other relevant information to air traffic control and other aircraft. The availability and utilization of this data is expected to enhance safe operations of all aircraft, manned and unmanned, in the national airspace.

The radio chip under development by North Dakota State University and Appareo will offer reduced power consumption, weight and cost as compared to current commercially available ADS-B radio chips. These advancements increase the viability of broad implementation of ADS-B technology as part of a larger strategy allowing for the eventual full integration of UAS into the national airspace.

"LDCAP is an extremely valuable test which addresses research questions surrounding ADS-B and ground-based radars as a sense and avoid capability."

- Frank Jones, NASA-Langley Research Center

PROGRAM PARTNERS

AAG, Inc.
Access Energy, LLC
Aerosim
Agri ImaGIS
Akzo-Nobel Aerospace Coatings
Aldevron
Alliance Pipeline, Inc.
Altravax
Appareo Systems, LLC
Arkema, Inc.
Ashland, Inc.
Avenue Right
Avianax, LLC
Basin Electric Power Cooperative
Bayer Material Science
BenchMark Energy
Bobcat Company
Boeing
Boldmethod
BOSH Global Services
Catalyst Clincial Research, LLC
Caterpillar Remanufacturing Drivetrain
Clear Springs
Clinical Supplies Management
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MDU
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Next Healthcare, Inc.
Nissan Chemical America Corp.
North Dakota Biodiesel
North Dakota Farmers Market & Growers Association
North Star Organic Farms
Northrup Grumman Corporation
Novadigm Therapeutics
Operational Security Services, Inc.
Pedigree Technologies
Poudre Valley Environmental Sciences, Inc.
PPG Industries
Pratt & Whitney Rocketdyne, Inc.
Praxis Strategy Group
Presco, LLC
Rapid Engines
ReconRobotics
Red Trail Energy
Riverbound Farm
Rockwell Collins
Schiltz Goose Farms, North, Inc.
SDS International, Inc.
SeaTec, LLC
SGC Energia
Shell Chemicals
Simlat
Somahlution
SpaceAge Synthetics
Spiritwood Station
St. Mary Land and Exploration Company
Starkey Laboratories, Inc.
Superior Edge
Technology Applications Group
Tesoro
Thompson Farm
TIORCO
Tri-State Aviation
Triton Systems, Inc.
United States Automotive Partnership
United Technologies Research Center
Unmanned Applications Institute Int'l.
URS Corporation
V2 Aerospace, Inc.
Western Research Institute
Whiting Petroleum Corp.
Wholesale Supply Company, Inc.
Wynntryst, LLC
Xcel Energy

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	$0.800	$3.565
Center for Advanced Electronics Design & Manufacturing	NDSU	Feb 2006	$3.000	$14.005
Dakota Precision Ag Center	LRSC	Feb 2006	$0.850	$1.890
National Center for Hydrogen Technology	UND EERC	Feb 2006	$2.500	$58.606
National Energy Center of Excellence	BSC	Feb 2006	$3.000	$7.292
Center for Surface Protection	NDSU	May 2006	$4.000	$8.682
Center of Excellence for Agbiotechnology: Oilseed Development	NDSU	May 2006	$3.500	$12.000
Enterprise University*	VCSU	May 2006	$1.000	$5.140
Petroleum Safety & Technology Center	WSC	May 2006	$0.400	$1.183
Unmanned Aircraft Systems Center of Excellence	UND	May 2006	$2.500	$15.838
Institute for Technology & Business	DSU Strom Center	Oct 2006	$1.150	$5.179
Center of Excellence in Life Sciences & Advanced Technologies	UNDRF	March 2007	$3.500	$4.005
Technology Incubator	NDSU	March 2007	$1.250	$5.038
Beef Systems Center of Excellence	NDSU	Oct 2007	$0.800	$2.000
Center for Biopharmaceutical Research & Production	NDSU	June 2009	$5.015	$6.262
Center for Integrated Electronics Systems	NDSU	June 2009	$2.050	$3.510
Center of Excellence for Passive Therapeutics	UNDRF	June 2009	$2.650	$6.554
Center of Excellence in Space Technology & Operations	UND	June 2009	$1.000	$0.165
Petroleum Research, Education & Entrepreneurship Center	UND	June 2009	$3.000	$6.604
SUNRISE BioProducts Center of Excellence	UND	June 2009	$2.950	$3.854
Center for Sensors, Communications & Control	NDSU	Jan 2011	$2.800	$0.014
Entrepreneurial Center for Horticulture	DCB	June 2011	$0.400	$0.915
Center for Advanced Technology Development and Commercialization	NDSU	Nov 2012	$3.900	$0.000
Enhancement Grants				
Center for UAS Research Education & Training	UND	June 2010	$2.754	$1.358
Research 1 Expansion	NDSU	Jan 2011	$4.000	$0.293
North Dakota UAS Airspace Initiative	UND	March 2011	$0.100	$0.007
UAS Software & Curriculum Development	UND	March 2011	$0.600	$0.193
Certificate Programs for Full Motion Video & 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	$0.200	$0.055
Materials & Nanotechnology Center	NDSU	Sept 2011	$1.000	$0.000
V2 Aerospace, Inc. Technical Assistance	UND Center for Innovation	Sept 2011	$0.370	$0.103
Law Enforcement and Public Safety Agency Small UAS Course	UND	May 2012	$0.230	$0.048
Centers of Research Excellence				
Center for Technologically Innovative Processes & Products	NDSU	Aug 2012	$0.320	$0.000
Center for Life Sciences Research & Applications	NDSU	Nov 2012	$1.350	$0.000
Base Realignment Grants				
Integrating UAS into the National Airspace, Phase II	UND	Dec 2011	$0.255	$0.151
Global Hawk Sensor Operator Part Task Trainer	UND	Dec 2011	$0.878	$9.787
Joint Distributed Common Ground System	UND	Dec 2011	$0.126	$0.046
Enhanced Use Lease for Grand Forks Air Force Base	UND	Aug 2012	$0.487	$0.000
Airspace Integration Team UAS National Test Site Application Proposal	UND	Nov 2012	$0.500	$0.000
Limited Deployment Cooperative Airspace Project				
Limited Deployment Cooperative Airspace Project	UND	Oct 2011	$2.700	$3.200
Automatic Dependent Surveillance-Broadcast Miniaturization Program	NDSU	Nov 2011	$1.300	$2.424
GRAND TOTALS			**$69.931**	**$189.991**

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

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:
$635 million

More than **$4** raised for every **$1** of awarded funds spent

1,082
jobs created

115
private sector partners

24
businesses created or expanded

www.NDCentersofExcellence.com