The University of Iowa
2010 Annual Economic Development Report

Executive Summary

Research drives innovation at The University of Iowa. In FY10, The University of Iowa generated an impressive growth in extramural support and achieved a record of $466.5 million. This robust research enterprise and integrated economic development activities at the UI have a significant and far reaching impact on the State of Iowa's economy. The IOWA Centers for Enterprise (ICE) provides infrastructure and services to enhance technology transfer and commercialization of UI technologies, new company formation, support of Iowa companies and workforce development. ICE currently includes the following departments.

- The University of Iowa Research Park (formerly Oakdale Research Park) (UIRP)
- The University of Iowa Research Foundation (UIRF)
- The John Pappajohn Entrepreneurial Center (JPEC)
- BioVentures Center (BVC) and The Technology Innovation Center (TIC)
- The University of Iowa Small Business Development Center (SBDC)

In September 2010, the UI released its Economic Impact Study that highlighted and emphasized the impact of research and economic development programs on the State of Iowa. Excerpts from the reports are noted below with the full report available at http://www.uiowa.edu/impact/.

> *Public research universities such as the University of Iowa stimulate economic development and extend the benefits of learning and discoveries to the citizens of the community, region, state, nation, and world. University-based research has proved to have a substantial and measurable effect on business formation and economic development. Research performed by Adam Jaffe at Harvard found that "...a state that improves its university research system will increase local innovation both by attracting industrial R&D and augmenting its productivity."*
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> *The University of Iowa does not just contribute to business enterprises through its research; it also actively promotes business enterprise formation, commercialization, and expansion via University business incubators and small business advisory services. Research and investments in research result in impacts outside of operations, specifically spin-off businesses, patents, and licenses.*
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> *The impact of research often is not shown in the economy until years after its initiation. Based upon current research funding of $429.5 (FY09) million, the economic impact of spin-off businesses and commercialization of research in existing companies is estimated to be between $1.4 billion (conservative) and $2.4 billion (aggressive) on the state's economy by 2020.*

The University of Iowa continues to make impressive strides in support of technology transfer and economic development. Much of this success is a result of the state appropriation and Grow Iowa Values Funding (GIVF) which has proven critical to the development of a strong UI infrastructure to promote economic development that is consistent with our mission and the goals of the State of Iowa. FY10 proved to be an outstanding year for economic development activities at the University of Iowa. Our most notable accomplishments include:

- UIRF executed a record number of 8 license agreements to startups based on UI intellectual property, and most of those startups made significant progress in company development. There are now more than 17 startups based substantially on UI IP, versus the hand-full that existed a few years ago. Of those 17, 13 are based in Iowa and collectively raised $7.3M in grant or equity financing last year.
- UIRF launched a pilot program called the "seeker" function, with the intention to find and work with key faculty with commercialization potential. This program has evolved into a new UIRF functional unit entitled intellectual property and asset development, and reflects the need to provide funding and industry experts to work with faculty well in advance of invention disclosure. UIRF anticipates that a significant increase in intellectual property with potential for commercialization will result from this early and critical guidance by these industry experts.
- The UI Research Park companies and affiliated labs report 2,010 employees living in 100 communities in 29 Iowa counties, a regional labor shed covering almost one-third of the State. The annual payroll nears $100 million resulting in an estimated $5.7 million in State income taxes in 2010.
- The John Pappajohn Entrepreneurial Center (JPEC) offers one of the most comprehensive entrepreneurial education and business support programs in the nation. Featured programs supporting economic development include: providing business consulting services to small companies located across Iowa through its student field study program (53 companies assisted last year); hosting/sponsoring five elevator pitch and business plan competitions to support innovation and new venture creation; supporting the creation and launch of student-based business through the Bedell Entrepreneurship Learning Laboratory (17 offices at full capacity); and delivering entrepreneurial education through academic courses across campus and online, workshops/seminars, and high school teacher training and curriculum. The UI's JPEC placed 23rd in the undergraduate ranking. It's the only school in Iowa to be ranked in the top 25, and one of only two Big 10 schools.
- At The BioVentures Center, a lease was signed with its seventh company, CQM Systems. The occupancy to date is at approximately 59%. The occupancy rate for the TIC is at approximately 83%.
- In FY10, the Small Business Development Center served nearly 400 clients, assisted in 28 business startups, helped clients raise over $12,000,000 in financing and created 149 jobs.

The following sections of this report will directly respond to specific areas as requested by the Board of Regents. These include, the impact of the University of Iowa activities on the economic growth in Iowa, institutional activities and services that indirectly promote economic development, quantitative information regarding economic development activities in FY10, a summary of outreach and service activities, direct economic development assistance to Iowa communities, summary of GIVF and Battelle expenditures, and emerging trends in the area of economic development.

Impact of UI Economic Development Activities on the Economic Growth in Iowa

Job creation and wealth in Iowa.

University of Iowa Research Park (UIRP)

UIRP, formerly known as the Oakdale Research Park & Oakdale Research Campus, is a blended campus consisting of a multitude of commercial ventures and a variety of university academic programs and infrastructure assets. As of June 2010, 10 established companies, 20 startup companies and 5 University anchor laboratories were located in the park. These companies have access to University research infrastructure including internet access and access to libraries and research facilities, core facilities to support chemistry, biology, computation, and instrumentation. Importantly, companies have access to faculty collaborators and to students as interns or employees.

In FY 2010, the 46 active Iowa companies affiliated with UI Research Park and Technology Innovation Center[1] reported 1,658 employees earning an average salary of $48,932. The five UI anchor laboratories on the Research Park reported another 352 employees, for a total workforce of 2,010 employees. The 2,010 employees of companies and labs affiliated with the UI Research Park and business incubator reported living in 100 communities in 29 Iowa counties, a regional labor shed covering almost one-third of the State. The annual payroll nears $100 million resulting in an estimated $5.7 million in State income taxes in 2010. The affiliated companies and labs also reported employing 89 UI students, and 143 employees had earned doctoral degrees.

BioVentures Center (BVC)

The UI BioVentures Center at the Research Park opened in November of 2008. This 35,000 sq ft state-of-the-art biosciences incubator facility allows the University to provide laboratory facilities to support technology based companies emerging from the commercialization of faculty research as well as other startup companies drawn to the area by the substantial R&D assets of the University. We have already leased 10 of the 20 laboratories in this facility to start up companies, 3 of which were formed from technology created by UI faculty. GIVF funding was critical in enabling the design and construction of this facility, which now allows us to capitalize on University assets. Seven companies (Vertex Pharmaceuticals, Cellular Engineering Technologies, Terpenoid Therapeutics, ASL Analytical, KemPharm, Exemplar Genetics and CQM Systems) occupy 10 wet labs and 13 dry labs/offices in BVC— 59% of leasable space. Two floors of the west wing of the BioVentures Center have been fit out for those UI units previously housed in Oakdale Hall. These units are associated with research centers reporting to the Colleges of Public Health and Pharmacy and the Office of the Vice President for Research.

Technology Innovation Center (TIC)

The Technology Innovation Center provides office space and a nurturing business environment to new technology-based ventures that do not require wet laboratories. In FY10, TIC reported two new tenants (J&J Solutions and ABMI Group). The occupancy rate for the TIC is at about 83%, 34 of the 40 offices are currently rented. Of the 11 companies in the TIC, 3 of them have UI affiliation.

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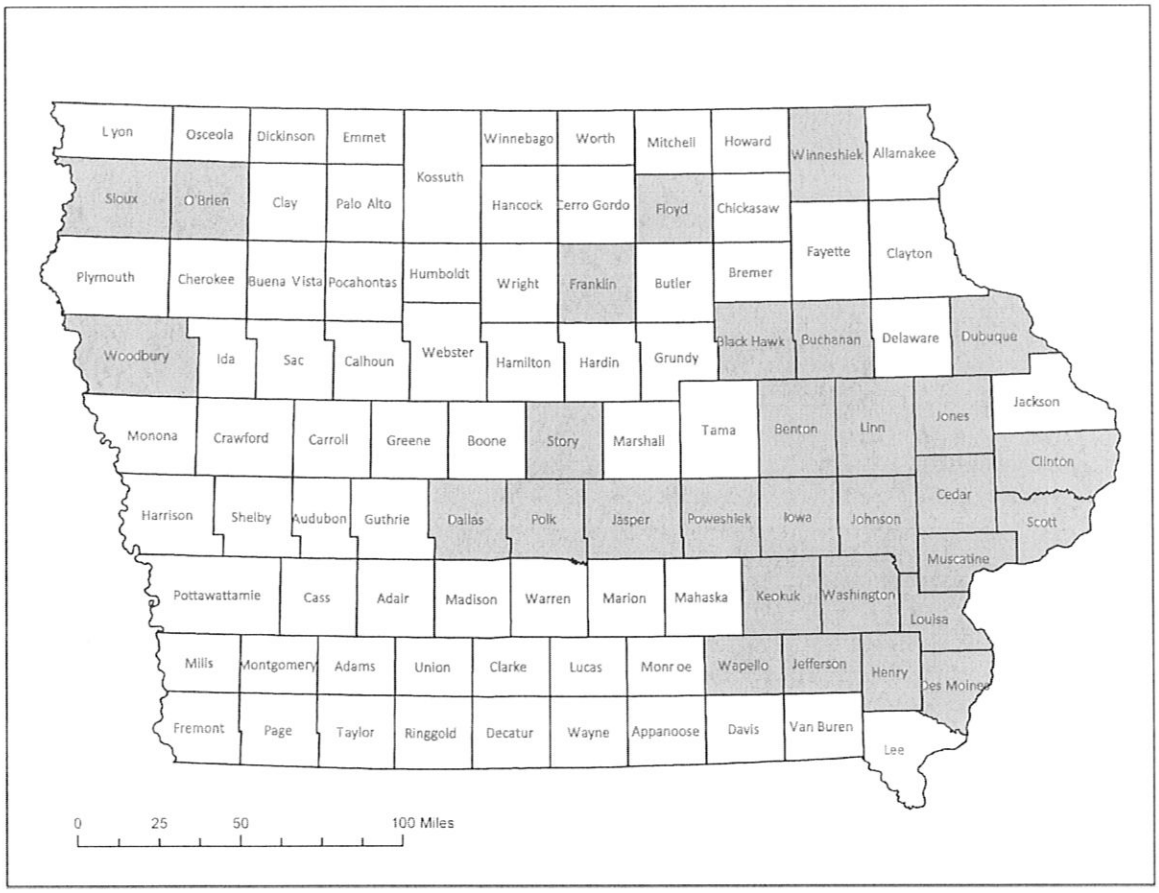
[1] This includes active companies at the Technology Innovation Center and/or at the UI Research Park, and graduate companies located in Iowa that are still in business.

FY10 Labor Shed for Affiliated Companies and Anchor Laboratories
UI Research Park, BioVentures Center and Technology Innovation Center



New Company Formation

Since FY07, 30 companies were formed, resulting in 90 jobs created, some due to support from GIVF. The table below summarizes the number of new companies formed FY07-FY10 and jobs created as a result of increased emphasis on new company formation.

Company	# of Employees	GIVF Gap Funded
Exemplar Genetics*	23	Y
Terpenoid Therapeutics*	4	Y
iOptics	0	Y
Repgenix	0	Y
OMR Sensors	3	Y
ASL Analytical*	4	Y
QI2* - Acquired by VIDA Diagnostics	7	Y
Voltesla	3	Y

Performex	1	Y
Santos Human*	1	Y
Behavioral Diagnostics	1	Y
View Point Molecular Targeting	3	Y
Quad CAD	1	Y
Advanced Infoneering	5	N
JL Meditech*	0	N
Componica*	2	N
Cellular Engineering Technologies*	4	N
Actual Safety, Inc.*	0	N
Soligence Corporation*	0	N
KemPharm*	6	N
The Thomas Group*	1	N
Bio::Neos*	3	Y
InnoMatix*	6	N
Kepa Services*	1	N
Pohaku*	4	N
J&J Solutions*	2	N
ABMI Group*	2	N
CQM Systems*	2	N
Optherion*	1	Y
NGI/Vivakor*	0	N

*Indicates company is in the BVC, TIC and/or UIRP.
Note: Non-Gap funded companies received support from UIRP and/or TIC.
Note also that Optherion, Repgenix, and UIQI2 benefited from Battelle funds

Institutional activities and services which indirectly promote economic development

University of Iowa Research Park, BioVentures Center and Technology Innovation Center

A variety of educational and training programs are offered for UIRP/BVC/TIC tenants and faculty investigators including company marketing techniques and a presentation by Kirkwood Community College on The Iowa New Jobs Training Program. Quarterly roundtables were held at the BioVentures Center. These roundtables are initiated by the Research Park companies. Agenda items cover Park and BVC updates as well as company issues and concerns. The Multi-Purpose Room at the BioVenutres Center was also made available in FY 2010 to over 50 outside groups. In early 2010, ICE held its first annual celebration of achievement for winner of our various elevator pitch and seed grant competitions. This event was attended by state legislators as well as leaders in the business community.

The John Pappajohn Entrepreneurial Center (JPEC)

The University of Iowa's John Pappajohn Entrepreneurial Center (JPEC) offers one of the most comprehensive entrepreneurial education and business support programs in the nation. Featured programs supporting economic development include: providing business consulting services to small companies located across Iowa through its student field study program (53 companies assisted last year); hosting/sponsoring five elevator pitch and business plan competitions to support innovation and new venture creation; supporting the creation and launch of student-based business through the Bedell Entrepreneurship Learning Laboratory (17 offices at full capacity); and delivering entrepreneurial education through academic courses across campus and online, workshops/seminars, and high school teacher training and curriculum. These are detailed in Appendix A of this report.

IOWA Centers senior staff participated in economic development organizations in FY10.

STATEWIDE:

- Iowa Department of Economic Development (IDED)
    - Board, Bioscience Alliance of Iowa (BAI)
    - Board, Iowa Information Technology Council (ITC)
- Iowa Biotechnology Association, Board of Directors
- Technology Association of Iowa, Board of Directors
- Technology Association of Iowa, Panelist Reviewer for TAI annual awards
- Prolog Ventures, Iowa Deal Flow Committee
- Iowa Venture Capital and Entrepreneur Conference, Planning Committee
- Iowa First Capital Fund, Advisory Board
- Entrepreneurial Development Center Board, Member

LOCAL AND REGIONAL:

- Priority One, Board of Directors
- Corridor Business Alliance
- Iowa City Area Development Group, Board of Directors
- Iowa City Area Chamber of Commerce, Member

NATIONAL:

- AUTM- Association for University Technology Managers Board of Directors, Assistant VP of Finance
- AUTM Foundation Board of Directors, Member
- National Science Foundation (NSF) SBIR program, Mentor for Phase I-II awarded startups
- NSF SBIR program, Panelist for Proposal Reviews
- NBIA National Business Incubator Association
- AURP Association of University Research Park and Association of University Midwest Research Park Directors
- COGR – Council on Governmental Relations

Metrics describing UI economic development activity FY10

	FY10
a. Number of disclosures of intellectual property	70
b. Number of patent applications filed	
• U.S. Applications	61
• National Applications	35
• Patent Cooperation	11
• Total Applications	107
c. Number of patents issued	97
d. Number of license and option agreements executed on institutional intellectual property (The 21 license/option agreements were for a total of 46 different UIRF disclosures)	21
• In Iowa	6
e. Number of license and option agreement yielding income	129
f. Revenue to Iowa companies as a result of licensed technology	$2.03 million
g. Number of startup companies formed	3
• In Iowa	3
h. Number of companies in research parks, incubators and graduates located in Iowa	46
i. Number of new companies in research parks and incubators	3
j. Number of employees in companies in research parks and incubators	2010
k. Royalties and license fee income	$27 million
l. Total sponsored funding	$466.5M
m. Corporate sponsored funding for research and economic development	
• In total	$30.8 million
• In Iowa	$1.8 million
n. Iowa special appropriations for economic development in the following categories	
• Annual state appropriations for ongoing programs (TIC, ORP and CADD)	$222,372
• Grow Iowa Values Fund appropriations	$1,732,500
• Battelle appropriations (FY06; Spent in ensuing years)	$0
o. Estimated jobs created by SBDC clients	149

Direct and hands-on technical assistance to businesses, faculty investors and entrepreneurs

The University of Iowa Research Foundation

The UIRF aspires to maximize public benefit through commercial use of UI technologies, excellence in commercialization, and long term sustainability. In pursuit of this vision, UIRF's primary functions are:

- Licensing - finding suitable partners for commercializing UI technologies and inventions
- New Ventures - identifying and developing new high growth UI technology spinout companies suitable for venture capital financing
- Intellectual property services - which include protecting UI inventions through patents and copyrights, advising on intellectual property terms for Clinical Trials and Sponsored Research, and executing out-going material transfers

UIRF's economic development emphasis is heavily focused on startup formation. Working directly with UI faculty, entrepreneurs, and investors in selecting, evaluating and developing new companies, these activities include:

- IP analysis for viability of proposed company products
- IP protection strategies and execution; UIRF fronts the cost of IP protection
- Due diligence on the viability of UI spinout companies
- Business model development for UI spinout companies
- Provide *Entrepreneurs-in-Residence* for high new priority UI companies
- Provide gap funding for highest priority projects
- Facilitation of financial investment in the company
- Licensing to UI spinout companies
- Extensive mentoring and education of faculty in new company formation

In FY10 UIRF launched a pilot program called the "seeker" function, with the intention to find and work with key faculty with commercialization potential. This program has evolved into a new UIRF functional unit entitled intellectual property and asset development, and reflects the need to provide funding and industry experts to work with faculty well in advance of invention disclosure. UIRF anticipates that a significant increase in intellectual property with potential for commercialization will result from this early and critical guidance by these industry experts.

As part of this work, UIRF - in collaboration with the ICE and commercial partners (The Entrepreneurial Development Center and Startup Midwest) managed to vet new projects, and fund proof of concept projects that could lead to new company formation. A summary of projects evaluated and forwarded in FY10 along with the commercial status of those projects is indicated in the following table. The 2nd table indicates the market/industry distribution of these funded projects. As expected, a majority of UI technologies fall into human life science related technologies and products.

Commercialization Potential of New Projects Evaluated and Supported in FY10

	Startup	Licensing	Too early to tell commercialization path	No commercial opportunity at this time
High	**Baker (√)**	Giangrande	Gopishetty	
	Bishop		Wemmie	
	Prisinzano		Weiss	
	Das (√)		**McCray (Oct'10)**	
Medium	**Manak (√)**	HawkIRB	**Adams (√)**	Shields
	Doddapaneni	Leddy	Herman/Polgreen	
	Schultz		Horswill	
			Anderson-FxRedux (√)	
			Kusiak	
Low	Philibert		Leira	Anderson-OsiriX
			Lim (Jan'11)	
			Korovkina	

Bold: FY10 GIVF Seed/Proof of Concept Grant
(√) - positive experimental results.

Industry segmentation of these Projects

Pharma	Diagnostics	Biopharm	Chemicals	Drug Delivery	Software / Device
Baker	**Manak**	Giangrande	**Das**	**Lim**	**Anderson**
Wemmie	Doddapaneri	Bishop	Goppishetty		Anderson
Prisinzano	**Schultz**	Korovkina	Leddy		HawkIRB
Adams	Leira	Horswill			Herman/ Polgreen
McCray	Philibert	Weiss			Shields
					Kusiak

Bold: FY10 GIVF Seed/Proof of Concept Grant

A detailed list of these projects is provided in Appendix B. For each project, the resources provided are listed, including proof of concept seed funding, support for obtaining external grants such as an SBIR, entrepreneur-in-residence, industry consultants, and other resources required to move the technology toward commercialization. A number of technologies were evaluated and listed as "under consideration", and have since moved into supported commercialization projects in FY11.

John Pappajohn Entrepreneurial Center (JPEC)

JPEC provides one-on-one counseling to technology based entrepreneurial companies. JPEC also uses undergraduate and MBA student teams to conduct product assessments, strategic marketing assessments, and other components of an entrepreneurial business plan. Some 53 consulting projects were conducted in FY10. In addition, JPEC supports the efforts of the UIRF to vet and spin out companies based on faculty technology by providing strategic business advice and participating in business development assessments. Several programs related to hands-on technical assistance are described below. For a description of the JPEC programs aimed at supporting Iowa entrepreneurism, please see Appendix A.

- **Iowa Venture Capital and Entrepreneurship Conference -** JPEC is a major sponsor and organizer of the Iowa Venture Capital and Entrepreneurship Conference, in partnership with IDED, the other Pappajohn Centers and Equity Dynamics.

- **FastTrac Entrepreneurial Training Program –** JPEC delivers the nationally acclaimed FastTrac® entrepreneurial training programs of the Ewing Marion Kauffman Foundation of Kansas City. The initiative prepares aspiring entrepreneurs to launch new ventures and existing companies to grow their businesses. Two classes were held in Iowa City in FY10.

- **Seminars/Workshops/Lecture Series –** JPEC hosted over 36 different opportunities last year for students, faculty and persons from the community. In FY10, over 1,700 attendees came to learn from experienced entrepreneurs on a variety of topics including: Technology Export Roundtable, various tax workshops, and Entrepreneurial Boot Camp.

- **Entrepreneurial Ventures Group –** JPEC conducts each year a seminar series, the Entrepreneurial Ventures Group, aimed at aspiring entrepreneurship in students, faculty and members of the community at-large.

- **Wellmark Venture Capital Fund –** JPEC is the regional administrator of the $5M Wellmark Venture Capital Fund that supports the creation and growth of new businesses throughout the state. JPEC screens applicants, performs due diligence, evaluates business concepts, and assists applicants with their business plans. JPEC partners with area angel investors, equity fund managers, lenders, the Iowa Department of Economic Development, and the Small Business Administration to help business owners secure additional venture funding.

- **Elevator Pitch Competitions** – Two Elevator Pitch Competitions were held with $45,000 in cash prizes awarded. One contest was open to any current University of Iowa Faculty, Staff, or Graduate Assistant and 53 teams participated in the competition and the winners received $25,000 in funds. A separate competition was held for UI students in which $20,000 was awarded to 17 student teams.

- **New Venture Challenge** – The John Pappajohn Entrepreneurial Center and the University of Iowa Research Foundation hosted the Spring 2010 New Venture Challenge with over $50,000 in cash prizes awarded. The New Venture Challenge was open to all University of Iowa Faculty, Staff and Students, as well as startup companies with principal addresses at the UI Research Park. Over 70 participants registered for this event.

Small Business Development Center

The Small Business Development Center (SBDC) offers one-stop assistance to current and prospective small business owners by providing high quality, one-on-one counseling that is tailored to the needs of individual clients. The SBDC conducts research, counsels, and trains business owners in management, financing, and operating small businesses, and provides comprehensive information services and access to experts in a variety of fields. Educational programs are offered on topics that include taxes, accounting systems, and business planning. It also offers a wide range of training seminars concerning business skills and issues, and assists small businesses in securing Small Business Administration backed loans. In FY10, the SBDC served nearly 400 clients, assisted in 28 startups, and helped clients raise $12,000,000 in financing and create 149 jobs.

Direct economic development assistance to Iowa communities

John Pappajohn Entrepreneurial Center

- **Distance Certificate in Entrepreneurial Management –** The Certificate in Entrepreneurial Management is available online to students across the State of Iowa as part of Iowa Community College partnerships. Many online students combine The Certificate in Entrepreneurial Management with the UI's Bachelor of Applied Studies (BAS) or Bachelor of Liberal Studies (BLS) in order to earn their undergraduate degree from The University of Iowa. These online opportunities are offered through UI Division of Continuing Education.

- **Business Consulting Services –** JPEC offers business consulting services to entrepreneurial and startup companies around the state.

- **Okoboji Entrepreneurial Institute** – JPEC conducts an annual institute at UI's Lakeside Laboratories at Lake Okoboji that provides hands-on experiential learning for 40 undergraduates from UI, ISU, UNI, Buena Vista College and Iowa Lakes Community College about what it takes to launch an entrepreneurial enterprise.

Corridor Business Alliance

Founded in December 2009, the vision of the Corridor Business Alliance (CBA) is to create a vital regional economy through the creation and growth of business. The CBA will harness and leverage corridor resources to achieve our vision as well as to recruit and keep talent in the region. The alliance is made up of the leaders of Alliant Energy, the Cedar Rapids Area Chamber of Commerce, the Entrepreneurial Development Center, Iowa City Area Chamber of Commerce, Iowa City Area Development Group (ICAD), Kirkwood Community College, MidAmerican Energy, Priority One, Kirkwood's Small Business Development Center, the University of Iowa's Small Business Development Center, Research Foundation and Pappajohn Entrepreneurial Center.

Economic development services provided by the research parks, incubators similar service/ units

The University of Iowa Research Park, BioVentures Center and Technology Innovation Center

Corporate tenants of the Park benefit from sustained relationships with UI in the form of access to specialized research facilities, library access, faculty consultation, research collaboration and access to students as interns and employees. UI resources also provide smaller companies with assistance in business planning, identifying professional service providers, introductions to local and state government agencies and the regional business community, help in identifying potential sources of investment and other funding and communications. For a list of companies and developers associated with the Research Park, BioVentures Center and Technology Innovation Center see Appendix C.

Research Park Magnet Laboratories

In addition to the core university facilities, four specialized UI laboratories reside within the Research Park that provide services on a fee-for-service basis to Park tenants, other Universities and private industry. These units provide Iowa with unique capabilities that IDED and local economic development entities have utilized in recruitment of outside companies to the Park, the region and the state. These facilities include:

Center for Advanced Drug Development (CADD)

The Center for Advanced Drug Development (CADD) is a division of the University of Iowa College of Pharmacy that offers contract analytical and quality assurance services to the pharmaceutical and biotechnology industry. CADD is U.S. Food and Drug Administration (FDA) registered and current Good Manufacturing Practices (cGMP) compliant and works closely with the University of Iowa Pharmaceuticals, housed on the central University campus. The focus of both CADD and UI Pharmaceuticals is the manufacture and control of clinical supplies of new drugs entering initial Phase I clinical trials. They are particularly attractive to smaller pharmaceutical/biotechnology companies that have new drugs moving into the clinic but have not developed their own manufacturing capabilities.

CADD and UI Pharmaceuticals have an extensive recurrent client base of mainly smaller biotechnology companies, manufacturers of pharmaceutical excipients, and a growing pool of U.S. and foreign pharmaceutical firms. CADD and UI Pharmaceuticals are particularly well positioned to work directly with discoveries from Iowa university research laboratories, thereby providing an opportunity to hasten technology transfer and shorten the time to market. The presence of these FDA registered facilities along with the Center for Biocatalysis and Bioprocessing makes UI unique among US universities in its ability to provide this type of infrastructure for pharmaceutical and biological products.

Center for Biocatalysis and Bioprocessing (CBB)

The Center for Biocatalysis and Bioprocessing is a research and education center reporting to the Vice President for Research and Economic Development that links university scientists from 6 different colleges who have focus on biocatalysis and bioprocessing. The Center also performs contract production for the fermentation and bioprocessing of products for the food, alternative energy, bio-pharmaceutical and biotechnology industries and is capable of working from small molecules to complex proteins, including such products as alcohols,

vaccines, antibiotics, anticancer drugs, polymers, biochemicals, enzymes, pharmaceutical intermediates and derivatives of bioactive compounds. It can produce products under Good Laboratory Practices (GLP) conditions at a scale of up to a 1000 liter fermentor, and under U.S. Food and Drug Administration current Good Manufacturing Practices (cGMP) conditions (products produced under cGMP conditions can be used in Phase I human clinical trials) at a scale of up to 300 liters. The CBB is central to the University's efforts to attract biotechnology R&D and industrial fermentation companies to Iowa. The ICE and CBB have worked in close concert with IDED and other Iowa economic development agencies to recruit companies to Iowa. The GIVF funded cGMP laboratories has already put CBB as the leading bioprocessing facility in a US university setting. Since 2006, 6 jobs have been created at CBB. At present, CBB is planning another expansion to build a state of the art fermentation and bioprocessing laboratory to attract Industrial Biotechnology companies involved in biomass-based production of chemicals and fuels. This new facility will position U of Iowa and to attract such companies to build R&D and pilot and manufacturing plants in Iowa.

National Advanced Driving Simulator (NADS)

Using the world's most advanced driving simulator, researchers at the University of Iowa's National Advanced Driving Simulator (NADS) have defined the state-of-the-art in driving simulation, vehicle performance and cognitive systems engineering. This national shared-use facility has working collaborations with federal and state governments, industry, including John Deere, and the military. It is available for use by any group interested in utilizing driving simulation as a tool to advance productivity, promote vehicle safety and foster innovation. Selected projects include studies of cell phone distraction in driving, younger driver risk, affects of pharmaceutical products on driver function, electronic stability control, crash avoidance, development of software for an agricultural equipment driving simulator, and customer satisfaction of ride quality during tractor driving tasks. Collaborators include the federal government, automotive companies and earth moving and agricultural equipment companies, including John Deere.

State Hygienic Laboratory (SHL)

The State Hygienic Laboratory (SHL) has provided health and environmental laboratory services to the State of Iowa for more than 100 years. The SHL performs 175 different clinical laboratory tests in maternal screening, newborn screening, virology, serology, microbiology, molecular biology, blood lead screening and biological and chemical terrorism response. SHL uses state of art chemical, biologic and enzymatic analytical methods. These laboratories also serve as important training facilities and can perform fee for service analyses for companies at the UIRP and throughout Iowa and the midwest. The new 113,665 sq ft State Hygienic Laboratory facility will open in the fall, 2010.

Collaboration for economic development with Iowa entities

Startup Company to Commercialize Animal Models of Human Disease

UI, Trans Ova Genetics of Sioux Center and the IDED have collaborated to support a startup company that develops animal models of human disease, an important tool for the research community in its effort to discover and develop new cures for diseases. The effort began with the work of UI's Michael Welsh, MD, and an investigator who has studied the development of cystic fibrosis (CF) for more than 15 years. Dr. Welsh developed an animal model for this disease as a part of his investigation. The collaboration with Trans Ova Genetics will allow a mechanism for translation for broader use as a research tool. A $400K Battelle award also supported a part of this development. A new company was formed, Exemplar Genetics, in which Trans Ova owns a minority, share and Dr. Welsh serves as a scientific advisor. The IDED is supporting further development of the business via a $1M forgivable loan awarded to UI to support three related projects: 1) development of a small pig facility to support the work, 2) development of a molecular biology laboratory to support the work, and 3) further R&D into the CF model and perhaps one additional animal model of human disease. Dr. Welsh developed intellectual property that is being licensed to Exemplar by the UIRF as a part of this overall effort. Currently, the company has 23 employees.

Shovel Ready Site Initiative

The Shovel Ready Site Program initiative was being spear-headed by the Iowa City Area Development Group. The program is designed to give the UI Research Park a competitive edge in the site selection marketplace. The goal of the program is to have selected sites "shovel ready" -- connections to utilities and other physical infrastructure, clear swift procedures for permitting and incentive programs that can be quickly applied to a project. The UI Research Park, along with two other area sites, was chosen as a pilot project site. Gaining "shovel ready" certification provides a very positive boost to recruitment of technology based companies to UIRP.

IAWind

The University of Iowa, and particularly the College of Engineering, took the lead in working with IDED to create the Iowa Alliance for Wind Innovation and Novel Development (IAWind), a virtual organization established to promote the wind energy industry in boost to Iowa. This collaboration includes:

- The Regents Universities
- Iowa Community Colleges
- State Agencies (IDED, DNR, Office of Energy Independence)
- Federal Agencies (NSF, DOE)
- Iowa Wind Industries
- Community Partners (Iowa Energy Center, Iowa Wind Energy Association)

The organization comprises components related to policy, research, training and education, and testing facilities. The impetus for this organization arose as the College of Engineering was assisting the Iowa Department of Economic Development in its efforts to recruit wind energy companies to the State, and the need to identify and integrate the state's wind energy assets became obvious. For more information: http://www.iawind.org

Grow Iowa Values Fund projects for FY 2010

GIVF Program Summary	Description of Program	FY10 – GIVF Expenditures From FY09 and FY10 Match Funds Source	Progress through June 30, 2010 ROI DATA
VP for Research	These funds have been instrumental in enabling UI to expand the economic development infrastructure. These funds supported critical economic development functions associated with University Research Park, BioVentures Center, Technology Innovation Center and IOWA Centers for Enterprise.	**FY 2010 $849,845** **MATCH:** **Ryan Companies in-kind contribution $424,074**	Satellite offices for ICE units have been established at BVC. This will provide tenant companies direct access to experts to help move their business development goals. Developed marketing materials for the core research units to help link university core research facilities with startup company needs. Staff support for UIRP, BVC and TIC Planning the first annual entrepreneurial education and celebration event that highlighted ICE accomplishments as well as recognize UI faculty, staff and students for entrepreneurial awards.
BioVentures Center and University of Iowa Research Park	The BioVentures Building was made possible by a collaborative partnership between Ryan Companies and the University of Iowa. The new building provides critical space and services for life science startup companies at the University of Iowa Research Park. The BioVentures Center will use these funds to pay debt associated with the construction of the new BioVentures Building. .	**FY 2010 $600,000** **MATCH:** **UI BioVentures Center in-kind contribution $300,000**	59% of leasable space. Seven companies (Vertex Pharmaceuticals, Cellular Engineering Technologies, Terpenoid Therapeutics, ASL Analytical, KemPharm, Exemplar Genetics and CQM Systems) occupy 10 wet labs and 13 dry labs/offices in BVC Two floors of the west wing of the BioVentures Center have been fit out for those UI units previously housed in Oakdale Hall.

John Pappajohn Entrepreneurial Center	To fund expenses associated with training, consultation and outreach for Iowa entrepreneurs. John Pappajohn Entrepreneurial Center will continue to expand outreach programs for Iowans. • Support the development, implementation, and expansion of entrepreneurship programs. • Enhance support for faculty and area technology and high potential startup and early stage companies through one-on-one consulting, education seminars and workshops, and student/faculty field study projects. • Continue support for elevator pitch and business concept competitions for UI-based new and emerging ventures.	**FY 2010** **$353,534** **MATCH:** **JPEC in-kind contribution $188,958**	Hired, Lee Groeschl, Associate Director, Business Services, who started work in January 2010. His role is to identify opportunities and manage projects for existing Iowa-based companies to work with UI faculty/students in the areas of strategic business planning, market research and analysis, and operations/financial assessment. JPEC hosted over 36 different opportunities last year for students, faculty and persons from the community. In FY10, over 1,700 attendees came to learn from experienced entrepreneurs on a variety of topics including: Technology Export Roundtable, various tax workshops, and Entrepreneurial Boot Camp JPEC held an Undergraduate Student Elevator Pitch competition which successfully had 42 participants to help early stage ventures raise capital for their business. JPEC also held a Faculty, Staff, and Graduate Assistant Elevator pitch competition which successfully had 40 participants to help early stage ventures raise capital.
Center for Biocatalysis & Bioprocessing	To expand into a dedicated bioprocessing support for industrial biotechnology companies at the CBB. Currently, CBB is deficient in performing these operations, which have the potential to convert soy and corn residues to fuels and chemicals. CBB has experienced a surge in these activities. This reflects the surge in DOE and Venture funding into companies involved in this area.	**FY 2010 $241,742** **MATCH:** **CBB in-kind contribution $116,621**	CBB achieved $3.5 million in revenue in FY10. Several 30 L fermentors have been installed as a first step towards establishing capability in the industrial biotechnology area. A startup company, Modular Genetics, has started working with CBB in producing biosurfactants from soy-carbohydrate. This company is in the process of setting up a contract with CBB for 1-3 years, to work on soy-derived chemicals and other biosurfactants. CBB is also joining hands with MIT towards production of biodiesel via fermentation. CBB has also teamed up with AmbroZea and DNA2.0, two Palo Alto, CA based companies to enhance the value of DDGs. Towards this, Iowa Power Fund has already

			approved $1.425 M to be spent at CBB, and the other 0.075 M to be spent at ISU. But this is subject to AmbroZea raising $10-13 M for the entire program.
University of Iowa Research Foundation (UIRF)	The University of Iowa Research Foundation (UIRF) will focus on two primary activities. First, continue with its contribution to the integrated model of new company formation. Second, educate faculty in key colleges and departments towards identifying viable technology that has potential to create intellectual property that can be protected and lead to new companies and/or licensing opportunities.	**FY 2010 $914,793** **MATCH:** **UIRF in-kind contribution $455,000**	Funds will be utilized to support existing projects that continue to demonstrate commercial merit. This support will include specialized entrepreneurs-in-residence, technology experts, external grant identification and application, intellectual property evaluation and strategy, external partnership development, and assistance in securing investment. GIVF Seed Grant Program. The funds are to support the development of innovations with commercial potential, with the result that more UI technology reaches the marketplace as the foundation for new Iowa companies and/or the growth of existing Iowa companies. The funding is intended to support a wide-range of stages in technology development, from initial concept (prior to intellectual property disclosure), to proof of concept, to licensing and commercialization. (Appendix B for details)
McKinley Research Collaboration	GIVF funding supported a two year collaboration between the University of Iowa and Iowa State University. The collaboration was for the development of novel bioactive materials to treat acute mechanical damage sustained by cartilage to prevent post-traumatic osteoarthritis. The funding was for salary support and fringe benefits and for materials, including the purchase of a UV light source, facilities charges, costs of peptide and consumables for sample preparation and cell culture.	**FY 2010 $106,334** **MATCH:** **Ryan Companies in-kind contribution $53,167**	Year one deliverables were focused on developing a viable material that meets structural and biologic criteria to be used to fill cartilage matrix cracking. Year two of testing was carried out mainly at the UI in a series of in vitro tests using bovine osteochondral specimens.

Battelle Fund projects through FY 2010
(Please note, the majority of these funds were expensed in FY 07, FY08, and FY09)

University of Iowa - as of June 30, 2010					
Battelle Appropriation					
	FY 2007 Battelle Appropriation		**$8,410,000**	Board of Regents approved September 2006.	
Endowment/Salary Funding	$2,000,000				
Infrastructure (RIIF and VIF)	$2,720,000				
Platform	$3,690,000				
o Commercialization of Santos, A Human Simulation Environment		$370,000			
o Development of Ad5-TRAIL as a Cancer Therapeutic		$400,000			
o Designing Transgenic Cells for Biomedical Applications		$400,000			
o Porcine Models of Human Disease		$400,000			
o Development of Peptides for Diagnosis and Therapy of Cancer		$400,000			
o Iowa Neuro-Musculoskeletal Therapeutic Training System (TNMTS)		$130,000			
o Iowa Imaging-based Multicenter Trials Organization (I-IMTO)		$400,000			
o Design & Testing of Novel Toll-like Receptor (TLR) 4-directed Immunomodulators		$170,940			
o Build-out of Space in Myriad Two Building in the Oakdale Research Park		$1,019,060			

University of Iowa	**Project**	**List of all Revenue Sources**	**Revenue Dollars**	**Board Approved for Programs and Projects**	**Amount of FY 2007 State Appropriations Expended as of 6/30/2010**
	Endowment/Salary Funding	FY 2007 State Appropriations (Battelle)	$2,000,000	$2,000,000	$2,000,000
		FY 2008-2009 Endowed Professor-Hageman	$100,000		
		FY 2009-2010 Endowed	$100,000		

		Professor-Fritzsch			
		FY 2008-2009 Matching Funds (Other)	$200,000		
		FY 2007-2009 Unallocated Endowment Interest	$318,651		
Description of Project	Create an endowed professor and/or entrepreneur-in-residence program.				
Anticipated End Results	Attract world-class, entrepreneurial talent in the core Battelle platform areas.				
Results achieved to Date	In FY 07, the initial $2M was invested in the long term endowment pool. The interest income from the endowment provides ongoing funds for the endowed chairs. Two endowed chairs have been awarded. One endowed professor ($100,000/year for three years) was filled allowing The University of Iowa to support a prominent professor's entrepreneurial efforts (July 1, 2007). This professor obtained a $15,000,000 National Institutes of Health (NIH) grant and was affiliated with Optherion, which closed on a $37,000,000 venture capital investment. A second endowed professor ($100K/yr for three years) position was filled allowing the UI to recruit a world class researcher. Dr. Bernd Fritsch was appointed Chair of the Department of Biological Sciences and Iowa Entrepreneurial Endowed Professor, effective July 1, 2008. He is internationally known for his research in neurology of the inner ear and joins a world class research group at the UI Cochlear Implant Clinical Research Center. Among his external funds in a SBIR award for development of neuronal tracers. Discussions underway with the Provost Office to better integrate these endowed chairs into the Strategic Plan, Iowa Promise II, associated with faculty cluster hires.				
University of Iowa	**Project**	**List of all Revenue Sources**	**Revenue Dollars**	**Board Approved for Programs and Projects**	**Amount of FY 2007 State Appropriations Expended as of 6/30/2010**
	Infrastructure (RIIF and VIF)	FY 2007 State Appropriations (Battelle RIIF and VIF)	$2,720,000	$2,720,000	$2,720,000

Description of Project	Create a joint venture partnership between The University of Iowa, regional economic development leaders and the private sector aimed at supporting technology-based startup companies.				
Anticipated End Results	Expand and develop a new Technology Incubation Center and enhanced UI Research Park.				
Results achieved to Date	Constructed a life sciences business incubator (The University of Iowa BioVentures Center) in November 2008. This facility contains 20 laboratories and 22 offices for startup companies as well as conference rooms, a shared equipment room, UI Research Park staff offices, and a multi-purpose room that supports conferences of up to 70 persons, receptions, and the like. As of July 2010 – Fifty Nine percent of leasable space with seven companies (Vertex Pharmaceuticals, Cellular Engineering Technologies, Terpenoid Therapeutics, ASL Analytical, KemPharm, Exemplar Genetics and CQM Systems) occupy 10 wet labs and 13 dry labs/offices in BVC. Two of three floors of the west wing of the BioVentures Center have been fit out for those UI units previously housed in Oakdale Hall. http://enterprise.uiowa.edu/researchpark/index.php?option=com_content&task=view&id=27&Itemid=76 Building at Myriad Plaza on the UI Research Park was purchased and renovated. A lease is signed with prominent local company with 500+ employees for renewable long term lease for this facility.				
University of Iowa	**Project**	**List of all Revenue Sources**	**Revenue Dollars for FY 2007**	**Board Approved for Programs and Projects**	**Amount of FY 2007 State Appropriations Expended as of 6/30/2010**
	See platform allocations below	FY 2007 State Appropriations (Battelle)	$3,690,000	$3,690,000	$3,690,000
Description of Project	To provide financial assistance in the form of grants to accelerate the transformation of new and ongoing research and development initiatives in the core platform areas into commercial opportunities.				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	

	Phase I funding of Core Platforms (see first 8 individual projects below	Phase I Platform allocation	$900,000	$900,000	
	Phase II funding of Core Platforms (see first 8 individual projects below)	Phase II Platform allocation	$1,770,940	$1,770,940	
Results achieved to Date/Plans	See first 8 individual projects below				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	
Abdel-Malek Team	**Commercialization of Santos, A Human Simulation Environment**	Platform allocation	$370,000	$370,000	
Description of Project	Information Technology, Advanced Manufacturing				
Results achieved to Date/Plans	These funds were used to better position the research to commercialization through several resources available from ICE. These included proof of concept funds, entrepreneur-in-residence, license assistance, numerous SBIR to federal funding agencies. SantosHuman Inc. was founded as a spin-off of the University of Iowa in 2008. The company was formed to continue development, test, and bring to market a revolutionary new digital human modeling and simulation software package, referred to as Santos™ http://www.santoshumaninc.com/ Santos is currently working with several companies including Ford Motor Company, GM, Caterpillar, Proctor and Gamble, Disney, Kodak, Harley Davidson, US Amry and Navy, and etc.				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	
Griffith Team	**Development of Ad5-TRAIL as a Cancer Therapeutic**	Platform allocation	$400,000	$400,000	
Description of Project	Bio- genetics- cancer therapy				

Results achieved to Date/Plans	These funds were primarily used to move the research forward/proof of concept funding. The long term objective of the project was to develop an effective treatment for prostate cancer. Specifically, treatment involves the viral-mediated transfer of the gene for the cytotoxic protein TRAIL into the prostate, resulting in prostate tumor cell apoptotic death and activation of systemic antitumor immunity. Outcomes: The research team developed a recombinant adenoviral vector encoding the human *TRAIL* gene, and were recently awarded a patent on the Ad5-TRAIL technology ("Method of inducing tumor cell apoptosis using TRAIL/Apo-2 ligand gene transfer", U.S. Patent #6,900,185). Completed an FDA-approved Phase I clinical trial in patients with locally confined prostate cancer. Began production process and testing of a new clinical lot of Ad5-TRAIL. The research team plans to continue to investigate new commercial possibilities and to continue the investigation of AD5-TRAIL in new preclinical models of cancer.				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	
Leno Team	**Designing Transgenic Cells for Biomedical Applications**	Platform allocation	$400,000	$400,000	
Description of Project	Bio-genetics- transgenic cell lines				
Results achieved to Date/Plans	These funds were primarily used to move the research forward/proof of concept funding. The scientific goals achieved were 1) the construction and validation of two human *TNF-a* gene-targeted reporter cell lines and the development of a *IL-1b* AAV targeting vector for cell line production; and 2)the development of primary pig fetal fibroblast cultures and construction of an ApoE AAV targeting vector for cell line production. Efforts to pursue the commercialization of these technologies included contacts/meetings with: 1) venture capital firms, e.g., Prolog Ventures, Corridor Management Co., etc. to secure funding for a startup enterprise; 2) biotechnology companies, e.g., Trans Ova Genetics, Struve Labs, NuPotential, Primorigen, Discovery BioMed, Viagen, etc. to partner in technology development and/or transfer; and 3) the University of Washington regarding licensing of the AAV-mediated gene-targeting technology. A disclosure describing the technology was also submitted to UIRF to initiate patent preparation and IP protection.				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	
Welsh Team	**Porcine Models of Human Disease**	Platform allocation	$400,000	$400,000	

Description of Project	Bio-genetics- animal models				
Results achieved to Date/Plans	These funds were used to better position the research to commercialization through several resources available from ICE. These included proof of concept funds, entrepreneur-in-residence, license assistance, and support of numerous SBIR to federal funding agency. With Trans Ova Genetics (Sioux Center, IA) established spin-out company Exemplar Genetics, Inc. to commercialize the technology. Exemplar has 23 (18 FTE) full-time employees located in Iowa City and Sioux Center. http://www.exemplargenetics.com/products.htm UI awarded $1,000,000 grant from IDED to further develop the CRF animal model and other models of human disease, establish a pig facility in Johnson County that will support such R&D, and to establish a molecular biology at the UI BioVentures Center that will also support such R&D. The pig facility and molecular biology facility will be used by Exemplar. Exemplar also obtained an NIH Phase I/Phase II SBIR award (approx. $725,000) to advance the CF pig model.				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	
O'Dorisio Team	**Development of Peptides for Diagnosis and Therapy of Cancer**	Platform allocation	$400,000	$400,000	
Description of Project	Bio-imaging & drug discovery				

Results achieved to Date/Plans	These funds were primarily used to move the research forward/proof of concept funding. The overall goal of this project was to establish a laboratory for production of Good Manufacturing Practice (GMP) grade peptides and a GMP grade radiolabeling facility that together can manufacture compounds for use in cancer diagnosis and treatment. These molecularly targeted peptides will be utilized for Positron Emission Tomography (PET) diagnostic imaging and Peptide Radio Receptor Therapy (PRRT). The business opportunity is in medical imaging; the challenge for the emerging company is in obtaining protection for the intellectual property, in sustaining the business through the unpredictable period of obtaining FDA approval, and in maintaining a FMP facility. Outcome - Eleven publications as a result of this funding. The research team has successfully recruited a peptide chemist who is interested in remaining with this operation. They have established a collaboration with a radio chemist who will partner with us as a co-investigator on grant applications and as a business partner in any future company. They have two funded grants currently active as well as a funded training grant for the peptide chemist.				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	
Shields Team	**Iowa Neuro-Musculoskeletal Therapeutic Training System (TNMTS)**	Platform allocation	$130,000	$130,000	
Description of Project	Bio-therapeutic/ medical device				
Results achieved to Date/Plans	These funds were primarily used to move the research forward/proof of concept funding. The overall research goal was 1) to develop the computer drawings (CAD) of a hinged-type knee brace that will attach to the leg below and above the knee which has been manufactured and is operational, 2) to design a brake power controller in the inventor software; included in this design is a controller circuit that uses modern surface mount components, and 3) to design all of the algorithms, and completed alpha version of the software code. Outcome: Identified 2 Iowa companies interested in manufacturing the final product on a contract basis. Formed Performex, Inc. to commercialize the technology. A CEO has been identified and is currently assisting in developing a business plan. Submitted NIH Challenge Grant ($750,000) to further develop the technology.				

University of Iowa	Project		Allocated Dollars FY 2007	Allocation expended as of 6/30/2010	
Van Beek Team	**Iowa Imaging-based Multicenter Trials Organization (I-IMTO)**	Platform allocation	$400,000	$400,000	
Description of Project	Information Technology; Bio- imaging				
Results achieved to Date/Plans	These funds were used to better position the research to commercialization through several resources available from ICE. These included proof of concept funds, entrepreneur-in-residence, and license assistance. Research team collaborated with UI Institute for Clinical and Translational Science to build a web-based application to deal with image transportation, image importing and linking to software tools that allow Quality Assurance, visual analysis and quantitative analysis. Formed Quantitative Imaging of Iowa, Inc. (QI2) to commercialize the technology. Q12 was acquired by VIDA Diagnostics in July 2010. Vida is currently a company located at BVC. http://www.vidadiagnostics.com/index.htm				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	

University of Iowa	Project		Allocated Dollars FY 2007	Allocation expended as of 6/30/2010	
Weiss Team	**Design and Testing of Novel Toll-like Receptor (TLR) 4-directed Immunomodulators**	Platform allocation	$170,940	$170,940	
Description of Project	Bio-genetics - immunology and infectious diseases				

Results achieved to Date/Plans	These funds were primarily used to move the research forward/proof of concept funding . The overall goals of the project were 1) to produced and purified wild-type E:MD-2, an endotoxin-protein complex involved in the inflammatory response, 2) to demonstrated that wild-type E:MD-2 is a potent agonist for airway TLR4, a receptor also involved in the airway immune response and 3) to demonstrated that underacylated E:MD-2 is a weaker airway agonist. Outcomes: Obtained agreement with NIH to test the ability of E:MD-2 to prime the airway host defense system against highly virulent airway pathogens. Concluded experiments showing that wild-type E:MD-2 protects mice from pneumonic plague. These protective effects are 100 times more potent than related endotoxin products without MD-2. Concluded experiments using an animal model of pneumonic tularemia, which showed a modest delay in killing the infective model. Demonstrated prophylactic effects against pneumonic plague. Obtained 5-year NIH award to advance the science and technology.				
University of Iowa	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2010**	
		Platform allocation	$1,019,060	$1,019,060	
Description of Project	Myriad Fit-out. The building was renovated to accommodate the California based start up company - National Genecular Institute, Inc.				
Results achieved to Date/Plans	Building at Myriad Plaza on the UI Research Park was purchased and renovated. National Genecular Institute, Inc. (NGI) moved into this space in early 2007, and has since moved to alternative space. A lease was signed with prominent local company with 500+ employees for renewable long term lease for this facility				

Emerging trends in university economic development and technology transfer

Emerging Trends- There has been a clear focus among major research universities to enhance their infrastructure necessary to more effectively move important research findings towards commercialization for the benefit of society as well as to maximize economic value. More venture and angel investors are engaging with university tech transfer groups. National conferences held by early stage investors and conferences held by university tech transfer groups are merging. Experienced business and new venture development professionals are becoming common place in university tech transfer organizations, and university tech transfer conferences are presenting relevant business and new venture sessions. Successful university research parks have vibrant laboratory-based business incubators that provide both facilities and active business support programs for their startup companies. Most successful university business incubators are constructed debt free, or very close to it. Graduate space for incubator companies – sometimes called accelerator space – is becoming a mainstream program to support companies as they graduate from life science and IT incubators.

Available Capital- The worldwide venture capital trend in the past years has been a movement away from investing in early stage companies to focus on later stage companies. This is not a helpful trend for university borne startups, virtually all of which are early stage. However, more recently early stage investing is reemerging as a focus area for a growing number of regional and national venture funds. Furthermore, venture and angel groups within Iowa are recognizing that investing in Iowa technology companies typically means investing in early stage. As such, the sources of capital for university startup companies are on the rise.

New Programs- Most universities see only a few percent of technologies commercialized, typically because of lack of proof of concept for these innovations. As such, this is an area of growing focus for universities. New programs are focused on establishing the means for proof of concept that can lead to an interested commercial partner and the required capital to bring innovations to market. One example is to extend the concept of "Entrepreneur-in-Residence" which is applied to new startups, to "Commercialization Expert-in-Residence" which is applied more generally to technologies that are too early to garner the interest of an entrepreneur or industry partner. These individuals are being attracted to universities for their combined technology and business expertise to help faculty invent for specific market needs, versus the more historical serendipitous approach.

Alignment with State and Regional Priorities and Cluster industries – working closely with the IDED as they develop their Innovation Council universities are strategically positioned to support the states three science and technology platforms of biosciences, advanced manufacturing and IT . They are also working across all 3 Regents institutions to develop strong infrastructure to support renewable energy. This alignment is crucial for Iowa's success in terms of science and technology infrastructure, workforce development and alignment with state and regional economic development assets need to create and recruit key companies in targeted areas. In the case of UI our local targeted industry clusters include Wind Energy, Food Processing and Biotechnology and the university continues to align itself to support growth in these areas.

Appendix A

The John Pappajohn Entrepreneurial Center

Outreach

JPEC is committed to providing entrepreneurial education, consulting services, and lectures to the community at large in order to contribute to the growth of existing and emerging businesses. Through its f programs, JPEC impacts the economic development of the region and the state of Iowa.

Youth Outreach - Jacobson Institute for Youth Entrepreneurship

The Jacobson Institute for Youth Entrepreneurship is a comprehensive program that enriches K-12 students' lives through classroom and practical educational experiences. Created in 2007, the Institute is built on three key components – teacher education, development of innovation curricula, and outreach opportunities. The Jacobson Institute provides opportunities for both instruction and practice in entrepreneurship and gives educators the tools they need to teach the "entrepreneurial mindset" – that is, to encourage creativity, innovation, critical thinking, and problem solving, and to prepare students for success in the worlds of business and entrepreneurship.

Teacher Training

The Jacobson Institute for Youth Entrepreneurship and JPEC work directly with secondary teachers by training them to incorporate entrepreneurship into their classrooms and providing them with ongoing support and curriculum resources throughout the school year. Designed to simulate an entrepreneurial-based classroom, the training provides educators with hands-on learning experiences enabling them to leave the training fully equipped to implement entrepreneurial education in their respective classrooms.

YouthBizCentral Online Curriculum

Educators incorporating entrepreneurship into their classrooms have access to a customized, innovative, internet-based entrepreneurship curriculum. In addition to downloading PowerPoint presentations, lesson plans, and activities on key entrepreneurial topics, teachers develop a fully customized business planning template geared to meet the specific needs of their classroom. Through completion of the business planning process, students using the YouthBizCentral curriculum learn firsthand the skills necessary for starting and running a successful business.

Through support from the Carver Trust of Muscatine, IA, the Jacobson Institute is currently developing discipline-based modules for math, science and agriculture to better meet the entrepreneurship education needs of these classrooms. Furthermore, teachers nationwide will have the opportunity to enroll in graduate level online entrepreneurship courses offered by the Jacobson Institute in partnership with JPEC.

Conferences & Speaker Series

The John R. Hughes Lecture Series, sponsored by Hills Bank & Trust, Inc., the Sandage Entrepreneurial Speaker Series, sponsored by the Sandage Charitable Trust, and the Community Lectures, a component of the Entrepreneur-in-Residence program, sponsored by the Iowa State Bank & Trust Company, bring successful entrepreneurs to campus to share their experiences with UI students and community members. The Iowa Venture Capital and Entrepreneur Conference and Collegiate Entrepreneurs Iowa Conference provide seminars and networking opportunities for aspiring entrepreneurs, business owners, investors, and students.

JPEC's Distance Certificate in Entrepreneurial Management
The Certificate in Entrepreneurial Management is available online to students across the State of Iowa as part of Iowa Community College partnerships. Many online students combine The Certificate in Entrepreneurial Management with the UI's Bachelor of Applied Studies (BAS) or Bachelor of Liberal Studies (BLS) in order to earn their undergraduate degree from The University of Iowa. These online opportunities are offered through UI Division of Continuing Education. Distance students may compete in the University of Iowa elevator pitch and business plan competitions, apply for scholarships, and participate in all other activities offered by the John Pappajohn Entrepreneurial Center.

Academic Program

Enrollment

- Summer 2009: 20 Classes/sections, 207 Undergrads, 98 graduate students
- Fall 2009: 41 Classes/sections, 1644 Undergrads, 7 graduate students
- Spring 2010: 43 Classes/sections, 1828 Undergrads, 55 graduate students

I-Envision Student Organization

• Number of members	26
• National / Regional Conferences Attended	2

Client Consulting Services

Wellmark Venture Capital Fund

• Companies funded	2

Consulting Projects

• Number of projects (program participants)		53
• Industries include: Service, Medical, Production, Retail, Education, Non-Profit		
• Estimated Job Creation		50
• Hours dedicated to one-on-one consulting	6,240	

FastTrac® Entrepreneurial Training Program
Iowa City area class:

• Classes	2
• Estimated New Business Starts	17
• Total Participants	22
• Estimated Job Creation	45

Assorted Other Clients
Various consulting projects and clients not directly involved in the programs above or the UI SBDC

• Estimated New Business Starts		40
• Total Clients		60
• Estimated Job Creation		25
• Hours dedicated to one-on-one consulting	600+	

Bedell Entrepreneurship Learning Laboratory Student Business Incubator

Enrollment Since Inception in May 2004

- Number of student teams 97
- Total students impacted 169

Bedell Entrepreneurship Learning Laboratory Programs

- 25 Entrepreneur-in-Residence sessions, entrepreneurs served as mentors
- 14 Roundtable Luncheon sessions with guest speakers/mentors
- Mentoring Sessions, weekly 30 minute sessions during academic year

Impact this year

- Estimated New Business Starts 20
- Program Participants 22
- Estimated Job Creation 10
- Hours dedicated to one-on-one consulting 400

Business Plan and Elevator Pitch Competitions

- Fall 2009: Student Elevator Pitch (40 Entrants)

Green Transitions (Brandon Yoder)		*$2,500*
Point of Sale Solutions (Ross Peterson)		*$2,500*
Cranium Inc (Justin Janus)		*$2,500*
Nostalchique Boutique (Alexandra Feig)		*$2,500*
Onyx Media Group (Harrison Wheeler)		*$1,250*
Moto: The African Hot Sauce (Mokotsi Rukundo)	*$1,250*	
Rader Originals (Adam Rader)		*$1,250*
Knotty Sisters (Brittany Burggraaf)	*$1,250*	
Elizabeth James Designs (Beth Wendling)	*$ 750*	
CollegeInformant.com (Jordan Tivers)		*$ 750*
Earth Accessories (Heather Swanson)		*$ 750*
KruTek (Matthew Kemp)		*$ 750*
The Styling Division (Stacy Kelsey)		*$ 750*
Hawk City Productions LLC (Dustin Bigelow)		*$ 500*
Universiticks (Dustin Waner)		*$ 250*
Hawkeye Hookup (Eric Procaccio)	*$ 250*	
Golf Database (Eric Crawford)		*$ 250*

- Fall 2009: Faculty & Staff Elevator Pitch Competition (53 Entrants)

Celadon Applications (Karen Pease)		*$2,500*
Carbon-Free Energy, LLC (Joseph Sulentic)	*$2,500*	
Guiding Vision LLC (Charles Mercer)		*$2,500*
Visualize Law (Anastasia Slivker)	*$2,500*	
CREW (Maria Lofgren)		*$2,500*
SmarteRx (Erin Thatcher)		*$1,500*
Samos Health (Jason Fries)		*$1,500*
VolTesla (Johna Leddy)		*$1,500*
Health Auction (Brandon Alleman)	*$1,500*	
FashRoom, LCC (Carlton Dick)		*$1,500*
LIGHTZERO (David Burgess)		*$1,000*
Online-Bidder (Tim O'Conner)		*$1,000*

Anchors Medical (Volney Brand)	*$1,000*	
Vidhi Solutions (Lalit Chellani)		*$1,000*
A Dream of Corn (Xin Fing)		*$1,000*

- Fall 2009: BELL Semester End Competition (17 Entrants)

Onyx Media Group (Harrison Wheeler)		$1,500
Hawk City Productions (Dustin Bigelow, Katie Mothershead)	$ 500	
The Grocery (Blake Peterson)		$ 500
Moto Hot Sauce (Mokotsi Rukundo)		$ 500
SmarteRX (Erin Thatcher)		$ 500
POS Solutions (Ross Peterson)		$ 500

- Spring 2010: New Venture Challenge (41 Entrants)

Viewpoint Molecular Targeting LLC (Michael Schultz)	*$25,000*	
Celadon Application (Karen Pease)	*$10,000*	
K&L Associates (Cody Kiroff &Nick Lacina)	*$5,000*	
Dibzees (Casey Everts)		*$5,000*
Fierce Corgi Specialty (Andy Hosmanek)	*$2,500*	
Moto: the African Hot Sauce (Mokotsi Rukundo)	*$2,500*	
Pierson Brain (Ron Pierson)		*$1,000*
NurturEnergy (David Burgess)		*$1,000*
Earth Accessories (Heather Sawnson)		*$1,000*
SureLock (Matt Wiese)		*$1,000*
Seasonal Salad (Stephen Bonnet)	*$1,000*	

- Spring 2010: Volding Business Plan Competition (17 Entrants)

*Responsible Transportation (*Keaton Walker*)*	*$5,000*	
*Moto: The African Hot Sauce (*Mokotsi Rukundo*)*	*$3,000*	
DibZees (Casey Everts, Robert Hu, Andrew Wright)	*$3,000*	
POS Solutions (Ross Peterson)		*$3,000*
K&L Associates (Cody Kiroff & Nick Lacina)		*$3,000*
Scott Allen Productions (Jordan Tivers)		*$1,000*
Rader Originals (Adam Rader)		*$1,000*
SmarteRX (Erin Thatcher)		*$ 500*
Golf Database, LLC (Eric Crawford)		*$ 500*

- Spring 2010: BELL End Year Competition (14 Entrants)

Responsible Transportation (Keaton Walker)	*$3,500*	
POS Solutions (Ross Peterson)		*$2,000*
Moto: The African Hot Sauce (Mokotsi Rukundo)	*$1,000*	
The Styling Division (Stacy Kelsey)		*$1,000*
GolfDatabase.com (Eric Crawford & Thad Reeves)	*$1,000*	
SmarteRx (Erin Thatcher)		*$ 750*
Hawk City Productions (Dustin Bigelow & Katie Mothershead)	*$ 750*	

- Fall 2009 Pappajohn Iowa Business Plan Competition (66 Entrants)
  3 of the 8 finalists and 3rd Place winner (Think Safe) were UI JPEC clients

- Spring 2010: Pappajohn New Venture Business Plan Competition (20 Entrants)
  Dibzees (Casey Everts, Andy Wright, Robert Hu) *$5,000*

Moto (Mokotsi Rukundo)
K&L Associates (Cody Kiroff & Nick Lacina)

- Spring 2010: Hubert E. Storer Engineering Student Entrepreneurial Startup Award (2 Entrants)
  Responsible Transportation (Keaton Walker) *$10,000*

- Spring 2010: Prometheus Award Finalist – Student Innovation of the Year
  SmarteRX, (Erin Thatcher)

- Spring 2010: Prometheus Award Finalist – Outstanding Startup Company of the Year and Life Sciences Company of the Year
  J & J Solutions, Inc. (Jared Garfield)

National Business Plan Competitions

- Nebraska Undergrad Finalist, Lincoln, Nebraska
  Green Transitions, LLC, (Brandon Yoder)
- GSEA Semi-Finalist
  J & J Solutions, Inc. (Jared Garfield)
- iBio Propel Business Plan Competition, Chicago, IL
  J & J Solutions, Inc. (Jared Garfield) *$10,000*

Programs, Seminars and Workshops - Highlights

- Sandage Speaker Series – Ted Waitt, 171 attendees
- MidWestOne Lecture Series, "Seize the Opportunity" Russell A. Gerdin, Founder and CEO of Heartland Express, North Liberty, IA, 460 attendees

Fall 2009	**# Of Participants**
Business Expenses & Deductions (SBDC)	9
FastTrac NewVenture Free Introductory Session (SBDC)	3
Global Student Entrepreneur Awards Competition	4
Sales, Use and Local Option Taxes (SBDC)	6
FastTrac New Venture Free Introductory Session (SBDC)	5
Business Expenses and Deductions (SBDC)	3
Reporting Sole Proprietor Income (SBDC)	4
FastTrac New Venture Entrepreneurial Training Program (SBDC)	10
Payroll and Employment Taxes (SBDC)	4
Faculty Elevator Pitch Workshop	42
Sandage Speaker Series – Ted Waitt,	171
Elevator Pitch Competition for Faculty, Staff, and Graduate Students	52
Undergraduate Student Elevator Pitch Workshop	29
Sales, Use and Local Option Taxes (SBDC)	4
Business Expenses and Deductions (SBDC)	4
Technology Export Roundtable (SBDC)	8
Undergraduate Student Elevator Pitch Competition	40
Reporting Sole Proprietor Income (SBDC)	2
Payroll and Employment Taxes (SBDC)	2
Construction Contractor's Tax Workshop (SBDC)	4
½ Day Entrepreneurship Boot Camp	55

Spring 10	
Sales, Use, and Local Option Taxes (SBDC)	3
Pappajohn New Venture Business Plan REGIONAL Competition	20
Business Plan Workshop	82
Paul Heath's Reception	48
Hughes Lecture Series – Dr. David Kohl	420
Collegiate Iowa Entrepreneurs Conference	37
FastTrac New Venture Series	15
New Venture Challenge Intent to Compete Deadline – 3/12	72
Volding Intent to Compete	9
½ Day Entrepreneurship Boot Camp	58
MidWestOne Lecture Series - Russell A. Gerdin	460
National Lab Day Elevator Pitch Competition – Intent to Compete	2
QuickBooks I (SBDC)	14
QuickBooks II (SBDC)	10
Technology Export Readiness (SBDC)	5
TOTAL	1716

Total Estimated Economic Impact

Across all programs, JPEC estimates the following total economic impact.

Academic Program

- Total Students 4,301

Bedell Entrepreneurship Learning Laboratory

- Estimated New Business Starts 20
- Program Participants 22
- Estimated Job Creation 10
- Hours dedicated to one-on-one consulting 400

Consulting Projects

- Number of projects (program participants) 53
- Industries include:
  Service, Medical, Production, Retail,
  Education, Non-Profit
- Estimated Job Creation 50
- Hours dedicated to one-on-one consulting 6,240

FastTrac® Entrepreneurial Training Program

Iowa City area class:

- Classes 2
- Program Participants 22
- Estimated New Business Starts 17
- Estimated Job Creation 45

Assorted Other JPEC Clients

Various consulting projects and clients not directly involved in other programs.

- Estimated New Business Starts 40
- Total Clients 60
- Estimated Job Creation 25
- Hours dedicated to one-on-one consulting 600+

Small Business Development Center

• New Business Starts	25
• Total clients counseled	313
• Estimated Job Creation	114
• Hours dedicated to clients	1,393

Programs, Seminars and Workshops

• Competitions/Awards Participants	292
• Participants (excluding FastTrac® Participants)	1691

Totals:

• Startups Served (New Business Starts)	***112***
• Total Program Participants	***4,398***
• Estimated Job Creation	***231***
• Hours dedicated to Clients	***8,633***

Appendix B

UIRF FY10 New Projects and Technologies for Commercialization

Project	Faculty	Description	FY10 Budget	Type of GIVF Funding
Radio-Imaging	Schultz	Prostate cancer diagnostic	$59,500	Seed grant, external grant support
Natural compound as therapeutic	Adams	Therapeutic treatment for muscle wasting, potentially other disease conditions	$50,000	Seed grant
Therapeutic use of iodide	McCray	Treatment for respiratory virus infections	$49,632	Seed grant
FxRedux – medical software	Anderson	Improved reconstruction of severe bone fractures	$36,064	Seed grant
Propofol derivatives	Baker	Therapeutic compound for anticonvulsant use	$35,000	Seed grant
Biosynthesis of compounds	Das	Production of commercially relevant chemicals	$27,000	Seed grant
Genomic tool	Manak	Identification of human disease-causing mutations	$48,949	Seed grant
Drug delivery	Lim	Use of thermo-reactive gels for the delivery of therapeutic treatments	$49,000	Seed grant
Genomic tool	Doddapa-neni	Improved genetic sequencing	$30,846	Development funding
TLR4 therapeutic compound	Weiss	Modulation of immune response for treatment of numerous infections	$32,500	Development funding
Epigenetic pattern recognition	Philibert	Diagnosis of behavioral conditions (smoking, alcohol, other)	$5,000	External grant support
Anticipatory control software	Kusiak	Prediction of inputs in optimization of	$26,500	Entrepreneur-In-Residence;

		numerous applications (wind, combustion, HVAC, others)		external grant support
Bacterial compound as therapeutic	Horswill	Use of bacterial signaling process to breakdown biofilms	$5,500	External industry consulting
Magnetic particles	Leddy	Enhanced electrochemical performance	$10,000	Development funding
Musculoskeletal Training Device	Shields	Bone loss and injury prevention (with and without electrical stimulation)	$9,500	Intellectual property assessment; external grant support
Badge / receiver signaling device	Herman / Polgreen	Healthcare delivery environment traffic pattern signaling (hand washing, patient patterns, others)	$2,500	Intellectual property assessment
Medical software	HawkIRB	Regulatory compliance in human clinical trials	$13,000	External industry consulting
Immune Banking	Bishop	Enhanced vaccines using innate immunity	$0	Under consideration
Medical imaging and treatment	Wemmie	Use of novel pathway for diagnosis and treatment of multiple condtions	$0	Under consideration
Therapeutic peptide	Giangrande	Enhanced targeting of prostate for diagnostics and treatment	$0	Under consideration
OsiriX - medical software	Anderson	Database of bone fracture images for improved treatment	$0	Not pursued at this time
Biosynthetic production	Gopishetty	Novel methods for the production of numerous commercial chemicals	$0	Under consideration
Opioid derivatives	Prisinzano	Improved treatment of pain, other	$0	Under consideration

		conditions		
Stroke monitoring device	Liera	Through improved physiological monitoring, better treatment of stroke victims	$0	Under consideration
Therapeutic compound	Korovkina	Use of toxin derivatives for treatment of numerous medical conditions	$0	Under consideration
StartupMidwest	N/A	Significant UIRF partner in commercializing UI technologies	$50,000	External industry consulting
Elevator Pitch	N/A	Competitive business idea award based on two minute business idea presentation	$25,000	Business idea award
New Venture Challenge	N/A	Competitive business proposal award based on written proposal and presentation	$25,000	Business proposal award
Total			$590,491.00	

Appendix C

Name of Business or Other Entity Served	City and County where this Project is in Place		University Unit that interacted with business or other entity
	City	County	
BUSINESS INCUBATOR TENANTS			
AMBIGroup	Coralville	Johnson	Technology Innovation Center
ASL Analytical	Coralville	Johnson	BioVentures Center
Bio::Neos, Inc.	Coralville	Johnson	Technology Innovation Center
Cellular Engineering Tech.	Coralville	Johnson	BioVentures Center
Componica, LLC	Coralville	Johnson	Technology Innovation Center
Digital Artefacts, LLC	Coralville	Johnson	Technology Innovation Center
Exemplar	Coralville	Johnson	BioVentures Center
Innomatix, LLC	Coralville	Johnson	Technology Innovation Center
J&J Solution	Coralville	Johnson	Technology Innovation Center
KemPharm, Inc.	Coralville	Johnson	BioVentures Center
QI2	Coralville	Johnson	Technology Innovation Center
Ramaanchar Technologies, Inc.	Coralville	Johnson	Technology Innovation Center
Terpenoid Therapeutics, Inc.	Coralville	Johnson	BioVentures Center
The Thomas Group	Coralville	Johnson	Technology Innovation Center
UIQI2	Coralville	Johnson	Technology Innovation Center
Vertex Pharmaceuticals	Coralville	Johnson	BioVentures Center
VIDA Diagnostics	Coralville	Johnson	Technology Innovation Center
Kepa Services	Coralville	Johnson	Technology Innovation Center
SantosHuman, Inc.	Coralville	Johnson	Technology Innovation Center

Pohaku	Coralville	Johnson	Technology Innovation Center
RESEARCH PARK TENANTS			
Innovative Software Engineering	Coralville	Johnson	UI Research Park/TIC Graduate
LMS North America	Coralville	Johnson	UI Research Park/TIC Graduate
Stanley Environmental, Inc.	Coralville	Johnson	UI Research Park
Vangent, Inc.	Coralville	Johnson	UI Research Park
Integrated DNA Technologies, Inc.	Coralville	Johnson	UI Research Park/TIC Graduate
Pearson Educational Measurement	Coralville/Iowa City	Johnson	UI Research Park
Noel-Levitz	Coralville	Johnson	UI Research Park
Cargill International	Coralville/Cedar Rapids	Johnson	UI Research Park
Brighton Group	Coralville/Des Moines	Johnson/Polk	UI Research Park
OTHER BUSINESS INCUBATOR GRADUATES ACTIVE IN IOWA			
Garvin Consulting Services	North Liberty	Johnson	Technology Innovation Center
Ecolotree, Inc.	Lowden, North Liberty	Cedar, Johnson	Technology Innovation Center
Accredo Therapeutics	Iowa City	Johnson	Technology Innovation Center
Corcoran Communications, Inc.	Iowa City	Johnson	Technology Innovation Center
Bio-Research Products, Inc.	North Liberty	Johnson	Technology Innovation Center
aJile Systems, Inc.	Cedar Rapids	Linn	Technology Innovation Center
CompuTerra, Inc.	Cedar Rapids	Linn	Technology Innovation Center
Sustainable Science	Iowa City	Johnson	Technology Innovation Center
Caviforce Technologies, Inc.	Des Moines	Polk	Technology Innovation Center
Sebesta Blomberg & Assoc., Inc.	Coralville	Johnson	Technology Innovation Center
HomeSafe	Coralville	Johnson	Technology Innovation Center
Integrated DNA Technologies, Inc.	Coralville	Johnson	UI Research Park/TIC
The Patient Education Institute	Coralville/Iowa City	Johnson	UI Research Park/TIC

Police Law Institute	Coralville/North Liberty	Johnson	UI Research Park/TIC
Goldfinch Diagnostics	Coralville	Johnson	Technology Innovation Center
Applied Fullerene	Coralville	Johnson	Technology Innovation Center
Corridor Media Group	Coralville	Johnson	Technology Innovation Center
DEVELOPERS			
Myriad Developers, Inc.	Cedar Rapids	Linn	UI Research Park
TMD, L.L.C.	Solon	Johnson	UI Research Park
Midwest Development & Invest.Corp.	Fairfield	Jefferson	UI Research Park
Liberty Growth	Iowa City	Johnson	UI Research Park
Hunter Companies	Cedar Rapids	Linn	UI Research Park
S & S Developers	Iowa City	Johnson	UI Research Park
EMRICO	Iowa City	Johnson	UI Research Park
Ryan Companies, US	Cedar Rapids	Linn	UI Research Park
LMC, LLC	North Liberty	Johnson	UI Research Park

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FY10 Board of Regents, State of Iowa, Annual Economic Development and Technology Transfer Report

PRESENTED BY SHARRON QUISENBERRY, VICE PRESIDENT FOR RESEARCH AND ECONOMIC DEVELOPMENT

September 20, 2010

1. Please briefly describe the relationship of your institution's economic development activities to the enhancement of economic growth in the state. The description should cover, but not necessarily be limited to the following:
A. the relationship between institutional activities and creation of jobs and wealth in Iowa
B. Institutional activities and services which indirectly promote economic development, such as training provided to staff of local economic development agencies

1A. Enhancement of Economic Growth through Job Creation and Retention, Investments, Sales, and Cost Savings

Iowa State University engages in several activities that have direct impact on both the creation as well as the retention of jobs in Iowa. The ISU Research Park is a technology community that encourages commercialization of university research. Likewise, the Innovations Development Facility, part of the Plant Sciences Institute, incubates new companies. In addition, the IPRT (Institute for Physical Research and Technology) Company Assistance Program, ISU Extension's Center for Industrial Research and Service (CIRAS), the Small Business Development Center (SBDC) and the ISU Pappajohn Center for Entrepreneurship interact with companies across Iowa to solve production and management problems. These interactions lead to the resolution of problems related to product development and business management. As a consequence of the improved production resulting from these interactions, businesses have been able to retain and often expand their work force. Some examples of the direct impact that these ISU units have had this past year are as follows:

- The ISU Research Park continues to be successful in initiating as well as nurturing numerous new businesses. Ten new companies and affiliates have joined the Park in FY10, bringing the historical total to 201 companies, research centers, and affiliates. Currently, there are 69 companies, research centers, and affiliates located in the Park, employing 894 people.

- One new faculty-affiliated start-up company has joined the Innovations Development Facility, which is an on-campus business incubator in the Roy J. Carver Co-Laboratory, under direction of the Plant Sciences Institute. A total of 15 companies have used this business incubator space since the facility opened in September 2003.

- A summary of project evaluation data 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. Companies report positive impacts affecting their sales, investments, and operating costs despite the economic recession of 2009-2010. Of the IPRT clients responding to the survey, the estimated annual impact over the last 5 years is $11.6 million per year. Companies also estimated over thirty jobs were created or retained each year from 2005-2009, with 14 jobs retained or created from projects surveyed in the past year when many employers were cutting jobs.

The satisfaction rating given by clients during this five-year period is 4.7 (1-5 scale, with "1" being "is not satisfied" and "5" being "very satisfied).

- ISU proprietary biodiesel catalysts technologies (developed by [recently deceased] Victor S.-Y. Lin, who had been director of IPRT's Center for Catalysis and a professor of chemistry at Iowa State University) have been successfully transferred to an Iowa-based startup company, Catilin, Inc. These unique recyclable solid catalysts have enabled Catilin to attract $6.7 million in venture capital. The company, founded in 2007, now employs almost 30 full-time staff members. Catilin and IPRT's Center for Catalysis received a grant in FY10 and are embarking on a $5.3 million study of biodiesel production from algae.

- Visualization software for medical applications (developed by Eliot Winer, associate director of IPRT's Virtual Reality Applications Center (VRAC) and professor of mechanical engineering at Iowa State University, James Oliver, VRAC director and Dr. Thom Lobe, a pediatric surgeon based at Blank Children's Hospital in Des Moines) have been transferred to an Iowa-based company. Visual Medical Solutions, founded in 2007, is offering BodyViz, software that creates 3D MRI, CT scan visualizations, unlocking medical imaging for the practicing surgeon, diagnostics and treatment. The company is located in the Iowa State University Research Park and employs four people.

- Biomass conversion technologies (developed by Robert Brown, director of IPRT's Center for Sustainable Environmental Technologies, Iowa Farm Bureau director of Iowa State's Bioeconomy Institute, and professor of mechanical engineering, along with three graduate students) have become the basis for a new company. Avello Bioenergy Inc. is commercializing profitable feedstocks for asphalt, fuels, chemicals and soil amendment markets through low-cost thermal conversion of biomass. The company was formed in 2009 by Brown and his students, Jared Brown, Cody Ellens and Anthony Pollard, now all graduates of Iowa State. The company has secured seed funding from an Iowa venture capital firm and is located in Ames.

- Extension's 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. Cumulatively, over the past five years, CIRAS and its partners have reported impact from companies totaling more than one billion dollars (new investments $315 million, costs saved or avoided $73 million, sales gained or retained $692 million) with 13,173 jobs added or retained as a result of the technical assistance, education, or research they received.

- In FY10, businesses from 97 counties in the state received assistance on projects or attended educational workshops with CIRAS staff or partners; 1,161 companies reported $46 million in new investments, $20 million in costs saved or avoided, and $261 million in sales gained or retained. Company executives stated that 5,254 jobs were added or retained as a result of the research, technical assistance, or education they received from CIRAS and its partners.

- As part of the CIRAS response to the floods and tornadoes of 2008, a business continuity planning program was developed for Iowa manufacturers. During the

business continuity planning process, CIRAS worked with companies to identify risks and to develop and implement mitigation plans to ensure critical business operations recover in the minimum amount of time after a disruption. Since the flood, the training has been provided to 17 Iowa companies. Beyond developing the plan for a disaster, companies participating have stated they have had many improvements in day-to-day operations resulting from the strategic planning that occurred during the plan preparation. Reported impacts have exceeded $250,000 per company.

- More than 700 participants were trained in FY10 by attending conferences and workshops offered through a partnership of CIRAS; Civil, Construction, and Environmental Engineering; Electrical and Computer Engineering; Alliant Energy; CIPCO; MidAmerican Energy; the Iowa Association of Municipal Utilities; the Baker Group; and the Iowa Energy Center. Energy efficiency workshops, held across Iowa, provided education on compressed air systems, pumps, and motors. Energy short courses educated participants on the production, transmission, and distribution of electricity. Engineers, geologists, technicians, and safety personnel attended structural engineering, transportation, and environmental and water resources design conferences. Attendees were able to obtain professional development hours towards retention of their Iowa engineering licenses.

- The recent economic downturn has caused a reduction in sales for many Iowa companies. As a result, there has been a growth in the number of companies seeking assistance from CIRAS to better understand how they might increase their sales by providing products or services to Federal, state, or local governments. CIRAS staff provided counseling to more than 770 companies. These companies reported over $189 million in government contract impact due in part to the assistance they received. The Defense Logistics Agency, which funds CIRAS to provide assistance to Iowa companies, indicated this impact helped create or retain over 3,000 jobs.

- During FY10, the Small Business Development Center (SBDC) provided business assistance to companies, involving 2,782 clients and 14,306 counseling hours. They also conducted 313 training workshops in which 3,827 individuals participated.

- The ISU SBDC, along with the ISU Pappajohn Center for Entrepreneurship, provided 2,953 hours of counseling assistance to start-up and existing companies; served 153 clients with one-on-one counseling; educated 353 attendees through workshops; provided advice to several hundred clients via telephone and email; and advised 41 technology companies in the areas of licensing, equity based financing, market entry, and numerous operational areas.

- Every year the SBDC commissions Professor James J. Chrisman to review the economic impact of the SBDC's clients who receive five or more hours of counseling from the SBDC, which account for only 20% of the total SBDC client base. In a report on this client segment published by Professor Chrisman, *Economic Impact of Small Business Development Centers (SBDC's)*, it was shown that for every $1.00 in state and federal funding in FY08, the total tax dollars returned to the State of Iowa and the federal government by SBDC clients

in 2009 was $1.25. Among these clients there were 248 jobs retained, 430 jobs created, and $16,330,310 in new sales. The SBDC helped these clients raise over $34 million in financing for their businesses.

- Technologies originating at ISU and licensed to Iowa companies have resulted in over $58 million in sales by those companies in calendar year 2009. Total sales of ISURF-licensed technologies were $514 million, not including germplasm.

- The Office of Intellectual Property and Technology Transfer began supporting SBIR (Small Business Innovation Research) and STTR (Small Business Technology Transfer) outreach efforts in FY06. Since then, SBIR and STTR funding in Iowa has rebounded. In FY10, eighteen different Iowa companies won twenty-four new or continuing SBIR and STTR awards worth $7.2 million. This is the fifth consecutive year that funding has risen and the first time it has surpassed $7 million. An emphasis has been placed on outreach and training activities. This includes a monthly newsletter and workshops presented by Federal program managers. In addition, comprehensive proposal preparation support has contributed to an increasing number of companies applying for funding. Twenty-three Iowa companies were assisted in the preparation of twenty-five proposals during FY10, including five Iowa State faculty or staff-related companies. The funded projects reflect Iowa's strengths in biotechnology, information systems, materials development and agriculture. Over $3.9 million in support was awarded by NIH for diverse projects that range from the development of improved influenza vaccines to new cancer drugs to new animal models for human diseases. An additional $1.8 million was received for Department of Defense projects that include innovative training tools, vaccines for biowarfare agents and software for optimizing the load distribution among soldiers.

- The ISU Grow Iowa Values Fund program has a competitive research component that pairs ISU faculty members with Iowa industries to create economic benefit for the companies. A survey of nine companies (surveyed one year after project completion) that participated in projects that were completed in June 2007 documented 71 jobs created or retained and a $9.1M sales impact due to the research projects conducted in partnership between ISU and the companies. Surveys for the round of projects completed in June 2009 are occurring this winter.

1B. Training Opportunities for Staff of Local Economic Development Agencies and Other Activities that Indirectly Promote Economic Development

- The College of Engineering and ISU Extension's Center for Industrial Research and Service (CIRAS) in partnership with the Iowa Alliance for Wind Innovation and Novel Development (IAWIND) and the Iowa Wind Energy Association (IWEA) held a joint wind conference to facilitate dialog and planning to grow the wind industry in Iowa. Industrial experts and academic researchers delivered educational workshops on new trends in wind turbine design, energy storage, and the integration of wind power into existing distribution systems. Over 260 attendees from academia, government, and industry participated in the conference.

- In 2010, CIRAS developed a training curriculum for Iowa businesses to provide education on a new federal regulation requiring compliance with the Department of Homeland Security (DHS) E-Verify system. Companies awarded specific Federal government contracts must enroll in the DHS online system to electronically verify the employment authorization of employees working in the United States. Thirteen workshops were held throughout the state of Iowa with over 130 attendees. This training provided companies with the necessary tools to meet the compliance requirement in selling to the Federal government.

- The Siouxland Industrial Roundtable, in partnership with the Siouxland Chamber of Commerce and CIRAS, provide opportunities for industry leaders to learn from each other's experiences, find out what has worked or not worked for others, and how to apply this information to grow their own companies. Nationally recognized speakers provided education in a variety of areas. The latest event focused on the immediate and future economic status of the Siouxland area. Over 100 attendees from Iowa, Nebraska, and South Dakota attended the Roundtables.

2. Please provide the following information for FY10: (If your institution utilizes additional metrics specific to your institution's specialized areas of research or service, please include them here)

Note: Unless noted, the data provided below are FY10 data.

a. Number of disclosures of intellectual property: 111
b. Number of patent applications filed: 26
a. Number of patents awarded: 29
b. Number of license and option agreements executed on institutional intellectual property, in total and in Iowa: 97 total, 32 in Iowa
c. Number of license and option agreements yielding income: 260
d. Revenue to Iowa companies as a result of licensed technology: $58 million (CY09)
e. Number of startup companies formed, in total and in Iowa (through licensing activities): 0 total, 0 in Iowa
f. Number of companies in research parks and incubators: ISU Research Park: 39 private and 17 university-related; Plant Sciences Institute Innovations Development Facility (IDF): 3 (all university-related or affiliated)
g. Number of new companies in research parks and incubators: ISU Research Park: 9 private and 1 university-related; Plant Sciences Institute IDF: 1 (both university-affiliated)
h. Number of employees in companies in research parks and incubators: ISU Research Park: 550 private and 202 university-related; Plant Sciences Institute IDF: 6 (all university-related or affiliated)
i. Royalties and license fee income: $9.4 million
j. Total sponsored funding received: $388.2 million of which $239.2 million is for research
k. Corporate sponsored funding received for research and economic development, in total and in Iowa: $21.1 million total, $11 million in Iowa

l. Iowa special appropriations for economic development in the following categories:
    i. Annual state appropriations for ongoing programs (such as research parks, SBDC, IPRT, IDM, Metal Casting Center): $2.5 million—includes $894,930 SBDC (includes state-wide programs), $130,010 ISU Research Park & $1,447,588 IPRT
    ii. Grow Iowa Values Fund appropriations: $1,732,500
    iii. Battelle appropriations No new funding in FY10
m. Research expenditures (including state appropriations and external funding) $224.3 million—Note that this is an FY09 number, most recent number available
n. Licenses and options executed per $10 million research expenditures: 3.4 (est.)—Note that this is an FY09 figure, most recent number available
o. Sales of licensed products by Iowa-based companies: See d. above
p. Number of employees for current Research Park tenants and incubator, as well as former tenants that are still in existence in basic form world-wide 2,845
q. Number of interactions ISU had in FY09 with communities and businesses across the State of Iowa: ~6,500 (in all 99 counties)

3. Please describe the ways in which your institution is engaged in the following activities (For example, what is the nature of the outreach and service activities? Which units provide it? What kinds of people and organizations benefit?)
A. Direct and hands-on technical assistance to businesses and entrepreneurs
B. Direct economic development assistance to Iowa communities
C. Economic development services provided by research parks, incubators or similar service units

3A. Direct and Hands-on Technical Assistance to Businesses and Entrepreneurs: ISU System for Innovation

Iowa State University is charged with advancing economic development and technology transfer activities that promote growth and benefit all citizens. While creation of knowledge remains the basic responsibility of a research university, the way we share knowledge determines our success. ISU shares knowledge and expertise with students (learning and teaching), communities (engagement), and business and industry (technology transfer and economic development). ISU ranks as one of the most successful universities nationwide in several categories of technology transfer and economic development. The activities of the colleges, institutes and centers are coordinated through the Research and Economic Development Council that advises the Vice President for Research and Economic Development. The Vice President and this Council continuously communicate with economic development entities within the State such as the Iowa Department of Economic Development, the Iowa Business Council, the Greater Des Moines Partnership and other local and regional agencies.

The Iowa State University "System for Innovation" was developed to focus on the transfer of university technologies into commercial applications in start-up or existing companies. Functions of the ISU System for Innovation include:

- **Business Development & Assistance and Entrepreneurial Activities**: Efforts related to start-up companies, including business assistance services & SBIR/STTR applications.
- **Technical Assistance & Technology Development**: Solving technical problems, assisting in product development and process improvement projects for existing businesses. This includes the current efforts of no-cost technical assistance and cost-sharing projects.
- **Industry Relations**: Facilitation of a multitude of interactions between ISU and its industry partners, including the management of research relationships and interactions with economic development groups, legislative groups, and other third parties.
- **Community Development**: To disseminate and develop programming, facilitating community organizations, fostering community planning, and coordinating with community and regional economic development networks and organizations.
- **Technology Transfer and Licensing:** The transfer of intellectual property (patentable inventions, copyright works and proprietary materials) to business and industry through license agreements.
- **Physical Space:** Physical space for business incubation is available in the ISU Research Park, the Plant Sciences Institute, and the Center for Crops Utilization Research.
- **Research and Instrumentation Facilities:** Iowa State University maintains more than 20 central research facilities that also serve communities and businesses on a fee-for-service basis.

3B. Direct Economic Development Assistance to Iowa Communities

- Since 2005, ISU Extension's Center for Industrial Research and Service (CIRAS) has partnered with the ISU Department of Economics to conduct six 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. The studies have been funded in part from a grant to CIRAS from the Economic Development Administration.

  The sixth study, "Establishing a Baseline for the Siouxland Tri-State Regional Innovation Project: Key Industries and Occupational Characteristics," was completed in June 2009. Through this study, CIRAS assisted the Siouxland Region (ten counties in three states) in identifying their regional economy by defining the occupational characteristics and key industries in the region. This data assisted the region in the development of a strategic plan driven by a Regional Innovation Grant (RIG). The RIGs are funded by the Employment and Training Administration within the Department of Labor to assist state workforce agencies and local Workforce Investment boards in the development of a comprehensive, integrated, strategic regional plan, with a focus on current or future unanticipated economic events. CIRAS continues to work with the greater

Siouxland region to assist with data driven decision-making in addressing economic development and workforce development issues in the region.

3C. ISU's Key Units Engaged in Economic Development

Iowa State University, as part of the higher education system in the State, is charged with advancing technology transfer and economic development activities that promote growth and benefit all citizens. The University evolves these goals by contributing to workforce development, creating intellectual property, advancing ideas to the stage of market readiness, supporting creation of new companies, offering assistance to existing companies, and attracting new companies to the State. The University's economic development/technology transfer support system includes the following units that are coordinated through the Research and Economic Development Council:

- **Pappajohn Center for Entrepreneurship and the Small Business Development Center (SBDC)**. These units work with researchers to define the technologists' role in the company, evaluate markets, assist in the creation of a business plan and help the company develop connections with a network of business resources including consultants, accountants, attorneys, prospective employees and investors. In a typical year, the Pappajohn Center, working with IPRT, the Plant Sciences Institute, ISURF/OIPTT and other research centers, identifies approximately 25 prospective new technologies. These technologies can take six to 26 months to develop sufficiently to justify the formation of businesses. During this time the researcher receives assistance in moving the technology from the researcher's bench to the marketplace. The Pappajohn Center helps the researcher develop the model for the business and establish the network of resources necessary to implement the plan. These resources can include business assistance, students or capital. The Pappajohn Center/SBDC also continues to provide a referral network and facilitates the recruitment of students including access to internships.

- **Institute for Physical Research and Technology (IPRT).** Through IPRT's Company Assistance Program, Iowa companies can leverage the expertise of the IPRT research centers and other ISU capabilities in order to solve technical problems, create new products and processes, and increase productivity and quality. IPRT Company Assistance provides help through both its Research and Development cost-sharing program and through short-term, no-cost technical assistance. IPRT assists early-stage technology commercialization and actively collaborates with Iowa companies on technology development projects. IPRT plays an integral role in the process of technology transfer targeted at new business creation. Many successful businesses have emerged from IPRT technologies, including Mechdyne of Marshalltown, BodyViz of Ames and PowerFilm, Inc. of Ames.

  The staff members of the Materials Group and the Nondestructive Evaluation Group within Company Assistance provide significant and broad expertise to help Iowa manufacturers address material and inspection issues. These programs offer state of the art knowledge made available to business, and both groups have expanded their capabilities and facilities to keep pace with research

advances and modern industrial needs. This direction allows them to reach ever more clients and tackle an increasingly wide range of challenges.

IPRT was a major supporter of the Interlock House, Iowa State's entry into the U.S. Department of Energy's 2009 Solar Decathlon competition. The entry finished in 12th place in the international competition held at the National Mall in Washington D.C. in October 2009. The team, which consisted of more than 75 students and faculty, designed and built the Interlock House as a free standing solar-powered home that generates more energy than it consumes. The Interlock House was the only entry in the competition that was entirely ADA accessible. More than 14,000 people toured the house while it was in Washington. The Iowa Department of Natural Resources has purchased the house and will use it as an interpretive center at the Honey Creek Resort State Park at Rathbun Lake in southern Iowa.

- **Iowa State Innovation System (ISIS).** Near the time a venture is launched, facilities become an issue. ISIS, ISU's technology incubator, provides an ideal first home for companies. ISIS offers connections to the University, affordable space with reception services, office equipment (copiers, fax machines, and computers), conference rooms, and other amenities at a very reasonable rate. The Pappajohn Center, described above, provides mentoring to the companies as well as the opportunity for companies to utilize students as interns and researchers. ISIS will generally attract five new companies each year. Companies typically spend one to three years in the Incubator moving from product development to product sales. Once sales are established, companies grow out of the Incubator. Some companies remain within the Research Park and continue to receive development assistance, while others move on to commercial space elsewhere but can still receive business development services from the ISU Pappajohn Center and ISU SBDC. As companies mature, the University provides opportunities for collaboration between researchers at the University and in the companies. Students provide cost-effective labor and are potential employees. The Research Park provides expansion space, often financing the space and improvements.

- **Iowa State University Research Park.** The Iowa State University Research Park is a 230-acre development with over 325,000 square feet of building space and is located south of the Iowa State University campus. The ISU Research Park is more than just land and buildings; it is a technology community that encourages commercialization of University research.

- **Extension's Center for Industrial Research and Service (CIRAS).** CIRAS provides research, education, and technical assistance to Iowa industry through partnerships with Iowa's universities and community colleges, government agencies, and business associations. Account managers throughout the state meet with clients to assess needs and provide links to resources that companies can use to increase their competitiveness. Solutions are offered through a combination of direct assistance from center staff, university faculty, partner organizations, and outside consultants.

  CIRAS staff has expertise in engineering, biobased products and biorenewables, management practices, government contracting, productivity, growth services,

supply chains, quality systems, and community-business economic development. Service to industry includes technical assistance in conjunction with ISU College of Engineering labs, regional economic development studies to better understand rural economies, engineering workshops for utilities and county and city engineers, and educational workshops and mentoring for small businesses.

CIRAS is supported in part by the DoC/NIST Manufacturing Extension Partnership, the DoD/DLA Procurement Technical Assistance Program, the DoC/EDA University Center Program, and the USDA BioPreferred program.

- **ISU Research Foundation (ISURF) and the Office of Intellectual Property and Technology Transfer (OIPTT).** ISURF owns and ISURF and OIPTT jointly manage, market and license the intellectual property for Iowa State University. ISURF/OIPTT works with faculty members in regard to the reporting and protection of innovations, including patenting inventions. It markets the innovations to find commercial partners interested in licensing. It also funds projects within the University that have potential for broadening the intellectual property protection or providing value for its commercial potential. ISURF also provides assistance to Iowa companies, including ISU faculty start-ups with SBIR and STTR applications.

- **Innovations Development Facility (IDF).** This is a business incubator operated by the Plant Sciences Institute to promote the commercialization of plant biotechnology. IDF encourages ISU faculty, staff, and students to commercialize their research in the plant sciences and promotes the development of start-up companies among aspiring entrepreneurs. IDF is housed in the Roy J. Carver Co-Laboratory and consists of six well-equipped laboratory modules. The facility offers an environment to transition research from a university to a business setting. The IDF facility is a productive research location where scientists from academe and industry can work together to advance the mission of the Plant Sciences Institute and to promote economic development in Iowa.

- **ISU Extension to Agriculture and Natural Resources (ANR)** provides educational leadership to integrate Iowa's rich natural resources, productive people, and viable communities with its strong agricultural industry to grow the economic base of Iowa agriculture. The ANR program plans and delivers extension education activities through seven teams of faculty, field specialists, and staff with expertise in crop production and protection, farm business management, horticulture, beef production management, pork production management, dairy production management, and natural resources and stewardship. ISU Extension Value Added Ag Program (VAAP) staff has conducted five major feasibility studies to-date in FY10. As a direct result of the studies, 29 existing jobs were retained and 58 new jobs were created. These feasibility reports assisted the businesses in acquiring nearly $31 million in loans and loan guarantees, resulting in tangible economic development in Iowa.

  In response to a USDA initiative and growing interest in local food production, ISU Extension Value Added Ag Program (VAAP) staff delivered nine workshops on high tunnel fruit and vegetable production at six locations across Iowa. Each of the 227 participants received a copy of the Iowa Fruit and Vegetable Production in High Tunnel Manual, which the VAAP staff developed and made

available in English and Spanish. In the first year of a three year project, nearly 70 high tunnels have been constructed in Iowa through a new cost-share program offered by USDA-NRCS. Working closely with the state NRCS staff, nearly all of the grower participants have accessed ISU-VAAP resources designed to help improve their profitability in development of a local food market.

- **ISU Extension to Communities** economists spent several months searching for data that would yield the clearest picture of the state of affordable housing in Iowa. The study examined effects of recent trends and occurrences such as the 2008 floods, the economic recession and the local impact of the national foreclosure crisis. As part of this project, ISU Extension worked with IDED staff and stakeholders to draft a strategic plan and solicit public comment on the anticipated use of federal housing funds in the next five years. The State of Iowa and all cities with populations more than 50,000 are required to submit a consolidated plan and strategy to Housing and Urban Development (HUD) every five years in order to receive Community Development Block Grant (CDBG), HOME Investment Partnership Program, Emergency Shelter Grants (ESG) and Housing Opportunities for Persons with AIDS (HOPWA) funds.

  In 2004, Le Claire, Iowa was accepted into the Partnering Landscape and Community Enhancement (PLaCE) program offered through ISU Extension and the ISU College of Design's Institute for Design Research and Outreach (IDRO). The community was paired with a community planning studio that developed a comprehensive plan that addressed growth, transportation, river and recreation, downtown revitalization and tourism. Six years later, the city just completed phase one of a multimillion-dollar streetscape enhancement. Phase one of the plan encompasses a seven-block area along U.S. 67, which runs parallel to the Mississippi River. The levee was developed first. Then, based on the ISU plan, the city redesigned the streetscape. To date, the city has invested nearly $5 million in the project. The second phase of the plan, which is currently on hold because of the economy, will be a continuation of the streetscaping completed in phase one.

  In 2009, the Turkey River corridor, including Elkader, Elgin and Clermont, participated in the Community Visioning Program as part of a long-term disaster recovery effort, and Elkader collaborated with the ISU landscape architecture community design studio. In 2010, the Turkey River corridor became an Iowa Great Place.

- **ISU Extension to Families'** Horizons program provides programming and leadership to help communities take charge, build stronger leaders to address poverty, economic decline and the exodus of young people. The program is funded by a grant from the Northwest Area Foundation. Thirty-six Iowa communities are now graduates of the 18-month Horizons program. Eight hundred thirty six community members participated in face-to-face public meetings in fourteen communities during the Visioning Phase of Horizons III, leading to development of their individual community plan to reduce and address poverty. Another 2,039 shared their poverty reduction ideas in a community survey. Communities implemented poverty reduction efforts like expanding child care, providing food including weekly week-end backpacks to children in need, improving housing, youth mentoring and tutoring, establishing or expanding food

pantries and Farmer's Markets. Twenty-eight Horizons communities learned entrepreneurial skills, grant writing, how to grow and expand volunteer base, marketing, housing, public policy, forming nonprofits, among other topics during the two state-wide Expanding Horizons workshops.

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 worked with community partners to recruit and train 70 volunteers to provide free tax preparation services to low-income families through the Volunteer Income Tax Assistance (VITA) program. In 2010, VITA volunteers working at 33 VITA sites helped 1,600 low-income Iowans complete income tax returns. 615 of the filers qualified for the Earned Income Tax Credit (EITC) received $685,845 in the 41 counties that participated in the Extension-community partnerships to expand VITA programs to rural Iowa.

- The Office of the Vice President for Research and Economic Development (OVPR/ED) works closely with all of the above units, including the Office of the Vice President for Extension and Outreach, in promoting the University's mission related to technology transfer and economic development.

    - The Research and Economic Development Council (chaired by the VPR/ED) coordinates ISU research, technology transfer and economic development activities. Members meet monthly 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. This council, formed in 1993, is comprised of representatives from all units on campus that have a primary role in economic development and technology transfer as well as representatives from each of the seven colleges.

    - The new comprehensive management strategy for key industrial partners is continuing and beginning to show results. This effort is co-led by the Director of Industry Relations and the Corporate and Foundations Relations group in the ISU Foundation. This is a collaborative effort that involves the Associate Deans for Research in the colleges, CIRAS, IPRT, ISURP, and key research faculty.

The above units are the key units that focus attention on economic development and technology transfer at ISU; however, significant additional related activity also occurs across campus in individual academic departments, centers and institutes, and colleges.

4. Please briefly describe two or three examples of major economic development collaborative projects with such other entities as Regent universities, Iowa community colleges, the Iowa Department of Economic Development, Iowa Workforce Development, or other state agencies.

Major Economic Development Collaborative Projects

NSF EPSCoR. ISU is collaborating with UNI and the U of I on an NSF EPSCoR proposal that is being submitted in October 2010. If funded and successful, this would develop a statewide energy plan for the State of Iowa, covering two renewable energy platforms—wind and bioenergy and a third platform dealing with energy efficiency. The ultimate outcome would be an energy plan leading to energy efficiency and sustainability for the State. Other partners include the Iowa Office of Energy Independence, the Iowa Energy Center, community colleges and other four-year institutions in Iowa, and industry.

Grow Iowa Values Fund. This legislation is providing the universities and private colleges financial resources to expand technology transfer and commercialization efforts. We are in the sixth year of GIVF funding, in addition to providing core support for infrastructure in the Research Park, Pappajohn Center and the VPR/ED office. Each year projects are funded that pair ISU researchers and Iowa companies. More information appears later in this report.

Battelle Initiative. ISU, the University of Iowa, and the University of Northern Iowa have worked closely with the Iowa Department of Economic Development, the Board of Regents, State of Iowa; legislators, and business leaders through the Biosciences Alliance of Iowa organization to implement the Battelle initiative. Proposed projects that focus on the biosciences, information technology and advanced manufacturing have been completed. More information appears later in this report.

State-wide committees – Many people from ISU serve on committees that promote economic development programs such as the Biosciences Alliance of Iowa, the Iowa Power Fund, the Iowa Advanced Manufacturing Council, Professional Developers of Iowa, the Iowa Business Council, the Iowa Innovation Council, the Iowa Alliance for Wind Innovation and Novel Development (IAWIND), Innovate Iowa!, etc.

5. Please provide the following information about Grow Iowa Values Fund projects for FY 2009:
A. Identify and briefly describe each project or initiative which received GIVF funding in FY 2009 including information on outcomes or progress made
B. Identify metrics which were used to measure outcomes for each project and report progress on each metric for FY 2009
C. Provide a description of the sources of the matching institutional dollars for each GIVF-funded project

The ISU Grow Iowa Values Fund (GIVF) program has a competitive research component that pairs ISU faculty members with Iowa industries to create economic benefit for the companies. See **Appendix 1 and Appendix 2** for complete report.

6. Please provide the following information about Battelle-funded projects for FY 2009:
A. Identify and briefly describe each project or initiative which received Battelle funding in FY 2009 including information on outcomes or progress made
B. Identify metrics which were used to measure outcomes for each project and report progress on each metric for FY 2009

- **Appendix 3 and Appendix 4** provide a detailed report on Battelle funding awarded to ISU.

7. Optional: If desired, please include observations regarding:
A. Availability of startup and venture capital for technology entrepreneurs
B. Suggestions for new programs or activities that could further enhance the impact of university technology transfer and service on creation of jobs and wealth in Iowa.

7A. Iowa continues to suffer from a lack of investment capital for start up and rapidly growing technology/innovation based firms.

- The Values Funds to the universities have provided a valuable source of funding for proof of concept/early stage development funding for the innovations that will become the next generation of businesses.

- There has been an increase in the number of Angel/Seed funds throughout the state. Available capital and experience varies widely and there is little coordination between the funds. The seed funds have typically brought more individual investors into play.

- The funding provided by Wellmark through the Pappajohn Center's has been a very valuable tool for early stage investment.

- There are very few true venture capital firms located in the state of Iowa actively investing funds at this point in time. Iowa continues to suffer from a lack of investment capital for start up and rapidly growing technology/innovation based firms.

- Each fund has a particular focus, the investment profile further limiting choices and resulting in very little competition.

- Most venture firms invest with other venture firms, one as lead with the others in secondary positions to spread risk and assure the ability to continue to fund the needs of the company--this is a major problem in Iowa.

- Firms must look outside the state for significant investments of $5 million plus.

- Really good businesses with really good management teams will attract money; a major problem is the development of an experienced/skilled management team.

- Due to the limited amount of venture capital in Iowa, the College of Engineering has started a *Venture Fund for Interdisciplinary Research Centers of Excellence* with college funds. The goal is to create new interdisciplinary research centers or institutes at ISU with transformational impact on the College, the State of Iowa, and the nation. This new effort is being marketed to alumni and others in an attempt to grow and sustain the initiative.

- Microenterprise--businesses with less than 5 employees--account for 86 percent of business firms in Iowa, according to the Association for Enterprise Opportunity. A 2007 survey conducted by the Iowa Bankers Association in collaboration with the Community Vitality Center and Leopold Center identified a gap in capital for small entrepreneurial firms seeking less than $50,000 in Capital. In 2008, the Community Vitality Center (CVC)--which is administered by ISU Extension--received part of a $1 million grant by Northwest Area Foundation and the Greater Des Moines Community Foundation to implement a business plan for organizing a statewide tax exempt nonprofit microloan intermediary as part of a 3-year Iowa Microenterprise Assistance Project (IMAP). The SBA has also approved a $750,000 revolving microloan fund for the new entity, called the "Iowa Foundation for Microenterprise and Community Vitality," In addition, $475,000 was appropriated for IDED to implement a Community Microenterprise Development Grant program and statewide microenterprise advisory committee to encourage collaboration and coordinate statewide efforts.

- During its 2010 session, the legislature created the Save Our Small Business loan program. This $5 million dollar fund is available to existing and startup businesses for certain qualifying uses. The program sunsets on March 31, 2011. In order to access the fund, prospective borrowers must start the application process with the SBDC, where the application is reviewed by SBDC counselors for eligibility and repayment ability. The Iowa Foundation for Microenterprise and Community Vitality acts as the credit facility for the program under an operating agreement with the Department of Economic Development.

7B. Restoration of funds for economic development and technology transfer activities due to budget cuts in the past several years would greatly enhance the University's efforts in this area. The following is a summary of what benefits would occur if funds were restored in the units affected by budget cuts.

- **Small Business Development Centers.** The legislature cut a total of $16,373 from the SBDC budget for FY09 and another $99,436 for FY10. In FY10 the state appropriation after the 10% reduction was $894,930. In FY11, the legislature appropriated an additional $100,000 restricted solely to business counseling and for no other purpose. The FY11 state appropriation is $994,929, down from a high of $1,211,869 in FY01.

  In the study by Professor Chrisman referenced above, for every Iowa tax dollar spent on the Small Business Development Center program, over $7.00 is

generated in increased tax collections the following year from SBDC counseling services alone. The majority of any restored and new funds would be directed toward client counseling, resulting in a substantial increase in tax revenues over tax expenditures. Conversely, a reduction in funding could well result in an adverse impact on the state treasury of up to seven times the amount of the reduction. If sufficient new funding was obtained, the SBDC would consider establishing a second service center in the Des Moines metro area, which is an underserved market for the SBDC.

A concurrent increase in federal funding remedied the reduction in state funds for FY09, leaving the net program budget relatively equal to the preceding year. Additional funding from a special congressional appropriation for Midwest disaster relief – the use of which is strictly limited to disaster recovery – permits the SBDC to meet most of the demands from its client base for continued recovery efforts related to the flooding that occurred in 2008.

Any future decreases in funding risk the ability of the program to retain experienced talent and to deliver the services needed by one of the largest component's of Iowa's economy, namely small business.

- **Iowa State University Research Park.** The restoration of approximately $230,000 in funding to the Iowa State University Research Park would provide direct benefit to Iowa State University efforts to establish and support new technology ventures. New funds would be utilized to support the costs of providing incubator space and the support services required by new and early stage companies. The additional funds will increase the capacity for business incubation resulting in more new companies created and higher quality support for the young companies.

- **Institute for Physical Research and Technology (IPRT).** The IPRT economic development programs suffered losses of over $161,000 in 2010 and $265,000 in 2009. These losses follow $2,500,000 in budget cuts in 2003, which were never restored. Ironically, these cuts came at times when the need for IPRT's expertise by Iowa industries was rapidly growing. Although much of the program has survived the cuts, it now serves only a fraction of the Iowa companies it once served and the current personnel are overextended. However, companies seeking help outside the core competencies of the IPRT Company Assistance staff cannot be assisted. In the past these potential clients were guided to working with faculty members via subsidized projects. Because of the budget cuts, IPRT has restricted the technical assistance it provides to Iowa companies to those services that fall within the core competencies of IPRT staff rather than pursuing these collaborative, cross-disciplinary projects. Also, fewer R&D cost-share projects that can lead to new products are pursued due to the declining funding. Over 75% of the Iowa manufacturers that IPRT serves have less than 100 employees.

  The materials assistance unit of the IPRT economic development program provides short-term no cost technical assistance to Iowa manufacturers and is often the first interaction that manufacturers have with the University. Restoration of funding would allow for growth of materials assistance, enhancing

their delivery of services. They seek to offer a wider scope of services directly meeting the needs of Iowa manufacturers.

The NDE (nondestructive evaluation) unit of this program functions similarly to the materials group, in that short-term technical assistance is provided to Iowa manufacturers on a no-cost basis. The focus of the NDE Group is to assist companies in areas of inspection and quality control. To that end, the NDE Group serves as an unbiased source of information, offering clients a broad range of expertise in various inspection methodologies. Manufacturers often do not have staff acquainted with these capabilities, so the group in effect complements the engineering capabilities of their clients. The group assists client companies in addressing problem areas, ensuring product development and quality. This assistance requires robust budget support to maintain the needed flexibility to successfully address the wide range of industrial concerns that are presented to it.

The technology commercialization unit has administered cost-sharing, contract research projects and since 1993 has leveraged tax dollars slightly better than 4 to 1. The staff is working with Iowa's small to medium-sized manufacturers and identifying research and development needs that can be addressed by university teams of faculty scientists and engineers. These small companies have very limited Research and Development dollars and facilities, and now, this unit does not have the funds needed to leverage Iowa companies' limited resources. These are projects with obvious economic impact—introduction of new products, addressing manufacturing processes, and improving quality—all areas that impact Iowa's global competitiveness in the manufacturing sector.

A unique feature of the economic development program in IPRT is the active participation of scientists from internationally renowned ISU centers such as the Center for Nondestructive Evaluation, the Virtual Reality Applications Center and the Center for Catalysis. These centers have excellent track records of spinning off new Iowa start-up companies in the areas in which they excel. Restoring the budget cuts to IPRT units would have a rapid positive impact on Iowa's manufacturing sector. An investment now will result in continuing benefits to Iowa's companies, important opportunities to retain our brightest students, and new start-up companies based on increased technology transfer from IPRT centers.

- **Center for Industrial Research and Service.** CIRAS has successfully leveraged its state budget to bring in additional federal grants and fees to expand technical assistance and education programs and economic development studies to support Iowa businesses. In FY10, CIRAS generated an additional $2.19 for each $1 of state funds provided. Of the approximately $4 million of additional funding generated, CIRAS distributed more than $900,000 to other business outreach units on campus to help them expand their work with Iowa companies.

  CIRAS has lost over $1.4 million of funds (in 2010 $) from their annual budget in the past decade. This includes state appropriations and matching funds provided by the Iowa Department of Economic Development. These funds were used as match on the Department of Commerce/NIST Manufacturing Extension Partnership award and the Department of Defense Procurement Technical

Assistance Program award. This loss of state funds reduces the extent of CIRAS assistance to companies and communities and limits the amount of additional funds that might be brought to Iowa via new business assistance grants.

The loss of annual funding from state appropriations and agencies equates to a reduction of approximately 13 full time staff. This can cause a further reduction of roughly 13 staff due to a loss of federal awards requiring matching funds from the state. Based on an analysis of data provided by Iowa companies, these 26 staff positions might have generated nearly $60 million of impact and more than 700 jobs in Iowa companies — each year.

Using this same data, for every $100,000 of additional state funds that are made available, CIRAS would be able to leverage the funds to bring in an additional $100,000 to Iowa and hire two new business professionals to provide services in the areas of engineering, biobased products and biorenewables, supply chain management, import/export services, government procurement, productivity, growth services, quality systems, or community-business economic development. These two staff would help create nearly 50 jobs and $4,000,000 of new sales, cost savings, and investment impact in Iowa companies.

EXECUTIVE SUMMARY – JULY 2010
IOWA STATE UNIVERSITY GROW IOWA VALUES FUND UPDATE

To date, 66 projects have been funded through the *Commercialization Program*. Forty-one of these projects are complete and many show excellent progress in improving the competitiveness and profitability of the Iowa companies involved.

Surveys are being conducted by the Center for Industrial Research and Service (CIRAS) on year after project completion. The data below represents projects that were funded in FY2006, completed in FY2007, and surveyed during the summer/fall of calendar year 2009:

Companies surveyed:	9 (all start-up companies)
Jobs created or retained:	71
Total sales increase:	$ 9.1 M
Total investment/cost savings:	$23.5 M
Average impact per company:	$ 3.6 M

The company surveys for projects funded in FY2007 (completed in FY2009, surveyed in FY2010) are as follows:

Companies surveyed:	9
Jobs created or retained:	18
Total sales increase:	$3.7 M
Total investment/cost savings:	$2.76 M
Average impact per company:	$0.72 M

The following metrics have been collected for the 14 projects that were completed in FY2010.

Publications and Presentations:	88
Awards:	8
New invention disclosure:	6
External funding applications:	46
Applications awarded*:	13
External funding received:	$2.72M reported (not all awards reported dollar amounts)

*Many applications are still pending

The following metrics have been collected for the 11 projects that are still on-going.

Publications and Presentations:	15
Awards:	0
New invention disclosure:	2
External funding applications:	6
Applications awarded*:	3
External funding received:	$106,475 reported (not all awards reported dollar amounts)

*Many applications are still pending

FULL REPORT
IOWA STATE UNIVERSITY GROW IOWA VALUES FUND UPDATE
JULY 2010

FY08 FUNDED PROJECTS – FINAL REPORT

Principal Investigator	Project Title	FY08 Total Award	FY08 Allocation	FY09 Allocation	ISU Cost Share reported	Industry Cost Share reported
Marian Kohut**	Effectiveness of EpiCor in improving immune function, inflammation, and performance after intense exercise	$ 92,777	$ 84,277	8,500	4,080	30,697
Charlie Hurburgh**	Automated phenotyping of biomass crops – part 1	$ 51,450	$ 30,450	21,000	10,080	---
Guru Rao**	Development of Novel Digestion-Resistant Starches from Corn to Combat Human Disease	$ 70,000	$ 55,000	15,000	18,588	--
Toni Wang**	Oil Recovery from Corn Fermentation By-Products	$ 113,500	$ 71,500	36,000	39,129	--
Mike Wannemuehler**	Generation X Vaccines: Combining Novel Antigens and Single Dose Delivery Technologies	$ 151,966	$ 121,966	30,000	18,033	--

**These projects were funded in FY08 and given a no-cost extension. They were completed in FY10. Cost share reported is from FY10 only

FY10 FUNDED PROJECTS
INTERIM REPORT

Principal Investigator	Project Title	FY10 Award Amount	ISU Cost Share	Industry Cost Share
Jim Bloedel (Kanthasamy)	Testing of lead PK compounds in preclinical animal models of Parkinson's disease	$ 128,100	18,013	6,500
Jim Bloedel (Jesse Goff)	Use of Beta-Glucuronides of Vitamin D to treat inflammatory bowel disease	$ 89,657	21,078	12,350
Bryony Bonning	Transgenic Plant Resistance to Invertebrate Pests	$ 107,680	41,587	1,641
Byron Brehm-Stecher	Rapid Sequence- based Detection of Human Pathogens: From Farm to Fork to Physician	$ 106,690	3,123	---
Pat Halbur	Development of a novel Genetic Test fo Inerited Bovine Diseases and its application to tissues and embryos	$ 69,500	27,281	15,000
Brad Bosworth	Prevention of swine influenza: Commercialization of replicon particle and replicon subunit vaccines	$ 146,610	40,308	---
David Grewell	Naturally Controlled Gelatinization of Corn Starch	$ 34,504	18,013	20,000
Rick Sharp*	Effect of oral ATP on human muscle performance	29,890	8,358	--
Tanja Opriessnig*	Cross Protective Immunity	80,000	--	--
Eliot Winer*	Volumetric Model Analysis for Bariatric Medicine	100,000		
Infrastructure				
Research Park		$ 200,000	96,000	200,000
Pappajohn Center		$ 200,000	--	---
IPRT		$ 100,000	--	n/a
VPRED		$ 100,000	29,840	n/a

*These projects were started during the summer, 2010, so no report is provided.

INTERIM REPORT

Title: Development of a novel genetic test for inherited bovine diseases and its application to tissues and embryos

PI: Patrick G. Halbur

Company Partners (company names only): Ames Center for Genetic Technologies

Project Goal: Develop and commercialize a panel of molecular diagnostic assays for detection of genetic diseases and production traits sensitive enough to use on biopsies from bovine embryos. This will benefit the Iowa beef and dairy industries by decreasing costs associated with maintaining the pregnancies of genetically diseased animals and accelerating the selection of genetically superior seed stock Iowa cattle producers.

Progress report (300 word maximum, please focus on results in non-technical terms and commercialization progress):

We have completed microarray validation for **Bovine Leukocyte Adhesion Deficiency (BLAD)** and **Complex Vertebral Malformation (CVM)**. We have also completed microarray validation of **three independent sexing primer pairs and oligonucleotide probes** and two have been selected for inclusion in the kit and the third reserved for **bovine specific typing**. These five markers (2 for bovine diseases, 2 for gender determination, 1 for bovine species confirmation) are well into transition to the Luminex xMAP Technology. Primer pairs and oligonucleotide probes have been designed and are undergoing PCR optimization and validation for **Arthrogryposis Multiplex (AM)** and **Neuropathic Hydrocephalus (NH)**. Designs are also in progress for **coat color**. In addition, we are in the process of developing a test for a newly emerged disease now known as **Fawn Calf Syndrome**. Sensitivity levels for detection of genetic disease are under validation using serial dilutions of known genomic DNA concentrations. We have confirmed that we can detect below ten genome equivalents by serial dilutions on the microarray platform and now we are ready to begin testing biopsied embryo samples. We have also begun to develop a virus screening panel for bovine embryos to protect against introduction of new diseases and to open up export markets. Viruses to be included in the panel include Bovine Virus Diarrhea Virus (BVDV), Infectious Bovine Rhinotracheitis Virus (IBRV), Blue Tongue Virus (BTV), and Bovine Leukosis virus (BLV). The embryo biopsy technique is being further adapted and validated to achieve acceptable pregnancy rates following post-biopsy genetic testing and freezing. Several embryos have been collected, biopsied to provide genetic materials for testing, and frozen. Recipients for embryo transfer have been identified and transfers are being performed. Indications to date are that we can achieve pregnancy rates greater than 50% for biopsied embryos. Confirmation that genetic testing of the embryonic tissue matches the genetic tests of the live born calves will be done as calves are born.

INTERIM REPORT

Title: Use of Beta-Glucuronides of Vitamin D To Treat Inflammatory Bowel Disease

PI: Jesse Goff (with James Bloedel, Chair, BMS)

Company Partners (company names only): GlycoMyr, Inc.; Heartland Assays, Inc

Project Goal: Develop products based on vitamin D to treat and prevent a number of human and animal diseases. The basis for these products is a plant of the *Solanaceae* family that contains a number of vitamin D-related compounds that have been shown to have unique activities affecting both calcium metabolism and cell growth and immune function. The native hormone form of vitamin D has been shown to ameliorate the symptoms or slow development of several auto-immune disorders in mice. However, the hypercalcemic effect of the native hormone precludes its use in humans. We intend to utilize glycosides of vitamin D compounds to target delivery of the vitamin D compounds to the lower gut to ameliorate inflammatory bowel disease. By delivering the vitamin D compounds only to the affected tissues we can reduce the potential for toxicity allowing use in humans.

Invention disclosures: Glycomyr, Inc., has filed a provisional patent on the use of these compounds for treating disorders in the bowel.

External funding applied for (indicate received/denied/pending): NIH Challenge Grant - Denied

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Progress report (300 word maximum, please focus on results in non-technical terms and commercialization progress):

In immune cells 1,25-dihydroxyvitamin D generally has an anti-proliferative effect and down-regulates production of Th1 cell inflammatory cytokines. Studies in mice also demonstrate 1,25-dihydroxyvitamin D acts within intestinal lining cells and is essential in maintaining the integrity of the intestinal mucosal barrier. We have utilized a mouse model utilizing dextran sodium sulfate to induce inflammatory bowel disease and previously demonstrated our 1,25-vitamin D glucuronide alone noticeably reduced severity of disease when fed at 70 ng /day. An equivalent amount of 1,25-dihydroxyvitamin D had a similar effect but caused severe hypercalcemia. When we combined our 1,25-dihydroxyvitamin D glucuronide with our vitamin D compound developed to competitively inhibit degradation of the 1,25-dihydroxyvitamin D inside target cells we got a highly significant reduction in clinical inflammatory bowel disease, with a moderate but tolerable increase in blood calcium. This past year we corroborated these findings and tried to move into the arena of determining which genes are affected so we can demonstrate a mode of action for the drugs. So far we have demonstrated the glucuronide drugs are more active in the colon than in the duodenum, which confirms our ability to target the drug to that portion of the intestinal tract. However, as we pursued these studies we have devoted much of our attention to secondary factors that influence the effect of our drug in this model. For instance we found that utilizing synthetic defined diet (where we can manipulate calcium and vitamin D) vs whole grains diets greatly exacerbated diarrhea in the model. We also demonstrated that diet calcium alone can greatly ameliorate symptoms of IBD in this model, with or without our added vitamin D compounds. Straightening out the factors affecting the DSS model has consumed much of our time as we need these animals on defined diets to pursue some of the gene analysis work. At the least we feel we can contribute to the literature in this way – almost none of the researchers working in this field appear to be manipulating diet in the way we are. We have demonstrated good and relatively safe efficacy of our compounds in the acute inflammatory bowel disease model. We are just beginning studies to test efficacy in a chronic inflammatory bowel disease model, which more closely resembles Crohn's disease in man. These data will be incorporated into the provisional patent application and are being readied for publication. Various combinations of compounds need to be tested to optimize the treatment as well as development of alternative models of inflammatory bowel diseases. Demonstrating therapeutic effect in several models will improve the likelihood that this will be chosen for use in human Phase I clinical trials.

INTERIM REPORT

Title: Testing of lead PK compounds in preclinical animal models of Parkinson's disease

Principal Investigator: James R Bloedel, Ph.D. (Anumantha Kanthasamy)

Company Partners: PK Biosciences Corporation

Project Goal: Our main goal is to develop oral neuroprotective drugs for the treatment of Parkinson's disease (PD) in humans. Currently we are in the preclinical stage of drug development. The ultimate success of the proposed neuroprotective technology may create many new opportunities in Iowa, including economic and job growth and a viable biotechnology industry.

Invention disclosures:

We have submitted provisional patent application SN 61/260,676, titled "Design, Synthesis and Functional Characterization of Rottlerin Analogs" filed on Nov 12, 2009 by ISURF. The data obtained from this proposal will augment our efforts to submit a full patent application in the future.

External funding applied for (indicate received/denied/pending):

- Pending: SBIR Phase II proposal to NIH *National Institute of Neurological Disorders and Stroke (NINDS)*.
- $14,000, IPRT June-October 2009. The funding was used for kinase profiling, primary culture in the drug discovery project. Dr. Walter Hsu, Principal investigator, Department of Biomedical Sciences, ISU, Ames, IA
- Denied: Michael J Fox therapeuitic Development Initiative

Progress report (300 word maximum, please focus on results in nontechnical terms and commercialization progress):

Results:

In the previous funding period (Jun-Dec 2009), we had shown that co-treatment with a single dose of PK analogs, PK8202 and PK9302 significantly improved locomotor deficits and attenuated striatal dopamine and DOPAC loss in MPTP-treated animals.

In this funding period we have completed a dose-dependent effect of PK9302. Gram quantities of PK9302 were synthesized in the laboratory of Prof George Kraus. Adult C57 black mice were injected with MPTP at a dose of 25 mg/kg ip once a day for five days to induce Parkinsonism and animals will be sacrificed 7 days post-MPTP. Control animals received saline injections. In the treatment groups, animals received either 3, 10 or 30 mg/kg PK9302 once daily by oral gavage. The drug treatments began a day prior to MPTP treatment and was continue for six days post-MPTP treatment. On the 7^{th} day, animals were subject to behavioral measurement, sacrificed, and nigral and striatal tissues were used for neurochemical, biochemical and immunohistochemcial studies. Results from animal experiments revealed that PK9302 significantly improved MPTP-induced locomotor deficits and striatal dopamine depletions in a dose-dependent manner. Furthermore, treatment with analog PK9302 improved nigral dopaminergic cell loss as determined immunostaining. We also quantified TH positive cells by stereological cell counting and showed a dose-dependent protection against nigral dopaminergic degeneration with PK9302 treatment. We recently showed significant levels of PK9302 in mouse brain substantia nigra after oral administration using LC-MSMS, demonstrating that this compound can effectively cross the blood brain barrier and exert it's neuroprotective effects. Similar experiments are planned with analog PK8202 in the upcoming funding period as mentioned in the original proposal. Funding has helped a hire a full-time post-doctoral researcher for carrying out animal studies and a graduate student for synthesis of PK analogs.

<u>Commercialization:</u>

1. A license option has been signed between ISU Research Foundation and PK Biosciences.
2. PK Biosciences has successfully formed a scientific and business advisory board which will assist by reviewing and advising on primary development decisions as the company moves forward.

INTERIM REPORT
Title: Transgenic Plant Resistance to Invertebrate Pests
Principal Investigator(s) Bryony C. Bonning and W. Allen Miller
Company Partner(s): Pioneer Hi-Bred International, a DuPont Company

Project Goal: We have developed a new technology for plant resistance to aphids based on a plant virus coat protein (CP) fused to an insect specific toxin (omega-atracotoxin Hv1a) that acts within the aphid body cavity (Miller and Bonning, 2007). The objectives of this research are to (1) test the CP-P-Hv1a resistance technology against a broad range of invertebrate pests, and (2) construct transgenic plants and determine the extent of pest resistance.

Centers/Institutes involved in this project: Plant Sciences Institute

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Progress Report:

Objective 1: We optimized methods for purification of CP-P-Hv1a and CP-P-Hv1am (Hv1am, modified non-insecticidal protein with two mutations in the Hv1a sequence), and conducted single dose feeding bioassays with these fusion proteins (150 ng/μl) and Hv1a alone (200 ng/μl) against four species of aphids. CP-P-Hv1a was shown to be active against the green peach aphid, *Myzus persicae*, the pea aphid, *Acyrthosiphon pisum*, the bird cherry-oat aphid, *Rhopalosiphum padi* and the soybean aphid *Aphis glycines*. We devised a method for identification of aphids that have fed on artificial diet by membrane feeding, by incorporating blue food coloring dye into the diet. Visual examination of aphids allows for exclusion of aphids that have not fed from bioassay data analyses.

The lethal concentration for 50% aphids (LC50) for CP-P-Hv1a against *Myzus persicae* was 82.84 ng/μl. Aphids were fed on the fusion protein continuously for a period of 7 days. The volume of diet ingested by *M. persicae* is unknown. However, a previous report indicated that an average of 46 *R. padi* consume 10 μL of phloem sap within 6 hrs (217 nl / aphid; (Gaupels et al., 2008). For reference, injection of 4 ng kills 100% *M. persicae* within 3 hr. We plan to assess the volume ingested to calculate the efficiency of CP-mediated transport of Hv1a into the aphid hemocoel.

Objective 2: We have constructed transgenic Arabidopsis for expression of CP-P-Hv1a, CP-P-Hv1am and CP-P-EGFP (control) with native coding sequences using standard procedures, and plants are currently being screened for the presence of inserts. Sequences of CP-P-Hv1a and CP-P-Hv1am optimized for soybean codon preference have been made. A second set of transgenic plants is planned using these codon-optimized sequences to test whether codon-optimization will result in enhanced protein expression by transgenic plants.

INTERIM REPORT

Title: Prevention of Swine Influenza: Commercialization of Replicon Particle and Replicon Subunit Vaccines
Principal Investigator(s): Bosworth, Brad **&** Vander Veen, Ryan
Company Partner: Harrisvaccines, Inc. d/b/a Sirrah Bios
Project Goal: The goal of this project is to develop replicons that express various influenza HA genes and to determine their immunogenicity and efficacy as SIV vaccine candidates

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Publications/presentations based on project:

- Vander Veen, R., Kamrud, K., Mogler, M., Loynachan, A.T., McVicker, J., Berglund, P., Owens, G., Timberlake, S., Lewis, W., Smith, J., Harris, D.L.. Rapid Development of an Efficacious Swine vaccine for Novel H1N1. *PLoS Currents Influenza.* 2009 October 29.
- Vander Veen, R. 2009 presentation. Rapid Development of a Novel H1N1 Vaccine for Swine Using Replicon Technology. Conference for Research Workers in Animal Diseases, December 6-8, 2009. Chicago, IL.
- Vander Veen, R. 2010 presentation. Vaccination of pigs against the novel H1N1 virus using replicon technology. American Association of Veterinarians annual meeting, March 6-9, 2010. Omaha, NE.
- Erdman, M.M., Kamrud, K.I., Harris, D.L., Smith, J. Alphavirus replicon particle vaccines developed for us in humans induce high levels of antibodies to influenza hemagglutinin in swine: proof of concept. 2010. *Vaccine* 28(3):594-96.
- Bosworth, B., Erdman, M.M., Stine, D.L., Harris, I., Irwin, C., Jens, M., Loynachan, A., Kamrud, K., Harris, D.L. Replicon particle vaccine protects against influenza. *Comparative Immunology, Microbiology and Infectious Diseases.* 2010. (accepted).
- Vander Veen, R. 2010 presentation. Efficacy of swine influenza virus vaccines produced using the alphavirus replicon system. Presentation to be given at the 21st International Pig Veterinary Society Congress, July 18-21, 2010.
- Harris, D.L. 2010 presentation. Selection of influenza vaccine strains and rapid method for producing antigenically homologous vaccine. Presentation to be given at the 21st International Pig Veterinary Society Congress, July 18-21, 2010.

Progress Report

Since its introduction, novel H1N1 virus has been a concern for the swine industry. For a novel H1N1 vaccine efficacy study, we produced novel H1 replicon particle (RP) and replicon subunit (RS) vaccines within two months of the outbreak being reported. Following challenge, both H1 RS and RP vaccinated pigs demonstrated reduced viral shedding and lung pathology, and increased average daily gain, when compared to non-vaccinated pigs. In addition to hemagglutinin (HA), we have done a preliminary study evaluating the nucleoprotein (NP) gene as a vaccine candidate. This study demonstrated that NP RP vaccination is able to decrease nasal shedding in pigs following homologous influenza challenge. The NP is conserved among influenza subtypes, and therefore has potential as a universal vaccine antigen capable of providing heterosubtypic protection. A larger study is currently in progress to determine both homologous and heterosubtypic protection following NP vaccination. These studies demonstrate that the replicon technology allows for more rapid development of vaccine than with traditional methods, and that these vaccines are immunogenic and efficacious against influenza in swine.

In addition to novel H1 and NP, replicons expressing swine H1 Beta, Gamma, Delta, and cluster 4 H3 have been produced and evaluated for antibody responses in pigs. Antigen-specific antiserum from the study is used in a hemagglutination inhibition assay with swine influenza field isolates to determine antigenic cross-reactivity. These results can be used to quickly produce customizable vaccines via Sirrah Bios' VCP (Vet/Client/Patient) relationship. In 2009, Sirrah Bios sold 198,868 doses of SIV RS vaccine via VCP relationship, and 390,800 doses in 2010 (as of May 31, 2010). In addition, Harrisvaccines, Inc. d/b/a Sirrah Bios, has submitted applications to the Center for Veterinary Biologics (CVB) for conditional licensure of the novel H1N1 RS vaccine and for full licensure of a cluster 4 H3N2 RP vaccine.

INTERIM REPORT
Title: Rapid Sequence-Based Detection of Human Pathogens: From Farm to Fork to Physician
PI: Byron Brehm-Stecher
Companies: Advanced Analytical Technologies, The Cleveland Clinic Foundation
Project Goal:

Publications/presentations based on project:

- Progress on Grow Iowa Values Fund project was reported in a University news release in May 2010: http://www.news.iastate.edu/news/2010/may/StecherAATI
- MS thesis, Brittany Porter, expected August 2010; Thesis title: "New CE tools for rapid sequence-based detection and characterization of human pathogens".
- Byron Brehm-Stecher named as chair for "High Throughput Analysis of Foods" session at the Association for Laboratory Automation meeting, January 2011 (LabAutomation2011).
- Pierre Varineau of Advanced Analytical Technologies, Inc., to present "Parallel capillary electrophoresis with fluorescence detection for sensitive, reproducible and automated analysis of DNA" in LabAutomation2011 session on "High Througput Analysis of Foods", January 2011.
- "DNA PROfiling for the detection and characterization of *Salmonella* in peanut butter" B. Porter, H.-J. Kim, H.-m. Pang, A. Oppedahl, G.W. Procop and B.F. Brehm-Stecher. Poster presentation, International Association for Food Protection's Annual Meeting, Anaheim, CA.
- "From Farm to Fork to Physician: Detection of Human Pathogens Across the Production to Consumption to Disease Continuum", Symposium proposal to International Association for Food Protection; Brehm-Stecher symposium co-convener with Dr. M.L. Tortorello, Chief, Food Technology Branch FDA/National Center for Food Safety and Technology, Chicago, IL.
- "Rapid Detection of Pathogens in Complex Food Matrices", invited talk at the 29th annual Current Concepts in Foodborne Pathogens and Rapid and Automated Methods in Food Microbiology meeting, University of Wisconsin-River Falls.
- "DNA PROfiling for Characterization of *Salmonella* spp", B. Porter, W. Wei, H. Pang and B.F. Brehm-Stecher, poster presentation P-080, American Society for Microbiology General Meeting, Philadelphia, PA.

External funding applied for (indicate received/denied/pending):

- Brehm-Stecher Rapid Microbial Detection and Control Laboratory named as subcontractor on NSF SBIR proposal submitted June 9th, entitled "96-Channel Pulsed Field Capillary Electrophoresis for Rapid Strain Typing of Microbes", subcontract value **$62,006**.
- "Pre-Analytical Concentration of Bacteria from Dairy Processing Surfaces", Midwest Dairy Association, 01/01/2010-12/31/2010, **$30,469**.
  Proposal abstract: *In the proposed work, we will examine new instrument-based sampling and sample preparation approaches for effective collection and concentration of microbes from model Dairy-processing surfaces.*

  Ultimately, we seek to couple efficient collection and recovery of microbial cells to subsequent sample concentration, thereby reducing larger "bulk" samples to analytically suitable volumes prior to rapid microbial testing.

  Specifically, we will evaluate Dairy-based applications for two new instrumental sampling or sample preparation approaches: the M-vac, a microbial "wet vac" for vacuum-based collection of microbes from large surface areas such as Dairy plant floors, drains, walls, etc., and the InnovaPrep concentrator, a newly available liquid-to-liquid sample concentrator initially developed for biodefense applications.

  We expect that use of these more effective sampling and sample preparation procedures will strengthen existing Dairy microbial testing programs and increase the safety margin for Dairy foods.

Progress report (300 word maximum): The current project is focused on use of AATI's DNA PROFiler instrument for advanced microbial detection. We have made excellent progress on this project since it began. Important milestones include presentation of our results at two international scientific meetings (joint authors on one submission with Gary Procop of the Cleveland Clinic) and training of one MS student (Brittany Porter, expected graduation August 2010). A news release detailing our progress on this project was issued in May

2010 by the University News Service: http://www.news.iastate.edu/news/2010/may/StecherAATI. Grow Iowa support was critical in facilitating one collaborative proposal for external funding from the National Science Foundation, submitted June 9th. In early June 2010, we also took delivery of our DNA PROfiler instrument, valued at $100,000, which represents a significant portion of the promised cost share on the project. AATI personnel to present data from this project during Association for Labortory Automation's LabAutomation2011 meeting in January 2011 in a session on high-throughput methods for the analysis of foods, chaired by Dr. Brehm-Stecher.

We have made excellent progress on our work since this grant began. Highlights of our progress include:

- Hired Dr. Hyun Jung Kim from the University of Rochester Medical School, New York. Dr. Kim is a published expert on the use of the polymerase chain reaction (PCR) for the rapid detection of foodborne pathogens. Dr. Kim will begin work in the lab on January 4th, 2010.
- Purchased a small rapid thermal cycler (PIKO thermocylcer, Finnzymes, Inc.) for speeding up the polymerase chain reaction (PCR) component of the sample-to-DNA profile section of our pathogen detection workflow.
- Evaluated several commercially available enzyme systems (Kappa 2G, Phusion, KOD hot start) for their suitabilities for rapid-cycling PCR protocols.
- Reduced time required to generate PCR products in *Salmonella*-specific and methicillin-resistant *Staphylococcus aureus* (MRSA)-specific reactions from ~2.5 hours to ~26 minutes - an almost 6-fold improvement - using the PIKO rapid cycling instrument.
- Applied for and received external funding ($30,469) from the Midwest Dairy Association (MDA) for development of pre-analytical sample preparation procedures that are expected to be of direct benefit to our work with the DNAProfiler.

INTERIM REPORT
Title: Naturally Controlled Gelatinization of Corn Starch
PI: David Grewell
Company Partners (company names only): Grain Processing Corporation, Emerson Electric

Project Goal:

The main thrust of the proposed work was to characterize, demonstrate, and scale-up the use of high powered ultrasonics to partially and controllably gelatinize corn starch application. The new processing method would allow Grain Processing Corporation (GPC) to market a new product using ultrasonication to partially swell the starch without solvents/chemicals, thus making it a "natural" product.

Publications/presentations based on project:

- Manuscript for journal publication will be created after task 2 of the project is completed.

External funding applied for (indicate received/denied/pending):

- none

Centers/Institutes involved in this project:
Center for Crops Utilization Research (CCUR)

Progress report (300 word maximum, please focus on results in non-technical terms and commercialization progress):

Currently, methods for producing instant starches (partially and controllably gelatinize starches) gel either involve use of harsh chemicals or energy intensive processes. The proposed ultrasonics method will allow the industry to produce a "natural" product without the use of these chemicals. Task 1 for this project has been completed. Task 2 is currently ongoing.

The main objective of task 1 is to optimize the ultrasonic conditions to partially gelatinize starch. We have used corn starch samples provided by our company partner, Grain Processing Corporation (GPC). Starch samples were mixed with water then sonicated using Branson ultrasonics bench scale ultrasonic system at varying amplitude (28-72μm) and starch concentration (20-30% total solids). The samples were then analyzed for particle size distribution, cross polarization microscopy and swelling power. All sonicated samples showed an increase in swelling power relative to the control (unsonicated). Swelling power results showed highest at amplitude of 72μm and 25% total solid concentration. Particle size analysis, similar to swelling power, showed that the highest average particle size achieved within the range of ultrasonic conditions tested is at an amplitude of 72μm and 25% total solid starch concentration. Starch swelling was also evident using electron microscopy where control samples were compared with sonicated samples. In addition, under cross polarized microscopy, some granules in the sonicated samples are intact but started to show deformed maltese crosses, which is conducive to gelatinization. This could be an indication that starch is starting to lose its crystallinity.

The main objective of task 2 is to transition the batch system into a continuous system in preparation for a pilot scale scale-up. In the continuous system, large volumes and longer reaction time will be required. The continuous ultrasonic system has been designed, set-up and ready for experimental runs. The samples for the continuous system will be analyzed for swelling power, thermal analysis and particle size analysis.

Iowa State University - as of June 30, 2010
Grow Iowa Values Fund Appropriations

FY 2010 GIVF Appropriation **$1,732,500** Board of Regents approved August 2009

1	Commercialization Infrastructure and Campus-Wide Entrepreneurial Culture	$684,500
2	Commercialization Program	$835,000

Iowa State University	Project	List of all FY 2010 Revenue Sources	Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010
1	**Commercialization Infrastructure and Campus-Wide Entrepreneurial Culture**	FY 2010 State Appropriations (GIVF)	$600,000	$255,287
		FY 2010 Matching Funds (General Fund)	$167,505	
		FY 2010 Matching Funds (In-Kind)	$0	
		FY 2010 Matching Funds (Other)	$200,000	
Description of Project	See individual projects			
Anticipated End Results				
Results achieved to Date				
Plans				

Iowa State University	Project	List of all FY 2010 Revenue Sources	Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010
2	**Commercialization Program**	FY 2010 State Appropriations (GIVF)	$1,132,500	$357,221
		FY 2010 Matching Funds (General Fund)	$248,584	
		FY 2010 Matching Funds (Federal Support)	$0	
		FY 2010 Matching Funds (Cash)	$38,401	
		FY 2010 Matching Funds (In-Kind)	$279,269	
Description of Project	See individual projects			
Anticipated End Results				
Results achieved to Date				
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Anumantha Kanthasamy (Jim Bloedel)	$128,100	$128,100	$41,197
Description of Project	Testing of lead PK compounds in preclinical animal models of Parkinson's disease			
Anticipated End Results	Our main goal is to develop oral neuroprotective drugs for the treatment of Parkinson's disease (PD) in humans. Currently we are in the preclinical stage of drug development. The ultimate success of the proposed neuroprotective technology may create many new opportunities in Iowa, including economic and job growth and a viable biotechnology industry.			
Results achieved to Date	In the previous funding period (Jun-Dec 2009), we had shown that co-treatment with a single dose of PK analogs, PK8202 and PK9302 significantly improved locomotor deficits and attenuated striatal dopamine and DOPAC loss in MPTP-treated animals. In this funding period we have completed a dose-dependent effect of PK9302. Gram quantities of PK9302 were synthesized in the laboratory of Prof George Kraus. Adult C57 black mice were injected with MPTP at a dose of 25 mg/kg ip once a day for five days to induce Parkinsonism and animals will be sacrificed 7 days post-MPTP. Control animals received saline injections. In the treatment groups, animals received either 3, 10 or 30 mg/kg PK9302 once daily by oral gavage. The drug treatments began a day prior to MPTP treatment and was continue for six days post-MPTP treatment. On the 7th day, animals were subject to behavioral measurement, sacrificed, and nigral and striatal tissues were used for neurochemical, biochemical and immunohistochemcial studies. Results from animal experiments revealed that PK9302 significantly improved MPTP-induced locomotor deficits and striatal dopamine depletions in a dose-dependent manner. Furthermore, treatment with analog PK9302 improved nigral dopaminergic cell loss as determined immunostaining. We also quantified TH positive cells by stereological cell counting and showed a dose-dependent protection against nigral dopaminergic degeneration with PK9302 treatment. We recently showed significant levels of PK9302 in mouse brain substantia nigra after oral administration using LC-MS¬MS, demonstrating that this compound can effectively cross the blood brain barrier and exert it's neuroprotective effects. Similar experiments are planned with analog PK8202 in the upcoming funding period as mentioned in the original proposal. Funding has helped a hire a full-time post-doctoral researcher for carrying out animal studies and a graduate student for synthesis of PK analogs. Commercialization: 1. A license option has been signed between ISU Research Foundation and PK Biosciences. 2. PK Biosciences has successfully formed a scientific and business advisory board which will assist by reviewing and advising on primary development decisions as the company moves forward.			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Jesse Goff (Jim Bloedel)	$89,657	$89,657	$43,913
Description of Project	Use of Beta-Glucuronides of Vitamin D to treat inflammatory bowel disease			
Anticipated End Results	Develop products based on vitamin D to treat and prevent a number of human and animal diseases. The basis for these products is a plant of the Solanaceae family that contains a number of vitamin D-related compounds that have been shown to have unique activities affecting both calcium metabolism and cell growth and immune function. The native hormone form of vitamin D has been shown to ameliorate the symptoms or slow development of several auto-immune disorders in mice. However, the hypercalcemic effect of the native hormone precludes its use in humans. We intend to utilize glycosides of vitamin D compounds to target delivery of the vitamin D compounds to the lower gut to ameliorate inflammatory bowel disease. By delivering the vitamin D compounds only to the affected tissues we can reduce the potential for toxicity allowing use in humans.			
Results achieved to Date	In immune cells 1,25-dihydroxyvitamin D generally has an anti-proliferative effect and down-regulates production of Th1 cell inflammatory cytokines. Studies in mice also demonstrate 1,25-dihydroxyvitamin D acts within intestinal lining cells and is essential in maintaining the integrity of the intestinal mucosal barrier. We have utilized a mouse model utilizing dextran sodium sulfate to induce inflammatory bowel disease and previously demonstrated our 1,25-vitamin D glucuronide alone noticeably reduced severity of disease when fed at 70 ng /day. An equivalent amount of 1,25-dihydroxyvitamin D had a similar effect but caused severe hypercalcemia. When we combined our 1,25-dihydroxyvitamin D glucuronide with our vitamin D compound developed to competitively inhibit degradation of the 1,25-dihydroxyvitamin D inside target cells we got a highly significant reduction in clinical inflammatory bowel disease, with a moderate but tolerable increase in blood calcium. This past year we corroborated these findings and tried to move into the arena of determining which genes are affected so we can demonstrate a mode of action for the drugs. So far we have demonstrated the glucuronide drugs are more active in the colon than in the duodenum, which confirms our ability to target the drug to that portion of the intestinal tract. However, as we pursued these studies we have devoted much of our attention to secondary factors that influence the effect of our drug in this model. For instance we found that utilizing synthetic defined diet (where we can manipulate calcium and vitamin D) vs whole grains diets greatly exacerbated diarrhea in the model. We also demonstrated that diet calcium alone can greatly ameliorate symptoms of IBD in this model, with or without our added vitamin D compounds. Straightening out the factors affecting the DSS model has consumed much of our time as we need these animals on defined diets to pursue some of the gene analysis work. At the least we feel we can contribute to the literature in this way – almost none of the researchers working in this field appear to be manipulating diet in the way we are. We have demonstrated good and relatively safe efficacy of our compounds in the acute inflammatory bowel disease model. We are just beginning studies to test efficacy in a chronic inflammatory bowel disease model, which more closely resembles Crohn's disease in man. These data will be incorporated into the provisional patent application and are being readied for publication. Various combinations of compounds need to be tested to optimize the treatment as well as development of alternative models of inflammatory bowel diseases. Demonstrating therapeutic effect in several models will improve the likelihood that this will be chosen for use in human Phase I clinical trials.			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Bryony Bonning	$107,680	$107,680	$52,849
Description of Project	Transgenic Plant Resistance to Invertebrate Pests			
Anticipated End Results	We have developed a new technology for plant resistance to aphids based on a plant virus coat protein (CP) fused to an insect specific toxin (omega-atracotoxin Hv1a) that acts within the aphid body cavity (Miller and			
Results achieved to Date	Objective 1: We optimized methods for purification of CP-P-Hv1a and CP-P-Hv1am (Hv1am, modified non-insecticidal protein with two mutations in the Hv1a sequence), and conducted single dose feeding bioassays with these fusion proteins (150 ng/µl) and Hv1a alone (200 ng/µl) against four species of aphids. CP-P-Hv1a was shown to be active against the green peach aphid, Myzus persicae, the pea aphid, Acyrthosiphon pisum, the bird cherry-oat aphid, Rhopalosiphum padi and the soybean aphid Aphis glycines. We devised a method for identification of aphids that have fed on artificial diet by membrane feeding, by incorporating blue food coloring dye into the diet. Visual examination of aphids allows for exclusion of aphids that have not fed from bioassay data analyses.			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Byron Brehm-Stecher	$106,690	$106,690	$54,889
Description of Project	Rapid Sequence- based Detection of Human Pathogens: From Farm to Fork to			
Anticipated End Results				
Results achieved to Date	The current project is focused on use of AATI's DNA PROFiler instrument for advanced microbial detection. We have made excellent progress on this project since it began. Important milestones include presentation of our results at two international scientific meetings (joint authors on one submission with Gary Procop of the Cleveland Clinic) and training of one MS student (Brittany Porter, expected graduation August 2010). A news release detailing our progress on this project was issued in May 2010 by the University News Service: http://www.news.iastate.edu/news/2010/may/StecherAATI. Grow Iowa support was critical in facilitating one collaborative proposal for external funding from the National Science Foundation, submitted June 9th. In early June 2010, we also took delivery of our DNA PROfiler instrument, valued at $100,000, which represents a significant portion of the promised cost share on the project. AATI personnel to present data from this project during Association for Labortory Automation's LabAutomation2011 meeting in January 2011 in a session on high-throughput methods for the analysis of foods, chaired by Dr. Brehm-Stecher.			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Pat Halbur	$69,500	$69,500	$21,136
Description of Project	Development of a novel Genetic Test fo Inerited Bovine Diseases and its application to tissues and embryos			
Anticipated End Results	Develop and commercialize a panel of molecular diagnostic assays for detection of genetic diseases and production traits sensitive enough to use on biopsies from bovine embryos. This will benefit the Iowa beef and			
Results achieved to Date	We have completed microarray validation for Bovine Leukocyte Adhesion Deficiency (BLAD) and Complex Vertebral Malformation (CVM). We have also completed microarray validation of three independent sexing primer pairs and oligonucleotide probes and two have been selected for inclusion in the kit and the third reserved for bovine specific typing. These five markers (2 for bovine diseases, 2 for gender determination, 1 for bovine species confirmation) are well into transition to the Luminex xMAP Technology. Primer pairs and oligonucleotide probes have been designed and are undergoing PCR optimization and validation for Arthrogryposis Multiplex (AM) and Neuropathic Hydrocephalus (NH). Designs are also in progress for coat color. In addition, we are in the process of developing a test for a newly emerged disease now known as Fawn Calf Syndrome. Sensitivity levels for detection of genetic disease are under validation using serial dilutions of known genomic DNA concentrations. We have confirmed that we can detect below ten genome equivalents by serial dilutions on the microarray platform and now we are ready to begin testing biopsied embryo samples. We have also begun to develop a virus screening panel for bovine embryos to protect against introduction of new diseases and to open up export markets. Viruses to be included in the panel include Bovine Virus Diarrhea Virus (BVDV), Infectious Bovine Rhinotracheitis Virus (IBRV), Blue Tongue Virus (BTV), and Bovine Leukosis virus (BLV). The embryo biopsy technique is being further adapted and validated to achieve acceptable pregnancy rates following post-biopsy genetic testing and freezing. Several embryos have been collected, biopsied to provide genetic materials for testing, and frozen. Recipients for embryo transfer have been identified and transfers are being performed. Indications to date are that we can achieve pregnancy rates greater than 50% for biopsied embryos. Confirmation that genetic testing of the embryonic tissue matches the genetic tests of the live born calves will be done as calves are born.			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Brad Bosworth	$146,610	$146,610	$49,648
Description of Project	Prevention of swine influenza: Commercialization of replicon particle and replicon subunit vaccines			
Anticipated End Results	The goal of this project is to develop replicons that express various influenza HA genes and to determine their immunogenicity and efficacy as SIV vaccine candidates			
Results achieved to Date	Since its introduction, novel H1N1 virus has been a concern for the swine industry. For a novel H1N1 vaccine efficacy study, we produced novel H1 replicon particle (RP) and replicon subunit (RS) vaccines within two months of the outbreak being reported. Following challenge, both H1 RS and RP vaccinated pigs demonstrated reduced viral shedding and lung pathology, and increased average daily gain, when compared to non-vaccinated pigs. In addition to hemagglutinin (HA), we have done a preliminary study evaluating the nucleoprotein (NP) gene as a vaccine candidate. This study demonstrated that NP RP vaccination is able to decrease nasal shedding in pigs following homologous influenza challenge. The NP is conserved among influenza subtypes, and therefore has potential as a universal vaccine antigen capable of providing heterosubtypic protection. A larger study is currently in progress to determine both homologous and heterosubtypic protection following NP vaccination. These studies demonstrate that the replicon technology allows for more rapid development of vaccine than with traditional methods, and that these vaccines are immunogenic and efficacious against influenza in swine. In addition to novel H1 and NP, replicons expressing swine H1 Beta, Gamma, Delta, and cluster 4 H3 have been produced and evaluated for antibody responses in pigs. Antigen-specific antiserum from the study is used in a hemagglutination inhibition assay with swine influenza field isolates to determine antigenic cross-reactivity. These results can be used to quickly produce customizable vaccines via Sirrah Bios' VCP (Vet/Client/Patient) relationship. In 2009, Sirrah Bios sold 198,868 doses of SIV RS vaccine via VCP relationship, and 390,800 doses in 2010 (as of May 31, 2010). In addition, Harrisvaccines, Inc. d/b/a Sirrah Bios, has submitted applications to the Center for Veterinary Biologics (CVB) for conditional licensure of the novel H1N1 RS vaccine and for full licensure of a cluster 4 H3N2 RP vaccine.			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	David Grewell	$34,504	$34,504	$29,984
Description of Project	Naturally Controlled Gelatinization of Corn Starch			
Anticipated End Results	The main thrust of the proposed work was to characterize, demonstrate, and scale-up the use of high powered ultrasonics to partially and controllably gelatinize corn starch application. The new processing method would allow Grain Processing Corporation (GPC) to market a new product using ultrasonication to partially swell the starch without solvents/chemicals, thus making it a "natural" product.			
Results achieved to Date	Currently, methods for producing instant starches (partially and controllably gelatinize starches) gel either involve use of harsh chemicals or energy intensive processes. The proposed ultrasonics method will allow the industry to produce a "natural" product without the use of these chemicals. Task 1 for this project has been completed. Task 2 is currently ongoing. The main objective of task 1 is to optimize the ultrasonic conditions to partially gelatinize starch. We have used corn starch samples provided by our company partner, Grain Processing Corporation (GPC). Starch samples were mixed with water then sonicated using Branson ultrasonics bench scale ultrasonic system at varying amplitude (28-72μm) and starch concentration (20-30% total solids). The samples were then analyzed for particle size distribution, cross polarization microscopy and swelling power. All sonicated samples showed an increase in swelling power relative to the control (unsonicated). Swelling power results showed highest at amplitude of 72μm and 25% total solid concentration. Particle size analysis, similar to swelling power, showed that the highest average particle size achieved within the range of ultrasonic conditions tested is at an amplitude of 72μm and 25% total solid starch concentration. Starch swelling was also evident using electron microscopy where control samples were compared with sonicated samples. In addition, under cross polarized microscopy, some granules in the sonicated samples are intact but started to show deformed maltese crosses, which is conducive to gelatinization. This could be an indication that starch is starting to lose its crystallinity. The main objective of task 2 is to transition the batch system into a continuous system in preparation for a pilot scale scale-up. In the continuous system, large volumes and longer reaction time will be required. The			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Rick Sharp	$29,890	$29,890	$17,412
Description of Project	Effect of oral ATP on human muscle performance			
Anticipated End Results				
Results achieved to Date				
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Tanja Opriessnig	$80,000	$80,000	$0
Description of Project	Cross Protective Immunity			
Anticipated End Results				
Results achieved to Date				
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2010	Amount of FY 2010 Allocation Expended as of 6/30/2010
Principal Investigator	Eliot Winer	$10,000	$100,000	$0
Description of Project	Volumetric Model Analysis for Bariatric Medicine			
Anticipated End Results				

University of Northern Iowa
Annual Economic Development and Technology Transfer Report
FY 2010

Section 1. UNI's Economic Development Activities to Enhance Economic Growth in Iowa

Capitalizing on the niche strengths of multiple programs, UNI remains a reliable resource supporting Iowa's economic development efforts. Each year, these programs strive to deliver increasingly customized technical assistance, meeting the unique needs of a statewide client base. Specific service areas for UNI include: community and economic development; market research; environmental research and service; sustainability; metal casting; biobased lubricants; executive development; new Iowans; and entrepreneurship. The Business and Community Services (BCS) division houses a host of programs that emphasize hands-on assistance to advance business, community and entrepreneurial development. Serving clients in each of Iowa's 99 counties, BCS is able to capitalize on the intellectual resources of the University to better meet Iowa's economic development needs. BCS strives to also engage the broader university community – the faculty, staff and students – all of which play critical roles in providing practical assistance. Outcomes realized by key economic development/tech transfer programs during FY 2010 include:

- Provided service in all 99 counties to more than 7,750 business, community and local government clients.
- Involved 208 faculty members and nearly 2,100 students in the delivery of these services.
- Leveraged each $1 invested by the state with $6 in private grants, fees or federal funding.

Entrepreneurship, Business Incubation and Technology Transfer

- UNI's 3 incubator/accelerator programs and MyEntre.Net helped start or expand 179 ventures, creating 263 jobs.
- MyEntre.Net now boasts nearly 6,500 actively engaged users.
- More than 1,100 entrepreneurs attended one or more webinars or entrepreneurial workshops.
- 18 student businesses were tenants in the John Pappajohn Entrepreneurial Center's Student Business Incubator and 31 additional student entrepreneurs were assisted by the affiliate program.
- One of the UNI John Pappajohn Center's student incubator tenants has been selected as a winner of the John Pappajohn Collegiate Business Plan Competition and another tenant was a finalist in the Global Student Entrepreneurs Association competition.
- 42 businesses have graduated from the 4th Street Incubator in downtown Waterloo to date; the Innovation Incubator graduated three businesses into the regional economy in FY10.
- UNI faculty and staff submitted 8 new intellectual property disclosures.
- A total of 3 patents were received and 8 new patents were filed.
- 3 new license agreements were approved and 2 more are in negotiations.

Waste Reduction and Environmental Assistance

- Environmental technical assistance and on-site reviews were provided to 542 small businesses.
- More than 100 different military bases were provided with painting / coating training to improve transfer efficiency.
- Worked in conjunction with multiple state and local agencies to use geospatial mapping data to resolve issues.
- Recycling and reuse project funding was provided to 56 companies and organizations.
- Energy education programming reached 14,959 K-12 students and 826 teachers in 59 Iowa counties.

Local Economic Development

- IDM created a Community Layoff and Crisis Response manual for Iowa Workforce Development.
- Community clients report creating approximately 1,500 jobs as a result of local economic development technical assistance from the Institute for Decision Making (IDM).
- Comprehensive technical assistance was provided to 35 community partners and 7 regional groups.
- Established the Midwest Node for the Global Rural Network, providing leadership capacity training and resources to a five state region.
- Developed a target marketing strategy and on-site business prospect training to Webster City in response to a pending plant closure.

Bioeconomy

- The Tallgrass Prairie Center hosted the 22nd North American Prairie Conference with 560 attendees.
- NABL moved to a renovated 25,000 square foot facility in the Cedar Valley TechWorks facility, a former John Deere tractor manufacturing building.
- Patented a new microwave grease processing technology with industrial partners in Cedar Rapids, IA.

Metal Casting – Advanced Manufacturing

- Continued sponsored research into biobased foundry binder systems resulting in two new patent submissions and license agreements.
- Provided technical assistance and outreach services to 36 foundries.

Market Research

- Market research and analysis services were provided to 16 Iowa companies.
- Market research clients report an average employment increase of 14%, due in part to the information provided by UNI.

Section 2. Technology Transfer and Intellectual Property

FY 2010

	UNI
a. Number of disclosures of intellectual property	8
b. Number of patent applications filed	8
c. Number of patents awarded	3
d. Number of license and option agreements executed on institutional intellectual property	3
e. Number of license and option agreements yielding income	11
f. Revenue to Iowa companies as a result of licensed technologies	$2,700,000
g. Number of start up companies formed, in total and in Iowa	72/72
h. Number of companies in research parks and incubators	30
i. Number of new companies in research parks and incubators	11
j. Number of employees in companies in research parks and incubators	61
k. Royalties/license fee income	$118,849
l. Total sponsored funding	$42,000,000
m. Corporate-sponsored funding for research and economic development and revenue generation (excludes corporate philanthropy - all in Iowa)	$1,547,678
n. i. Annual appropriations for economic development ii. Grow Iowa values appropriation	$549,606 $855,000

Section 3. Overview of UNI's Economic Development Programs

UNI outreach services for community and economic development activities are outlined in a table format on the following seven pages. The format provides a brief overview of each program, its purpose, who is served and outcomes. Together, the programs served approximately 7,750 communities and/or businesses in the past year.

Section 3. Overview of UNI's Economic Development Programs

Programs	Services	Those Typically Served	FY 2010 Results	Cumulative Results
Institute for Decision Making (IDM)	Hands-on community and economic development guidance and research	Economic development organizations, chambers, city councils, communities and others	✓ Developed the IWD Community Layoff and Crisis Response manual. ✓ Established the Midwest Node for the Global Rural Network providing leadership capacity training and resources to a five-state region. ✓ Developed a target marketing strategy and on-site business prospect training to Webster City as part of their economic development initiative. ✓ Assistance and research provided to 35 community partners and seven regional development groups.	✓ Served 635 communities, counties and groups in nearly all of Iowa's counties to date. ✓ Community clients report approximately 1,500 new jobs annually as a result of IDM assistance. ✓ Trained more than 750 economic development professionals.
Iowa Waste Reduction Center (IWRC)	Free, confidential, non-regulatory environmental assistance for small businesses	Small businesses throughout Iowa	✓ Environmental technical assistance and on-site reviews were provided to 542 small businesses.	✓ Provided 5,063 on-site reviews to Iowa small businesses.

Section 3. Overview of UNI's Economic Development Programs

Programs	Services	Those Typically Served	FY 2010 Results	Cumulative Results
National Ag-Based Lubricants (NABL) Center	Biobased lubricants research, testing services, development of performance standards and biobased lubricant product certification	Companies and individuals developing biobased lubricants, traditional lubricant companies, and lubricant consumers	✓ Moved to new 25,000 square foot laboratory facility in former John Deere tractor manufacturing space. ✓ Patented new microwave grease processing technology with industrial partners in Cedar Rapids, Iowa. ✓ Completed over 1000 hours of diesel engine tests using soy-based engine oils. ✓ Provided fee-based testing services to industry clients.	✓ A national testing and certification center, leading the nation's biobased lubricants industry. ✓ Anchor tenant for Cedar Valley TechWorks. ✓ Over 40 soy lubricants, greases, metalworking fluids and specialty lubricants developed to date.
Strategic Marketing Services (SMS)	Market research and analysis	Businesses, entrepreneurs and non-profit organizations	✓ Market research and analysis services were provided to 16 Iowa companies.	✓ Since 1990, market research and analysis services have been provided to 272 Iowa companies.
Executive Development Center (EDC)	Management and professional training workshops and certificate programs	Iowa businesses and organizations	✓ Specialized business management training provided in 56 workshops to 918 business professionals in 41 businesses during the past year.	✓ Since 1998, the EDC has provided training in 1,076 workshops to 18,496 business professionals.

Section 3. Overview of UNI's Economic Development Programs

Programs	Services	Those Typically Served	FY 2010 Results	Cumulative Results
John Pappajohn Entrepreneurial Center (JPEC)	Research, entrepreneurship education, technology transfer, and capital investment programs	Students interested in entrepreneurship, UNI faculty and staff entrepreneurs, new ventures and rapidly growing small companies	✓ One UNI student entrepreneur won a first place award at the state-level competition. ✓ The first youth entrepreneur camp successfully assisted fourth and fifth graders with starting small businesses. ✓ 18 student business owners were provided space and services in the student business incubator. ✓ 31 student business owners were provided services as part of the student business (affiliate) incubator program. ✓ Mentoring and training services to other colleges and universities increased by 93%, while overall clients and services provided increased by 23%.	✓ The JPEC Student Business Incubator has provided space to 42 businesses since the BCS building opened. ✓ The JPEC has had four first place wins and four honorable mentions in the state-level student business plan competition. ✓ The JPEC has had a finalist twice in the Global Student Entrepreneur Awards competition. ✓ The Cedar Valley Venture Fund, managed by JPEC, has invested in seven new ventures.
Iowa Center for Immigrant Leadership and Integration (ICILI)	Helping Iowa communities and businesses accommodate the needs of newcomers	Communities, faith-based organizations, law enforcement agencies, health care providers and businesses	✓ Conducted colorectal screening social media marketing campaigns for Iowa minorities. ✓ Provided cultural competency training for more than 40 companies, health care providers, social service providers and communities to better meet the needs of newcomers.	✓ Assistance in accommodating the needs of newcomers has been provided to more than 200 Iowa companies and organizations. ✓ More than 30,000 copies of four different guides/manuals (and untold electronic copies) have been distributed throughout Iowa.

Section 3. Overview of UNI's Economic Development Programs

Programs	Services	Those Typically Served	FY 2010 Results	Cumulative Results
UNI Regional Business Center/ Small Business Development Center (RBC/SBDC, MyEntre.Net)	Rural/ Urban Entrepreneurship development, online entrepreneurship resources, business consulting, business training, business incubation	Small and medium sized businesses, entrepreneurs, entrepreneurial service providers, community leaders	✓ MyEntre.Net's online community more than doubled to over 6,500 members. ✓ 692 entrepreneurs participated in a free, interactive Webinar online. ✓ 149 community leaders attended an Entrepreneurship Economic Development Seminar and 408 entrepreneurs attended an EntreBash! in their home communities. ✓ EntreFest!, drew 318 participants to West Des Moines. ✓ RBC Incubation Services served 12 growth-oriented businesses, graduating five into the regional economy. ✓ 342 clients representing ten counties were served with technical assistance or training by the UNI SBDC. ✓ MyEntre.Net entrepreneurs reported 182 new or expanded businesses, 288 new FTE jobs and $13,684,966 in commercial/ equity investment in FY2010.	✓ More than 6,500 entrepreneurs are now engaged online at www.myentre.net, Iowa's online community for entrepreneurs. ✓ 54 companies have been served by UNI RBC incubation programs to date; collectively creating 157 FTE jobs and providing 18,000 square feet of primarily downtown commercial infill in the Cedar Valley.

Section 3. Overview of UNI's Economic Development Programs

Programs	Services	Those Typically Served	FY 2010 Results	Cumulative Results
Tallgrass Prairie Center (TPC)	Research, techniques, education and source-identified seed for restoration and preservation of native vegetation, also prairie biomass for alternative energy.	Iowa counties, state and federal agencies, commercial native seed producers, the community, educators, students, prairie enthusiasts, and others	✓ Roadside vegetation research for restoring right-of-ways was provided to 55 counties in Iowa. ✓ Sampling of prairie species mix plots to determine optimal biomass for electrical generation was conducted. ✓ Published with U of I Press: *Tallgrass Prairie Center Guide to Prairie Restoration in the Upper Midwest* and *Tallgrass Prairie Center Guide to Seed and Seedling Identification in the Upper Midwest*. ✓ Hosted the 22nd North American Prairie Conference (560 participants).	✓ More than 16,000 acres of roadway right-of-way have been restored to native vegetation. ✓ Provided information for Iowa DOT to change seeding regulations. ✓ Provided valuable, durable information regarding prairie restoration. ✓ Laid the groundwork for more practical applications of prairie plants.
Recycling and Reuse Technology Transfer Center (RRTTC)	Recycling and by-products research through grants, recycling and environmental education and outreach.	Serving Iowa businesses, the recycling industry and Iowa citizens locally and across the state.	✓ Research project funding and outreach services related to recycling and reuse were provided to 56 companies and organizations. ✓ Outreach and services provided to 29,126 individuals.	✓ Over 43 RRTTC funded research projects; more than 170 reports and publications available.

Section 3. Overview of UNI's Economic Development Programs

Programs	Services	Those Typically Served	FY 2010 Results	Cumulative Results
Metal Castings Center (MCC) and Center for Advanced Biobased Foundry Binders (CABB)	Metal casting technologies, applied research, testing and training	Iowa casting users, foundries and foundry suppliers	✓ Maintained active contracts with 24 companies, provided outreach projects to six Iowa foundries and technical assistance to 30 additional foundries. ✓ Sponsored research into bio-based foundry binders continued, resulting in two patent submissions. ✓ Partnered with the UI and ISU on light weight metal castings projects.	✓ More than 50 industry funded research projects have been completed to date.
Center for Energy and Environmental Education (CEEE)	Technical assistance, educational programs and leadership in energy conservation and renewable energy, environmental conservation and community-based agriculture	Iowa cities, counties, Iowa schools, teachers, farmers, businesses, elected officials, state agencies, community leaders, citizen organizations	✓ 46 Green Iowa AmeriCorps members provided energy conservation advice to 6000 residents, weatherized 200 homes, reached 4,000 Iowans at educational events, and recruited 250 volunteers. ✓ CEEE's energy education programs helped 14,959 K-12 students and 826 teachers in 59 counties. ✓ $2.6 million generated on locally-grown agricultural products. ✓ CEEE's Farm Energy Working Group workshops engaged 140 working group members, farmers and others. ✓ CEEE's solar instructor training reached 23 installers, 25 higher education representatives across the state, 15 government officials, 6 utility representatives.	✓ Since 1998, energy and environmental education programs in 72 counties have reached over 110,000 K-12 students, and 5,780 K-12 teachers. ✓ Since 1998, Buy Fresh/Buy Local program has facilitated purchase of $8.6 million worth of meat and produce from hundreds of area farmers by food vending institutions.

Section 3. Overview of UNI's Economic Development Programs

Programs	Services	Those Typically Served	FY 2010 Results	Cumulative Results
Materials Innovation Service (MIS)	Mechanical, physical and chemical tests of metals, polymers and cementitious materials	Serving Iowa manufacturers and suppliers	✓ Technical assistance provided to more than 160 individuals and testing contracts from five companies.	✓ Technical assistance or testing provided to approximately 160 individuals this year. Over 1,870 hours of testing provided since the beginning of the program.
Geoinformatics Training, Research, Education and Extension Center (GeoTREE)	Geospatial technologies, education, research, and outreach activities for federal, state, local and tribal agencies	Federal, state, local and tribal (FSLT) government agencies (NASA)	✓ Seven educational workshops held with more than 250 attending. ✓ Worked with Iowa DNR and Public Health Department to apply geospatial data for resolving specific issues. ✓ Working with Cedar Falls Utilities on identifying areas most in need of energy conservation and efficiency assistance. ✓ Provided training on Agent-based Modeling, LiDAR, ArcGIS Desktop, Basic HAZUS-MH for Flooding.	✓ GeoTREE has provided 19 training and educational workshops for approximately 560 federal, state, local and tribal government staff members.

Section 4: Grow Iowa Values Funding Project

See attached spreadsheet highlighting outcomes from UNI's Grow Iowa Values Fund projects in 2010.

Section 5: Collaboration for Economic Development

Examples of UNI's collaboration with state government, federal agencies and other Regents institutions are outlined by category below, by subject area:

Energy and Environment

Center for Energy and Environmental Education (CEEE) and Educational Partners
3,127 Iowa students in grades 1-6 participated in The Iowa Energy Poster Contest. Entries came from 71 teachers at 64 schools, plus entries from multiple schools that participated in 9 local contests sponsored by energy related companies. The Fabulous Resources for Energy Education (FREE) Program loaned energy education materials to 7,996 students supervised by 261 teachers. CEEE staff made 78 energy education presentations to 4,395 K-12 students and their 500 teachers.

Center for Energy & Environmental Education (CEEE) and state partners
CEEE has been working with many state agencies, city and county officials and some federal agencies to continue to engage Iowans in developing better policies that will safeguard Iowa against floods of the future.

Recycling & Reuse Technology Transfer Center (RRTTC) and Educational Partners
The RRTTC worked with six Elementary schools in Cedar Falls to bring the Environmental Education program, Get Your Green On, to more than 2,500 K-6 students through the course of the school year. This program also included members from UNI Tallgrass Prairie, Cedar Falls Utilities, Waste Trac, and City Carton Recycling. The RRTTC also worked with the CEEE, CFU, St. Vincent de Paul, Goodwill, University Book & Supply, and the UNI Physical Plant to help bring about "Panther Pick-Up" to help reduce useable items and recyclable metal materials from going into the landfill. The RRTTC also works with USGS, Des Moines Water Works, IAWA, DMACC, Iowa Association of Municipal Utilities, Iowa Rural Water Association and Iowa Groundwater Association to present the Iowa Children's Water Festival for over 10 years running.

GeoInformatics Training, Research, Education, and Extension (GeoTREE) Center, the Iowa Dept. of Natural Resources and the Iowa Dept. of Transportation
GeoTREE continues its collaboration with the Iowa Department of Natural Resources and the Iowa Department of Transportation, and has developed a web portal to disseminate optical remote sensing data for the entire state. This team is also working with other federal, state, local and tribal agencies in Iowa on a variety of other research, education and outreach activities utilizing remote sensing data.

Public Health

Center for Energy & Environmental Education (CEEE) and community Partners
CEEE's Northern Iowa Food and Farm Partnership piloted a program with three school districts to offer more fruits and vegetables, less sugar and fat, and more locally grown seasonal food items for their school lunch programs.

The Iowa Center for Immigrant Leadership and Integration, Iowa Dept. of Public Health and the Iowa Center on Health Disparities
The Iowa Center for Immigrant Leadership and Integration (ICILI) worked with the Iowa Center on Health Disparities and the Iowa Department of Public Health to develop advertising materials to encourage more Latinos to be tested for colorectal cancer. This marketing research involved focus groups with Latino adults in Waterloo, Des Moines and Storm Lake, Iowa.

Entrepreneurship and Local Development

IDM and Iowa Workforce Development
The Institute for Decision Making continues its collaborative projects with Iowa Workforce Development (IWD forming a strong collaboration with IWD, the Institute for Decision Making developed a Community Layoff and Crisis Response Manual and Iowa's Early Warning System Dashboard. The Dashboard tool will help community-based partners enhance capacity to deploy regional assets and leverage resources from government and non-government resources to support industry transformation and ensure successful workforce transitions into new occupations and industries.

Regional Business Center, Strategic Marketing Services and Iowa Workforce Development
In FY 2010, the RBC partnered with Strategic Marketing Services (SMS) and Iowa Workforce Development (IWD) to survey employer firms in Iowa. New resources are being added to address labor management issues, strategic planning and conflict resolution on MyEntre.Net.

Regional Business Center (RBC) and Statewide Service Providers
For the third year, the UNI RBC continues to lead a collaborative effort of 12 statewide partners to plan and implement an annual conference for Iowa small business owners called EntreFest!. This two-day conference is tailored to the unique needs of Iowa's smallest ventures. Collaborators include multiple private sector companies and the following public entities: Iowa State University, University of Iowa, Iowa Area Development Group, Community Vitality Center, Farm Bureau, Iowa Small Business Development Centers, Alliant Energy, Black Hills Energy and the Iowa Bankers Association.

UNI John Pappajohn Entrepreneurial Center (JPEC) and John Pappajohn Entrepreneurial Centers at the University of Iowa and Iowa State University
JPECs from UNI, ISU and UI collectively offer the Okoboji Entrepreneurial Institute each August for Iowa college students interested in entrepreneurship. JPECs at UNI, UI and ISU also collaborate with the Iowa Department of Economic Development to plan and host the annual

Iowa Venture Capital and Entrepreneurs Conference and jointly plan and host the Collegiate Entrepreneurs Iowa conference, annually.

Bioeconomy

Tallgrass Prairie Center, Cedar Falls Utilities, the Iowa Crop Improvement Association
The Tallgrass Prairie Center (TPC) has developed a relationship with Cedar Falls Utilities (CFU) to determine the maximum energy production potential from prairie biomass. CFU will burn the biomass in their stoker furnace to evaluate the materials. TPC is also working with the Iowa Crop Improvement Association to develop a consortium of native seed producers, native plant growers, nurseries, Iowa DNR, Iowa DOT, Iowa NRCS and private individuals to market native plants.

National Ag-based Lubricants Center (NABL) and AmTek
AMTek Microwaves, of Cedar Rapids, IA is partnering with the NABL Center to develop an innovative new grease manufacturing system. Together with AMTek's microwave experts, NABL researchers have designed and tested a new method of producing biobased lubricating grease. Traditional grease manufacturing involves heating the vegetable oil and other components with hot oil and jacketed heating kettles. Using NABL's new grease-producing process, a specially-designed microwave heating unit provides a uniform, even heat throughout the vegetable oil-based product, significantly reducing the amount of oxidation while significantly decreasing the amount of time required to heat the product. AMTek and NABL are currently constructing a pilot-scale reactor to evaluate the successful laboratory process on an industrial scale.

Advanced Manufacturing

Metal Casting Center, Iowa State University, University of Iowa and Quad Cities Manufacturing Laboratory

The UNI Metal Casting Center (MCC) is spearheading research and development efforts, which include Iowa State University (ISU) and the University of Iowa (UI), to advance manufacturing methods for titanium metal casting. Each institution has a unique research role based on specialized laboratory capabilities. The resulting methods developed by UNI, ISU and UI will be pilot tested through a partnership with the Quad Cities Manufacturing Laboratory. This collaboration aims to produce a casting process that is faster, more flexible, higher quality and more cost effective than is currently available.

Section 7: Client and Project Summary

See attached spreadsheet of UNI's clients served in 2010

University of Northern Iowa - as of June 30, 2010
Grow Iowa Values Fund Appropriations

FY 2009 GIVF Appropriation - $950,000

1	Technology Transfer and Business Incubation (5279)	$320,000	$263,858.00	**$767,858.00**	**Reflects 20% reduction due to state disaster reallocation**
2	Rural Entrepreneurship (5281)	$200,000	$160,000.00		
3	Market Research (5283)	$100,000	$80,000.00		
4	Capacity Building and Implementation for Regional Development (5280)	$130,000	$104,000.00		
5	National Ag-Based Lubricants (NABL) Center (5282)	$200,000	$160,000.00		

FY 2010 GIVF Appropriation - $855,000 **Reflects 10% reduction to base appropriation**

1	Technology Transfer and Business Incubation (5429)	$288,000
2	Rural Entrepreneurship (5431)	$180,000
3	Market Research (5433)	$90,000
4	Capacity Building and Implementation for Regional Development (5430)	$117,000
5	National Ag-Based Lubricants (NABL) Center (5432)	$180,000

University of Northern Iowa	**Project**	**List of all FY 2010 & FY2010 Revenue Sources**	**5279 Revenue Dollars for FY 2010**	**Amount of FY 2010 State Appropriations Expended as of 6/30/2010**	**List of all FY 2010 Revenue Sources**	**5429 Revenue Dollars for FY 2010**	**Amount of FY 2010 State Appropriations Expended as of 6/30/2010**
1	**Technology Transfer and Business Incubation**	FY 2010 State Appropriations (GIVF)	$263,858	$263,858	FY 2010 State Appropriations (GIVF)	$288,000	$190,398
		FY 2010 Federal Support		$194,642	FY 2010 Federal Funding		$392,726
		FY 2010 Other		$72,583	FY 2010 Other		$55,799
Description of Project	UNI continues to advance intellectual property disclosures, protection and commercialization across campus. Strategies for commercialization include licensing, strategic partnerships and new business development. The Innovation Incubator has created a hub facility, coalescing the existing strength of Intellectual Property disclosures and University research with quality business services to support commercialization and licensing. The incubator and support facilities offer a physical link between Iowa's business community, campus innovators and faculty researchers to enhance technology transfer at UNI. Central to this approach are multiple BCS programs that combine education and innovation - some new and some successfully established - working in tandem to create a rich spectrum of services and a unique physical environment to support technology transfer and entrepreneurship.						
Anticipated End Results	As technology transfer and intellectual property development continues to mature at UNI, we expect to generate 12 disclosures per year, file 5 patents, enter 2-3 license agreements and graduate 3-4 new companies into the Iowa economy annually; we expect that 50% of those served will be directly tied to commercialization resulting from research or innovation at UNI. These expected outcomes will result in UNI ranking highly for technology transfer activity among comprehensive undergraduate institutions.						
Results Achieved to Date	During the past year, tech transfer activity increased with 3 substantial license agreements and increased business incubation activity. Intellectual property disclosures were fewer, but patent activity increased. UNI-licensed technologies have resulted in approximately $5 million in annual revenue for Iowa companies. The Student Business Incubator is full with one of the tenants again chosen as a finalist in the Global Student Entrepreneur Competition. The Innovation Incubator expansion is now complete, featuring 14 fully furnished business suites and support facilities dedicated to business growth. The incubator has attracted and served and graduated early stage companies and is near full capacity. In addition, the 4th Street Incubator recently graduated two companies, adding 55 new jobs to the regional economy. More than 40 companies have graduated from the 4th Street Incubator since it opened.						
Plans	UNI will continue to focus on commercialization initiatives, including license negotiations and business start ups. Tenancy at the new Innovation Incubator will continue to increase and reach 100% occupancy by the end of the year. At least 12 intellectual property disclosures will be received with 2-3 licensing agreements executed under patent or trade-secret provisions and UNI will continue to support late-stage faculty research projects. In addition, the Student Business Incubator will remain full, generating spin-off companies for the Iowa economy. Additionally, UNI will launch a corporate research and development program to assist existing businesses in Iowa.						

University of Northern Iowa	Project	List of all FY 2010 Revenue Sources	5281 Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 12/31/2009	List of all FY 2010 Revenue Sources	5431 Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010
2	**Rural Entrepreneurship**	FY 2010 State Appropriations (GIVF)	$160,000	$160,000	FY 2010 State Appropriations (GIVF)	$180,000	$149,828
		FY 2010 Federal Support		$84,836	FY 2010 Federal Funding		
		FY 2010 Other		$75,437	FY 2010 Other		$78,605
Description of Project	MyEntreNet is an entrepreneurship development system which identifies, recruits, networks and serves small business owners with information, services and access to capital in rural regions across the state. Through a comprehensive, technology-supported approach of building community capacity, customized technical assistance, networking and enhanced access to capital, MyEntreNet fills a significant gap in rural economic development in Iowa.						
Anticipated End Results	In FY 2010, MyEntre.Net's online community will grow by 25% to 4,000 Iowa small business owners engaged online. 500 small business owners will attend a regional EntreBash! event and 400 will go on to attend one or more events supported by a service provider partner participating in the MyEntreNet Master Calendar. Those served will generate 125 new or expanded businesses and create 300 new FTE jobs. A total of 250 entrepreneurs representing 50 Iowa counties will attend the 3rd annual EntreFest! in February 2010.						
Results Achieved to Date	The economic downturn in Iowa has increased interest in entrepreneurship, particularly in rural regions of the state, as evidenced by higher demand for services through MyEntre.Net. During FY 2010, thousands of small business owners joined MyEntre.Net, Iowa's Online Community for Small Business and Entrepreneurs. As of year end, more than 6,500 Iowans were engaged online, a new record. More than 1,100 small business owners attended an EntreBash! networking event or participated in an interactive Webinar in 2010. The third annual EntreFest! statewide conference for small business and entrepreneurs attracted 318 attendees to West Des Moines in February. Rural communities have also requested assistance with developing entrepreneurship economic development strategies. In the past 7 months, Harlan, Sheldon, Mount Pleasant, Bloomfield, Holstein and Monona received technical assistance to support entrepreneurship and received training in use of the online community. The economic impact survey conducted of MyEntre.Net entrepreneurs in June 2010 revealed that 31% of MyEntre.Net members added one or more jobs since January, up considerably from the previous six months. For the year, MyEntre.Net small business owners created 219 new FTE jobs, but 73 other jobs were lost. Of survey respondents, 174 self-reported starting or expanding their business during FY 2010, and they invested $13,684,966 in their firms.						
Plans	In FY 2011, MyEntre.Net's online community will grow by 50% to 9,000 Iowa small business owners engaged online. 500 small business owners will attend a regional EntreBash! event and 300 community leaders will begin the process of creating an entrepreneurship support system by participating in the Entrepreneurial Communities Project. Those served through this systems approach will generate 125 new or expanded businesses and create 300 new full time jobs. 350 entrepreneurs representing 50 Iowa counties will attend the 4th annual EntreFest! statewide conference for small business on February 24th and 25th 2011 in Dubuque.						

University of Northern Iowa	Project	List of all FY 2010 Revenue Sources	5283 Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010	List of all FY 2010 Revenue Sources	5433 Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010
3	**Market Research**	FY 2010 State Appropriations (GIVF)	$80,000	$80,000	FY 2010 State Appropriations (GIVF)	$90,000	$81,066
		FY 2010 Federal Support			FY 2010 Federal Funding		
		FY 2010 Other		$80,084	FY 2010 Other		$88,395
Description of Project	Strategic Marketing Services (SMS) is focused on market research projects for start-up and existing businesses and organizations to expand and stimulate economic growth across Iowa. All GIVF dollars are matched on a one-to-one basis with funds from the client. This project centers on market research to help Iowa businesses be more competitive and will provide the following services: 1) Assist businesses, entrepreneurs, and organizations in assessing the potential of an idea for a product/service concept or in growing their organization. 2) Provide a structured research protocol that the client can then implement on their own, with a provider of their choice, or by continuing to work with SMS.						
Anticipated End Results	Improve competitive intelligence for Iowa companies, thus increasing sales, business stability, and job retention and creation. Costs for market research projects are split between the client and GIVF investment, with a maximum GIVF support of $10,000 per project.						
Results Achieved to Date	During FY10, SMS developed structured research protocols, provided strategic direction assistance, improved market intelligence for Iowa companies/organizations, and provided strategic assessments. Area 1: Market Research Based Projects – In FY10, SMS engaged in projects with the following companies: Heartwood Investments (Cedar Falls); b-calm (Waterloo); Controlled Drainage (Scranton); Progressive Structures (Elkader); Stellar Industries (Garner); Opportune Risk Bridging (Johnston); Far Reach Technologies (Cedar Falls); Woodlands and Prairies (Monona); Iowa City Area Development (Iowa City); SYNN Clothing (Cedar Falls); Tall Grass Prairie Center (Cedar Falls). Area 2: Market Research Plans and Assessments: SMS consulted with the following Iowa-based clients regarding the state of their businesses and discussed a Market Research Plan/Strategic Plan, along with an assessment of their situation: Computer Software Development (Center Point); Butterworth Clocks (Muscatine), Bentley Machine and Manufacturing (Marion) Creative Composites (Waterloo).						
Plans	In order to attract additional Iowa-based companies to take advantage of available funding for market research, SMS will continue a broad based marketing campaign initiated in 2008. Activities in this campaign include targeted mailings, news articles, and participation in the EntreFest! entrepreneurship conference. This two day event attracts entrepreneurs and small business owners from across the state. During FY11, SMS plans to assist up to 10 Iowa companies with extensive market research projects.						

University of Northern Iowa	Project	List of all FY 2010 Revenue Sources	5280 Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010	List of all FY 2010 Revenue Sources	5430 Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010
4	**Capacity Building and Implementation for Regional Development/Helping Regions Succeed**	FY 2010 State Appropriations (GIVF)	$104,000	$104,000	FY 2010 State Appropriations (GIVF)	$117,000	$82,507
		FY 2010 Federal Support		$16,873	FY 2010 Federal Funding		
		FY 2010 Other		$95,650	FY 2010 Other		$118,034
Description of Project	With the shared purpose of expanding and stimulating economic growth across the state of Iowa, the Institute for Decision Making (IDM) continues to implement regional development assistance programs that build capacity regionally and locally to sustain Iowa's regional economies over the long term.						
Anticipated End Results	Improvements are expected to five key areas related to regional development: 1) sustainability of regional work and strengthening the collaborating member groups, 2) regional metrics project, 3) social media as potential marketing tools, 4) economic adjustments and shifts to economic base and 5) regional workforce assessments - skillsheds.						
Results Achieved to Date	IDM provided technical assistance to four regions and successfully obtained a 2010 Regional Initiatives Grant for the Off-Shore Iowa (OSI) marketing efforts. IDM provided IDED with a template for establishing regional benchmarks based on secondary data available to the department. IDM reviewed all provided regional work plans and provided IDED with suggested region-specific benchmarks as related to those work plans. IDM built its staff capacity in social media as marketing tools by attending five webinars and multiple conference training modules. IDM staff piloted a social media marketing initiative with the Heartland Economic Development Course, which increased the interest level among course participants, many of whom are in Iowa's economic regions. IDM staff used knowledge gained from the webinars to develop a Best Practices whitepaper that can be shared with regional clients. IDM researched, completed, and delivered a manual to IWD of practical guidance for local leadership who may potentially, or are actually dealing with mass layoffs or business closures. IDM obtained feedback from early users of the manual in order to make updates to the manual. IDM identified several significant challenges inhibiting Regional Innovation Grant (RIG) follow-through (workforce assessments) after federal funding is exhausted, thus yielding a low follow-through rate. IDM has assisted IWD and others with the development and completion of its initial pilot skillshed analysis in the Siouxland Region. A skillshed analysis integrates laborshed survey data, job vac survey data and other skill and career path data from secondary sources to map out potential skills-development paths for workers in a region.						
Plans	IDM will continue supporting regional targeting, marketing and planning efforts as requested, administering the grant to the Off-Shore Iowa virtual region, and assisting in the development and assessment of region-specific benchmarks. IDM continues to provide feedback to IWD as they make revisions to the pilot skillshed study and move forward with additional studies. Planned new areas for FY11 include participation in the Business Expansion & Strategic Trends (BEST) of Iowa program and implementation of the Entrepreneurial Communities Project (ECP) to enhance and increase entrepreneurship initiatives in local economic development.						

University of Northern Iowa	Project	List of all FY 2010 Revenue Sources	5282 Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010	List of all FY 2010 Revenue Sources	5432 Revenue Dollars for FY 2010	Amount of FY 2010 State Appropriations Expended as of 6/30/2010
5	**National Ag-Based Lubricants (NABL) Center**	FY 2010 State Appropriations (GIVF)	$160,000	$160,000	FY 2010 State Appropriations (GIVF)	$180,000	$147,267
		FY 2010 Federal Support		$160,046	FY 2010 Federal Funding		$147,267
		FY 2010 Other			FY 2010 Other		$0
Description of Project	As a globally-recognized biobased lubricants research center, The National Ag-Based Lubricants (NABL) Center supports the growth of Iowa's bioeconomy with cutting-edge research involving biobased industrial and automotive lubricants, greases, functional fluids, and biobased product process and manufacturing technologies. NABL has become the primary source of expertise for biobased lubricants and greases in Iowa and the nation, a role that is increasingly important during this critical transition from a petroleum-based economy to a growing biobased economy.						
Anticipated End Results	As the anchor for TechWorks, a regional economic development initiative focused on the bioeconomy, NABL's resources and expertise will be used to attract prospective biobased companies to Iowa. NABL will continue to provide support for the profitability and growth of the state's biobased products industry by offering credible performance testing resources and successful new product development.						
Results Achieved to Date	To provide support for the growth of the state's biobased products industry, the NABL Center has expanded its reach by: • Moving the NABL Center's laboratory to a newly remodeled facility at the Cedar Valley Techworks (CVTW). As CVTW's anchor tenant, NABL offers biobased product development and biolubricant testing services, to encourage further development of the State's biolubricants industry. • Partnered with AMTek Inc., a locally-owned company in Cedar Rapids, Iowa and a leader in microwave technology and industrial microwave systems, to develop a microwave-based biogrease production pilot plant. • Researched the effect of isolating individual fatty acids for use in biobased grease production and their impact on the final properties and performance of biobased grease formulations. • Provided ISO 17025 accredited testing services to 10 start-up or existing businesses in biofuels, biolubricants, and other biobased product industries. • Applied NABL's unique expertise to advance the goals of national and international partners and industries in the development of biobased lubricants and greases, using their own crop oil inputs.						
Plans	The NABL Center's novel microwave grease production process will provide the biobased grease industry with a unique cost advantage. If this project is successful, the competitive advantage will belong for perhaps the first time to a biobased lubricant. Coupled with current research investigating specific fatty acids as grease feedstocks, this project promises to catapult the State's biobased lubricants industries ahead of the competition by creating better performing products at better prices, with opportunities for added value to remain in the State and the region. In addition, NABL will provide research and testing to at least 10 biofuel or biolubricant campany projects in FY 2011.						

FY 2007 Battelle Appropriation

$8,410,000 Board of Regents approved September 2006.

Endowment/Salary Funding	$2,000,000
Infrastructure (RIIF and VIF)	$2,720,000
Platform	$3,690,000
o Bioeconomy Platform Proposals	$1,054,666
o Advanced Food and Feed Proposals	$856,344
o Biosecurity Proposals	$450,000
o Animal Systems Proposals	$579,000
o Information Technology	$650,000
o Advanced Manufacturing	$100,000

Iowa State University	Project	List of all Revenue Sources	Revenue Dollars	Board Approved for Programs/Projects	Amount of FY 2007 State Appropriations Expended as of 6/30/2009
	Endowment/Salary Funding	FY 2007 State Appropriations (Battelle)	$2,000,000	$2,000,000	$2,000,000
Description of Project	Create an endowed professor- and/or entrepreneur-in-residence program.				
Anticipated End Results	Attract world-class, entrepreneurial talent in the core Battelle platform areas.				
Results achieved to Date	The positions have been finalized:				
Plans	Use the investment pool and matching funds to continue the program.				

Iowa State University	Project	List of all Revenue Sources	Revenue Dollars	Board Approved for Programs/Projects	Amount of FY 2007 State Appropriations Expended as of 6/30/2009
	Infrastructure (RIIF and VIF)	FY 2007 State Appropriations (Battelle RIIF and VIF)	$2,720,000	$2,720,000	$2,720,000
		FY 2009 Matching Funds (General Fund)	$999,049		
		FY 2009 Matching Funds (Federal)	$1,573,113		
		FY 2009 Matching Funds (3rd Party Cash)	$458,851		
		FY 2009 Matching Funds 3rd Party In-Kind)	$0		
Description of Project/Anticipated End Results	$1,600,000 will be used for the Colleges of Agriculture, Engineering, Human Sciences and Liberal Arts and Sciences for laboratory and appurtenant equipment upgrades that support research and commercialization in the areas of biosecurity, the bioeconomy and information technology. $1,058,000 of Infrastructure funding related to Battelle Core Platform projects will be used for laboratory renovation and remodeling and for appurtenant equipment to carry out the projects.				

Iowa State University	Project	List of all Revenue Sources	Revenue Dollars	Board Approved for Programs/Projects	Amount of FY 2007 State Appropriations Expended as of 6/30/2009
	See 7 platform projects below	FY 2009 State Appropriations (Battelle)	$3,690,000	$3,690,000	$3,690,000
		FY 2009 Matching Funds (General Fund)	$2,465,798		
		FY 2009 Matching Funds (Federal)	$1,203,388		
		FY 2009 Matching Funds (3rd Party Cash)	$232,793		
		FY 2009 Matching Funds 3rd Party In-Kind)	$237,433		

Iowa State University	Project		Allocated Dollars FY 2007	Allocation expended as of 6/30/2009
Robert Brown	**Bioeconomy Platform Proposals**	Platform allocation	$1,054,666	$1,054,666
Results achieved to Date/Plans	Task 1: The objective of this task is to produce syngas with properties suitable for catalytic or biocatalytic upgrading to fuels and bioproducts. A ThermoStar mass spectrometer was purchased from Pfeiffer Vacuum and installed to analyze producer/syngas contamination levels. The mass spectrometer instrument proved capable of analyzing important gas stream constituents: Hydrogen Sulfide, Hydrogen Chloride, Ammonia, Sulfur Dioxide, Methane, Carbon Dioxide, Carbon Monoxide, Hydrogen, Nitrogen, Ethylene, and Ethane. Equipment purchases and upgrades to the gasifier using Battelle funding allowed completion of studies to understand the relationship between biomass alkali concentrations and carbon conversion during the gasification process. The work has attracted additional funding from ConocoPhillips Company and the U.S. Department of Energy to build a syngas cleaning system. This system is scheduled to be completed by September, 2010..			
	Task 2. An experimental program was completed to investigate the effects of adding functionalized nanoparticles to a gas-liquid fermentation system to enhance the carbon monoxide-liquid mass transfer rate. We have shown that MCM41 functionalized by 5% mole ratio mercaptopropyl groups provides the strongest mass transfer enhancement of nearly a factor of 2 in the CO-water system without fermentation media. The addition of various electrolytes revealed a mass transfer enhancement by up to a factor of ~4.7. When the functionalized nanoparticles were added to actual fermentation broth in the presence of Rhodospirillum rubrum, the biologically mediated water-gas shift reaction was enhanced, but the enhancement was only moderate. We concluded that at the present time, functionalized nanoparticle addition to fermentation systems to enhance CO-liquid mass transfer does not produce sufficient enhancement at the present time when considering the challenges associated with manufacturing and separating the functionalize nanoparticles.			
	Task 3. Experiments last year completed our studies to optimize growth and fermentation condition for Rhotospirllum rubrum for hydrogen and polyhydroxyalkanoate (PHA) during growth on syngas. Limiting nitrogen concentrations in the growth media was shown to increase the yield of PHA by approximately 400% with no effect on hydrogen production.			
	Task 4.The goal of this task is to examine an alternative route to ethanol production that avoids the high energy and water costs of distillation. We engineered E. coli to produce acetaldehyde plus hydrogen. These compounds, which are volatile, can be converted to ethanol chemically bypassing distillation. We are preparing a manuscript that describes our findings.			
Iowa State University	Task 5. This task has focused on understanding and manipulating the metabolism of Rhodospirillum rubrum so as to make this organism more suitable as a platform for the fermentation-based conversion of syn-gas to biorenewable chemicals and biofuels. We have completed the characterization of the negative gene effectors that modulate the ability of this organism to produce biorenewable bioplastics. To address this question we created R. rubrum strains that lack functional negative genes individually or in combination. Genes that have been evaluated include: phaC, phaC-like1, phaC-like2, and phaJ, the double mutant combinations of phaC and phaC-like1, phaC and phaC-like2, phaC-like1 and phaC-like2, and the triple mutant in which all three genes phaC, phaC-like1, phaC-like2. These characterizations led to the discovery of specific genes and gene combinations that can be manipulated to enhance bioplastics production.			

	Task 6. This task focuses on generating bio-oil under well characterized operating conditions in conjunction with the characterization of the physicochemical properties which influence bio-oil stability. The original goal of building a new pyrolysis unit was expanded with the receipt of $500,000 from the U.S. DOE which allowed the construction of a proprietary bio-oil collection system developed at ISU as well as the purchase of new feedstock milling and drying equipment. The new fast pyrolysis reactor, char removal system, and bio-oil collection equipment have been designed, built, and tested. The results demonstrated the fractionating bio-oil recovery concept. A new company, Avello, has been launched in Ames, IA to commercialize this technology. With support from the Department of Energy and the ConocoPhillips Company, the system is now being used to support research to explore methods to improve bio-oil stability. In an ongoing effort to improve our ability to characterize biomass and bio-oil, instrumentation capabilities were added to the analytical laboratory. Instruments purchased include a HPLC (from Dionex) for quantifying the bio-oil major chemical compositions and a TGA/DSC (from Mettler) for determining biomass, bio-oil and biochar proximate analysis. These have given us unprecedented analytical capability to conduct research under sponsorship from the U.S. DOE.				
	Task 7: Our project had three primary goals: 1. Pure butyl or isopropyl oleates have low enough melting points to make attractive lubricants, but contamination by small amounts of saturated esters raise the melting point. We wished to see if these esters could be made from high-oleic soybean and then purified sufficiently by as low-temperature crystallization from 20-50%acetone solutions to be economically-produced bio-lubricants. Purities of 92.5% were achieved by crystallizations from acetone at -27 and again at -37oC. The butyl ester formed more easily crystallized than the isopropyl ester. The oils recovered from the acetone solution melted below -30oC.				
	Task 8. The reactor infrastructure purchased in this project has been used to support bio-oil upgrading studies and other biorenewable conversions. These project areas have been funded by ConocoPhillips, ADM, NSF and DOE. Work was performed on a range of bio-oil upgrading reaction strategies including esterification, C-C coupling (aldol condensation and ketonization), steam reforming, aqueous phase reforming, and hydrogenation.				
	Raj Raman, Startup: Battelle Funds provided to Associate Professor D Raj Raman as startup funds were used to support the following activities: • Summer salary to allow working on multiple biorenewable related projects, including low-cost pretreatment reactors using aqueous ammonia steeping method, and organizing Intensive Program in Biorenewables using Cargill Gift funds to bring over 40 students from across the country and around the world to ISU campus to learn about				
	David Grewell, Startup: This work has a patent pending application and focuses on embossing features designed to act as reservoirs, valves, and reaction chambers to allow glucose and lactate levels to be measured in solution using a standard PC-CD player and thus termed 'Glucose/lactate Bio-CD'. Once embossed, the surface energy of the plastic substrate was chemically modified to make it hydrophilic by increasing the surface energy by approximately 135%. Flash-free micro patterns were embossed on thermoplastic substrates. The embossing technique relies on a micro-cellular foamed substrate to absorb the displaced material during the embossing process so that				
	Jacek Koziel, no report received				
Robert Brown	**Bioeconomy Platform Proposals**	Infrastructure allocation	$1,054,666	$1,054,666	
	College of Engineering: No update received, previous report. Dr. Chris Williams has upgraded a servo-pneumatic testing machine for testing materials associated with bio-energy research. Research will be under contract within the next 6-12 months. A substantial amount of exposure is being received by the research team associated with utilizing bio-energy co-products in asphalt materials and this equipment will further expand their research capabilities and thus research exposure.				
	College of Liberal Arts and Sciences: We are developing imaging instrumentation and methods, and subsequently applying these techniques in a diverse set of applications, including the study of cellular processes that are initiated at the cell membrane, lignocellulosic biomass, and catalytic systems. Two goals of this work are elucidating how properties of the cell membrane influence cell signaling events across the membrane, and developing methods to study reactions utilizing chemical and biological catalysts. The analysis techniques that we use include fluorescence and Raman scattering. Raman imaging is a particularly attractive imaging mode since it provides sp				
	College of Agriculture: The Biocentury Farm was dedicated with an open house on September 22, 2009. Infrastructure installation and improvementa included autoclave installation, boiler automation, utility installation to additional buildings, compressed air drops, dividers for office and lab space, and door openers				
Ruth MacDonald	**Advanced Food and Feed Proposals**	Platform allocation	$857,572	$857,572	
Results achieved to Date/Plans	Greg Welk and Mike Spurlock: The Battelle funds have been critical to the continued growth and success of the Nutrition and Wellness Research Center. Since the last reporting period, Michael Spurlock (director of integrative and translational research) and Gregory Welk (director of clinical research and community outreach) were appointed to co-lead the NWRC. A key goal of the NWRC is to merge basic and applied research in order to capitalize on the bold vision set out by that National Institutes of Health (NIH) to transform medical and health-related research. The NWRC is working to engage interdisciplinary research teams to pursue integrated lines of research related to nutrition, physical activity and other health and wellness issues. The increasing prevalence of obesity is a major public health concern so obesity-related research has been a priority area of research within the center. The NIH has emphasized the importance of translational research paradigms to ensure that scientific				
Results achieved to Date/Plans	Ruth MacDonald, Startup: Completed work includes five animal studies designed to examine the effects of dietary components on colon inflammatory responses. We have used a chemical induction model to mimic human inflammatory bowel disease in mice. Several dietary interventions were performed to characterize a protective response. We have analyzed colon samples from these experiments for cytokine expression using the Luminex system which provides 23 cytokine quantifications. From these data, we observed most were increased by the induction of inflammation and dietary intervention prevented the increase of some, but not all. Ongoing work is needed to better understand how specific cytokines are regulated by dietary factors. In the colon samples, we have also quantified histological changes and COX-2, TLR-4 and B-catenin using Western immunoblot. The dietary intervention did somewhat affect COX-2 or TLR-4 expression, although less than we had predicted. The most recent				
Results achieved to Date/Plans	Mike Spurlock: This study evaluated the effects of high-carbohydrate versus high-fat diets on inflammation located in adipose and skeletal muscle of pigs which are genetically predisposed to obesity. Fourteen Ossabaw swine were housed in an Iowa State University facility and our experienced animal caretaker oversaw the daily feeding and care of the pigs. The swine were divided into two experimental groups, one of which was allowed to eat a commercial swine diet ad libitum. The second group was restricted to a quantity of commercial feed that maintained their body weight but did not promote weight gain. The swine were fed in this manner for twelve weeks, and then their diets were switched to high-fat or high-carbohydrate diets for an additional thirty six weeks. The swine were sacrificed and blood and tissue samples were taken to measure markers of inflammation, including sera insulin, non-esterified fatty acids, total cholesterol, glucose, and triglycerides. Sera insulin concentrations were not				
Results achieved to Date/Plans	Director Startup: These funds provided salary support for the Nutrition and Wellness Research Center, partially or fully supporting the following positions: interim director and interim associate director of NWRC, director of clinical research and community outreach, administrative specialist, and stipends for several graduate research assistants conducting research for NWRC-administered projects.				

Iowa State University	Project		Allocated Dollars FY 2007	Allocation expended as of 6/30/2009	
Manjit Misra	**Biosecurity Proposals**	Project allocation	$450,000	$450,000	
Results achieved to Date/Plans	Earlier trials had suggested the inhibitory substance in CDS is of low mol. wt. We procured more test materials from Lincoln Way Energy and designed an experiment to determine the relative size (Mol. Wt.) of the substance(s) responsible for the Salmonella inhibition. We dialyzed some of the CDS, then lyophilized the retentate to reduce its volume. This material was tested against Salmonella in the Bioscreen and compared with undialyzed CDS. The data show that CDS after dialysis has no effect on the growth of Salmonella. This material was dialyzed vs. distilled water in dialysis tubing with a molecular weight cut-off (MWCO) of 3500, so the material responsible for the inhibition must have a mol. wt. of <3500 mass units. In this experiment, 2 different levels of CDS (30- & 60 uL per Bioscreen well) were used. There was inhibition by undialyzed CDS (UCDS), and the inhibition shows a dose response. However, the extent of inhibition by UCDS was not as great as has been observed in the past. This suggests that the amount of the inhibitory material in CDS varies from batch to batch. This may be explained by that LWE has modified their process somewhat which will affect the levels of inhibitory substances in CDS. For the Iowa Livestock traceability project, using the electronic system offered through GlobalVetLink, we created 83 Iowa Preconditioning Certificates representing 3,414 animals. These certificates were created by six veterinary practices. From these users, feedback was collected by GlobalVetLink for improvements to the preconditioning certificate application. GVL staff is currently working on development and testing for an updated version of the product to be released in the first quarter of 2010. The majority of the updates focus on improving the user interface for a more intuitive user experience.				
Results achieved to Date/Plans	Munkvold Startup: Larvae of the corn rootworm (CRW) (Diabrotica spp.) injure maize roots through their feeding activity, completely destroying some roots and leaving others with extensive epidermal and cortical damage. We hypothesized that the roots of plants with CRW injury will be more intensively colonized by soilborne fungi, including root and stalk rot pathogens. In 2007 and 2008, we planted maize hybrids in fields where high populations of CRW had been encouraged through the use of trap crops. Hybrids genetically engineered with different genes for CRW resistance were compared to their near-isogenic CRW-susceptible counterparts in replicated plots in each of three locations (Mead, NE; Ames, IA; Crawfordsville, IA, USA) in 2007 and two locations (Mead and Crawfordsville) in 2008. We measured CRW injury (0-3 nodal injury scale) and Fusarium colonization (by dilution plating and quantitative PCR) in mid to late July and again in mid September, and recorded the incidence of stalk rot symptoms in plants collected randomly from each plot. CRW injury was severe on susceptible hybrids, especially at the Mead location in 2007 and Crawfordsville in 2008, with scores averaging ~2.0. Transgenic hybrids showed moderate to high levels of resistance, with average scores <1.0. Several Fusarium species were isolated from roots, including F. verticillioides, F. proliferatum, F. semitectum, and F. graminearum. Dilution plating showed that colonization by all Fusarium species was higher in CRW-susceptible hybrids exceeded that of their CRW-resistance counterparts for locations with severe CRW feeding injury, although results for individual plants were highly variable. Several of the observed Fusarium species are stalk rot pathogens and CRW-susceptible hybrids also had more severe symptoms of stalk rot than resistant hybrids. However, quantitative PCR results from roots and stalks did not demonstrate consistent differences in colonization by F. verticillioides and F. graminearum				
Manjit Misra	**Biosecurity Proposals**	Infrastructure allocation	$343,470	$343,470	
Results achieved to Date/Plans	College of Agriculture: Funding was approved for construction of a field building erected in FY07. The building is being used primarily by a new tenure-track faculty member for field research on soybean pathogens. Batelle funds were invested in making improvements in critical infrastructure to the BioCentury Research Farm to enhance research and development capabilities in biomass production and conversion to biofuels and biobased products. These improvements include: installing gas and electric services to the Biomass Preparation Building; transporting a large autoclave and processing kettle donated by Centecor, a division of Johnson & Johnson, for the Fermentation Area of the Biomass Conversion Building; purchasing and installing jib cranes for the Fermentation Area and Thermochemical Area; purchasing and installing a control system for the chiller in the Biomass Conversion Building; installing compressed gas cylinder storage area; purchasing load cells for a 1,000-L ferm				
Results achieved to Date/Plans	College of Vet Med: A small allocation was made to the College of Vet Med to assist in building a biosafety level 3 (BSL3) modular research facility. Construction is currently underway on this laboratory. It is needed because many of the infectious disease agents of major and emerging concern are extremely virulent, highly contagious, and highly regulated, making their study problematic and requiring high-level containment. Thus, Iowa State University's lack of adequately equipped BSL3 laboratory and animal facilities is a major limiting factor that prevents our expanding research efforts in this area, strongly curtails our competitiveness for biomedical research funding, and hampers our abilities to adequately deal with emerging disease threats of interest to Iowa and the world				
Results achieved to Date/Plans	DDGS (Distiller Dried Grains with Solubles) and CDS (Condensed Distiller's Solubles or "Syrup") were obtained from Lincoln Way Energy, Nevada, IA. Extracts (25% w/v) of DDGS were prepared by steaming for 2 hrs @88oC in water or 20% (v/v) ethanol. The liquid portions of the extracts were recovered by vacuum filtration through Whatman #1 filter paper, concentrated to syrups by rotary evaporation at 60oC, then adjusted to pH 7. Ethanol lost during the evaporation step was replaced to a final concentration of 20% (v/v). Extracts were filter sterilized through 0.2 µm filters, then tested for anti-microbial activity against Esherichia coli O157:H7, Listeria monocytogenes, Salmonella, sp., and Staphylococcus aureus. Tests were done on the Bioscreen Growth Curve instrument in replicates of five. S. aureus and L. monocytogenes were not inhibited by the extracts. It is likely that nutrients in the extracts stimulate these bacteria, resulting in improved growth. With E. coli O157:H7, slight inhibition was observed with aqueous extracts; inhibition was greater in ethanolic extracts. Salmonella, sp. was moderately inhibited by aqueous- and ethanolic extracts. Viability tests showed that the DDGS extracts did not kill the cells, so their effects are bacteriostatic, not bacteriocidal. CDS (syrup) was also tested with similar results. With E. coli, only slight inhibition was observed, and then only with the highest doses of CDS. With S. aureus and L. monocytogenes, low doses of				
Iowa State University	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2009**	
Max Rothschild	**Animal Systems Proposals**	Project allocation	$579,000	$579,000	
Results achieved to Date/Plans	Max Rothschild: This grant uses the pig as an animal model to predict bone disorder predisposition in pigs and humans. In this work, 214 genes affecting skeletal development and mineral metabolism were chosen and a total 435 SNPs were detected in 146 genes and these SNPs were deposited to dbSNP of NCBI (Accession numbers: ss86352080-ss86352515). Five Sequenom's genotyping multiplexes were developed involving 172 SNPs. We excluded SNPs with no calls, monomorphism, mistaken inheritance, MAF less than 5% and a call rate less than 85%, 119 SNPs from 95 genes were successfully genotyped for 2066 commercial pigs which were scored for 17 traits describing various leg and feet and conformation conditions. Association analyses between SNPs and individual scoring traits, and principal components (PCs) were completed using SAS package. A number of genes were found to be significantly associated with the various leg traits. Planning of in vitro functional studies on bone marrow culture system is being conducted for important genes. A second grant was received from the National Pork Board to do much larger scale association work, called whole genome association analyses. To do this, the Illumina Porcine Bead Chip with over 50,000 SNPs is being used. Genotypes were taken on a total of 800 animals and the analyses of these are now underway. SNP quality appears to be good and we are reviewing genotypes. It is hoped this will help point to gene pathways affecting bone health in pigs and humans. Analyses will be conducted to examine associations. Funding for the project has now been compl				
Results achieved to Date/Plans	Matthew Ellinwood: Work supported aims to develop biomedical research in 1) neurologic and 2) ophthalmologic diseases which capitalize on ISU strengths in large animal biomedical models. Substantial progress was made at the research or grantsmanship level. A review of specific goals follows: Neurologic Conditions Achievements 1. Develop an enzyme fusion capable of crossing the blood brain barrier. Work continues on this project which has yeiled a patent application for the recombinant fusion protein which will likely generate interest from specific biopharmaceutical company for the production of a therapeutic product to treat MPS IIIB. 2. Further characterize and maintain a feline congenital glaucoma model. This model continues to be maintained and used to characterize this spontaneous and unique model for one of the worlds leading causes of blindness. This model is the subject of an awarded grant to Dr Gill McLellan, Univ of WI. In conclusion, this award has helped in the securing of ~$1,00,000 in direct competitive external grant funds. Additionally over 10 abstracts, invited presentations, and peer reviewed publications were generated. Finally one patent disclosure is proceeding, associated with work done as part of this platform c				
Results achieved to Date/Plans	Heather Greenlee: Dr. Molly Murphy, the post-doc supported by these funds is continuing to collect data as the majority of animals that are intended for this study are at the National Animal Disease Center (a collaborator on this project) have been at pre-clinical stages of disease. We have begun to analyze some of the data gathered in the preclinical period. The data is quite noisy as it is gathered in 'field-conditions'. The first animals (which were inoculated with a more aggressive isolate of the disease) have succumbed to illness and tissues have been collected. Data collected by Dr. Murphy will be used as preliminary data in a proposal to be submitted to NIH (Characterizing retinal pathology associated with transmissible spongiform encephalopathies). Target submission date has been delayed (now target is June 2010). Data from the earliest animals that succumbed to disease will be used as preliminary data for the upcoming NIH proposal, and will be the first manuscript to come from this project.				
Results achieved to Date/Plans	Mike Spurlock: This study evaluated the effects of high-carbohydrate versus high-fat diets on inflammation located in adipose and skeletal muscle of pigs which are genetically predisposed to obesity. Fourteen Ossabaw swine were housed in an Iowa State University facility and our experienced animal caretaker oversaw the daily feeding				
Results achieved to Date/Plans	Diane Moody Spurlock: Funds have been used to establish a research program studying the genetic and physiological regulation of energy balance in dairy cattle. This program currently has two primary focus areas. (1) Genetic regulation and genomic selection of energy balance traits in dairy cattle. USDA-NRI funding has been awarded to evaluate genotypes from a panel of 50,000 of bovine single nucleotide polymorphisms (SNP) and determine associations with multiple traits relating to energy balance in lactating dairy cows. This is a collaborative project with the Scottish Agricultural Center (SAC). To date, genotypes have been determined for 300 animals representing the SAC population, and phenotypic data are currently being collected cows at the ISU Dairy. This project will evaluate genotypes and phenotypes from a total of 800 cows. (2) Integrated regulation of lipolysis by perilipin, adipose triglyceride lipase, and CGI-58 in dairy cows. We are studying the physiological regulation of energy balance by investigating novel proteins involved in regulating the mobilization of energy substrates from adipose tissue in lactating dairy cows. We have determined that the abundance of phosphorylated perilipin is correlated with indicators of lipolysis, and that the abundance of adipose triglyceride lipase is greater in cows in mid				
Max Rothschild	**Animal Systems Proposals**	Infrastructure allocation	$47,000	$47,000	
Results achieved to Date/Plans	Matthew Ellinwood: This infrastructure award was used to renovate large animals research/housing facilities in Kildee Hall. These facilities and the animals housed therein have been instrumental in securing over ~1,000,000 in extramural funding, one patent application, and over 10 publications, abstracts, or presentations since this award was made				
Iowa State University	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2009**	
Jim Oliver	**Information Technology**	Project allocation	$650,000	$650,000	

Results achieved to Date/Plans	To help foster the cross-disciplinary research needed to address today's complex challenges, in mid-2008 CII established openings for five resaearch support positions. Each member center of the CII agreed to a 1-1 match to support these term-limited, full time positions which can take the form of post-doctoral researcher, research scientist, graduate student, or visiting professor, depending on the nature of the candidate and the needs of the CII. The CII research support positions were targeted at the following broad technical areas: 1. High-performance computing 2. Data Mining, information integration, semantic web 3. Visualization 4. Information assurance/network modeling				
Jim Oliver	**Information Technology**	Infrastructure allocation	$1,068,800	$1,068,800	
Results achieved to Date/Plans	By encouraging partnerships, CII nurtures new synergies among faculty, students, industry leaders, and entrepreneurs to create an entrepreneurial culture that fosters connections and opportunities. This vision motivated the creation of a space that encourages collaboration and community. To date, five companies have located at the CyberInnovation Technical Collaboration Facility, building on CII's commitment to economic development in the state of Iowa. Our industry partners now include: • Entrepreneurial teams: o New entrepreneurial clients since January include: — Measure Inc., a design company focused on new media communication				
Results achieved to Date/Plans	College of Liberal Arts and Sciences: In one major research effort, we have been using dynamic nucleation theory Monte Carlo to examine small water clusters, small nitric acid clusters and small sulfuric acid clusters using ab initio methods – their reaction rates, energy distributions and properties. In our quest to reduce the number of quantum mechanical evaluations, we have continued developed of a method to scale configurational probability distributions obtained at high temperatures to lower temperatures without any additional evaluations. These results are currently being reviewed for an article in the Journal of Physical Chemistry A. In addition, we have had two papers accepted on the overall methodology and parallel algorithms used in the research. In addition, we have continued to make significant inroads into the computational science of component development. On the component front, we have been tackling the complex issue of developing components for interoperability of integral codes between three computational chemistry codes, NWChem, GAMESS and MPQC. \				
Results achieved to Date/Plans	College of Engineering: No update received, previous report. These funds were used as part of a startup package where the equipment has been in place for approximately 1.5 years. The Fluoromax-4 is a highly sensitive fluorescence fluorometer which we use to formally characterize fluorescent nanoparticles synthesized in our laboratory. It is a workhorse piece of equipment and invaluable to our research. Recently, it has been used to study protein-protein interactions using fluorescence resonance energy transfer (FRET) where quantum dots donate energy to nearby fluorescent dyes. The emission spectrum provides quantitative distance and orientation information about the associating biomolecules. This is a capability that is greatly enhanced through the use of this instrument.				
Results achieved to Date/Plans	Jim Alleman, Startup: 1) Five professors within the department (more than 20% of our total faculty) are using the system for archival and backup data storage as well as for routine IT applications tied to individual research and departmental operations. In addition, our department's staff communications specialist also uses the system primarily for large-scale photo and video archiving and retrieval (i.e., see item #4 below). 2) One of these professors (i.e., Charles Jahren) is in charge of the CCEE department's 'distance education' (DE) initiative, and according uses the server as the department's DE-related course file storage repository. A related highlight point on this account is that our department's DE activities represent one of the most rapidly evolving college-level DE operations, with rapidly expanding course offering and enrollment changes, and the use of this server plays a strategically critical role with local hosting of course materials. 3) Yet another professor using this system (i.e., David White), uses the server for high-level storage of data tied to his world-class initiative in geo-construction engineering. In this case, Dr. White is also studying the parallel use of this server as a repository for real-time data acquisition via on-site sensors tied to intelligent compaction technologies coupled with in-field geotechnical equipment. 4) This server is also used as the primary storage site for all departmental photographs and videos taken during routine student, faculty, and staff events. This information is then used for both developing both print and web-based materials.				
Results achieved to Date/Plans	Jaeyoun Kim, Startup: The research focuses on a novel plasmonic waveguide structure for future applications in photonic integrated systems. Plasmon waveguides are attractive for their ability to confine electromagnetic waves on subwavelength scale, which is not possible in purely optical waveguides. Numerous plasmonic waveguiding structures have been demonstrated. Many of them require, however, extremely small feature size or high aspect ratio which makes their implementation prohibitively difficult. We invented a new plasmonic waveguiding structure called "quasi-coplanar plasmon waveguide (QCPW)." The results of 2D numerical studies reveal that QCPW has many desirable characteristics: (1) The fabrication QCPW involves only standard lithographic and deposition processes. (2) It supports a wide range of wavelength, especially the important "telecommunication bandwidth". (3) The size of propagating modes is far below wavelength scale. (4) The tolerance of the modal characteristics to the fabrication imperfection is good. These 2D results are published and presented [2,4]. Since the QCPW structure is partially open in lateral directions, its performance in "perturbed 3D operations", such as propagation through waveguide bends or couplers, needs to be confirmed with 3D simulations. The results show that: (1) 2D mode analysis and 3D propagation simulation results match well each other. (2) The coupling				
Results achieved to Date/Plans	ZJ Wang: The computer clusters purchased since Z.J. Wang joined ISU have been critical in establishing his research program at ISU. Nearly all of his externally funded projects have used these clusters, and thus significantly improved the competitiveness of his grant applications. These clusters also enabled large-scale CFD computations to be carried out, thus providing understandings of physical phenomena previously out of reach due to a lack of computing facility. In addition, the clusters have also been an excellent tool for my students to develop and test parallel computing codes.				
Results achieved to Date/Plans	Andrew Hillier: This equipment is for use on a US Department of Energy project that Dr. Hillier is working on with Drs. Keith Woo and Bob Angelici (Chemistry). It is an instrument designed to measure gas products from the electrochemical reduction of carbon dioxide.				
Iowa State University	**Project**		**Allocated Dollars FY 2007**	**Allocation expended as of 6/30/2009**	
Ron Cox	**Advanced Manufacturing**	Project allocation	$100,000	$100,000	
Description of Project/Anticipated End Results	This project is designed to help businesses and companies improve logistics of their supply chain and provide training about new ideas in product design and production				
Results achieved to Date/Plans	CIRAS has completed a number of activities under the Battelle program focused primarily on improving supply chain management capabilities for Iowa manufacturers and supporting the development of engineering and technology within the Advanced Manufacturing sector.				

Iowa State University - as of June 30, 2009
Grow Iowa Values Fund Appropriations

		FY 2009 GIVF Appropriation	**$1,535,716**	Board of Regents approved August 2008
1	Commercialization Infrastructure and Campus-Wide Entrepreneurial Culture	$684,500		**Reflects 20% reduction**
2	Commercialization Program	$835,000		**due to state disaster reallocation**

Iowa State University	**Project**	**List of all FY 2009 Revenue Sources**	**Revenue Dollars for FY 2009**	**Amount of FY 2009 State Appropriations Expended as of 6/30/2009**
1	**Commercialization Infrastructure and Campus-Wide Entrepreneurial Culture**	FY 2009 State Appropriations (GIVF)	$684,500	$684,500
		FY 2009 Matching Funds (General Fund)	$465,362	
		FY 2009 Matching Funds (In-Kind)		
		FY 2009 Matching Funds (Other)	$325,500	
Description of Project	See individual projects			
Anticipated End Results				
Results achieved to Date				
Plans				

Iowa State University	**Project**	**List of all FY 2009 Revenue Sources**	**Revenue Dollars for FY 2009**	**Amount of FY 2009 State Appropriations Expended as of 6/30/2009**
2	**Commercialization Program**	FY 2009 State Appropriations (GIVF)	$851,217	$851,217
		FY 2009 Matching Funds (General Fund)	$609,657	
		FY 2009 Matching Funds (Federal Support)	$31,333	
		FY 2009 Matching Funds (Cash)	$165,531	
		FY 2009 Matching Funds (In-Kind)	$198,796	
Description of Project	See individual projects			
Anticipated End Results				
Results achieved to Date	Due to budget cuts, the projects were implemented during the fourth quarter of 2009. The first project updates will be provided after the conclusion of FY09.			

Iowa State University	**Project**	**Total Project Budget**	**Allocated Dollars FY 2009**	**Amount of FY 2009 Allocation Expended as of 6/30/2009**
	Mike Kessler, Principal Investigator	$40,000	$11,725	$11,725
Description of Project	Protruded Window Frames from Agricultural Oils			
Anticipated End Results	To develop resins and composites for pultrusion manufacturing to produce fiberglass reinforced biorenewable composite window frames.			

Results achieved to Date	We are making good progress in developing and characterizing polymer composites processed by the pultrusion processing of fiberglass/bio-resin for composite window frame applications. These bio-based resins are made from soybean and linseed oils by two different processes: cationic polymerization and ring-opening metathesis polymerization (ROMP). Our initial efforts had been directed at decreasing the cure times and characterizing the cure kinetics of the resins made by the cationic polymerization of soybean oil (with different loadings of the styrene and divinylbenzene co-monomers). In that work, we found that the room			
Plans				
Iowa State University	**Project**	**Total Project Budget**	**Allocated Dollars FY 2009**	**Amount of FY 2009 Allocation Expended as of 6/30/2009**
	Jesse Goff, Principal Investigator	$125,550	$125,550	$125,550
Description of Project	Test glycosides of 1,25-dihydroxyvitamin D for anti-cancer activity in vitro and in vivo			
Anticipated End Results	Develop products based on vitamin D to treat and prevent a number of human and animal diseases. The basis for these products is a plant of the Solanaceae family that contains a number of vitamin D-related compounds that have been shown to have unique activities affecting both calcium metabolism and cell growth. An immediate goal is to purify/ synthesize the active compounds for testing in cell culture and in			
Results achieved to Date	This year we continued to utilize cell cultures of human cancer cells to determine if we could slow their proliferation with the glycosides of vitamin D. This year we focused on MCF-7 cells, derived from a human mammary gland tumor. With this cell line we could reduce growth ~ 40 % with the vitamin D compounds. We initially wanted to test these compounds in vivo using mice that have essentially no immune system. This would allow the mice to accept grafts of human cancer cells. However, we did not pursue this as our studies in mice suggested a major action of vitamin D is on the immune cells. Therefore we developed a mouse tumor model utilizing BALB-C mice. Years ago a BALB-C mouse was found with a mammary tumor and cells from this tumor were kept in culture. They can be transplanted into other BALB-C mice rather			
Plans				
Iowa State University	**Project**	**Total Project Budget**	**Allocated Dollars FY 2009**	**Amount of FY 2009 Allocation Expended as of 6/30/2009**
	Michael Olsen, Principal Investigator	$104,690	$99,886	$99,886
Description of Project	Development of the Next Generation of Vortex Flow Meters for Engine Applications			
Anticipated End Results	To assist J-TEC in developing their next generation of vortex flowmeters, the proposed research seeks to: 1) experimentally study the basic physics of vortex flows generated by struts in automotive applications, 2)			
Results achieved to Date	On the experimental side of the project, we have studied the thermal effects on the wake behavior behind a heated circular cylinder in the forced and free convection regimes are investigated experimentally by using Particle Image Velocimetry (PIV) technique. This geometry and flow conditions is analogous to the fundamental physics governing the behavior of vortex flow meters. The experiment was conducted with the heated cylinder installed horizontally in the middle of a vertical water channel and the approaching forced flow being downward, which results in the direction of buoyancy force being opposite to that of the approaching			
Plans				
Iowa State University	**Project**	**Total Project Budget**	**Allocated Dollars FY 2009**	**Amount of FY 2009 Allocation Expended as of 6/30/2009**
	Gary Munkvold, Principal Investigator	$25,121	$25,121	$25,121
Description of Project	Low-Temperature Plasma Treatments for Improving Seed Performance			
Anticipated End Results	To determine whether low temperature plasma treatment of high value seeds can improve seed performance by reducing contamination from economically important pathogens and/or by enhancing the efficacy of			
Results achieved to Date	We made efforts to adjust low-temperature plasma treatment parameters because of a negative impact on sweet corn seed germination in some case. Although the germination impact could be alleviated by reducing the intensity or duration of treatment, none of the combinations achieved the desired goals of reducing fungal contamination or enhancing seed treatment efficacy. Seed contamination was lower under one set of treatment parameters compared to the other plasma treatments (approximately 66% of seeds vs. approximately 100%), yet this was not significantly different from control seed that had been shipped with the treated			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2009	Amount of FY 2009 Allocation Expended as of 6/30/2009
	Nikki Pohl, Principal Investigator	$66,477	$66,477	$66,477
Description of Project	Automated synthesis of custom-order carbohydrates for biologists and pharmaceutical scientists			
Anticipated End Results	To advance carbohydrate synthesis technology developed at ISU to assist LuCella Biosciences, Inc., an Ames startup company, in achieving the success of IDT (Integrated DNA Technologies). The specific goal of			
Results achieved to Date	Several key building blocks that serve as the basis for the automated synthesis platform have now been made in ways that have gotten around some initial problems. The stability of over a dozen building blocks has been tracked for several months and surprisingly many activated blocks are stable even at room temperature and almost all can be kept at 4 °C. These findings are very important as storage costs would be significantly			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2009	Amount of FY 2009 Allocation Expended as of 6/30/2009
	Iver Anderson, Principal Investigator	$171,499	$130,245	$130,245
Description of Project	Iowa Powder Atomization Technologies (IPAT): Titanium Atomizer Prototype Design			
Anticipated End Results	The primary goal of this project is to design and fabricate a novel prototype atomizer for the production of fine spherical titanium metal powder. Upon completion, this prototype will be used to demonstrate the			
Results achieved to Date	Task 1: A prototype close-coupled high pressure gas atomization (CC-HPGA) system with a cold wall copper melting crucible and composite refractory superheat pour tube was completed. An extended period of detailed system design was conducted and a complete set of engineering drawings was completed. In addition to the titanium atomizer, a monitoring and recording "module" and large heat-exchanger system were			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2009	Amount of FY 2009 Allocation Expended as of 6/30/2009
	Tim Ellis, Principal Investigator	$33,433	$9,942	$9,942
Description of Project	A Novel and Cost-Effective H2S Absorption Technology Using Rubber Particles From Scrap Tires			
Anticipated End Results	Development of a new hydrogen sulfide absorption process to clean biogas using tire derived rubber particles.			
Results achieved to Date	Laboratory-scale testing was conducted to gain a better understanding of the TDRP treatment mechanism. A strong correlation was found to match metal content and surface area with hydrogen sulfide treatment capability. Additional particle size analysis and adsorption testing supported the theory that removal capacity is mostly a function of surface area. Further analysis of the TDRP surface suggest that TDRP media uses chemical reactions (chemisorptions) to adsorb hydrogen sulfide, which is different than the physical mechanism (physisorption) encountered with activated carbon.			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2009	Amount of FY 2009 Allocation Expended as of 6/30/2009
	Atul Kelkar, Principal Investigator	$143,816	$134,477	$134,477
Description of Project	Waste Plastics, Crude Oil Sludge, and Tar Sand to Diesel – Capturing Energy from Waste			
Anticipated End Results	To conduct research related to thermo-catalytic conversion of Waste Hydrocarbons to useful fuels. Specific goal of this GIVF project is to enhance and fine-tune the proof-of-concept technology developed by IES			
Results achieved to Date	1. Based on the data given by IES from their proof-of-concept trials a new set of catalyst compositions and trial matrix was developed for various feedstocks in first half of 2009. Using this matrix different trials were conducted for different feedstock combinations and catalyst combinations. More trials continue for generating more exhaustive database			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2009	Amount of FY 2009 Allocation Expended as of 6/30/2009
	Victor Lin, Principal Investigator	$117,150	$51,150	$51,150
Description of Project	Catalytic Production of 1,6-Hexanediol			
Anticipated End Results	The proposed technology involves conversion of either sorbitol or fructose-derived hydroxymethyl furfural to 1,6-hexanediol (HDO), a chemical precursor to a polymer commonly used by industry. This work			
Results achieved to Date	Continuing our previous success in synthesizing a rhodium nanoparticle-encapsulated mesoporous silica catalyst (Rh-MS), we have incorporated other metal oxides, such as iron oxide and calcium oxide, into the matrix of this material for superior product selectivity and conversion efficiency. These materials exhibits the same mesoporous structure previously reported. We have demonstrated that these "second-generation" of nanocomposite materials are efficient heterogeneous catalysts for the hydrogenation of both sorbitol and fructose-derived hydroxymethyl furfural			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2009	Amount of FY 2009 Allocation Expended as of 6/30/2009
	David Grewell, Principal Investigator	$78,452	$78,452	$78,452
Description of Project	Protein Polymer Product Development			
Anticipated End Results	The main thrust of the proposed work is to cooperate with several industrial partners to develop and commercialize novel biobased products that impact Iowa's economy. These products will include hay bale			
Results achieved to Date	Two products are currently being tested by the industrial sponsors; soy protein plastic pellets by SoyWorks and soy based lubrication sticks by Creative Composites. In more detail, we have worked with SoyWorks to develop a soy plastic formulation and pellet geometry to match their product specifications. This involved indentifying proper mixing sequence, material ratio and design, and fabrication of an extrusion die. To date, nearly 2,000 pounds of soy protein based plastic were supplied to SoyWorks. Soy Works has indicated that our ability to accommodate several difficult specification changes requested by their customer was critical to			
Plans				

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2009	Amount of FY 2009 Allocation Expended as of 6/30/2009
	Robert Brown, Principal Investigator	$132,247	$8,477	$8,477
Description of Project	Gasification Technologies in Support of Biorefineries			
Anticipated End Results	This project has three goals: (i) validate computational fluid dynamics models that are used to simulate biomass gasification in fluidized bed gasifiers; (ii) use CFD to predict pressure fluctuations and then analyze these			
Results achieved to Date	A Pfeiffer Mass Spectrometer (MS) was calibrated and installed to analytically measure Hydrogen Sulfide, Hydrogen Chloride, Ammonia, Sulfur Dioxide, Methane, Carbon Dioxide, Carbon Monoxide, Hydrogen, Nitrogen, Oxygen, Acetylene, Ethylene, and Ethane gases on-line. Approximately 14 initial trials to quantify these gases were completed in Black Engineering on a 5 kg/hr atmospheric gasifier to establish a baseline for future gasification tests. The MS was relocated to the BECON facility to analyze the producer gas stream from a 200kg/hr pressurized biomass gasifier. The installation and calibration was reproduced following			
Plans	This project is complete			

Iowa State University	Project	Total Project Budget	Allocated Dollars FY 2009	Amount of FY 2009 Allocation Expended as of 6/30/2009
	Marian Kohut, Principal Investigator	$92,777	$8,500	$8,500
Description of Project	Effectiveness of EpiCor in improving immune function, inflammation, &			
Anticipated End Results	Determine whether a dietary supplement alters immune, oxidative, or metabolic response to exercise stress.			

Results achieved to Date	The second phase of the research project has finished data collection involving human subjects. The final assays are being run in the laboratory in December 2009 and January 2010. We anticipate that all data analyses for the second phase will be completed in spring 2010.			
Plans	This project was funded in FY08 given a no-cost extension			
Iowa State University	**Project**	**Total Project Budget**	**Allocated Dollars FY 2009**	**Amount of FY 2009 Allocation Expended as of 6/30/2009**
	Toni Wang, Principal Investigator	$113,462	$36,000	$36,000
Description of Project	Oil Recovery from Corn Fermentation By-Products			
Anticipated End Results	Obtaining oil from corn ethanol fermentation co-products			
Results achieved to Date	Condensed corn distillers solubles (CCDS) contains more oil than dried distillers grains with solubles (DDGS), 20 vs. 12% (dry weight basis). Therefore, significant amount of oil is present in the liquid fraction after fermentation and ethanol distillation. The oil removed represents a significant alternative feedstock for biodiesel production. The objectives of this second-phase research were to study the effect of enzyme hydrolysis on oil recovery from CCDS, to determine the effect of physical and chemical processes on oil recovery from CCDS, and to characterize quality of oil recovered from CCDS and the nature of deposits in CCDS oil.			
Plans	This project was funded in FY08 given a no-cost extension			
Iowa State University	**Project**	**Total Project Budget**	**Allocated Dollars FY 2009**	**Amount of FY 2009 Allocation Expended as of 6/30/2009**
	Guru Rao, Principal Investigator	$70,000	$15,000	$15,000
Description of Project	Development of Novel Digestion-Resistant Starches from Corn to Combat Human Disease			
Anticipated End Results	The project goal is to develop maize lines that produce novel starches that when fed in human diets result in more gradual of glucose to the blood stream than normal starch.			
Results achieved to Date	Previous analyses of genetically modified (GM) corn plants identified a line producing long-chain amylopectin starch (LCAPS) that is enzymatically converted to glucose more slowly than normal cornstarch (60% of the normal rate), and another line accumulating a higher than normal percentage of starch (~5% increase, termed HS). Objectives for the current period were: 1) to analyze the properties of a new LCAPS-based starch, LCAPS3, and 2) to design a means to further increase the starch amount in the HS line, toward the long-term goal of producing high yield, slowly digestible starch for incorporation into health-promoting			
Plans	This project was funded in FY08 given a no-cost extension			
Iowa State University	**Project**	**Total Project Budget**	**Allocated Dollars FY 2009**	**Amount of FY 2009 Allocation Expended as of 6/30/2009**
	Mike Wannemuehler, Principal Investigator	$151,966	$30,000	$30,000
Description of Project	Generation X Vaccines: Combining Novel Antigens and Single Dose Delivery			
Anticipated End Results	This project proposes to develop a single dose vaccine product that will induce humoral (i.e., antibody) and cell-mediated immunity to protect against infectious agents. The specific focus of this project will be the			
Results achieved to Date	The goals of this project are to develop a novel vaccination strategy using bioerodible polyanhydride nanospheres and modification of the vaccine candidate with the sugar alpha-galactose (aGal). This will lead to the design of a vaccine regimen that will induce protective immunity following immunization with a single dose and improve patient compliance. The project focuses on the use of a recombinant protein (rF1-V) derived from Yersinia pestis, the causative agent of plague. During the past six months, we have focused on the induction of anti-F1-V antibodies following immunization with aGal-modified rF1-V loaded into polyanhydride			
Plans	This project was funded in FY08 given a no-cost extension			
Iowa State University	**Project**	**Total Project Budget**	**Allocated Dollars FY 2009**	**Amount of FY 2009 Allocation Expended as of 6/30/2009**
	Charlie Hurburgh, Principal Investigator	$51,450	$21,000	$21,000
Description of Project	Automated Phenotyping of Biomass Crops			
Anticipated End Results	To develop a computer vision-based plant screening station that can reconstruct 3D plant images for plant structure and growth rate analysis.			
Results achieved to Date	No update was received.			
Plans	This project was funded in FY08 given a no-cost extension			