

# IOWA STATE UNIVERSITY

OF SCIENCE AND TECHNOLOGY



## Strengthening Iowa's Economy

Technology transfer accomplishments

2008-09



## On the cover

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The cover features a central graphic with a grid of hexagonal portraits of faculty members. The text 'IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY' is at the top. The title 'Strengthening Iowa's Economy 2008-09' is in a dark grey bar, with the subtitle 'Technology transfer accomplishments' below it. Lines connect each portrait to a name and department on the left or right.

Name	Department
Nicola L. Pohl	Chemistry
J. Adin Mann III	Mechanical Engineering
Eric R. Henderson	Genetics, Development, and Cell Biology
Iver E. Anderson	Materials Science and Engineering
Steven L. Nissen	Animal Science
Edward S. Yeung	Chemistry
James A. Roth	Veterinary Microbiology and Preventive Medicine
Nick E. Christians	Horticulture
Doug W. Jacobson	Electrical and Computer Engineering
Walter R. Fehr	Agronomy

# **Creating Economic Well-Being for Iowa**

## *It's all about people*

### **Annual Report of Technology Transfer & Economic Development from Iowa State University**

It's all about people—from discovery and invention to commercialization for broad benefit. This year's cover features some current researchers whose discoveries and inventions have led to new businesses and new business activity in Iowa and beyond that benefit Iowans and others. Sustaining the environment, securing the internet, ensuring food safety, improving the quality of life—these and other important outcomes are the results of university research. Iowa State researchers are discovering technologies to make the world a better place.

- **Iver Anderson**, adjunct professor of materials science and engineering and senior metallurgist in the U.S. Department of Energy's Ames Laboratory, discovered lead-free solder that reduces environmental contamination caused by traditional leaded solder. His discovery has been licensed all over the world.
- **Nick Christians**, University Professor of Horticulture, developed a pre-emergence weed control product using corn gluten meal that provides a safe and effective means for controlling weeds in lawns and gardens without the use of synthetic herbicide.
- **Walt Fehr**, Charles F. Curtiss Distinguished Professor in Agriculture and Life Sciences, developed more than 125 soybean varieties that have been licensed to businesses and farmers nationwide.
- **Eric Henderson**, professor of genetics, development, and cell biology, developed a biochemical technology for drug identification used in a variety of chemical and biological sensors and created BioForce Nanosciences, Inc., to provide molecular printing tools to the biomedical and life sciences markets.
- **Doug Jacobson**, University Professor of Electrical and Computer Engineering, founded Palisade Systems, Inc., to provide Internet management and security devices that help prevent identity and data theft, and provide Web filtering. His products are used in hundreds of businesses, schools, universities and government organizations worldwide.
- **Adin Mann**, associate professor of mechanical engineering, invented a central vacuum cleaner muffler, which was licensed to Beam Industries, Webster City, Iowa, the world's largest producer of "quieter" central vacuum systems.
- **Steve Nissen**, professor of animal science, discovered HMB, a biochemical compound that increases human muscle mass by minimizing muscle damage caused by diseases, aging and strenuous physical activity. He founded Metabolic Technologies, Inc., to commercialize credible safe and effective nutritional products.
- **Nikki Pohl**, associate professor and Caldwell Chair of Chemistry, developed a nanoscale process for the synthesis of complex carbohydrates to create diagnostic tools, vaccines and biological therapies and is starting LuCella, Inc., to provide the synthetic carbohydrates.
- **Jim Roth**, Clarence Hartley Covault Distinguished Professor in Veterinary Medicine, founded Veterinary Resources, Inc., to leverage ISU expertise for conducting research on improved vaccines for cattle and swine.
- **Ed Yeung**, retired Distinguished Professor in Liberal Arts and Sciences and continuing contract associate in the Chemical and Biological Sciences program at the U.S. Department of Energy's Ames Laboratory, developed a method to analyze multiple chemical substance samples simultaneously by detecting, monitoring, and quantifying materials 24 times faster than previous methods.

Think of Iowa State University as a good source of life-improving technologies.



Ted H. Okiishi  
Interim Vice President for Research and Economic Development

## Economic Development Council

This council was formed in 1993 and coordinates ISU technology transfer and economic development activities. Representatives meet regularly to discuss problems, update each other on activities, assess the state and national environment for technology transfer, and propose policy and procedures to encourage technology transfer and economic development activities at ISU.

Ted Okiishi (Chair)  
tedo@iastate.edu  
VP for Research & Economic Dev.  
515 294-6344

Ron Cox  
rcox@iastate.edu  
CIRAS  
515 294-9592

Lisa Lorenzen  
llorenze@iastate.edu  
Industry Relations  
515 294-0926

Matthew Bailey  
mabailey@iastate.edu  
Sponsored Programs Administration  
515 294-5225

Michael Crum  
mcrum@iastate.edu  
College of Business  
515 294-2422

Shashi Nambisan  
shashi@iastate.edu  
CTRE  
515 294-8103

Tom Barton  
barton@energy.iastate.edu  
Iowa Energy Center  
515 294-9912

Walter Fehr  
wfehr@iastate.edu  
Biotechnology  
515 294-6865

Balaji Narasimhan  
nbalaji@iastate.edu  
College of Engineering  
515 294-5933

Diane Birt  
dbirt@iastate.edu  
Nutrition and Wellness Research Center  
515 294-8624

James Heckmann  
jimh@iastate.edu  
Small Business Development Center  
515 294-2037

David Oliver  
doliver@iastate.edu  
College of Liberal Arts & Sciences  
515 294-6426

James Bloedel  
bloedel@iastate.edu  
College of Veterinary Medicine  
515 294-9348

Stephen Howell  
shh@iastate.edu  
Plant Sciences Institute  
515 294-5252

James Oliver  
oliver@iastate.edu  
CyberInnovation Institute  
515 294-2649

Tim Borich  
borich@iastate.edu  
College of Design  
515 294-8707

Alex King  
alexking@ameslab.gov  
Ames Laboratory  
515 294-2770

Jack Payne  
jpayne@iastate.edu  
VP for Extension & Outreach  
515 294-4603

Charlotte Bronson  
cbronson@iastate.edu  
Research Administration  
515 294-6344

Kenneth Kirkland  
kenk@iastate.edu  
OIPTT/ISURF  
515 294-4740

Carla Peterson  
carlapet@iastate.edu  
College of Human Sciences  
515 294-7804

Robert C. Brown  
rcbrown@iastate.edu  
Bioeconomy Institute  
515 294-7934

Sonja Klocker  
skklock@iastate.edu  
Research Administration  
515 294-6344

Chitra Rajan  
rajanc@iastate.edu  
Research Administration  
515 294-6344

Steven Carter  
stc@iastate.edu  
Pappajohn Center and Research Park  
515 296-7275

Mike Krapfl  
mkrapfl@iastate.edu  
University Relations  
515 294-4917

Joseph Colletti  
colletti@iastate.edu  
College of Agriculture & Life Sciences  
515 294-1823

George Kraus  
gakraus@iastate.edu  
IPRT  
515 294-1634

# **Iowa State University**

## **Economic Development/Technology Transfer Activities**

### ***Executive Summary***

- In FY08, ISU received \$274.1 million in sponsored project funding from both federal and non-federal sources. Of this amount, \$24.4 million was received from businesses and commodity groups for research activities and \$10.8 million for non-research activities, including many projects that provide technical support and outreach to companies in the State of Iowa.
- ISU has maintained its position as one of the nation's leading universities in technology transfer accomplishments. In the latest survey conducted by the Association of University Technology Managers (FY06), in which 161 U.S. universities participated, ISU ranked 4th in licenses and options executed and 2nd in the number of licenses and options executed per \$10 million in research expenditures.
- ISU was described as a "licensing powerhouse" in a report by Innovation Associates, Inc., entitled "Technology Transfer and Commercialization Partnerships". The report was also featured in Business Week.
- ISU inventors disclosed 87 new inventions in FY08 to the Office of Intellectual Property and Technology Transfer (OIPTT), and 27 patents were issued on ISU inventions.
- The Iowa State University Research Foundation (ISURF) executed 62 new licenses and options, including 31 licenses for plant germplasm. Twenty-five new technology licenses were executed with companies, six of which are located in Iowa. Of the six new option agreements executed in FY08, one of them is with an Iowa company.
- Iowa State holds the contract to operate the U.S. Department of Energy's Ames Laboratory with an annual budget of approximately \$30 million.
- Technologies licensed to Iowa companies (not including plant germplasm) resulted in over \$84 million in sales by those companies in calendar year 2007.
- Ten new Iowa companies that are related to ISU technologies were formed during the past two years. This brings the total count to 96 over the past two decades.
- The SBIR/STTR Program Administrator in OIPTT, Kris Johansen, assisted 20 small Iowa companies in the preparation of 21 Phase I and Phase II proposals in FY08.
- The ISURF Board approved the establishment of a Research and Economic Opportunities Fund to support the University's research and economic development activities. Presently, the Fund has assets of \$8.7 million.
- ISU has worked closely with legislators, the Iowa Department of Economic Development, the University of Iowa, the University of Northern Iowa and the Board of Regents, State of Iowa, in administering the Grow Iowa Values Fund (GIVF). This legislation is providing the universities and private colleges financial resources to expand technology transfer and commercialization efforts. The ISU Grow Iowa Values Fund program has a competitive research component that pairs ISU researchers with Iowa industries to help realize economic benefit for the state. A survey of seven companies that participated in projects that were completed in June 2007 documented 42 jobs created or retained and a \$5.3 million sales impact due to research projects conducted in partnership between ISU and the companies.

- ISU has been actively working with the State of Iowa Office of Energy Independence to launch board approved Iowa Power Fund projects. Several proposals have been submitted, and some are in the final stages of negotiation.
- Ten new companies and affiliates joined the ISU Research Park in FY08, bringing the historical total to 178 companies and research centers that have located in or been affiliates of the Research Park. These companies employ more than 2,700 people throughout the world. The total square footage within the Research Park is now nearly 325,000 sq. ft.
- The ISU SBDC, along with the ISU Pappajohn Center for Entrepreneurship, provided 5,157 hours of counseling assistance to start-up and existing companies; served 134 clients with one-on-one counseling; educated more than 400 attendees through workshops; provided advice to several hundred clients via telephone and email; and advised 50 technology companies in the areas of licensing, equity-based financing, business development, etc.
- Accessing expertise from across the university, the Institute for Physical Research and Technology (IPRT) is able to meet the research and development needs of diverse Iowa companies by matching Iowa businesses and entrepreneurs with university resources in cost-shared research and development projects. In the last two years, IPRT cost-sharing funds of \$367,272 were leveraged to investments of \$704,049 in 38 projects.
- A research team led by Hans van Leeuwen, professor of civil, construction and environmental engineering, was awarded a 2008 R&D 100 Award from R&D Magazine. This team is using fungi to clean up and improve the dry-grind ethanol production process. This is the 30<sup>th</sup> R&D 100 Award presented to researchers affiliated with Iowa State.
- The Center for Industrial Research and Service (CIRAS) has a mission to improve the quality of life in Iowa by enhancing the performance of business and industry through research, education, and technical assistance. In FY08, businesses from 93 counties in the state received assistance on projects or attended educational workshops conducted by CIRAS staff or partners. 667 companies reported \$62 million in new investments, \$12 million in costs saved or avoided, and \$122 million in sales gained or retained (\$196 million total). Company executives stated that 2,226 jobs were added or retained as a result of the technical assistance and education they received from CIRAS and its partners. In addition to direct project and workshop assistance to companies, CIRAS staff provided educational information to over 10,000 individuals in FY08.
- A “Point of Contact” system continues to help companies find the assistance they need within the university. The university homepage has a link for business/industry that takes the reader to the “Point of Contact” information. In the past year, the Office of the Vice President for Research and Economic Development acted upon approximately 500 inquiries, including requests from Iowa manufacturers for technical assistance, information on special courses/workshops and/or results of specific research projects.
- More than 25 ISU units work with Iowa industry, communities, and economic development personnel in a variety of capacities. Over 7,500 interactions occurred in Iowa in FY08. All 99 counties were served.

*Iowa State University does not discriminate on the basis of race, color, age, religion, national origin, sexual orientation, gender identity, sex, marital status, disability, or status as a U.S. veteran. Inquiries can be directed to the Director of Equal Opportunity and Diversity, 3210 Beardshear Hall, (515) 294-7612.*

# Economic Development and Technology Transfer Statistics

## Sponsored Project Funding

In FY08, \$274.1 million was received by Iowa State in sponsored project funding (Figure 1).

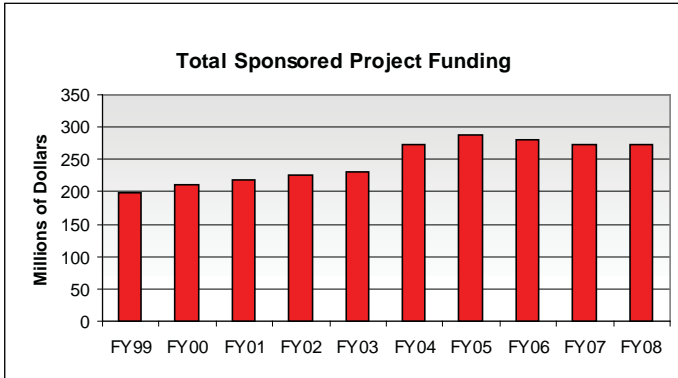


Figure 1

\$167.1 million of this was dedicated to research activities (Figure 2) and the rest to public service, educational projects, financial aid and buildings.

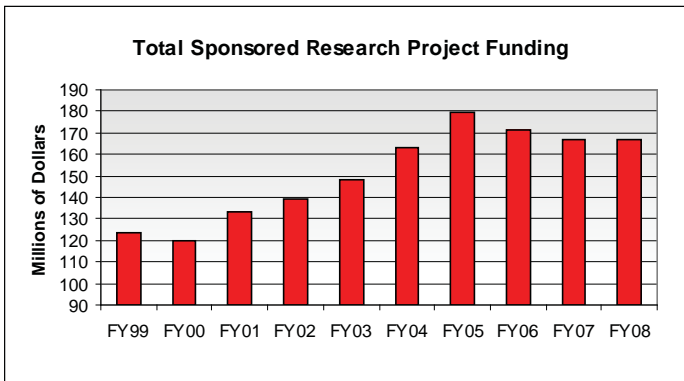


Figure 2

The research awards include contracts and grants from both federal and non-federal sources. Many projects supported by these funds result in technology that is transferred to the marketplace and consequently assists companies and communities across Iowa. Figures 3 and 4 show the two major sources for this type of support—the federal government and businesses and commodity groups. In FY08, the federal government funded research projects totaling \$105.9 million (Figure 3).

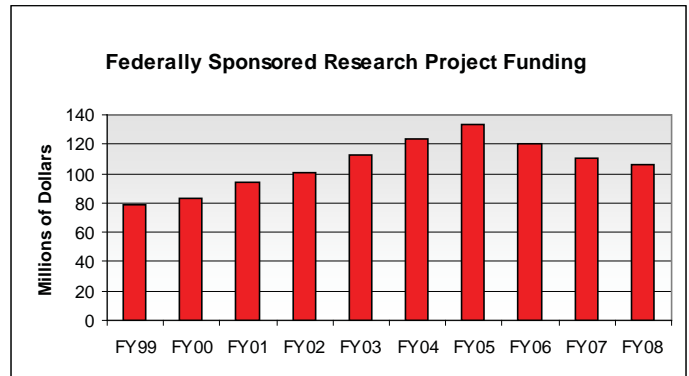


Figure 3

As shown in Figure 4, in FY08 businesses (including commodity groups) funded research projects at ISU totaling \$24.4 million. In addition, businesses funded non-research projects totaling \$10.8 million (not shown in Figure 4).

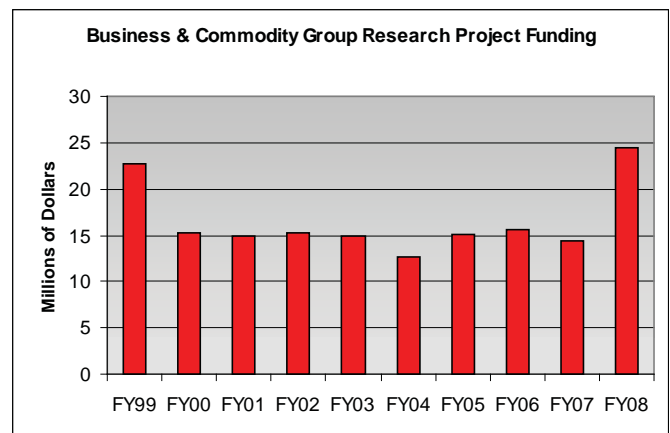


Figure 4

## Iowa State's Research Foundation Disclosures of Inventions

Iowa State researchers disclosed 87 new inventions in FY08 to the Office of Intellectual Property and Technology Transfer. Figure 5 below shows disclosures received over the past 10 years by discipline.

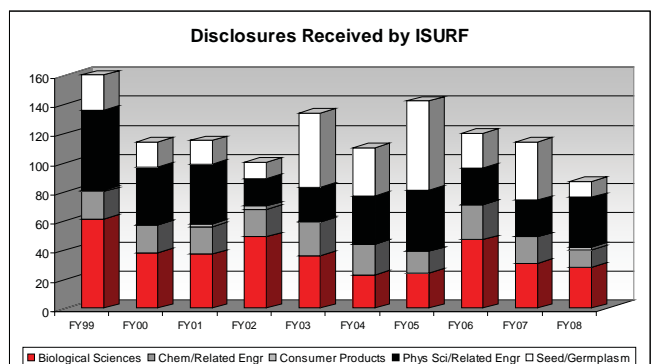


Figure 5

### Patents Issued to Iowa State Inventors

Figure 6 below shows patents issued to the Iowa State University Research Foundation (ISURF) over the last ten years.

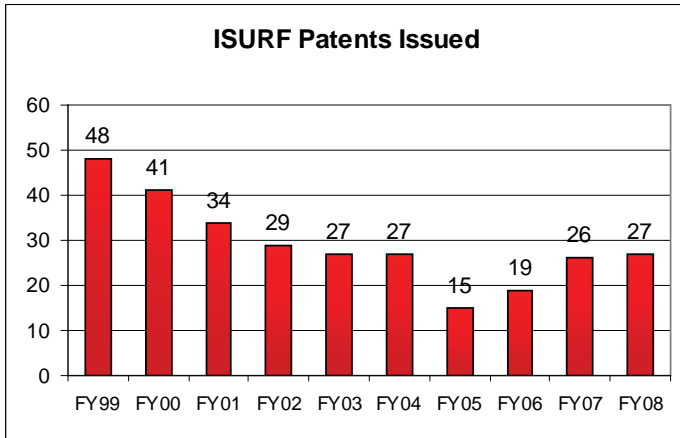


Figure 6

### Iowa State Ranked High Nationally

Iowa State is one of the nation's leading universities in research accomplishments. In the last AUTM survey, in which 161 U.S. universities participated, ISU ranked 4th in licenses and options executed and 2nd in the number of licenses and options executed per \$10 million research expenditures, even though it was in 53rd place in terms of research expenditures.

### ISU Technology Generates Iowa Sales

New technologies originating at Iowa State contribute directly to the economy of Iowa. Technologies licensed to Iowa companies, excluding plant germplasm, resulted in over \$84 million in sales by those companies in calendar year 2007. Figure 8 shows both Iowa and non-Iowa sales of licensed ISU technologies during the last ten years. Total sales of ISURF-licensed technologies (not including plant germplasm) were \$468 million in calendar year 2007. The next graph (Figure 9) shows the pattern over the past ten years of only Iowa companies.

### Research Foundation Signs New Licenses

In FY08, the Research Foundation signed 62 new license and option agreements, including 31 for plant germplasm. Of the thirty-one new technology licenses and options signed, seven were with Iowa companies. These are critical statistics since licenses and options characterize the actual transfer of ISU technologies to the marketplace. It should be noted that 32 inventions were licensed/optioned for the first time in FY08. Of these, 13 are plant varieties and 19 are other technologies.

Figure 7 shows the number of active license and option agreements over the last ten years.

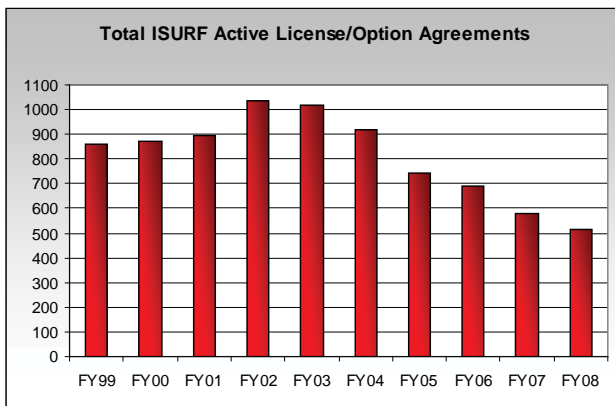


Figure 7

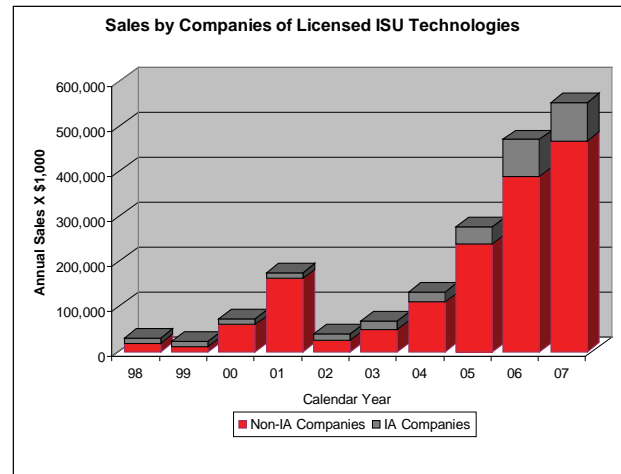


Figure 8

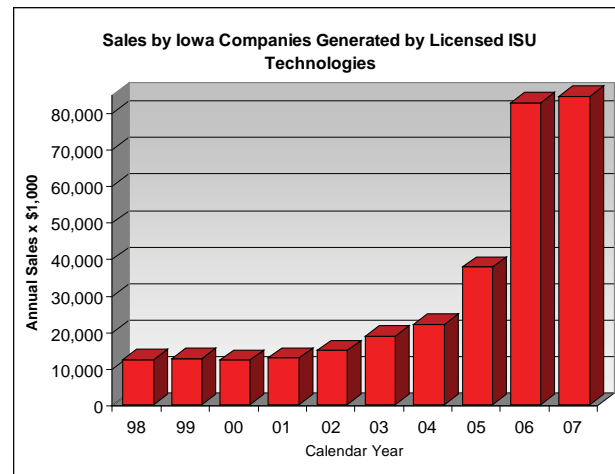


Figure 9

## Making New Plant Germplasm Available

Figure 10 below shows the number of bushels of soybeans planted in Iowa on which royalties were collected and the dollar amount of those royalties over the last ten years. In FY08, 27,491 bushels of specialty soybean varieties developed at ISU were planted in Iowa, generating \$86,915 in royalties.

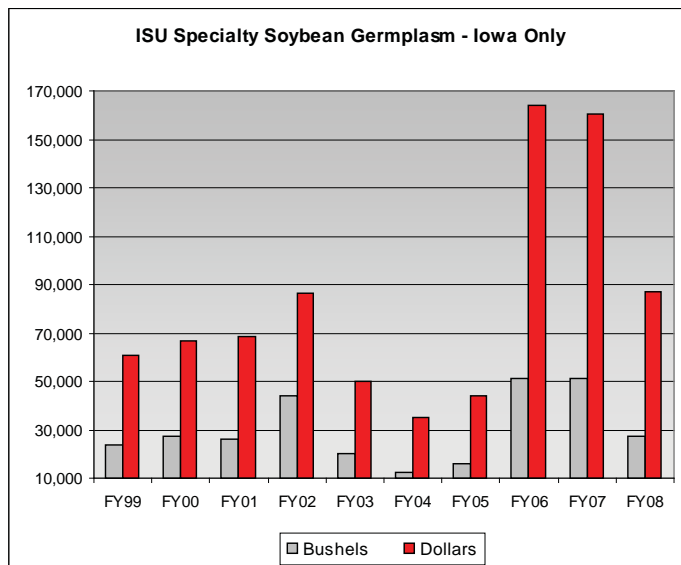


Figure 10

## Encouraging the Development of Intellectual Property

In FY08, ISURF disbursed value-added funds for eight ISU inventor projects for a total of \$194,450. Some of these projects are the subject of patent applications and are being actively marketed and licensed. In addition, ISURF provided a total of \$5,298 to two faculty start-ups as reimbursement for consultant and attorney fees.

## Research and Economic Opportunities Fund

Since FY99, ISURF has provided grants to the Vice President for Research office to be used for faculty recruitment and retention, to purchase lab equipment and to provide funds for bridge grants. During FY06 and FY07, part of these grant funds contributed to a total of 18 start-up packages and five retention packages for University faculty.

In FY08, an investment committee formed by the President of ISURF recommended that in lieu of the annual grant, part of ISURF's endowment be used to establish a Research and Economic Opportunities Fund. This was approved by the Board in October of 2007. The Fund will be drawn upon as required to support a wide range of activities including faculty start-up and retention packages, seed grants for new research initiatives, purchase of scientific equipment and investment in research infrastructure. At the beginning of FY08, the Fund had assets of \$8.7 million. These monies will be used to leverage the University's strategic goals in research and economic development and will be invested

in those areas where the University has clear strengths and historical success. The investments will help to provide the infrastructure necessary for innovative research to take place, which when combined with other resources, will also further advance technology-transfer-related activities. Funds provided in the past have also been strongly leveraged in terms of extramural funding obtained by the recipients.

## SBIR/STTR Proposal Assistance

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) funding continued its upward trend during FY08. An emphasis placed on outreach and training activities—including a monthly newsletter and proposal writing workshops—in addition to providing proposal preparation support through the Office of Intellectual Property and Technology Transfer has led to an increasing number of companies receiving funding. Twenty Iowa companies were assisted in the preparation of 21 proposals or administration of awards, including seven Iowa State faculty or staff-related companies.

In FY08, twenty-one Iowa companies won twenty-one new SBIR and STTR awards worth \$6.2 million. The Departments of Agriculture, Defense and Energy, as well as the National Institutes of Health, the National Aeronautics and Space Administration, and the National Science Foundation are funding this year's Iowa SBIR/STTR award winners. The funded projects reflect Iowa's strengths in biotechnology, information systems, materials development and agriculture. Over two million dollars in support was awarded from NIH for diverse projects that range from the development of novel cancer treatments to imaging systems to tools to facilitate life sciences research to medical monitoring devices. An additional \$2.1 million was received from DoD for Navy and Air Force projects to enhance training, improve fluid dynamics research, and develop materials for applications in electronics.

SBIR/STTR Funding in Iowa 1999-2008

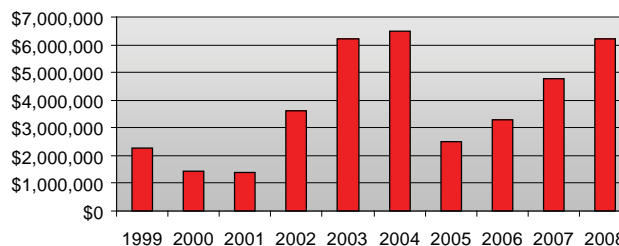


Figure 11

Nineteen Phase I awards were received by Iowa companies in FY08, up from thirteen in FY07. Iowa companies also received ten Phase II awards in FY08; up from eight the previous year.

## Software Company Wins First STTR

A start-up company founded by two Iowa State computer science professors, Johnny Wong and Wallapak Tavanapong, has received a \$150,000 Phase I STTR grant from NSF for the development of software for a quality control system for colonoscopy procedures. While colonoscopy has contributed to a decline in the number of colorectal cancer-related deaths, recent data suggest that there is a significant miss-rate for the detection of polyps and possible cancers. The company's software documents how each procedure is done and whether it is done satisfactorily, thereby enabling automated, objective quality control for colonoscopy and potentially improving patient care for millions of people undergoing this procedure in the U.S. each year. The STTR application process was facilitated by OIPTT staff, who provided one-on-one proposal consultation and review. In addition, company representatives attended a Phase I SBIR/STTR Writing Workshop developed, organized and presented by OIPTT. The funding will enable the company to accelerate the advancement of its software, which was developed in part at Iowa State.

## ISU Research Park

Currently there are 56 companies and centers located at the Research Park employing 766 people and ten affiliate companies employing 145 people. Ten new companies and affiliates have joined the Park during FY08 bringing the historical total to 178 companies and research centers that have been located in or been affiliates of the Research Park.

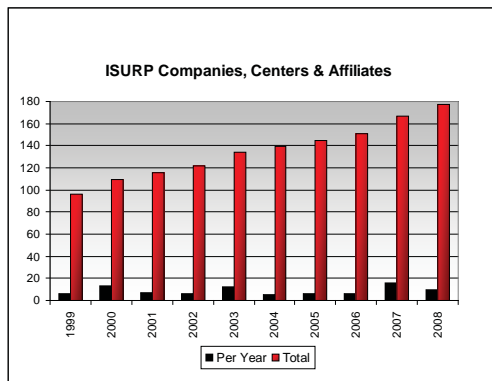


Figure 12

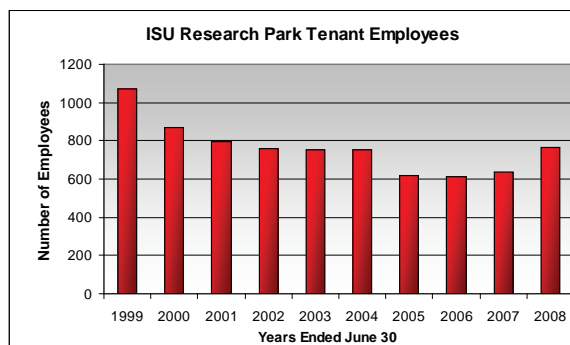


Figure 13

## ISU Research Park Employment Figures

Existing tenant companies & centers	766
Other Iowa employees of existing tenants	9
Other U.S. employees of existing tenants	14
International employees of existing tenants	1
Existing ISIS affiliates	145
Former ISIS & RP companies	<u>1849</u>
Totals	2784

## Institute for Physical Research and Technology (IPRT)

### IPRT Meets R&D Needs of Iowa Industry

Accessing expertise from across the university, IPRT is able to meet the research and development needs of diverse Iowa companies by matching Iowa businesses and entrepreneurs with university resources in cost-shared research and development projects. Technology commercialization associates in IPRT Company Assistance develop sponsored research projects with Iowa companies to do product development and process improvement research as well as technology development and commercialization. In the two-year period of FY07–FY08, IPRT cost-sharing funds of \$367,272 were leveraged to investments of \$704,049 in 38 projects.

Year	<sup>1</sup> No. of Projects	IPRT Cost-sharing Funds	<sup>2</sup> Industry Investment
2008	15	\$ 174,845	\$ 379,097
2007	23	\$ 192,427	\$ 324,952
2006	23	\$ 202,042	\$ 542,660
2005	23	\$ 179,669	\$ 302,340
2004	37	\$ 284,488	\$ 532,933
2003	26	\$ 219,156	\$ 357,472
<b>Total</b>	<b>147</b>	<b>\$ 1,252,627</b>	<b>\$ 2,439,454</b>

<sup>1</sup>At any point in time, Technology Commercialization Associates will be developing, implementing, and managing 40-50 projects. Associates work with Iowa industry to define research needs and match those needs with university resources. This column reports the number of contract research agreements initiated with Iowa firms.  
<sup>2</sup>The figure in this column reflects funds from the IPRT appropriation for contract research projects and Technology Commercialization Acceleration Program cost-sharing funds.

## IPRT Works for Iowa

In the two-year period covering FY07 and FY08, IPRT collaborated with 201 unique organizations in 80 Iowa cities (identified by pins in the map below) for a total of 298 interactions. IPRT centers logged 72 interactions. IPRT Company Assistance provided short-term, technical assistance on 188 projects and developed 38 cost-shared research and development projects.

## IPRT Company Assistance

IPRT Company Assistance leverages the expertise of the IPRT research centers and other Iowa State capabilities to help Iowa companies solve technical problems, create new products and processes, and increase productivity and quality. IPRT's efforts also lead to development of new, high-tech companies. IPRT Company Assistance provides help through both short-term, no-cost technical assistance and its R&D cost-sharing program.

Each year, IPRT Company Assistance helps more than 100 firms—from one-person start-ups to Fortune 500 corporations. Figure 15 below indicates the number of projects undertaken each year since 1998 with Iowa companies.

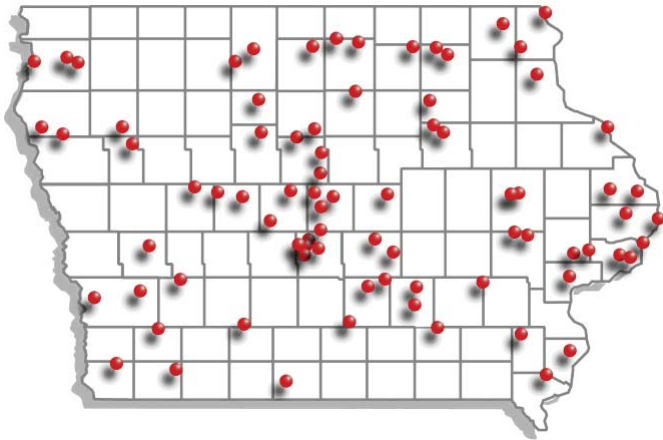


Figure 14

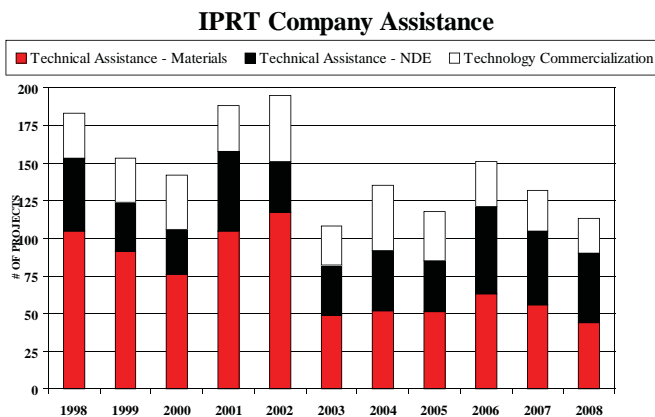


Figure 15

## Iowa Companies Report Economic Impact

IPRT's economic impact averaged \$13.9 million per year over a five-year span from 2003-2007. See Figure 16 below. The impact comes from increased and retained sales, cost savings and investments, according to surveys of Iowa companies assisted by IPRT Company Assistance. This clearly shows that Iowa companies with technical problems and research and development needs continue to find important technical help through the services of IPRT Company Assistance. The average cost per year of providing these programs is approximately \$660,000.

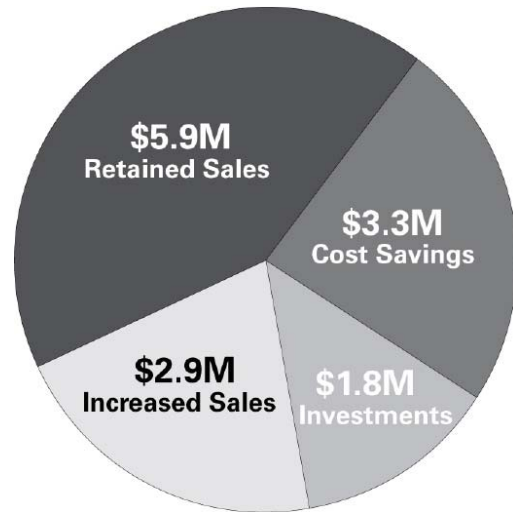


Figure 16

## Center for Industrial Research and Service (CIRAS)

Businesses from 93 counties in the state attended educational events or received assistance from the Center for Industrial Research and Service (CIRAS) staff, CIRAS partners or Engineering Continuing Education (ECE).

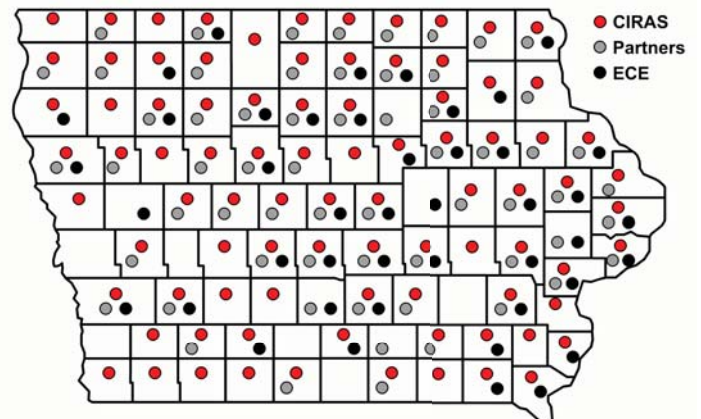


Figure 17

## CIRAS Regional Studies

The Center for Industrial Research and Service (CIRAS) has partnered with the ISU Department of Economics to conduct five regional economic studies throughout Iowa. The studies provide economic developers with an overview of their regional economy and the forces affecting it, assess the regional industrial structure, identify key regional industries, and promote the use of research-based criteria for justifying public economic development spending. The regional studies help to enhance the link between local economic development needs and Iowa State University research, extension, and continuing education professionals.

Study 4 “Understanding the Greater Jasper County Labor Region, and its Workforce and Industrial Characteristics” was completed in July 2007. Through this study, CIRAS assisted Newton in identifying their regional economy by defining the workforce/trade region. This data assisted the region in winning the Central Iowa Regional Innovation Grant (RIG) and establishing the first in the nation RIG’s region. The purpose of the grant is to encourage strategic planning that will greatly enhance and complement the current approach to National Emergency Grants. RIG’s are proactive, actively engaging all key players, leveraging

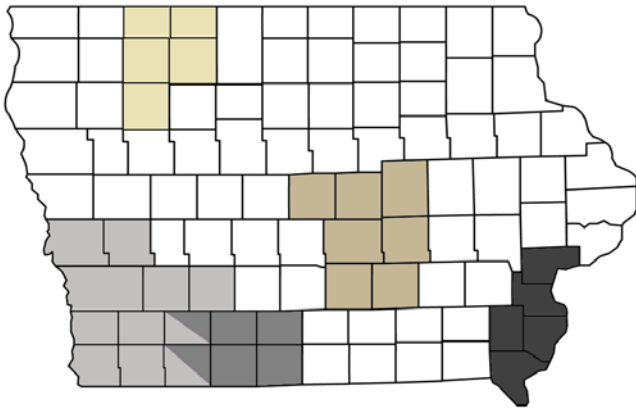


Figure 18

Study 1: Targeting Industrial Growth Opportunities in Southeast Iowa, completed May 2005
Study 2: Targeting Industrial Growth in South Iowa, completed June 2006
Study 3: Targeting Industrial Growth in Southwest Iowa, completed February 2007
Study 4: Understanding the Greater Jasper County Labor Region, and its Workforce and Industrial Characteristics, completed July 2007
Study 5: Evaluating the Industrial and Occupational Foundations of the Iowa Lakes Region, completed March 2008

collective assets, investing in innovative strategies focused on infrastructure, talent development and investment in the region.

The RIG’s are funded from the ETA, DOL, through the Limited National Emergency Grant Resources to assist state workforce agencies and local Workforce Investment Boards (WIBs) in the development of a comprehensive, integrated, strategic regional plan based upon the WIRED conceptual framework, with a focus on current or future unanticipated economic events.

CIRAS continues to work with the Greater Jasper County Labor Region to assist with data-driven decision-making in addressing economic development and workforce development issues in the region.

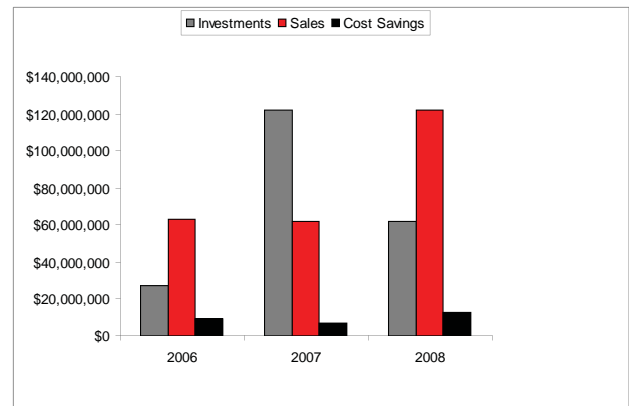


Figure 19: Investments, Sales, and Cost Savings impact reported by Iowa companies

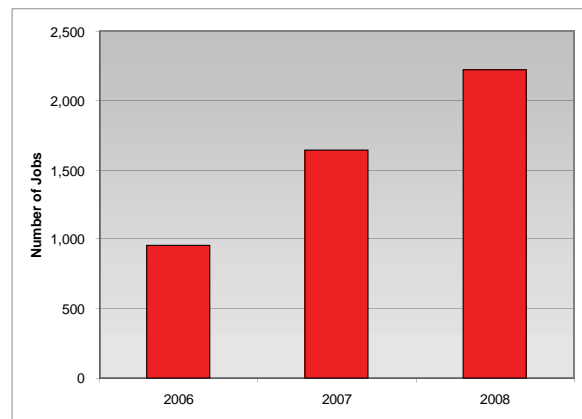


Figure 20: Jobs created or retained as a result of assistance from CIRAS staff and CIRAS partners.

# Small Business Development Center

In a report published by James J. Chrisman, professor in management and information systems at Mississippi State University, data was collected from survey respondents for Economic Impact of Small Business Development Centers (SBDC's). In that report, based on several years of data, it was shown that for every \$1.00 in SBDC funding in FY06, the amount of tax dollars returned to the State of Iowa and the federal government by SBDC clients was \$2.02. There were also 334 jobs retained, 545 jobs created, \$7.1 million in sales retained and \$37.5 million in sales increased.

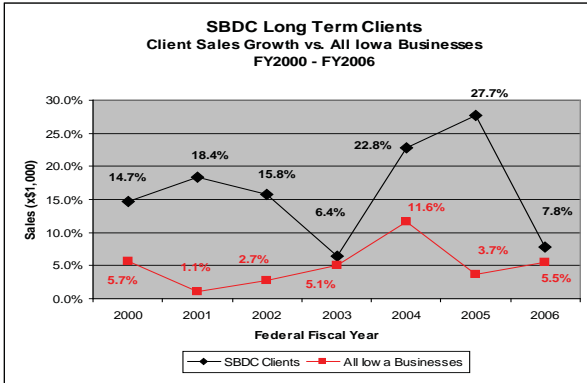


Figure 21

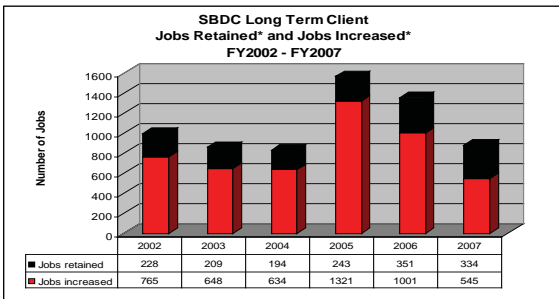


Figure 22

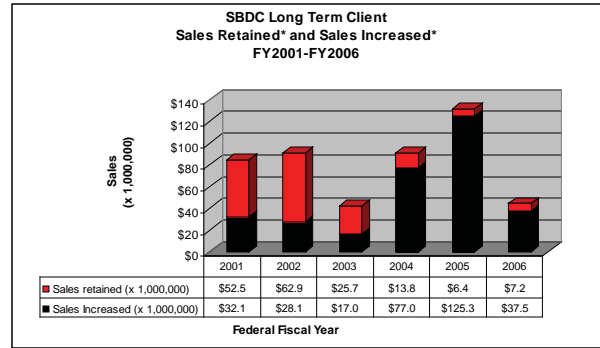


Figure 23

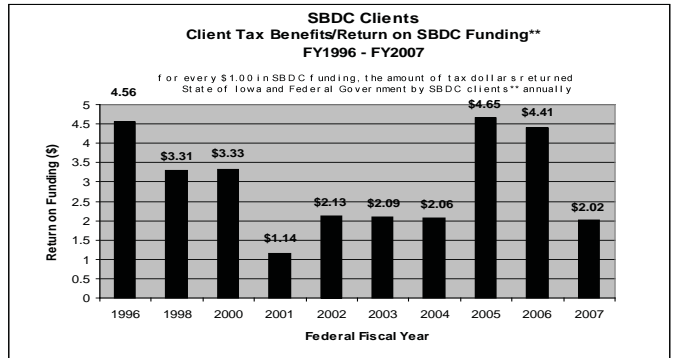


Figure 24

## Iowa Companies That Have Formed Due To Iowa State Technologies and/or Technical Expertise

<u>Name of Company</u>	<u>Date</u>	<u>Specialization</u>
BioCrystals, Inc.	2008	Protein crystals from supersaturated solutions
Envirotech Systems, Inc.	2008	Anaerobic treatment of medium and low strength industrial and municipal wastewater
ImmunoBiotics Iowa, Inc.	2008	Vaccine technologies for veterinary use
Glycomyr, Inc.	2008	Development of nutraceuticals for animal and human health
Aspera Corp	2008	Ultraminiaturized point of care diagnostics
Immunobiotics, Inc.	2008	Vaccine technologies
Visual Medical Solutions	2007	Virtual Reality Software
Spectral Energies	2007	Laser instrumentation
PK Biosciences Corp	2007	Diagnostics and therapeutics for neurodegenerative and other disorders
Photon Energy Technology, Inc.	2007	Nanotube-based devices
LuCella Biosciences	2007	Technologies and applications of synthetic carbohydrates
IPAT, Inc.	2007	Production of atomizer for titanium
SafeSoy Biodiesel	2006	Biodiesel production
Starch Design, Inc	2006	New types of starches from corn
Mell O3Z	2006	Ozonation and granular activated carbon adsorption to remove volatile organic impurities
Advanced Genome Technologies Inc	2006	Modification of plant and fungal genomes
Magnet Array Co.	2006	Oil filters
Endometrics, Inc.	2006	Medical software
Sirrah, LLC	2005	Vaccines for swine
Noise & Vibration Technologies, Inc.	2005	Noise and vibration product development
MTEC Bioanalytics	2005	Imaging for specialty grains
Catilin, Inc.	2004	Catalysts for biodiesel production
NERP Technologies, Inc.	2004	Protein systems in plants
Mobiliscript	2004	Growth enhancement in plants
ZProMinGene, Inc.	2004	Diagnostic reagent kits
G-Rad Systems, Inc.	2004	Civil/construction engineering data acquisition software
Actus Potentia, Inc.	2004	Software for manufacturing processes
Infiscape Corporation	2004	High-end graphics software
Riboassembly, Inc.	2004	Protein production
CMnet Inc.	2004	CAD data search engine
Vibroacoustics Solutions Inc.	2003	Active noise control
Integrated Sensor Technologies	2003	Optical sensors
DAF Enterprises	2002	Data filtering and padding
Osteoceramics, Inc.	2002	Animal orthopedics
International Cooperation Analysis & Planning	2002	Algorithms for mining databases
Glass House Studio	2001	Visualization and simulation techniques
Advanced Structural Imaging	2001	Computer aided tap testing
Walters and Associates	2001	Live animal fat prediction software
Ensoft, Corp.	2000	Software reengineering
NewLink Genetics Corp.	2000	Genomics and therapeutic products
MultiSep, Inc.	2000	Electrophoretic instrumentation technology
Nitro Cream, Inc.	2000	Ice cream processing system
Novascan, Inc.	2000	Instrumentation for atomic force microscopy
Phytodyne Incorporated	1999	Plant transformation technologies
Technology Labs, Inc.	1999	Assessing computer performance
MASIM, Inc.	1999	Process for joining ceramics (closed in 2002)
IA-TEK	1999	Process for analyzing seeds (closed in 2000)

Biotronics	1999	Ultrasound techniques for food animals
Innovative Materials Testing Technologies	1999	Advanced nondestruction evaluation techniques
Modelspace Corporation	1998	CAD System for turbomachinery
MSTRS Technologies	1998	Metered semiochemical timed-release systems
NDE Technologies, Inc.	1998	X-ray simulation code
epmt, inc.	1998	auction market simulators
Carbon Energy Technology (CETECH)	1997	Biomass gasification technology
MechDyne Corporation	1997	Haptic feedback devices
Advanced Analytical Technology, Inc.	1997	Applications of microanalytical instrumentation
Engineering Analysis, Inc.	1997	Computational fluid dynamics
Applied Academics	1997	Interactive veterinary training
Delta Tie	1997	Engineered structures
Accumen	1997	Data storage
Engineering Manufacturing, Inc.	1997	Powdered metals
Vista R & D	1997	Video hardware, software
X-L Space Systems	1997	Rocket fuel processing
Environmental Odor Control	1997	Hog waste treatment technology (closed in 2000)
Mid-Continent Instruments	1996	Instrumentation control technology (closed in 1999)
Anaerobic Biosystems Corporation	1996	Anaerobic technologies (closed in 2002)
ESGA, Inc.	1996	Computer-based patient medical records system (closed in 1997)
Palisade Systems, Inc. (formerly MidAmerica Networking, Inc.)	1996	Computer network products
NewMonics, Inc.	1996	Real-time Java software and computer memory management systems
Amtak, Inc.	1995	Nondestructive evaluation instrumentation (closed in 2000)
Pefftronics	1995	Audio processing
Intellignostics, Inc.	1995	Biomedical sensors
Bioforce Laboratory	1994	Atomic force microscopy (probes)
8VA Corporation	1994	Thermal management components
Intellitech Inc.	1994	Software for nondestructive evaluation (closed)
MOLECULAR EXPRESS Incorporated	1994	Research and testing of laboratory products
RESIFT, Inc.	1994	Ultra-high sensitivity in microsequencing small proteins and peptides (closed)
Arete Software Company	1993	Software for manufacturing processes (closed in 1995)
Pioneer Precision Coatings Inc.	1993	Hard coating surfaces (closed in 1994)
Potter Solar Services	1993	Electric Motors
Veterinary Resources, Inc.	1993	Testing new animal health products
Calfscale Company	1993	Livestock specialties
Adaptivation, Inc.	1992	Adaptive medical devices
Larock Organics	1992	Organic forms of palladium
PROTOTYPE Engineering	1992	Sensors for pilots (closed in 1995)
CETAC Technologies	1991	Analytical instruments
Full Spectrum	1991	Laser fiber optics
Ames Specialty Metals	1990	Permanent magnet materials (closed in 1993)
Edge Materials, Inc.	1990	Nondestructive evaluation (closed in 1991)
Engineering Animation, Inc.	1990	Scientific computer visualization
Metabolic Technologies, Inc.	1990	Natural biological compounds
Cimtechnologies	1988	Computer implemented manufacturing
Iowa Thin Film Technologies, Inc.	1988	Thin film solar cells
Edge Technologies, Inc.	1987	Evaluates technologies for commercialization
Etrema Products, Inc.	1987	TERFENOL-D
Heartland Software	1986	Computer graphics software
MTEC Photoacoustics, Inc.	1984	Photoacoustic cells

Count = 96 (as of 9/1/08)



# Business Development and Entrepreneurship

## New Company Highlights in the ISU Research Park

New companies this past fiscal year include:

**AimsBio, Inc.** is a bioanalytics service provider and biotechnology company currently focusing on developing next-generation high-throughput bioanalytics to aid the plant breeding, plant biotechnology, ethanol production, and feed and food production markets. The company currently offers a range of high-throughput bioanalytics services that includes a mycotoxin analysis service, fatty acid analysis service, and a high-throughput nutritional analytics service for developing novel crop lines and analyzing biofuel co-products. The main focus is toward high-throughput capabilities and rapid bioanalytics that helps our customers analyze large numbers of samples in a cost-effective and efficient process. The company is also developing a broad range of innovative high-throughput analytics for a variety of crops, seeds, foods, and ethanol production co-products. This company was started as the result of a new postdoc entrepreneurial program developed by the ISU Research Park and the Pappajohn Center.

**Catilin, Inc.** is a nanotechnology-based company that is revolutionizing how biodiesel is produced. Catilin's patent pending technology is centered on a family of solid heterogeneous catalysts. The solid catalyst can be reused several times with no loss of activity and works with virtually every biodiesel feedstock source. Neutralization and washing steps necessary in the traditional process can be eliminated with Catilin's revolutionary technology, making the process both economically and environmentally more desirable, while producing a more pure biodiesel and glycerol side-product.

**Cellencor Corporation** is a new company whose mission is to reshape the economics of the global renewable energy industry. Transformative technology will be offered to ethanol and other cellulosic energy providers that will enhance the value of ethanol production co-products, significantly reduce process energy consumption and dramatically reduce an ethanol plant's carbon footprint. The initial focus will be working with corn-based ethanol producers; however, the processes and technologies can be

effectively used with other biomass feedstock. Cellencor Corporation will also partner with key suppliers to the renewable energy industry in order to offer complete solutions that make economic, scientific and environmental sense.

**Farmers Cooperative Company (FC)** has corporate headquarters in Ames, Iowa, and is the largest farmer-owned local agriculture cooperative in Iowa. FC serves over 5,800 members throughout their trade territory of over 1,400,000 acres. Members are served from 48 locations by a 400-employee team. Currently 40 employees are located in the Ames office.

**Global Consulting, Inc.** is a consulting firm that has been providing construction inspection, industrial hygiene, environmental engineering, construction and engineering administration services since 1994. Global Consulting, Inc. has been awarded a contract by the Federal Highway Administration, Office of Pavement Technology, to provide technical support for the FHWA's mobile concrete laboratory. This work deals with equipment operation, material testing, data acquisition, data analysis, and training highway and industry personnel in the activities related to concrete durability, construction-related issues, nondestructive testing and the implementation of the new mechanistic-empirical pavement design guide.

**Kung Pow Studios** is a growing Iowa-based technology consultancy and graphic design studio with its home office in the CyberInnovation Institute at the Iowa State University Research Park. Kung Pow Studios has been in business since 2005 under its previous name of Conure Limited Company. Kung Pow Studios works with clients in several states and across many different industries providing custom 3D graphics, Flash and web development, user-interface design, and graphic design solutions.

**PK Biosciences Corporation**, founded by Anumantha Kanthasamy, professor of biomedical sciences, focuses on providing research and diagnostic tools for drug discovery and therapeutic development for treatment of neurological and neurodegenerative diseases. Its technology tools specifically target cell signaling molecules involved in apoptotic cell death.

**Plasmer Seeds, LLC** was founded in 2008 in Iowa. This new company's invention will be incorporated around concepts developed and to be demonstrated at Iowa State University. Plasmer Seed technology focuses on products using cold plasma technology to improve the performance of seeds.

## Pappajohn Center for Entrepreneurship/ ISU Small Business Development Center

### Business Assistance

In the past year, the Iowa State Pappajohn Center/SBDC has:

- Provided 5,157 hours of consulting assistance to start-up and existing companies
- Served 134 clients with one-on-one counseling
- Educated more than 400 attendees through workshops
- Provided advice to several hundred clients via telephone and email
- Advised 50 technology companies in the areas of licensing, equity-based financing, business development and numerous operational areas.

In the past year, the Center has helped 16 clients attract more than \$4 million in state and federal research funds and private equity investments. For the second consecutive year, Center clients achieved the top two rankings in the John Pappajohn Iowa Business Plan Competition, earning \$40,000 in prize money. In the 2008 competition, which is currently in the final phases of judging, six of the finalists are clients of the Center.

### Education and Experiential Learning

The **undergraduate minor in Entrepreneurial Studies** has been reviewed by a committee of associate deans and faculty representing every college and is being re-launched in the fall of 2008. Some courses have been retired from the minor, and newly-developed, college-specific entrepreneurship courses have replaced them. An experiential learning component has been incorporated into the curriculum requirements, encouraging every student completing the minor to participate in hands-on learning.

A **faculty retreat** was conducted in the spring of 2008 that focused on entrepreneurial teaching at Iowa State. Faculty who have developed coursework in entrepreneurship were showcased to an audience of over 50 faculty and staff. The group held a series of planning sessions to share best practices and develop a plan for moving forward with the campus-wide initiative to embed entrepreneurship into the curriculum in each of the colleges.

### The Entrepreneurship & Innovation Learning

**Community** began its fifth year in the fall of 2008. Thirty students with varying majors live together in this residential community focused on learning and practicing entrepreneurship and innovation. In the spring of 2007, the students opened their own espresso café, The Barista Café. The students are the sole shareholders of the café and handle all aspects of operations.

The third **Okoboji Entrepreneurship Institute** included eight Iowa State students who spent a week participating as delegates at a premier learning opportunity. The students

spent a week immersed in entrepreneurship training and networking. The Iowa State students worked in teams with students from the University of Iowa, the University of Northern Iowa, Buena Vista, and Iowa Lakes Community College.

**Internship and work experiences** for students are offered on a year-round basis to companies located in the ISU Research Park. All majors and classifications are invited to apply for opportunities to work with start-up and new companies based on technologies developed at Iowa State. More than 30 students are employed each year through the Pappajohn Center's formal entrepreneur internship training program.



### Statewide Venture Capital and Entrepreneur Conference

The Pappajohn Center has continued to partner with the Iowa Department of Economic Development and the four other Pappajohn Centers in the state to offer an annual fall conference targeted at entrepreneurs and investors. The conference is held annually in October in Des Moines, drawing 300-400 participants each year.

### ISU Pappajohn Center / ISU SBDC Assists with Partnership Dissolution

A client company faced a disagreement among its principles which put the company on a trajectory for dissolution. The Center played an intermediary role between the parties that created a dissolution framework, which once construed, was then ready for attorney review. Had the work involved in reaching the dissolution framework been pursued through traditional means, the cost for each party would likely have exceeded \$25,000.

## **ISU Pappajohn Center / ISU SBDC Helped Companies Access Capital**

Five client companies prepared business plans with the Center's assistance, resulting in \$500,000 of seed-stage financing from the Wellmark Venture Fund. Other clients have combined to raise more than \$4 million in early stage equity investments. Ten client companies have raised in excess of \$2,000,000 in financing from state economic development programs including the Grow Iowa Values Fund and the Iowa Demonstration Fund. In all of these cases, the Center has played a significant role in market analysis, business plan development, licensing, grant writing and the establishment of operations. Two companies which received considerable incubation assistance from the Center have grown their businesses and raised combined equity capital in excess of \$40 million, one in a public offering and the other in a large private placement.

**BioForce Nanosciences Holdings, Inc.**, is a bionanotechnology company founded in 1994 by Eric Henderson, a professor of genetics, development and cell biology. The company has raised over \$16 million in federal, institutional and private investor funding and created many high technology jobs at its Iowa location in the Aspen Business Park. BioForce sells a "disruptive technology" (Frost and Sullivan, 2008) embodied in the NanoNabler™ and CytoeNabler™ surface patterning systems. This technology is being used for research and product development in the areas of stem cells, neuro-regeneration, tissue engineering and biosensing. BioForce has its own patents and patent licenses with Iowa State, exemplifying the type of synergistic relationship that can be forged between the University and industry in an entrepreneurial and achievement driven environment.



## **Statistics Makes Hy-Vee Significantly Better**

Hy-Vee and the Iowa State Department of Statistics have embarked on several projects together that introduced new statistical technology that will help Hy-Vee, an Iowa-based company, better compete with national retailers such as Wal-Mart. Hy-Vee is satisfied with their turn forecasting, but believes that the ad forecasting could be improved. Assistant professor Petrutza Caragea and graduate students Ling Huang and Brian Weaver developed a model that predicts

the correct inventory that Hy-Vee will implement into their Computer Assisted Reordering System to provide more accurate ad forecasting, and as a side effect, another option for their system to consider when forecasting turn stock for individual items.

## **Continuous Improvement Adds to the Bottom Line**

Stellar Industries, Inc., Garner, Iowa, had a pressing issue regarding plant layout and space. Founded in 1990, the family-owned company, which manufactures hydraulic-truck-mounted equipment, including tire and mechanic-service-truck packages, appeared to have outgrown its space. CIRAS was called in and discussed theory of constraints (TOC) principles with the Stellar team and developed a five-phase project to improve their bottom line. The company decided to involve their people, giving many of the 250 employees the opportunity to learn about the philosophy of continuous improvement, offer their insights on the manufacturing process and contribute to the implementation. Stellar has seen outstanding results from the TOC assistance from CIRAS staff Mike Willett and Jeff Mohr. Throughput increased, allowing for a \$4.5 million increase in sales without hiring additional staff or adding capital equipment and facilities. In addition, the company believes they retained \$2.1 million in sales that they were at risk of losing had they not been able to increase production.

## **Monks Learn to Be Lean**

Managers at Trappist Caskets in Peosta sought assistance in solving inefficiencies in their manufacturing process, leading to a partnership among the Center for Industrial Research and Service, the Iowa Department of Natural Resources, Northeast Iowa Community College and the Natural Resources Research Institute, to form the Iowa Wood Lean Partnership and the creation of a lean applications program designed specifically for small wood processors of 30 employees or less. Trappist Caskets improved their efficiency and received help setting up a new facility. They were the only made-to-stock company in the partnership; the rest were made-to-order companies. Trappist also had an atypical work force—half were New Melleray Abbey monks. Through the partnership, they established standardized training in workstation areas and focused on flow, safety and cost of goods. After the lean management trainings, Trappist gained a better understanding of lean practices from CIRAS project managers Verl Anders and Jeff Mohr. As a result of this project, the company estimates a 20 percent increase in sales and a three percent gain in sales retention.

## **Assistance Leads to Increased Business**

ESCP Corporation is a Davenport manufacturer/metal fabricator that supports local OEM's in the automotive, military, agriculture and construction industries. CIRAS procurement technical assistance program manager, Dave

Bogaczyk, and procurement staff have provided a full range of procurement and technical assistance solutions for ESCP throughout 2007 and 2008, designed to increase their business in the government marketplace. ESCP received assistance with government bid preparation, Department of Defense packaging requirements, first article product testing, Wide Area Workflow accounting system requirements and information on how to obtain a security clearance. ESCP personnel have also taken advantage of CIRAS procurement assistance events that allowed this company to directly market to government purchasing departments, including the Rock Island Arsenal. This preparation and networking aided ESCP to bid and secure government contracts totaling \$852,386 over the last year. The Department of Defense estimates that 13 jobs were created or retained as a result of these contracts.



**C**ompanies who have benefitted from the Center for Industrial Research and Service's technical assistance, education or research have reported **4,826 jobs added or retained** over the past three years.

### Multi-Million Dollar Project

Maple River Energy, LLC, is in the process of building a three million bushel soybean crush plant and a five million gallon biodiesel production facility in Galva, Iowa. The project was made possible by obtaining a USDA Section 9006 loan guarantee, which resulted from the completion of a technical report based on ten required areas. As a result of the report, prepared by CIRAS project manager Rudy Pruszko, the company received a \$10 million loan guarantee for the project from USDA. Maple River Energy, LLC, anticipates \$30,000,000 in sales, 15 new employees and an increase in investment of \$15,000,000. The crush plant is scheduled to be in production by the end of 2008, and the biodiesel plant should be in production in the first quarter of 2009.

### Plant Layout Improvement

Geater Machining and Manufacturing Company turned to CIRAS when it sought to create a new layout for its machining department. The company, located in Independence, Iowa, has worked with CIRAS over the

years on numerous other layout projects. Machining is a key operation for Geater, which also performs finishing, sheet metal fabrication, assembly and secondary operations for aerospace, electronics and other high-tech companies across the country. CIRAS worked with Geater staff to implement the process of ongoing improvement, and Geater staff attended a CIRAS workshop on theory of constraints. CIRAS project manager, Mike Willett, not only provided the guidance but helped them implement the changes. A new plant layout plan for the manufacturing department was incorporated, and as a result, Geater's sales rose by \$1.5 million and they saw a cost savings of \$300,000. The capacity of the plant expanded by more than 10 percent.

### Overcoming Adversity to Help the Disabled

After losing her corporate IT job at age 35, a Central Iowa woman started a company to accommodate her own disabilities and create jobs for other qualified people with disabilities. The Mid Iowa SBDC used a "wizard council" of professional counselors and a comprehensive growth acceleration process to help the client grow her innovative company. This process included financial assistance, strategic growth assistance and accounting assistance. This virtual company is an SBA-certified 8(a) woman-owned firm that is a leading provider of compliance IT accessibility testing and repair solutions for federal agencies and government contractors who must comply with the Rehabilitation Act of 2001. It employs 21 people, half of whom are disabled. The company's unique structure and organization allows its highly-trained, well-paid employees to work from home, doing work for which they are uniquely qualified, many because of their disabilities. The company's revenue potential for 2008 under its new contract is projected to triple and continue its growth pattern.

### New Soybean Crushing Facility in Iowa

Larry Johnson and Charles Hurburgh, of the Center for Crops Utilization Research, and Departments of Food Science and Human Nutrition, and Agricultural and Biosystems Engineering, provided assistance to SafeSoy Technologies of Ellsworth, Iowa, to commence operations of a new soybean crushing facility. Already a collaborator to both researchers on Grow Iowa Values Fund and IPRT projects, SafeSoy employs new gas-supported screw pressing technology requiring less heat than standard methods to press oil from soybeans. This improves oil quality and makes meal uniquely suitable for food protein ingredients. Johnson confirmed this suitability plus that of new fractionated soy protein products with enhanced functional and health benefits using a process for which Iowa State has filed a patent disclosure. Johnson and Hurburgh's analytical support for oil and meal quality enabled the plant's timely start-up and met customer quality demands.

## Thickener Improves Feeding Safety


Woodward Resource Center in Woodward, Iowa, treats many patients with dysphagia—a condition where people have difficulty in swallowing. Adding some thickener to the food or liquid commonly available in food stores is one way to help these individuals. The thickener must increase the viscosity for safer swallowing and prevent fluid aspiration. However, some products do not measure at the viscosity level claimed. Using a Rapid Visco Analyzer instrument, Pamela White, professor of food science and human nutrition, and ISU food science student Shirley Witarsa worked to formulate standard quantities of a purchased thickener, Simply Thick gel thickener, to mix with various liquids including water, juices and milk, to obtain a “nectar” thickness and to provide a matrix for Woodward Resource Center to use.

## Partnerships Enhance Results

NFI Iowa, a partnership between Northern Iowa Grain Processing of Riceville and Nutr-e Food Innovation of Collierville, Tennessee, contacted CIRAS regarding commercialization of a process for agricultural products. CIRAS directed NFI to the Center for Crops Utilization Research (CCUR) for assistance with commercialization. CCUR conducted a proprietary trial in the West Processing Pilot Plant for NFI Iowa. NFI Iowa is currently building a 6,300 square foot facility in Osage that will take grain and apply a patented process from Nutr-e to provide new ingredients similar to soy protein. Nutr-e’s process provides nutritional product manufacturers with a way to create and market innovative products that are unique and nutritionally superior. The results of the trial allowed NFI Iowa to adjust their process further. The Osage City Council and Osage Development Corporation provided incentives for the new facility that is expected to provide eight new jobs in Osage.

## Big Impact on Animal Agriculture

Iowa animal agriculture receipts are approximately \$8 billion annually. Increasing production or decreasing mortality by 1% has at least an \$80 million impact. Infectious diseases and toxicoses cause major losses to the livestock industry. Iowa livestock producers and veterinarians submitted 48,000 cases in 2007 to the Iowa State University Veterinary Diagnostic Laboratory (ISU VDL) for diagnosis of the cause of death or sickness. The ISU VDL faculty and staff are focused on using the latest molecular and bioanalytical technologies to get accurate and timely diagnoses for these producers to minimize economic losses. Results are typically delivered to the referring veterinarian and producers within 1–3 days. Expertise is also available in the VDL to provide information on best practices for treatment, control and prevention of disease or production problems.



**A**s a result of the State of Iowa Grow Iowa Values Fund program, Iowa State administers research competitions that pair ISU faculty members with Iowa industries. Seven companies that participated in Iowa State projects completed in 2007 reported **42 jobs created or retained and \$5.3 million in sales impact.**

## Biodiesel Co-product for Swine and Poultry

The major ingredient of swine and poultry feed is corn. As corn prices increase, producers search for alternative feed sources. Crude glycerin, a co-product of biodiesel production, has been evaluated as a livestock energy feedstuff for swine and poultry in a collaborative project involving Mark Honeyman, professor of animal science, and USDA Agricultural Research Service researchers. Working with a biodiesel plant in Sergeant Bluff, Iowa, researchers conducted metabolism trials with growing pigs and laying hens at Iowa State and with broilers in Mississippi. The project showed crude glycerin has a feeding energy value similar to corn. Crude glycerin is usually a liquid. The scientists found it can be added to dry swine diets up to a 10 percent level without problems of feed flow and with no impact on pig performance, meat quality or carcass composition. The researchers continue to work with various sources of crude glycerin to further establish it as a viable energy source for swine and poultry.

## A Boost to Animal Health Care Products

Iowa State scientists have been helping Van Beek Natural Science, LLC, in Orange City, enhance production of natural livestock and companion animal healthcare products. Research led by Byron Brehm-Stecher, assistant professor in food science and human nutrition, focused on boosting the primary essential oil in a line of products as part of its active compound, while studying other essential oils that would be more effective against specific strains of bacteria. The project also combined a natural enhancer to the compounds to further improve effectiveness. The end goal is that less of the compound needs to be used, thereby reducing the cost to food producers.

## Quick Action Solves Quality Challenge

Sauer-Danfoss is a worldwide leader in the design, manufacture and sale of engineered hydraulic, electric and electronic systems and components. Its Ames, Iowa, plant turned to IPRT Company Assistance when it needed fast help with a quality issue in a product being made for a key customer. Sauer was machining parts using castings from an outside supplier. Some of the castings had flaws that weren't externally visible, so the company needed a way to separate good castings from bad. Rick Lopez of the IPRT Company Assistance nondestructive evaluation group and Dan Barnard from IPRT's Center for Nondestructive Evaluation quickly developed a manual ultrasonic inspection technique to do the sorting. The accuracy of the nondestructive evaluation was confirmed by destructive testing. The technique was used to sort castings before machining and to evaluate products awaiting shipping. Jake Auliff from Sauer-Danfoss, cites the work of Lopez and Barnard. "Due to their help, Sauer-Danfoss was able to keep a very key customer's production line running smoothly and on-time," he says. "The NDE test plan that followed resulted in not only reduced labor costs associated with the disassembly of suspect units, but helped us to maintain a positive quality image in the eyes of our customers."



Product sales from Iowa State technologies licensed to Iowa companies reached a new record of **\$167 million** over the past two years.

## Natural Solution Launches Pet Product

Green Products Co., a manufacturer of corn cob products in Conrad, Iowa, was facing a dilemma. Their natural pet bedding product was losing market share due to microorganisms in the bedding. In an effort to gain back the lost sales, Green Products President Matt Schryver approached IPRT Company Assistance. Two separate projects resulted from that initial meeting. The first project, with Aubrey Mendonca, professor in food science and human nutrition, developed a natural way to treat the bedding to kill almost all of the microorganisms. The second, with Gary Osweiler, professor in veterinary diagnostic and production animal medicine, tested animal reaction to the new bedding with rats, mice, hamsters and finches. Technology commercialization associates with IPRT Company Assistance not only introduced Schryver to the faculty members, but also awarded cost-sharing funds

to help pay for both projects. Project results helped Green Products Co. stay competitive in the pet bedding market. The company's new, natural, low microbial product began production in August 2007. It now has six products in Petco and four in Petsmart, two of the most visible pet retailers in the U.S. The company's current efforts focus on utilizing the low microbial characteristic of the new bedding to expand into the laboratory bedding market.

## Test Chamber Recreates Harsh Conditions

When Softronics Ltd. of Cedar Rapids was asked by NASA to develop a radio transmitter that could operate in the harsh environment of the surface of Venus, they believed they could do it. However, there was no way to test the transmitter's functionality since no Venus test chamber existed. As an affiliate of the Iowa Space Grant Consortium (ISGC), Softronics sought assistance in converting an outdated pressure vessel they owned into such a chamber. Working with ISGC and aerospace engineering faculty member William Byrd, the result was a functioning test chamber that is one of a kind in the world.

## Partnership Clears the Air

When Pickwick Manufacturing Services in Cedar Rapids sought to improve the air quality of its 100,000 square foot facility, it contacted the Center for Industrial Research and Service (CIRAS) to ask for assistance. CIRAS used the Manufacturing Extension Partnership to contact the ISU Industrial Assessment Center (IAC), which specializes in providing energy assessments for medium to small manufacturers. The IAC performed the assessment and provided an audit report indicating that both the air quality and heating efficiency could be improved. With the feedback, Pickwick Manufacturing worked with HVAC contractors to replace the inefficient exhaust systems with heat exchanging air make-up units. As a result, the air-quality environment for employees was significantly improved and the heating costs for the facility were reduced by more than \$30,000 per year.

## Industry Best Practices Made Even Better

The management group of Clipper Turbine Works in Cedar Rapids established a goal of exceeding regulatory and industry best practices in safety health and environmental stewardship. A safety audit that resulted from the intervention of Iowa State partnerships will assist the company in achieving that goal. Experts from the Center for Industrial Research and Service and the Safety Training Instruction and Research Center, a partner of CIRAS through the Manufacturing Extension Partnership, visited Clipper Turbine Works to look at continuous improvement opportunities through lean manufacturing and occupational safety. A walk-through of the facility was conducted with Clipper managers of safety, operations and engineering to identify ways to improve efficiencies and workplace best practices.

## Class Project Brings Cost Savings

A partnership that the Center for Industrial Research and Service arranged between Snap-on Tools in Algona and an Iowa State University industrial engineering class resulted in cost savings for the manufacturer and brought real-world learning experiences to the students. Twenty-nine students from the Department of Industrial and Manufacturing Systems Engineering devoted their fall 2007 semester to problem solving for Snap-on. The class divided into seven groups based on needs defined by Snap-on, including setup and changeover time on a large stamping press, defects in the powder coat line, increasing the hanging of painted parts, evaluating products that require rework and examining the daily plant schedule. An example of recommendations made to the company by the students was the reduction in setup time on the largest metal sheet press from 45 minutes to 12 minutes.

## Developing Wind Blade by Blade

TPI, a manufacturer of composite products, began negotiating with the city of Newton on the possible placement of a factory to manufacture wind turbine blades. The Center for Industrial Research and Service and TPI developed a project to train the company on the use of static simulation tools and plant layout techniques. A short timeline provided an additional challenge. Through onsite training sessions, development and presentation of alternative layouts, factor evaluations on alternatives and a final flow analysis report, a final layout was selected and agreed upon. CIRAS is currently involved with TPI on additional projects as the company begins production in its new Newton facilities.

## Turning Waste into Clean and Green Energy

Research with a military application may also reduce the environmental impact of public landfills. Surya Mallapragada and Balaji Narasimhan, chemical and biological engineering professors and group leader and associate dean, respectively, in the Bioinspired Materials program at the U.S. Department of Energy's Ames Laboratory, have worked with two companies—Renewable Energy Group, an Ames company that produces soy diesel, and General Atomics of San Diego, California—to devise a method to dissolve waste plastic in biodiesel. The work, which has been supported by the U.S. military, capitalizes on the simple concept that many commodity plastics, like coffee cups and food packaging, dissolve in biodiesel, providing an instant source of energy at a military base and avoiding the problem of leaving garbage behind, which an enemy could use to determine the location and size of a unit. The research has enormous implications for civilian applications as well, as it may help us reduce the environmental impact that landfills have and provide us with a clean and green source of energy—dissolved waste plastic in biodiesel.

## Research Vineyards Bear Fruit

After years of careful planting, pruning, training and spraying, the Iowa State research grape vineyards bore fruit in 2007 and with it a lot of valuable information. Detailed records of growth, yield, injury, pests and grape characteristics are helping Iowa's rapidly growing grape and wine industry identify the best grape varieties to plant. The vineyards planted in 2002 and 2003 are located at four ISU research farms—the Horticultural Research Station near Ames, Armstrong Research and Demonstration Farm near Lewis, Northeast Research and Demonstration Farm near Nashua and Southeast Research and Demonstration Farm near Crawfordsville. The vineyards are a mixture of dozens of grape varieties or cultivars planted to test the grape's adaptation to Iowa's climate and soils. The vineyards are the result of cooperation with the Iowa Department of Agriculture and Land Stewardship, the Iowa Grape and Wine Development Commission, the Iowa Wine Growers Association and ISU's Leopold Center for Sustainable Agriculture.



Over the past three years, companies who have been assisted by the Center for Industrial Research and Service and its campus and external partners have reported over **\$480 million** in new investments, cost savings, and increased or retained sales.

## Siting Swine Facilities to Minimize Odor

Research led by Steve Hoff, professor of agricultural and biosystems engineering, has resulted in a Community Assessment Model (CAM) that assists and educates swine producers in the proper siting of new facilities in order to foster strong community relations and avoid potential odor nuisance situations. CAM helps producers site new facilities to account for size, local wind incidents, the presence of other livestock in the neighborhood and actual neighbor location. Swine producers receive an initial screening and educational information on working with neighbors. If a siting model run is deemed necessary, information is gathered, the model is run and the results are presented to the swine producer. During FY07 and FY08, CAM

runs were performed for 59 producers representing a total investment of \$44.2 million. The model influenced the placement of these investments, minimizing the potential for legal action by disgruntled neighbors.

### **Running with Deere & Company**

IPRT's Virtual Reality Applications Center (VRAC) continues its unique partnership with Deere & Company, one of the world's leading manufacturers of agricultural, forestry, construction and turf-care equipment. The partnership includes multiple projects funded on three-year cycles. The projects are led by faculty members in collaboration with Deere engineers and scientists and staffed by graduate and undergraduate researchers. The projects explore ways that emerging interface technologies can be used in exciting and productive ways to simulate vehicle operations, evaluate human factors and ergonomics and analyze complex engineering data. They also build capabilities in a range of product and manufacturing process development and business applications. VRAC and Deere are also working with other scientists from Iowa State University and IPRT's Center for Nondestructive Evaluation to develop methods to better predict fatigue life of mechanical parts.

### **Eat Your Fiber**

A human study of dietary fiber was completed in December 2007 for an Iowa company. Over three 14-day periods, subjects in random order ate a high fiber breakfast bar containing wheat bran or the test fiber, or a control low fiber bar. Suzanne Hendrich, professor of food science and human nutrition and research staff found the fecal weight change per gram of dietary fiber added was similar between the test fiber and wheat bran. Dietary fiber intakes were significantly increased by the addition of high fiber breakfast bars to daily diets, with no adverse effects on gastrointestinal function. There was little effect of the fiber source on blood glucose, but they may exert other diabetes preventive effects. The new dietary fiber, functioning similar to wheat bran, may open new product markets given the increasing public awareness of the need to eat more dietary fiber, and the need to make new, tasty food products containing more fiber. This project was supported by the Grow Iowa Values Fund program.

### **A "Green" Candle**

Partially hydrogenated vegetable oil (PHVO) has recently been used to make vegetable oil-based candles. However, its use is limited primarily to container candles because of its inherent physical properties, such as brittleness when hard and greasiness when it is soft, lacking the desired cohesiveness and elasticity of inexpensive commercial petroleum paraffin and expensive beeswax. To improve the cohesiveness and thermal properties of PHVO, Tong Wang, associate professor of food science and human nutrition, and partners chemically modified the fatty acyl

chain of PHVO through a series of reactions, a cost effective modification. These newly synthesized derivatives or waxes were found to significantly improve the cohesiveness and melting range of PHVO, thus promising a possible replacement of petroleum wax and the traditional tallow wax because of its more desirable environmental and combustion properties. The new materials with increased cohesiveness are also expected to replace paraffin in other applications, such as coating waxes and in encaustic painting.



### **Soy Flour Hydrolysate for Wood Adhesives**

Doug Stokke and John Schmitz, Center for Crops Utilization Research and Departments of Natural Resources Ecology Management and Food Science and Human Nutrition respectively, plus Yilin Bian formerly of Center for Crops Utilization Research and Department of Food Science and Human Nutrition, worked with an enzyme production plant in Iowa to optimize enzyme-mediated soy flour processing for wood adhesive applications. A patent disclosure was filed for new soy protein adhesive technology, wherein multiple hydrolyzed soy flour products with different adhesive characteristics can be produced using company enzymes. This company developed proprietary adhesive formulations of protein hydrolysates that contain fewer harmful chemicals than traditional adhesives that meet increasingly restrictive air quality standards.

### **Healthy New Starch Processing Technology**

A new processing technology for making a high-amylose cornstarch that breaks down more slowly in the digestive tract has been developed by Jay-lin Jane, professor of food science and human nutrition and graduate student, Jovin Hasjim. This chemically produced cornstarch is more resistant to breakdown, it moderates sugar release in the digestive tract, offering potential health benefits for colon cancer, diabetes and obesity intervention. Suzanne Hendrich, professor of food science and human nutrition, conducted human feeding studies, discovering more than 50% reductions in blood glucose content and insulin levels compared with individuals fed a white bread control. A colon-cancer-prevention study on rats by Diane Birt, professor of food science and human nutrition, revealed a reduced number of precancerous gut lesions in the animal system.

## New Vaccines for Pigs

Pat Halbur and Tanja Opriessing in the Department of Veterinary Diagnostic and Production Animal Medicine were part of an inter-institutional and multidisciplinary team with researchers at Virginia Polytechnic Institute and State University and scientists at Fort Dodge Animal Health that launched the first fully licensed porcine circovirus type 2 vaccine in North America in April of 2007. Approximately 3-5 million doses per month of this product are being marketed to North American pork producers to protect pigs against a newly emerged disease known as porcine circovirus associated disease (PCVAD). PCVAD has quickly become a major global threat to the pork industry. PCV2 vaccines have markedly reduced mortality associated with PCVAD.

## On the Fast Track with Biodiesel Catalysts

Three Iowa State University proprietary biodiesel catalysts technologies developed by Victor S.-Y. Lin, director of IPRT's Center for Catalysis (CCAT), a professor of chemistry at Iowa State and program director for Chemical and Biological Sciences at the U.S. Department of Energy's Ames Laboratory, have been successfully transferred to an Iowa-based start-up company, Catilin, Inc. These unique recyclable solid catalysts allowed Catilin to attract a \$3 million investment from a California-based venture capital firm, Mohr Davidow Ventures. Even though the company was just founded in May 2007, Catilin has already built a pilot plant for biodiesel production with one million gallon annual production capacity at the Biomass Energy Conversion (BECON) facility of the Iowa Energy Center in Nevada, Iowa, using the unique CCAT solid catalyst technologies. Currently, there are nine full-time employees in Catilin, including three of Lin's former graduate students and postdoctoral research associates. Several major news media, such as the New York Times, the Des Moines Register, the Ames Tribune, and other magazines, have covered the cutting-edge technologies of Catilin since 2007.

## Visualizing Medical Data

Researchers from IPRT's Virtual Reality Applications Center are developing technology that helps medical personnel easily visualize and interact with 3D images of patients' complex internal systems. Currently, most doctors use two-dimensional images to plan for surgeries. Using methods and tools created at VRAC, surgeons can view and interact with those data sets as 3D objects, promising to change the ways surgeons prepare for surgeries. With this technology, surgeons can look at internal organs or tumors as three-dimensional objects. While other software designed for this purpose is often complicated and difficult to use, VRAC's user interface applies principles in Human Computer Interaction to make intuitive interfaces, centered on users' needs. VRAC's researchers and graduate students are collaborating with pediatric surgeons from Blank Children's Hospital in Des Moines and Juntendo University School of

Medicine in Japan to make the technology accessible and usable to the medical community.

## Quality Control for Medical Procedures

Endometrics is a start-up company developing tools to analyze the quality of colonoscopy examinations. It was founded in 2006 by Johnny Wong and Wallapak Tavanapong, professors of computer science at Iowa State University; and Jung Hwan Oh, computer science and engineering professor at the University of North Texas in cooperation with Piet de Groen, a practicing physician at Mayo Clinic. The company is marketing an automated video capture system and a suite of software tools to analyze colonoscopy exam quality and facility/procedure efficiencies, generating automatic reports. The research innovation was recognized by the American College of Gastroenterology with its Governors Award for Excellence in Clinical Research. The project has received funding from ISU's Grow Iowa Values Fund program, the National Science Foundation and most recently an Iowa Department of Economic Development Demonstration Fund grant. IPRT Company Assistance's technology commercialization group also supported Endometrics with funds for beta test site equipment and early discussions with potential customers. The company is in the process of testing the software at the University of Iowa hospitals and at Mayo Clinic with several other companies expressing interest. A patent on the technology is pending.



## Ultra-hard Composites

In late 2007, New Tech Ceramics, Inc., opened a manufacturing facility in Boone to produce and sell an ultra-hard, wear-resistant material: AlMgB14 + TiB2 composite. This family of boride composites, co-invented by U.S. Department of Energy Ames Laboratory scientists Bruce Cook and Alan Russell, who is also a professor of materials science and engineering, has been licensed to New Tech Ceramics. The extraordinarily wear-resistant composite is expected to be used in pump seals, abrasive jet cutting tools, dies and other applications where resistance to wear is crucial.

## **Innovative Software Grows Iowa's Economy**

Suraj Kothari, professor of electrical & computer engineering, founded EnSoft Corp., which has made great strides over the last year. Utilizing funds from the Grow Iowa Values Fund monies administered by Iowa State, EnSoft Corp. has developed Knowledge Centric Software technology that can be used in the automotive, avionic and software industries to analyze and transform software efficiently and quickly. This year, EnSoft Corp. has been awarded the Prometheus Award from the Technology Association of Iowa as the Innovator of the Year. The award recognized the outstanding contributions Iowa information technology companies have made to the industry, community and state. Earlier in the year, EnSoft Corp. received the \$25,000 top prize at the John Pappajohn Center for Entrepreneurship's Iowa Business Plan Competition. Many companies are showing interest in the software tools developed by EnSoft. Companies with Iowa interests such as Rockwell Collins, Siemens and Caterpillar have purchased the software product.

## **Novel Diagnostic Assay for Johne's Disease**

Jesse Hostetter and Doug Jones, faculty members in veterinary pathology, are developing a novel diagnostic assay for Johne's disease in cattle. The goal of this assay is to detect early (stage I) animals that do not display symptoms. This diagnostic tool is an advance on the current skin test, but rather than measure the swelling size at the injection site, inflammatory cells and mediators are collected and measured. These parameters give a profile that is very accurate in identifying infected animals. Studies completed demonstrate that this methodology is very promising and could be a useful tool to the Iowa livestock industry. This work has led to one patent application and is funded through ISURE, the Iowa Veterinary Medical Association and the Iowa Livestock Health Advisory Council.

## **ISU Team Competes in Solar Decathlon**

Iowa State University was accepted as one of only 20 teams into the U.S. Department of Energy's Solar Decathlon competition for 2009. IPRT's Center for Building Energy Research built a team of faculty and students from 11 departments in five colleges. It is the first team from the State of Iowa to participate. The team's "Interlock House" will be designed as a free-standing, solar-powered dwelling that will generate enough energy for its needs and direct any surplus to the grid or a companion house nearby. The design incorporates a balance of three primary system features: the photovoltaic array to produce electricity; the structure's envelope and thermal mass to capture and store energy; and water-based radiant heat and cooling vents to balance overall energy flows. Key among the House's innovative material features are building components with recycled and recyclable materials such as agricultural waste (biocomposites) and a water system that minimizes reliance on offsite infrastructure such as storm water drainage

systems. The Interlock House is a great opportunity for Iowa State and for Iowa and Midwestern companies and manufacturers to showcase their new sustainable materials, assemblies and components for which collaborations are currently sought and already under development.

## **Student Business Plan Competition**

Two graduate students and a faculty member competed in the annual John Pappajohn New Venture Business Plan Competition in the spring and received a \$5,000 top award. Joel Rieken, Andy Heidloff and faculty member Iver Anderson presented their business concept for Iowa Powder Atomization Technologies.



## **Community Housing Agency Company**

Denison needed to develop a local infrastructure to respond to housing issues. ISU Extension partnered with the City of Denison and the Region XII Council of Governments to help create the Denison Community Housing Agency. Region XII conducted a housing study to define the extent of the problem. ISUE then helped the new organization structure itself with Articles of Incorporation, By-Laws, Mission Statement, assistance in strategic planning and instruction in housing development basics. The project included several community coffees where citizens could learn more about the housing issues and provide input toward possible solutions. Partnering with the Crawford County Chamber and Development Corporation, two stakeholder meetings were held to enlist support, resulting in efforts to provide employee housing counseling to assist with relocation to the community, create an updated list of available units and homes for sale and rent and provide information to help employees access down payment assistance programs.

## **Design/Build Architecture Studio Project**

Through a partnership with the City of South Sioux City, Nebraska, and Lite-Forms, College of Design students learned to use a locally-produced construction product to build a four-person camping cabin in South Sioux's Scenic Park. The students participated in a Design/Build studio class held in spring 2008 at Design West, ISU College of Design's satellite studio space in Sioux City. The students designed, constructed and installed a pre-formed concrete camping cabin into place in South Sioux City's Scenic Park

along the Missouri River. The cabin features a prairie grass motif on the walls and clear plastic panels at the top. The front door lifts open like a hatchback with a patio area, fire pit and view of the river. Design West was created through a partnership of the Sioux City Great Places Committee, the Siouxland Chamber of Commerce, the ISU College of Design and ISU Extension Community Economic Development (CED).

### **Geospatial Technology**

ISU Extension CED developed an online geospatial survey to address transportation enhancement issues for communities participating in the Iowa's Living Roadways Community Visioning Program. Using the ISU Ortho Photo server and an interface with GoogleMaps, the survey allows respondents to draw on interactive maps the routes they take when commuting, biking, running and walking. Workshops were held in each community, where residents were invited to take the survey and see a presentation of the preliminary results using "live" data. The visioning communities received the final survey results to use during the goal setting process.

### **Bioeconomy in Greene County**

In response to the concerns raised by Greene County residents regarding the possible benefits and detriments of biofuels production, ISU Extension CED developed a pilot study to address what Greene County should do to minimize the negative and maximize the positive impacts of the bioeconomy on its territory. The pilot study employed Geographic Information Systems (GIS) technology to conduct a feedstocks potential assessment, a transportation infrastructure spatial analysis and a Web-based survey. Based on the results of the study, the researchers recommended a moratorium on new biorefinery construction, repair of some areas of the transportation infrastructure, a crop suitability analysis using GIS, an education program on conservation for residents, water quality analysis and policies supporting livestock expansion in Greene County. The complete results of the pilot study are published in "A Participatory Approach to Assess the Future of the Bioeconomy in Greene County: A Pilot Study for Iowa."

### **Technology to Develop Community Plan**

Mount Pleasant requested assistance from Iowa State's Institute for Design Research and Outreach (IDRO) Extension program to plan for the impact of a new bypass. The community also requested assistance with creating a new community graphic identity, redeveloping the town square and the surrounding area, and redesigning and updating the Old Threshers grounds. Mount Pleasant funded the \$50,000 project.

### **Medical Decision Aids**

Several faculty members from the Department of Art and Design, headed by Debra Satterfield, and IDRO are teaming

up with Mayo Clinic to study medical decision aids used with diabetes patients. It will examine how design variables such as color, typography, use of icons and organization of material influence the decision-making process of patients using the decision aids. This project is an offshoot of a paper presented in Hong Kong that examined how the physical space of ISU's Thielen Student Health Center impacted student experiences. Ways to improve health-related outcomes and communication that better target the emotional, social and behavioral needs of college students were examined in this research. Researchers from Mayo Clinic's Knowledge and Encounter Unit asked Satterfield to try this unique methodology to study the medical decision aids for diabetes patients. Because of the practicality and innovativeness of this research, it has received supplemental funding through the ISU Bailey Research Career Development Award for the amount of \$150,000.

### **Single Family, Green, Affordable Housing**

In spring 2008, an architecture studio taught by Nadia Anderson, architecture lecturer, worked on designing single-family housing in the Riverbend Neighborhood in Des Moines for the nonprofit Community Housing Development Corporation. The students explored how these designs can benefit the neighborhood identity through storm water management strategies and the study of social spaces in the area. Students continuing in the fall studio will have the opportunity to develop their projects in greater detail. The fall studio will work with a real client, budget, neighborhood and contractor. As part of the American Institute of Architects's (AIA) Practice Academy Pilot Program, this studio will also work with Des Moines firms that will conduct workshops on relevant areas of practice and will have interns working with the student teams. Groundbreaking for this house development is set for this fall 2008.

### **GIS Geospatial Technology Training Program**

College of Design has been offering Geographic Information System (GIS) workshops to professionals in/around Iowa who want to learn and relearn ArcGIS and its components. Courses ranged from basics of ArcGIS 9.x to advanced classes such as GPS, CommunityViz, Census, cartography and GIS for economic and community developments. Classes range from 1 to 2 days and participants can earn CEU credits if they wish. For FY08, it was attended by 21 different organizations.

### **New Homestead Care Center**

Meredith Janssen, Administrator of the New Homestead & Homestead Acres, contacted the College of Design PLaCE program in March 2007. This residential healthcare facility was in the process of constructing a new facility and contacted the Institute of Design Research and Outreach for assistance. Program Coordinator Susan Erickson contacted Heidi Hohmann, an associate professor of landscape

architecture. They offered special topics on therapeutic gardens, biophilia and elder populations. Students traveled to Guthrie Center to visit the facility and gather input from residents and staff about how they might use new outdoor spaces. Students provided preliminary concepts on two courtyards and an entry plaza. Janssen and other representatives attended final presentations of the students' work at ISU. Janssen remarked that she particularly liked how the students considered special needs of residents and their physical and mental abilities in their design work. In the future, Hohmann and Erickson are interested in studying how the courtyards are used by the residents, their families, and staff.

### **Landscape Architecture Outreach Project**

The community of Allison applied for project assistance to the College of Design's PLaCE Program. The community requested assistance in designing a natural play area as a portion of Wilder Park. The project was completed by second year landscape architecture students. Their professors, Peter Butler, Michael Martin and Mike Bell, worked to make this a "win-win" situation. The students won by having an engaging and fun project to work on, and the community won by receiving many innovative and unusual ideas for developing their park.

### **Creating Art and Rejuvenating Downtown**

Imagine Michelangelo's Sistine Chapel recreated with spray paint. After receiving help from the SBDC, a Northeast Iowa man spent 4 months wearing a ventilator and lying horizontally on scaffolding, using over 5,000 cans of spray paint to create this artwork. Doing so generated worldwide attention, which led to international visitors, appearances on national media across the United States, and helped the clients to realize their dream and open their restaurant/art studio. Along with gaining citizenship, learning a new language and adapting to new customs, the clients got a second mortgage on their home, invested their life savings, obtained a bank loan and an SBA 504 loan and financed the \$500,000 project. The UNI SBDC helped the clients craft their business plan, assisted with market research, helped obtain estimates, formulated projections and gave additional instruction via an SBDC business plan course. Opening in December 2006, the business has been drawing customers from around the world and is helping rejuvenate downtown Waterloo.

### **Love and the Entrepreneur**

An entrepreneurial Southwest Iowa couple who started out doing wedding photography fell in love with the entire wedding process and recognized a profitable trend across the United States—one-stop weddings held in beautiful, rural settings. With the help of the Iowa Western SBDC, the couple successfully opened a 14,000 square foot ballroom facility on 6 acres of land in the Loess Hills that accommodates up to 400 guests. They facilitate the entire

wedding process from the planning to the nuptials to the reception and soon—the honeymoon! The SBDC helped them put together five-year financial projections, write a business plan and present it successfully to area banks, obtaining \$670,000 in financing. The facility has hosted over 50 weddings and is filling up for 2009. Five to ten jobs were created and they are already adding new services, dance lessons and a bed and breakfast facility.

### **Training for Youth Facing Barriers**

Project Ready, an alternative high school in Scott County, has a mission to provide a quality alternative education by assisting students in earning high school diplomas, increasing student employability, and enhancing life skills to promote success beyond high school. To support this effort, Iowa State University Extension collaborated with Scott County Kids Decategorization to provide 21 hours of Workplace Essentials Soft Skills training to these students. Today's economy and business climate emphasize soft skills, but often present a challenge for this population. The common soft skills that employers seek in an employee are an absolute necessity for anyone entering the workplace, especially for individuals who have multiple barriers to employment. Of the ten students who completed this course, most were entering the workforce full time immediately upon completion of the program. According to post-program evaluation data, 100% of participants cited that Workplace Essentials helped them identify the steps in making good choices. 100% of the participants were able to list five things that will increase their success in the workplace. 100% of participants cited that Workplace Essentials will help them recognize and respond appropriately to workplace culture.



### **Help Reduce Poverty**

The Earned Income Tax Credit (EITC) augments the wages of low-income workers and, in turn, this flow of income makes a substantial economic impact in local communities. EITC recipients circulate their refunds through the local economy, creating a ripple effect many times the size of the original refund. This money strengthens neighborhoods, assists small businesses and spurs local economic development. ISU Extension works with community

partners to recruit and train volunteers to provide free tax preparation services to low-income families through the Volunteer Income Tax Assistance (VITA) program. In 2008, VITA volunteers helped 1,398 low-income Iowans complete income tax returns. About half of those tax filers qualified for the Earned Income Tax Credit (EITC) totaling \$670,977 in the 18 counties that participated in the Extension-community partnerships to expand VITA programs to rural Iowa.

### **PROSPER Project**

More than 3,100 middle school youth in Iowa participated in programs designed to prevent substance use and other risky behaviors. These youth are in the seven Iowa communities that participate in the PROSPER project (PROmoting School-Community-University Partnerships to Enhance Resilience). ISU Extension to Families and the Partnerships in Prevention Science Institute collaborate on this project, designed to better understand how to implement effective prevention programs in communities. The community PROSPER teams raised funding locally to support these prevention programs. Over \$91,000 was raised by the seven community teams as well as over \$55,000 in in-kind contributions. Data collected over the last few years indicate that students in the PROSPER communities are less likely to begin using marijuana, inhalants and methamphetamines and are less likely to get drunk than students in seven control communities. This program has a strong impact on our future workforce.

### **K-12 Outreach Feeds Engineering Pipeline**

The College of Engineering Precollegiate Program carries out innovative K-12 activities that develop a pipeline of future students to fill the high demand for engineers and engineering technologists. One such approach is Project Lead The Way (PLTW), created in 1997 as a not-for-profit organization that promotes pre-engineering courses for middle and high school students. PLTW works to increase the quantity and quality of potential engineering students through courses in the school system as part of the district's curriculum offerings. Through partnerships with public schools, higher education and industry, the program influences the numbers and talents of engineering graduates entering the workforce. Iowa State is in its third year as a university affiliate of PLTW, providing training opportunities to teachers, administrators and guidance counselors along with engineering experiences and college credit for students. In the most recent school year, 63 schools from across the state participated in the PLTW program.

### **Biobased Industry Conference**

CIRAS staff member Jill Euken coordinated the 2007 Biobased Industry Outlook conference for people involved in the production and manufacturing of biobased products. More than 700 people attended the two-day

event that featured speakers who discussed harvesting and transporting of biomass, the implementation of policies to mitigate global climate change, the importance of nutrient recycling and the status of ongoing efforts to replace petroleum-based products with biobased products. Representatives from ConocoPhillips that established a \$22.5 million research program at Iowa State to support work in diversifying America's energy sources, were in attendance. Conference participants were also able to attend a national presidential candidate event, discussing the importance of the growth and development of the bioeconomy.

### **Opportunity for Biobased Business**

ISU worked with USDA, the Midwest Governors' Association and Iowa legislators to help open new markets for biobased product businesses. CIRAS project manager Steve Devlin and his team located over 14,000 products produced by 2,100 U.S. businesses as part of the USDA BioPreferred program. Over 100 Iowa companies are included in the database. The information gathered will be used by the Midwest Governors' Association to help expand markets for biobased products in the Midwest. The group, composed of 12 Midwest governors and the premier of Manitoba, is developing a procurement implementation plan for biobased products. Iowa is in the forefront in the Midwest, having already developed a state-based biobased product procurement effort designed around the national BioPreferred program. In 2008, Governor Culver signed into law legislation that gives preferential procurement to biobased products.



### **Preventing Identity Theft**

Steffen Schmidt, University Professor of Political Science, and graduate research assistant Michael McCoy have been working with a group of Iowa companies concerned with identity theft. This work has included two years of research and product development through a National Science Foundation grant, coordinated by the ISU Center for Information Protection and the Information Assurance Program, and with direct company coordination by a unit of The Principal Group. This work has resulted in numerous workshops throughout Iowa and the United States and Canada, the writing of two books by Schmidt and McCoy, the creation and distribution of ID theft prevention CDs,

a blog (The Identity Theft Prevention Institute) and an Internet short seminar to certify persons in business who deal with sensitive information.

### **Energy – Demand and Supply**

CIRAS partnered with Alliant, MidAmerican Energy, CIPCO and the Iowa Energy Center to hold energy efficiency workshops across Iowa. Workshops were held on lighting, industrial refrigeration and steam systems. The sessions, coordinated by Bob Coacher, were geared toward the needs of facility and energy managers and energy service personnel, the demand side issues. CIRAS also co-sponsored a series of short courses led by Tom Baird in the Department of Electrical and Computer Engineering. These courses deal with the supply side issues of that industry—how electricity is produced, transmitted and distributed to industry and all users. Topics included SCADA and substation/feeder automation, electric substations, control system cyber security and protective relay issues. Over 150 participants were able to gain valuable information during the three-day sessions.

### **MFRC Advances Forensic Drug Chemistry**

The Midwest Forensics Resource Center (MFRC), an IPRT center and a project of the U.S. Department of Energy's Ames Laboratory, conducted a successful experiment in technology transfer with the Midwest Association of Forensic Scientists May 8-10, 2007, in Ames, Iowa. It was a Symposium on Forensic Drug Chemistry that attracted 52 participants from 17 states, 44 crime labs, and four federal agencies. The participants held in-depth discussions on emerging drugs of abuse, new drug analyses and new methods. A pre-conference binder and CD contained all the Symposium presentations and a post-symposium CD contained resources identified during the event. The materials also included a description of a substance developed at Iowa State University that inhibits the synthesis of methamphetamine when added to anhydrous ammonia. The participants shared analytical protocols for difficult-to-analyze drugs of abuse, as well as a comprehensive listing of all of the analytical instrumentation and statistical protocols they use. Organizers and participants reported that the Symposium advanced their field. One participant said, "I loved the fact that there was enough time for questions about the presented topics. You learn just as much, if not more, from the other people and what they know as you do from the speakers."

### **Process Mapping in Forensic Science**

The MFRC, an IPRT center and a project of the U.S. Department of Energy's Ames Laboratory, is helping the forensic community improve its processes and management infrastructure through the formation of a process mapping cooperative. The cooperative consists of the MFRC and any participating crime laboratories (initially in the Midwest,

but now expanded to include the entire nation) interested in building process mapping concepts and practices into everyday crime laboratory management. Cooperative members participate in a two-day Executive Training session, followed by a three-day Process Mapping Facilitator Training session. During the Executive session, crime laboratory directors learn about the goals and objectives of the cooperative, the commitments required and the process mapping technique. They identify a lab process they want mapped, objectives, and two staff members to be trained in facilitation. These staff members receive in-depth training in process mapping and facilitation. Upon completion, the process mapping facilitators conduct a site review to gain experience. The MFRC is currently developing a training course on implementing crime laboratory process changes and tracking the impact of changes.

### **ServSafe Food Safety Training**

Nutrition and Health field specialists have taught the ServSafe® Food Safety Certification course to over 1,500 Iowans in the last two years, with a pass rate of 86%. Participants are those working in commercial and non-commercial foodservice operations. Not only do foodservice operators see training as one proactive measure to reduce the risk of a foodborne illness outbreak, recent legislation has mandated that the person in charge of operations in certain industry sectors be certified in food safety (an example is assisted living facilities) or has required HACCP plan implementation that builds on food safety principles (in schools). Preliminary research from Iowa State indicates food safety training can lead to a competitive advantage in the market. One goal of ISU Dining Services is to certify all full-time staff members in food safety. They have partnered with Families Extension to provide ServSafe® training the past two years to work toward this goal.

### **Training for Animal Emergency Responses**

The Center for Food Security and Public Health at the Iowa State University College of Veterinary Medicine, with funding from Iowa Homeland Security and Emergency Management and in collaboration with the Iowa Department of Agriculture and Land Stewardship, has developed educational materials and tools to help local communities prepare for and respond to an animal disease emergency. The materials include training on the steps involved in responding to an animal disease emergency, state and federal agencies involved, response protocols (NIMS and ICS) and the role county level responders may have during an emergency. To aid in planning and preparing, a local response plan template, two tabletop exercises and a functional exercise have also been developed. Awareness level educational resources on high consequence animal diseases are also provided for just-in-time training in the event of an animal disease emergency. All of the materials are available on the Center's website. ([http://www.cfsph.iastate.edu/Animal\\_Response/default.htm](http://www.cfsph.iastate.edu/Animal_Response/default.htm))