

**Governing Iowa's public
universities and special schools**

University of Iowa
Iowa State University
University of Northern Iowa
Iowa School for the Deaf
Iowa Educational Services for the Blind and
Visually Impaired
Lakeside Laboratory Regents Resource Center
Western Iowa Regents Resource Center



Michael J. Richards, MD, President, *West Des Moines*
Sherry Bates, President Pro Tem, *Scranton*
David R. Barker, PhD, *Iowa City*
Nancy Boettger, *Harlan*
Abby Crow, *Tiffin*
Nancy Dunkel, *Dyersville*
Jim Lindenmayer, PhD, *Ottumwa*
JC Risewick, *Johnston*
Greta Rouse, *Emmetsburg*

Mark J. Braun, EdD, Executive Director

November 29, 2022

Mr. Charlie Smithson
Secretary of the Senate
State Capitol Building
Des Moines IA 50319

Ms. Meghan Nelson
Chief Clerk of the House
State Capitol Building
Des Moines IA 50319

Tim McDermott, Director
Legislative Services Agency
State Capitol Building
Des Moines IA 50319

Dear Members of the Iowa General Assembly:

Pursuant to Iowa Code and Iowa Acts, the enclosed annual report includes information from the University of Iowa, Iowa State University, the University of Northern Iowa, and their respective research foundations as follows:

Iowa Code §262B.3(3)

Patents and Licenses for FY 2022

2013 Iowa Acts, Chapter 141.54 (HF 604)

Activities, Projects, and Programs Funded with
Board of Regents Innovation Fund Approp,
Technology Commercialization, Entrepreneurship,
Regional Development, and Market Research Report

Collectively, in FY 2022, the three universities provided over \$1.5 Billion dollars in total sponsored funding to the state of Iowa, including \$617 million from competitive federal grants and awards. This is a research funding record for both the UI and ISU. The Regent universities also provide assistance to Iowa businesses and start-up companies across Iowa. The numbers fluctuate on an annual basis, but generally reflect an upward trend over several years.

In FY 2022, there were 4,478 employees in the 194 companies located in the university research parks and incubators, 84 license and option agreements on institutional intellectual property were executed, and 150 patents were awarded. For FY 2022, the Iowa General Assembly appropriated nearly \$12.6 million in total funding for economic development, technology transfer and commercialization of research to the three Regent universities, which is a \$2.4 million increase from FY 2021.

If you have any questions or need more information, please don't hesitate to contact this office.

Sincerely,

Mark J. Braun

\\Box Sync\Board of Regents Shared\BF\Legislative\2022 session\Reports\

Attachments

cc: Simon Sheaff
Legislative Liaisons
Legislative Log

**BOARD OF REGENTS
STATE OF IOWA**

ANNUAL ECONOMIC DEVELOPMENT AND TECHNOLOGY TRANSFER REPORT

Executive Summary: Iowa's three public universities collaborate with business and industry and with each other to foster success for all economic development and entrepreneurship efforts in Iowa. They significantly impact Iowa on a daily basis and demonstrate to the public the value of research through research-based expertise and business assistance directly to Iowa's people, industry and communities in all 99 counties. Conducting academic research also results in intellectual property discoveries and innovations available to business, industry and the marketplace; and it provides Iowa with an educated workforce. Research and scholarship from faculty and staff at the Regent universities often lead to the discovery of innovations that can improve the quality of life for people in the state, the nation, and worldwide.

The Regent universities research and economic activities outlined in their reports meet the Board of Regents Strategic Plan, Priority 2, Objective 2.3: The Regent Enterprise will build strategic collaborations among universities and with outside entities to foster opportunities for innovation and economic development. Each institution shall report annually on significant partnership and/or collaboration activities. This includes both quantitative and qualitative metrics that demonstrate the impact of these activities.

FY 2022 Highlights: Collectively, in FY 2022, the three universities provided over \$1.5 Billion dollars in total sponsored funding to the state of Iowa, including \$617 million from competitive federal grants and awards. This is a research funding record for both the UI and ISU. The Regent universities work diligently to develop breakthroughs that help to improve Iowa's economy through economic development, technology transfer and commercialization of research. The Regent universities faculty and researchers compete with other faculty and researchers from around the world to win this funding for their work. Students are the beneficiaries of this hard work as they get hands-on experience participating in this research.

Externally sponsored projects supplement the instruction, research, scholarship and public services provided by the Regent universities. These funds do not supplant state general fund dollars. This is true for all external funding (federal or non-federal) because it is required by federal regulation that external funds shall supplement and not supplant state dollars.

The Regent universities also provide assistance to Iowa businesses and start-up companies across Iowa. The numbers fluctuate on an annual basis, but generally reflect an upward trend over several years. In FY 2022, there were 4,478 employees in the 194 companies located in the university research parks and incubators, 84 license and option agreements on institutional intellectual property were executed, and 150 patents were awarded. These numbers only tell part of the story. The value added by aiding licensees and startup companies as they take these (usually) early stage research ideas and turn them into revenue is not reflected. In addition,

information on revenue from licensed patents is only collected during the patent term, which results in an underreporting of revenue generated from products that contain university technology. Nonetheless, these statistics reflect excellent performance when compared to similar institutions and reflect the economic value the Regent universities provide to the State of Iowa.

The below charts show the combined statistics for the three universities over the past five fiscal years. See the chart at end of the docket item for the details from each university.

Licenses, Intellectual Property and Patents	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Patent applications filed	299	260	250	239	284
Patents awarded	117	88	176	158	150
Disclosures of intellectual property	299	259	237	256	197
Total license and option agreements executed on institutional intellectual property	104	96	85	96	84
License and option agreements executed on institutional intellectual property in Iowa	32	38	34	30	16
License and option agreements yielding income	322	292	260	217	208
Revenue to Iowa companies as a result of licensed technology	\$41.7 M	\$13 M	\$10.3 M	\$6.9 M	\$12.1 M
Royalties and license fee income	\$6.2 M	\$4.6 M	\$4.6 M	\$4.8 M	\$6.5 M

Companies	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Total startup companies formed through licensing activities	7	10	7	15	5
Startup companies formed in Iowa through licensing activities	5	9	5	12	3
Startup companies formed through UNI assistance	96	94	99	107	98
Companies in research parks and incubators	179	189	191	185	194
New companies in research parks and incubators	60	168	72	55	55
Employees in companies in research parks and incubators	3,673	4,766	4,596	4,460	4,478

Income and Funding	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Total sponsored funding	\$1,102.7 M	\$1,098.5 M	\$1,207.8 M	\$1,449.5 M*	\$1,515.4 M
Sponsored funding from federal grants	\$518.2 M	\$540.4 M	\$648.3 M	\$790.3 M*	\$617 M
Total Corporate-sponsored funding	\$143.7 M	\$135.3 M	\$143.3 M	\$159.8 M	\$199.9 M
Corporate-sponsored funding in Iowa	\$23.1 M	\$32.2 M	\$21.6 M	\$20.59 M	\$27.6 M

*FY 2021 sponsored funding includes federal Higher Education Emergency Relief Fund (COVID Relief) funding

State Appropriations: Stable state dollars allow the Regent universities to grow Iowa's economy. In many cases sponsored projects, including many federally sourced projects, require cost share

(match) funds so that the sponsor and the university have a financial stake in the project. In order to provide cost share some state dollars are used and in doing so the Regent universities are able to make every state dollar have twice, and sometimes more, of an impact on the university's instruction, research and public service.

Additionally, federal agencies will only invest in institutions that are financially healthy, compliant with federal regulations that have cutting edge technology and instrumentation, robust public service portfolios, and that have top-tier scholars and researchers. State funding supplies these resources, allowing the Regent universities to attract federal and non-federal funds so that every state dollar invested in the Regent universities has double or more of an impact on Iowa's communities and economy.

For FY 2022, the Iowa General Assembly appropriated nearly \$12.6 million in total funding for economic development, technology transfer and commercialization of research to the three Regent universities, which is a \$2.4 million increase from FY 2021. The two state general fund appropriations for FY 2022, totaling nearly \$3.9 million, are divided as follows:

- Nearly \$3.5 million to ISU and UI for the biosciences innovation program (divided \$2,623,481 to ISU and \$874,494 to UI), which is an increase of \$2.4 million from FY 2021. The funding continues the four bioscience platforms identified in the TEconomy report where Iowa has the greatest likelihood of achieving a differentiated leadership position to grow and diversify the state's economy: biobased chemicals, precision and digital agriculture, vaccines and immunotherapeutics, and medical devices. The funding will facilitate technology transfer, incubate start-ups and accelerate technology transfer, attract external funding and provide innovation ecosystem services, and develop a skilled workforce.
- \$394,321 to UNI for the expansion of the Metal Casting Center's additive manufacturing capabilities related to investment castings technology and industry support, which is the same as FY 2021. This program was initially funded at \$400,000 in FY 2020.

The remaining \$8.7 million allocated to the Regent universities, from the Skilled Worker and Job Creation Fund (SWJCF), has not changed since creation of the fund in FY 2014:

- \$3 million to the Regents Innovation Fund, which is used in the areas related to technology commercialization, marketing, entrepreneurship, business growth, and infrastructure projects and programs needed to assist in implantation of activities under Iowa Code chapter 262B (Commercialization of Research). The Regent universities invest the funds received from the legislature in opportunities that yield successful startups, innovative business assistance, and critical research leading to commercialization. The universities are required to match the funding on a one-to-one basis from non-state resources. Research grants, private investors or companies interested in a project, and other university funds are often used as match dollars. The legislation divides the funding: 35% to UI, 35% to ISU, and 30% to UNI.
- \$2 million to UI for implementing the entrepreneurship and economic growth initiative. The appropriation is used to expand public/private partnerships and programing through the Pappajohn Entrepreneurial Center.
- \$209,000 to UI for the UI Research Park, Technology Innovation Center and UI Pharmaceuticals (formerly Advanced Drug Development program). UI must direct expenditures for research toward projects that will provide economic stimulus for Iowa and emphasize providing services to Iowa-based companies.

- \$2.4 million to ISU for small business development centers, the ISU Research Park and the Center for Industrial Research and Service. At least \$735,728 must be allocated for purposes of funding small business development centers. ISU is to direct expenditures for research toward projects that will provide economic stimulus for Iowa and emphasize providing services to Iowa-based companies. The industrial incentive program must focus on Iowa industrial sectors and seek contributions and in-kind donations from businesses, industrial foundations, and trade associations, and that moneys for the Center for Industrial Research and Service industrial incentive program can only be allocated for projects which are matched by private sector moneys for directed contract research or for nondirected research. The match required of small businesses for directed contract research or for nondirected research shall be \$1 for each \$3 of state funds. The match required for other businesses for directed contract research or for nondirected research shall be \$1 for each \$1 of state funds. The match required of industrial foundations or trade associations shall be \$1 for each \$1 of state funds.
- \$1.07 million to UNI for the Metal Casting Center, the Center for Business Growth and Innovation, and the Institute for Decision Making. UNI must allocate at least \$617,638 for purposes of support of entrepreneurs through the university's Center for Business Growth and Innovation and Advance Iowa program. UNI must direct expenditures for research toward projects that will provide economic stimulus for Iowa and emphasize providing services to Iowa-based companies.

Annual Report Highlights:

The University of Iowa secured its highest-ever level of external funding for research, scholarship, and creative activities in FY 2022 at \$867.2 million, breaking their previous record of \$818 million. The State Hygienic Laboratory continued to receive funds from the Centers for Disease Control and Prevention via the Iowa Department of Public Health, including \$115 million in multiyear awards to meet the high demand for COVID-19 testing and enhance laboratory preparedness for preventing and controlling future infectious disease outbreaks. The record funding is a testament to the commitment and innovation of the university's faculty and staff.

Iowa State University broke its record by securing \$601.7 million in total external funding, breaking the previous record of \$559.1 million. ISU continues to expand the reach and impact of the university's Biosciences-focused Innovation Ecosystems with the critical support of the Iowa Legislature and in close partnership with BioConnect Iowa. The legislature allocated just over \$2.6 million for FY 2022 to support Iowa State's research and development efforts across three Biosciences platforms: Biobased Products, Digital and Precision Agriculture and Vaccines and Immunotherapeutics. The report provides some key accomplishments of each platform during FY 2022.

In FY 2022, the University of Northern Iowa provided economic development assistance throughout all of Iowa's 99 counties, for the 23rd consecutive year. Every dollar received from the state to UNI's Business and Community Services (BCS) division leverages five dollars in private grants, fees or federal funding. Client interaction reached 3,756, a record for BCS outreach centers and programs.

Indicators	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	ISU	SUI	UNI	Regents Total	ISU	SUI	UNI	Regents Total	ISU	SUI	UNI	Regents Total	ISU	SUI	UNI	Regents Total	ISU	SUI	UNI	Regents Total
Number of disclosures of intellectual property	145	143	11	299	165	83	11	259	132	95	10	237	144	101	11	256	82	103	12	197
Number of patent applications filed	143	153	3	299	98	160	2	260	102	146	2	250	114	123	2	239	94	188	2	284
Number of patents awarded in total	42	74	1	117	32	54	2	88	98	76	2	176	71	86	1	158	69	80	1	150
Number of license and option agreements executed on institutional intellectual property in total	51	51	2	104	46	48	2	96	46	37	2	85	47	47	2	96	34	48	2	84
Number of license and option agreements executed on institutional intellectual property in Iowa	21	9	2	32	25	12	1	38	22	10	2	34	22	7	1	30	10	5	1	16
Number of license and option agreements yielding income	185	127	10	322	155	127	10	292	154	95	11	260	118	87	12	217	113	83	12	208
Revenue to Iowa companies as a result of licensed technology	\$36.9 million	\$1.24 million	\$3.6 million	\$41.74 million	\$8.3 million	\$1.2 million	\$3.5 million	\$13 million	\$5.4 million	\$1.1 million	\$3.8 million	\$10.3 million	\$1.7 million	\$1.1 million	\$4.1 million	\$6.9 million	\$5.5 million	2.32 million	\$4.3 million	12.12 million
Number of startup companies formed, in total (through licensing activities)	2	4	1	7	4	5	1	10	4	2	1	7	8	6	1	15	1	3	1	5
Number of startup companies formed, in Iowa (through licensing activities)	2	2	1	5	4	4	1	9	4	0	1	5	8	3	1	12	1	1	1	3
Number of startup companies formed through UNI assistance	--	--	96	96	--	--	94	94	--	--	99	99	--	--	107	107	--	--	98	98
Number of companies in research parks and incubators	118	41	20	179	130	38	21	189	135	34	22	191	134	32	19	185	142	32	20	194
Number of new companies in research parks and incubators	40	6	14	60	151	1	16	168	53	5	14	72	35	5	15	55	45	2	8	55
Number of employees in companies in research parks and incubators	2,178	1,429	66	3,673	2,253	2,459	54	4,766	2,041	2,500	55	4,596	1,913	2,500	47	4,460	1,945	2,500	33	4,478
Royalties and license fee income	\$4.3 million	\$1.72 million	\$21,500	\$6.24 million	\$2.8 million	\$1.77 million	\$29,050	\$4.6 million	\$3.0 million	\$1.57 million	\$45,100	\$4.62 million	\$2.9 million	\$1.81 million	\$63,400	\$4.8 million	\$2.8 million	\$3.65 million	\$35,600	\$6.5 million
Total sponsored funding	\$509.2 million	\$554.0 million	\$39.5 million	\$1,102.7 million	\$469.0 million	\$588.7 million	\$40.8 million	\$1,098.5 million	\$494.7 million	\$666.2 million	\$46.9 million	\$1,207.8 million	\$559.1 million*	\$818.04 million*	\$72.4 million*	\$1,449.5 million*	\$601.7 million	\$867.2 million	\$46.5 million	\$1,515.4 million
Sponsored funding from federal grants	\$235.6 million	\$260.5 million	\$22.1 million	\$518.2 million	\$237.1 million	\$281.5 million	\$23.2 million	\$541.8 million	\$272.5 million	\$346.7 million	29.1 million	\$648.3 million	\$303.5 million*	\$431.3 million*	\$55.5 million*	\$790.3 million*	\$251.7 million	\$343.1 million	\$22.2 million	\$617 million
Corporate-sponsored funding in total	\$51.3 million	\$91.6 million	\$803,000	\$143.7 million	\$57.2 million	\$77.1 million	\$1.0 million	\$135.3 million	\$51.2 million	\$91.1 million	\$1.0 million	\$143.3 million	\$51.5 million	\$107.1 million	\$1.2 million	\$159.8 million	\$62 million	\$136.6 million	\$1.27 million	\$199.9 million
Corporate-sponsored funding in Iowa	\$7.8 million	\$14.9 million	\$400,000	\$23.1 million	\$20.7 million	\$10.9 million	\$560,000	\$32.2 million	\$11.8 million	\$8.8 million	\$1.0 million	\$21.6 million	\$12.2 million	\$7.49 million	\$900,000	\$20.59 million	\$18.8 million	\$8 million	\$800,000	\$27.6 million

* FY 2021 sponsored funding includes federal Higher Education Emergency Relief Fund (COVID Relief) funding

IOWA STATE UNIVERSITY

OF SCIENCE AND TECHNOLOGY

FY22 ANNUAL ECONOMIC DEVELOPMENT
AND TECHNOLOGY TRANSFER REPORT
TO BOARD OF REGENTS, STATE OF IOWA

PRESENTED BY:

David Spalding
Raisbeck Endowed Dean, Debbie and Jerry Ivy College of Business
Interim Vice President, Office of Economic Development and Industry Relations

September, 2022

Iowa State University Annual Economic Development and Technology Transfer Report – FY2022

Iowa State University of Science and Technology is a renowned research and land-grant university that prepares its nearly 30,000 students to make the world a better place. Iowa State is #16 in the nation for research expenditures among universities without medical schools and ranks among the top 100 universities worldwide awarded U.S. patents. Iowa State annually delivers a \$3.4 billion impact to Iowa's economy, and its activities support one out of every 49 Iowa jobs. Hundreds of Iowa companies from every county benefit each year from the expertise of ISU's Small Business Development Center, the Center for Industrial Research and Service, and Iowa State's Extension and Outreach programs.

A recognized national leader in innovation and entrepreneurship education, Iowa State's world-class academic programs and experiential opportunities include the Student Innovation Center, a state-of-the-art space for students to exercise their innovative and entrepreneurial muscles, and the Start Something Network, a set of academic opportunities across six colleges that nurtures students' ideas and brings out their inner innovator and entrepreneur. "Innovate at Iowa State" is a mindset and a call to action for those who want to think and act beyond the traditional boundaries of education.

As the land-grant institution in the very first state to adopt the Morrill Act, Iowa State University wholeheartedly supports the land-grant ideals of putting science, technology and human creativity to work. Economic development is a top priority for Iowa State, and the university is very proud of the impact it has on both the lives of its students and the state economy. Iowa State's **economic development programs, services and initiatives** contribute to the overall positive net impact the university creates on Iowa's business community and return on investment it generates for students, taxpayers, and society. Through President Wendy Wintersteen's **Innovation and Entrepreneurship Initiative**, we are embedding innovation and entrepreneurship more deeply into our culture and curriculum. By doing so, we are cultivating the next generation of innovators and entrepreneurs while responding to the needs of our communities and state.

Iowa State was named the winner of the APLU's 2021 Innovation & Economic Prosperity (IEP) Award in the Place category. Our submission made the case that our place is all 99 counties in Iowa. The submission featured two case studies from our Small Business Development Centers and one from Iowa State Extension. In the five years we have been in the IEP, we have won awards in three of them for Talent, Innovation and Place. In one other year, we were a finalist for the Innovation award. These awards are external validation of the outstanding work done in economic development at Iowa State.

Iowans continue to count on Iowa State to serve as a trusted resource, using our core strengths— innovation, science-based extension and outreach, and education. Units within the **Office of Economic Development and Industry Relations (EDIR)** serve Iowans in all 99 counties, every day. The report that follows is intended to provide the Regents a look into measurable impacts of those groups within EDIR—The Center for Industrial Research and Service, America's Small Business Development Centers, Iowa, The Iowa State Pappajohn Center for Entrepreneurship, the Iowa State University Research Park, and the Office of Innovation Commercialization. Additionally, this report contains information on select initiatives from our Iowa State Office of the Vice President of Research and our state funded Chief Technology Officers, as well as our 99 County Iowa State University Extension. We've resolved as regents institutions to shorten the appendices and provide a succinct look into the impact your investment is having for Iowans.

EDIR consists of the following key university economic development units that provide integrated and comprehensive business, technical, entrepreneurial support, and educational services to Iowa State's clients and partners:



- The **Center for Industrial Research and Service (CIRAS)** works with business and industry across all 99 counties to enhance their performance through service offerings in five general areas: technology, growth, productivity, leadership, and workforce. CIRAS leads three federal business outreach programs and three state-based programs, with staff and partners located across campus and across the state.



- The **Small Business Development Center (SBDC)**, administered by Iowa State, consists of 15 regional centers serving all 99 counties in Iowa. SBDC assists individuals interested in starting new companies and provides business services and counsel to existing small companies across Iowa to solve management problems, to improve operations, to seek financing, and to pursue new opportunities. Iowa State also operates two of the regional centers.

IOWA STATE UNIVERSITY

Pappajohn Center for Entrepreneurship

- The **Pappajohn Center for Entrepreneurship** serves entrepreneurs on campus and in our community, provides entrepreneurial opportunities for students including a student accelerator, hosts statewide and local business plan and pitch competitions, and participates in university-wide academic programs in entrepreneurship ranging from a cross-campus minor to a PhD program. The Pappajohn Center for Entrepreneurship has a presence in the Research Park Core Facility, and on campus in the Student Innovation Center. Flagship programs include ISU Startup Factory, CYstarters, and CyBIZ Lab.

IOWA STATE UNIVERSITY

Office of Innovation Commercialization

- The **Office of Innovation Commercialization** serves the Iowa State University community and the state of Iowa by commercializing intellectual property resulting from the research enterprise at ISU. Consisting of the **Iowa State University Research Foundation (ISURF)** and the **Office of Intellectual Property and Technology Transfer (OIPTT)**, OIC develops and executes appropriate protection and licensing strategies for both pre-partnered innovations (funded by industry-sponsored research agreements) and un-partnered technologies (primarily funded through federally-sponsored research programs). Established and startup companies benefit from licensing intellectual property rights by creating new products, decreasing manufacturing costs, improving revenue streams and increasing market share.



- **ISU Research Park (ISURP)** provides a resource-rich environment *Where Innovators Flourish*. It includes easy access to Iowa State University for our tenant partners, which include start-ups and established companies that range from growing entrepreneurial ventures to global corporations. The Research Park offers access to an ongoing pipeline of talent, research infrastructure, equipment, high quality labs and office space, as well as numerous community events, services and amenities that support the efforts of science- and technology-based organizations.

OFFICE OF THE VICE PRESIDENT FOR RESEARCH

The Iowa State research enterprise received [\\$284.2 million](#) in **external sponsored research funding** for fiscal year 2022, a new record for the university. This record research funding was a key contributing factor in Iowa State achieving a new milestone for **total external funding** in FY22 of [\\$601.7 million](#), which surpassed the previous record of \$559.1 million set in FY21.

FY22 represents an impressive rebound from the pandemic-impacted 2021 fiscal year. The \$284.2 million in external sponsored research funding is \$53.1 million more than the \$231.1 million in external research funding received in FY21. The FY22 total included new benchmarks in both federal research funding, \$198.2 million, and non-federal research support, \$86 million.

In June, the university released a new strategic plan that runs through 2031. A cornerstone of the plan are five aspirational statements that define how the institution intends to position itself over the next nine years, including Iowa State strives to be: the **university** that creates opportunities and forges new frontiers; and the trusted **partner** for proactive and innovative solutions.

Here are just a few examples of new projects funded in FY22 that are forging new frontiers and making Iowa State researchers sought-after partners in discovering and developing innovative solutions to some of society's greatest challenges . . .

- D. Raj Raman, Agricultural and Biosystems Engineering, received an award of nearly \$10 million from the U.S. Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA). These funds will support a five-year project to explore and develop new approaches to using perennial ground covers for [regenerative cover crops](#).
- Baskar Ganapathysubramanian, Engineering, is the principal investigator (PI) and director of the [AI Institute for Resilient Agriculture \(AIIRA\)](#), one of 11 new National Science Foundation (NSF) artificial intelligence institutes across the country. Partnering with NSF, USDA-NIFA is providing \$20 million in funding to support this multi-institutional effort – headquartered at Iowa State – that is committed to leveraging AI to accelerate the productivity and sustainability of agriculture at a critical juncture in our world's history.
- Raquel Espin Palazon, Genetics, Development and Cell Biology, received an initial installment of nearly \$400,000 from the National Institutes of Health (NIH) National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). [The five-year project](#), with an estimated total award of roughly \$2 million, could spark new advances in regenerative medicine for patients with blood diseases such as leukemia.
- Pete Evans, Industrial Design, is the PI for a three-year private-public research partnership that received \$1.4 million in funding from the Iowa Economic Development

Authority (IEDA). The team working on the College of Design's [3D Affordable Innovative Technologies \(3D AIT\)](#) Housing project is focused on using 3D-printing technology to create faster, more affordable housing across the state, particularly in rural areas.

BIOSCIENCES-BASED INITIATIVES

Iowa State continues to expand the reach and impact of the university's Biosciences-focused Innovation Ecosystems with the critical support of the Iowa Legislature and in close partnership with [BioConnect Iowa](#). The legislature allocated just over \$2.6 million for FY22 to support Iowa State's research and development efforts across three Biosciences platforms: Biobased Products, Digital and Precision Agriculture and Vaccines and Immunotherapeutics. Here are just a few of the key accomplishments and economic impacts for each platform during FY22.

Biobased Products

- Iowa State actively supported the winning team for the federally funded Bioindustrial Manufacturing and Design Ecosystem ([BioMADE](#)), and now serves as a governing member. The university, in partnership with Cargill and Genomatica, received an initial award of \$2.1 million in biomanufacturing scale-up technology from BioMADE.
- Partnering with ADM, 3M and Diageo, ISU began a \$2.7 million Department of Energy funded project on biodegradable polymers from biomass
- Revenue from the Center for Crops Utilization Research's ([CCUR](#)) fermentation and downstream processing scale-up facilities grew 32% and the client base was expanded to startups across the U.S.

Digital and Precision Agriculture

- Digital and Precision Agriculture-focused startups contributed to economic growth in the state with more than \$4.3 million in funding.
- Digital and Precision Agriculture platform leadership supported workforce development efforts in the state by helping startups identify and connect with talent.
- Key research initiatives were drivers that contributed to significant federal investments within the state:
 - [AIIRA](#) – the Artificial Intelligence Institute for Resilient Agriculture, a new National Science Foundation (NSF) AI-focused national institute received a five-year, [\\$20 million funding commitment](#) from the U.S. Department of Agriculture (USDA). AIIRA is interacting with both large corporations and startups in agriculture.
 - [ARA](#): Wireless Living Lab for Smart and Connected Rural communities is bringing in \$16 million in federal and matching funds to explore and implement solutions to improve rural broadband connectivity.

Vaccines and Immunotherapeutics

- Spearheaded by the platform chief technology officer, Iowa State entered into a [four-year strategic alliance with Merck Animal Health](#) that will bring together industry and university talent to address complex needs and expedite delivery of innovative animal health solutions to the marketplace.
- The V&I Innovation Ecosystem established a commercial development team to bring broad expertise to promising startups, such as [3D Health Solutions, Inc.](#), that offer great potential to create jobs and deliver economic impact to the state.
- Research collaboration with industry continues to be a top priority with 10 seed grant proposals funded for accelerated technology development.

- V&I stakeholders facilitated two new companies joining the ISU Research Park and have fostered discussions with two additional global companies.

ISU EXTENSION AND OUTREACH

Iowa State University Extension and Outreach, in collaboration with ISU colleges, impacts economic development in the state through all of its programs—Agriculture and Natural Resources, Community and Economic Development, Human Sciences, and 4-H Youth Development.

Since approximately 30-40% of crop revenue goes toward farmland rental expenses, land leasing arrangements are a top concern for Iowa producers and farmland owners. Agriculture and Natural Resources extension specialists provided unbiased, research-based **farmland leasing education**, reaching 856 participants in the past year; 189 completed a post program evaluation. Approximately 95% reported an increase in knowledge of leasing, legal issues, and cash rental rates; 88% reported increased confidence to change their lease agreements.

The **Iowa Small Towns Project (ISTP)** integrates research and extension to better understand conditions facing small Midwestern communities and provide support. A team of ISU scientists assisted six small towns with declining populations—sharing ISTP survey data, town profiles, and focus groups to help identify priorities and secure grants and fundraising efforts. As a result, in Sac City the local development agency received a \$20,000 Iowa Economic Development Authority grant for a feasibility study for reuse of the middle school building and adjacent green space. Elma benefited from a \$1.2 million fund drive to convert an elementary school building into a community center for a new public library and childcare center. Bancroft pooled resources for a building to house a grocery store and a new distillery to bring in tourism.

Iowa's Food Code requires at least one supervisory employee in licensed foodservices to be certified in food safety through an approved program. In 2021, 2,033 Iowans participated in **ServSafe** classes taught by Human Sciences extension specialists, with 77% successfully earning the Certified Food Protection Manager credential. Servsafe is the National Restaurant Association Educational Foundation's internationally recognized food safety certification program, providing food service workers with the knowledge they need to protect the public from foodborne illnesses.

The **Volunteer Income Tax Assistance program** trains community volunteers to provide free tax preparation to qualified individuals with low or moderate income. In Federal FY21, Human Sciences extension specialists trained 68 volunteers who completed IRS certification and then provided 1,848 hours of their time. With outreach and administrative support from 13 county extension offices, the volunteers provided nearly 1,400 Iowans with free, accurate tax preparation, allowing them to save approximately \$240,975 on tax preparation fees. The volunteers also helped 341 of these Iowans claim \$495,767 in the Earned Income Tax Credit, boosting family income.

After participating in **Beef Quality Assurance** education and certification, 49% of participants changed cattle handling/processing areas to improve cattle welfare and productivity, and 40% changed their cattle health program, improving both animal health and profitability. Their conservative estimate of the total value of this education averaged \$430 per operation.

From 2019 to early 2021, in-person and virtual **soil fertility workshops** reached 255 farmers, landowners, and industry professionals with ISU research-based recommendations, local agronomist knowledge, and relevant, hands-on information. As a result, participants were better able to apply the correct amount of nutrients at the right time and rate, thereby reducing over-application and protecting water quality while maintaining yields that sustain farm income.

OFFICE OF INNOVATION COMMERCIALIZATION

The **Office of Innovation Commercialization** serves the Iowa State University community and the state of Iowa by commercializing intellectual property resulting from the research enterprise at ISU. Consisting of the **Iowa State University Research Foundation (ISURF)** and the **Office of Intellectual Property and Technology Transfer (OIPTT)**, OIC develops and executes appropriate protection and licensing strategies for both pre-partnered innovations (funded by industry-sponsored research agreements) and un-partnered technologies (primarily funded through federally-sponsored research programs). Established and startup companies benefit from licensing intellectual property rights by creating new products, decreasing manufacturing costs, improving revenue streams and increasing market share.

In FY22, Iowa State researchers submitted 82 intellectual property disclosures (not including datasets) and ISURF filed 94 patent applications. In calendar year 2021, Iowa State was recognized for having 34 U.S. utility patents issued, 86th of the top 100 worldwide universities granted U.S utility patents by the National Academy of Inventors. In FY22, Iowa State was awarded 37 U.S. utility patents and an additional 32 patents from foreign countries for an overall total of 69. ISURF executed 47 license and option agreements for ISU technologies in FY22, 22 of which were with Iowa companies. ISURF currently has 113 license and option agreements which are yielding income. Iowa companies reported \$5.5 million of revenue from sales of ISU-licensed technologies in calendar year 2022, and one startup company was formed during that time period to commercialize ISU technologies. Global sales of licensed technologies was \$83 million. ISURF has been self-supported since 1992 through returns on its licensed technology portfolio; in addition, ISURF has returned over \$10.7 million over the last ten years to Iowa State and the Ames National Laboratory to support further investments in the research enterprise. ISURF distributes royalty revenue in accordance with the royalty sharing policy to technology inventors, and retained earnings in excess of what is needed to support ISURF's operations are utilized to support research initiatives as recommended and approved by the ISURF Board of Directors.

The Office of Intellectual Property and Technology Transfer negotiates and executes sponsored research agreements for ISU with industry partners and commodity groups as well as nondisclosure agreements and material transfer agreements for Iowa State University. In FY22, OIPTT handled in excess of 1226 agreements.

Improved Genetics for the Swine Industry – Iowa State researchers discovered a gene that unlocks the growth rate for feeder pigs, allowing faster growth to market weight with higher feed efficiency. OIC negotiated a sponsored research agreement with a leading swine genetics provider to test this discovery in production genetics and provide an option to negotiate a license to the background intellectual property.

Reduced Volatile Organic Compounds in Wood Stain – Iowa State researchers are developing additives for water-based wood stains that dramatically improves performance and ease of application versus commercial stains. ISURF entered into an option agreement with an Iowa-based startup company that is maturing the technology in conjunction with an established northwest Iowa coatings company.

CENTER FOR INDUSTRIAL RESEARCH AND SERVICE (CIRAS)

Since 1963, CIRAS has partnered with Iowa companies and communities to help them prosper and grow. A vast network of university and industry experts brings years of professional experience to CIRAS, making us a leading integrator of solutions in Iowa. Over the past five

years, CIRAS and its partners have reported impact from companies totaling more than \$2.8 billion and more than 30,000 jobs created or retained as a result of the assistance they received.

Last year, **1,591 businesses from 99 counties** in the state received assistance on projects or attended educational workshops from CIRAS staff or partners.

CIRAS Director Ron Cox delivered over 100 presentations on a novel approach to workforce solutions to nearly 3,000 people across Iowa in the past year. “Ron challenged us to think differently about sources of labor ... The only way we’re going to increase our workforce is to become more open minded to alternative ways of hiring people and alternative pools of prospective employees.” said Tom Pientok, CEO of Timberline Manufacturing in Marion.

CIRAS continues to support a variety of initiatives under the Iowa Economic Development Authority (IEDA) *Manufacturing 4.0* plan. One initiative included over 200 on-site technology assessments for small manufacturers to help them make informed investment decisions and improve their chance of success. Independence-based Priority Custom Machining, which specializes in high-precision metal cutting, was able to identify opportunities to implement new technologies. CEO Robert Hearn stated, “The assessment helped me identify opportunities to grow my business and reaffirmed CIRAS as a valuable resource.”

In response to the rapidly changing supply chain needs of Iowa industry, CIRAS hosted 5 workshops and conducted over 50 supplier searches. Workshop partners included the Iowa State University Ivy College of Business, the University of Iowa Tippie College of Business, and regional/statewide economic development agencies. One attendee stated “[t]his is one of the best, most informative seminars I have been to in a while.”

CIRAS helped Black Cat Wear Parts in Dewitt develop a go-to-market plan that included market research, identifying prospects, and developing a compelling value proposition, leading to \$440,000 of new sales with potential sales of more than \$2 million. Company owner, Josh Daniel, participated in a CIRAS strategic planning boot camp and stated, “Through the boot camp, I was able to learn how to use important tools like research and analysis, strategic development, and tactical implementation.”

Aerial Services, Inc., a veteran-owned small business providing a wide range of services, including aerial LiDAR, digital orthoimagery, and comprehensive mapping solutions, won over \$11 million in government contracts with assistance from CIRAS. Ryan Kibsgaard, marketing manager for Aerial Services, said that CIRAS provided his company with valuable technical assistance such as helping keep its federal procurement accounts complete and up to date, which helped them compete for and win multiple federal contracts.

Through the College of Engineering and College of Agriculture and Life Sciences, CIRAS facilitated 96 student capstone projects with 62 Iowa businesses in FY21. Ida Grove-based Gomaco Trolley Company has utilized the Capstone Program for years. Company Manager Lex Jacobson stated, “The students brought a unique perspective to a difficult problem, which carries the potential for developing a valuable solution. We also feel our participation increased our exposure with faculty and students, which is a potential benefit to recruiting.”

PAPPAJOHN CENTER FOR ENTREPRENEURSHIP

For the second year in a row, Iowa State’s undergraduate entrepreneurship program was ranked #11 of over 300 programs by the Princeton Review. A new sub-ranking put Iowa State as the #3 top rated school for entrepreneurship in the Midwest, and #1 in Iowa.

During the summer of 2022, 17 students launched 14 businesses in the CYstarters summer accelerator program. Over 60 professional mentors supported the students. The experience culminated in a community Demo Day attended by 160 people. Over \$120,00 in cross-campus support was provided to the student entrepreneurs, and more than \$12,000 in prizes were awarded to students on Demo Day.

Over 330 students competed in the Pappajohn Center's campus-wide pitch and business plan competitions. Top performers won over \$77,500 in cash prizes in local and national business competitions.

The CyBIZ Lab student consulting program completed 37 projects with private businesses and area non-profit organizations and created 70 student employee positions. CyBIZ Lab students work on market validation, market research, and analytics projects for small businesses, large businesses, non-profit organizations and startups.

ISU Startup Factory cohort members launched 18 new businesses, generating 23 new jobs. \$1.5 million in capital was raised to support these startups. One Startup Factory company had a successful exit in 2022.

In partnership with BioConnect Iowa, the Go-To-Market (GTM) accelerator launched three cohorts in the last year. The program has supported 10 existing business startups, employing 23 people. \$9.5 million in capital was raised by these companies.

The Pappajohn Center provided matched funding and placed 54 student interns in ISU Research Park startup companies in the last year. Many of those students continue on with the company on a part-time or full-time basis after completing the internship.

The Pappajohn Center, with partners SBDC and Home Base Iowa, hosted the first and anticipated annual Iowa Veterans Entrepreneurship Conference in Ames. More than 100 people participated in this one-and-a half day event. A follow up "pitch competition" event will take place in December to motivate and reward those who have taken the initiative to pursue an idea.

Collaborating with the Ivy College of Business marketing team, staff have developed a workshop program for Iowa State student athletes who are navigating the rapidly-changing NIL (name-image-likeness) landscape.

The Pappajohn Center director offered a "Start Something" challenge to high school-age international recruits. A surprising 356 students from 22 countries, and 71 teams participated in the challenge, with \$4,500 in prizes going to students who won the challenge.

Iowa State installed 21 students at the Sigma Nu Tau Entrepreneurship Honor Society event in April 2022. Students in Sigma Nu Tau must be majoring or minoring in entrepreneurship and have maintained a 3.2 GPA.

Nearly 20,000 students at Iowa State took courses with an entrepreneurship theme or component.

SMALL BUSINESS DEVELOPMENT CENTERS

In FY 2022 the America's Small Business Development Centers Iowa provided counseling for 3,928 clients. Those clients reported that assistance in part helped to create 1629 jobs and 169 business starts. Additionally, they reported \$118,698,805.84 in new capital and sales increases of \$221,954,972.98.

In order to reach all 99 counties, the America's SBDC Iowa has over 50 outreach offices that we use to meet clients where they are as well as online meetings. Over the last year, our Technology/Commercialization program, the Rural Business Innovators, has gained a lot of traction. We are also working with these businesses on concept development and our team has also started working with them on prototype development in a program focused on the Path to Prototype.

Client Spotlight: SBDC Cherie Edilson, Member Marketplace, Inc.

Cherie's business was critical during and after the pandemic to help Iowa's businesses to get online through her portal. The Iowa Economic Development Authority and America's SBDC Iowa provided funding to make the portal free to businesses to use. Through the success in Iowa, her platform has been adopted in Wyoming, Nevada, New York, North Dakota and California as well as others. There are businesses from every county on the www.shopiowa.com platform and orders that have been placed from over 44 states.

IOWA STATE UNIVERSITY RESEARCH PARK

ISU Research Park - ISURP has a long history of success because companies find value in a close physical presence and connection to the university as it facilitates working with faculty and graduate students on research, tapping into and recruiting the graduate and undergraduate student talent pool, and accessing university facilities. Tenant partners include companies of all sizes and industry focus, though engineering and technology and bioscience/ag tech comprise the largest proportion, reflecting Iowa State's strength in STEM. Tenants include companies incubated at ISURP as well as established global brands. **Five Iowa companies that had an IPO started at ISURP; today two remain at ISURP and one other is located elsewhere in Ames.** In addition, multiple ISURP companies have enjoyed significant liquidity events, with multiple startups acquired by global brands that chose to stay at ISURP including Merck, Zoetis, and Boehringer Ingelheim.

In FY22 ISURP added an additional 150 acres via a partnership with the Committee for Agriculture Development to pave the way for additional agricultural company development, bringing its total connected acreage to 550. It anticipates building two new buildings in the next year, both in the agricultural space, one which will provide additional capacity for Iowa companies to work with one of Iowa State's most accomplished research teams, Digital Agriculture Innovation. This research program has more than 29 products sold globally that contain their intellectual property and currently collaborates with multiple ISURP companies. ISURP also continued its partnership with the Athletics Department and announced its intention to develop a \$200 million entertainment district between C.Y. Stephens and Jack Trice football stadium.

ISURP manages a portfolio of 17 buildings, 11 of which are owned and operated by ISURP, accounting for more than 800,000 square feet of building space. **Fifteen new companies and affiliates, and 36 pre-incubator cohorts joined ISURP in FY22, bringing the cumulative total to more than 600 companies research centers and 8,000 employees for current and former tenants that are still in existence world-wide.** Currently, there are **142 companies and research centers located at ISURP, employing 1,945 people.**

CASE STUDIES

CIRAS launched a new summer internship program to build the talent pipeline for small- to mid-sized manufacturers. This program also aims to increase the diversity of the pipeline through partnering with programs supporting under-represented students. The U.S. Department of Commerce awarded CIRAS \$920K to establish this program in Iowa and thirteen other states. A pilot of this internship included ISU student Cassie Swacker and On With Life, a company that provides post-acute programs for brain injury survivors. Cassie used Industry 4.0 technologies including 3D printers, and laser scanners to develop and personalize assistive living aids. She stated, “The program gives me the opportunity to learn how to utilize engineering technologies to solve real-world issues and help people facing significant challenges”. She was selected to present at the national American Congress of Rehabilitation Medicine (ACRM) Conference. On With Life’s Director of Analytics Joe Walters added, “Presenting at ACRM demonstrates the significant value this work has in the field of brain injury rehabilitation and is an example for others to follow.”

A central Iowa manufacturer of sports performance equipment credits CIRAS with getting the company back on track after a fire left them dealing with extensive water damage. “Without them, we would’ve been set back a year or more, and if we’d tried to move forward on our own through trial and error, it would probably would have been longer than that,” said Chris Conner, general manager of Power Lift in Jefferson. CIRAS helped secure recovery resources and designed a new plant layout for Power Lift, making modifications to account for the damage to the plant’s footprint from the fire. The assistance CIRAS provided helped Power Lift get their product out the door sooner, resulting in more than \$1 million in sales retained.

Our College of Design is partnered with multiple Iowa State colleges, Iowa Central Community College for workforce training, Iowa Department of Economic Development for equipment funding, and multiple groups within EDIR and Extension ecosystems to pilot the creation of Iowa’s first 3D printed housing community—to be placed in a rural Iowa community of Hamburg—which was previously devastated by flooding. State funding will assist in the purchase of equipment to create affordable housing in rural Iowa focused on the gap between housing demand in our rural areas and the need for faster, less costly solutions to keep our rural communities thriving.

Our athletics department and research park created a unique partnership between two unlikely organizations, to try to solve a major deferred maintenance problem with our performing arts facilities—spaces that were once focal points of our university and now are in need of repair and upgrading. Together, they have envisioned a concept called CYTown, \$200 million, self-sustaining, multi-use development that will drive revenue and value to a highly visible and valuable area that was previously sitting vacant most of the time for parking.

Summary of ISU Economic Development and Innovation Data	
a. Number of disclosures of intellectual property (excluding data sets)	82
b. Number of patent applications filed	94
c. Number of patents awarded: U.S. issued patents	37
total issued patents (world-wide)	69
d. Number of license and option agreements executed on institutional technologies: in total	34
in Iowa	10
e. Number of license and option agreements yielding income	113
f. Revenue to Iowa companies as a result of licensed technology (CY21)	\$5.5 million
g. Number of startup companies formed (through licensing activities) in total	1
in Iowa	1
h. Number of companies in research park and incubators pre-incubator companies	36
private	85
university related	21
i. Number of new companies in research park and incubators pre-incubator companies	36
private	6
university related	3
j. Number of employees in companies in research park and incubators	1,945
k. Royalties and license fee income	\$2.8 million
l. Total sponsored funding received	\$601.7 million
How much of this is for research	\$284.2 million
m. Corporate sponsored funding received for research and economic development: in total	\$62.0 million
in Iowa	\$18.8 million
n. Iowa special appropriations for economic development, in total	\$3.474 million
SBDC	\$0.936M
CIRAS Technology Assistance Program	\$1.365M
ISU Research Park	\$0.122M
Regents Innovation Fund	\$1.050M
o. Research expenditures (federal, state and local; business; nonprofit; institution funds; all other sources, FY22):	\$268.6 million
p. Licenses and options executed per \$10 million research expenditures (FY19 AUTM Survey)	1.0
q. Sales of licensed products by Iowa-based companies (CY21)	\$5.5 million
r. Number of employees for current Research Park tenants and incubators, as well as former tenants that are still in existence in basic form world-wide	7,957
Note: Unless noted, the data provided above are FY22 data.	

**Summary of FY21-22 Regents Innovation Fund
Commercialization Program Projects**

Principal Investigator	FY20 RIF Commercialization Program Projects (\$414,344 of \$1,050,000 RIF Allocation)	Award Amount
Drs. Yu and Greenlee	Machine-learning enabled non-invasive Raman spectroscopic test for diagnosing chronic wasting disease (CWD) in live animals	\$40,623
Dr. Houqiang Fu	Wide bandgap semiconductors based next generation efficient and robust power electronics	\$49,900
Dr. Beiwen Li	Panoramic precisions large-scale 3D scanning for large scale equipment (aircraft, vehicles)	\$49,936
Dr. Eliot Winer	Software enhancements for ISURF-owned VIPRE visualization software deployed for use in education, medical, veterinary, and legal markets	\$49,073
Dr. Eric Cochran	Contractor-applied soybean-oil based polymer modifiers for sustainable asphalt pavements	\$50,000
Dr. Wenzhen Li	On-site upcycling of Nitrogen from meat processing wastewater by a membrane-free alkaline electrolyzer (MFAEL)	\$25,000
Dr. Ratnesh Kumar	Self-powered wireless IoT for structural health monitoring integrated vibration sensor and energy harvester	\$50,000
Dr. Shan Jiang	Additive and formulation for improving waterborne coatings	\$50,000
Drs. Abhishek Sarkar and Ikenna Nlebedim	Magnetic field assisted fast charging of lithium-ion batteries	\$50,000
Dr. Adam Thoms	Evaluation of RAB as turf fertilizer	\$50,000

IOWA STATE UNIVERSITY™

Iowa State was named the winner of the APLU's 2021 Innovation & Economic Prosperity Award in the Place category. Our submission made the case that our place is all 99 Iowa counties. These awards are external validation of the outstanding work done in economic development at Iowa State.

CIRAS *partnerships*

Over the past five years, CIRAS and its partners have helped more than 4,400 businesses across every Iowa county, creating an economic impact of more than \$2.8 billion.

Pappajohn Center for *Entrepreneurship*

#11 Top Ranked Undergraduate Entrepreneurship Program in the country; #3 in the Midwest; #1 in Iowa

More than 100 Iowa Veterans and Family Members Attended the inaugural Iowa Veterans Entrepreneurship Conference

Iowa State *Extension*

Agriculture and Natural Resources extension education was delivered through 124,806 contacts at in-person and virtual events with farmers and agribusinesses, providing research-based information to help Iowans grow the economic base of Iowa agriculture.

Research Park + *CYTown*

Iowa State Research Park and Iowa State athletics announced their intention to build an additional \$200M entertainment district between Iowa State Center and Jack Trice/Mid American Stadium. The first \$200 million investments included the Stark Student Athlete Performance Center, parking lot and infrastructure improvements and the pedestrian bridge spanning University Boulevard, and more.

SBDC FY22 Impacts

SBDC clients reported as a result of client counseling: 1,629 jobs created, 169 businesses started, 3,928 clients counseled, \$118,698,805.84 in total new capital, \$221,954,972.98 in total sales increases

CIRAS *Manufacturing 4.0*

CIRAS conducted more than 200 on-site technology assessments for small manufacturers as part of the Iowa Economic Development Authority (IEDA) Manufacturing 4.0 program. The CIRAS Digital Manufacturing Lab powered by Alliant Energy continued to expand technologies and host events, reaching 740 attendees from 247 companies in the past year.

IOWA STATE UNIVERSITY™

ISURF executed an exclusive license for technology developed by Iowa State Faculty. The technology received a national R&D 100 Award in 2021. TelVib is a start-up based in Boone that went through Startup Factory Cohort 8. It is now partnering with the Ames Laboratory Critical Materials Institute to recover rare-earth metals from electronic waste on a commercial scale.

Pappajohn Center for Entrepreneurship Impacts

18 New Businesses Launched in ISU Startup Factory, 17 New Student Businesses Launched in Cystartups summer accelerator, 70 Students completed 37 CyBIZ Lab Business Consulting Projects

Iowa Lean Consortium/CIRAS

CIRAS' Iowa Lean Consortium (ILC) hosted a record-breaking 120 companies at our annual ILC Fall Conference.

Research Park Growing Again

ISU Research Park will construct two new buildings in the next 12 months, both in the agricultural space. Overall vacancy rates are the lowest in research park history, with less than 2.5% of usable space vacant, adding 18 tenants in the past year and increasing revenues over \$10 million.

Iowa Municipal Professionals Certification

Iowa State Community and Economic Development extension staff instruct municipal professionals in certification. 69% of respondents reported a salary increase, contract extension, job title change, or improved benefits package as a result of Iowa Municipal Professionals Institute certification

CIRAS + Student Capstone Projects

Through the College of Engineering and College of Agriculture and Life Sciences, CIRAS facilitated 96 student capstone projects with 62 Iowa businesses.

4-H Youth Development

4-H Youth Development programs reached more than 100,000 Iowa youth in 2020-2021, preparing these young people to actively pursue careers and education beyond high school and build skills. Annually about 91% of 4-H seniors report they intend to pursue trades or post-secondary education within 12 months of graduation.

The University of Iowa

FY22 Annual Economic Development Report

Ranked amongst the best global universities, the University of Iowa stresses bringing “learning and discovery into the service of the people of the state of Iowa, the nation and the world” as a central mission. Translation of research and knowledge generated by University faculty, staff and students is a central means through which this mission is accomplished. Those actions subsequently translate into positive impact on the economy of Iowa. The University’s new strategic plan calls to “Accelerate entrepreneurship and support broader economic development through innovative engagement and partnerships with industry and community organizations.” This strategy is implemented by:

- Creating increased opportunities for entrepreneurial education, new venture creation, technology transfer, with a specific focus in medtech and edtech innovation, and
- Connecting faculty, staff, and students to organizations and subject matter experts to solve unmet needs in social, health, technical, and business problems

A robust strategy incenting economic development, on a campus like the University of Iowa, is key to transforming ideas into impact benefiting Iowans and beyond.

Subsequently, this report provides a description of the UI’s key initiatives in the economic development space— the work of the Chief Innovation Officer, who oversees Protostudios, UI Research Park, Translational Research Incubator, UI Ventures, and MADE; UI Research Foundation; John Pappajohn Entrepreneurial Center (JPEC); UI Pharmaceuticals, and other activities.

I. Organizing to Support Economic Development

The Chief Innovation Officer, who reports to the Vice President for External Relations with a dotted-line report to the President, oversees and coordinates the economic development activities for faculty, staff and graduate students at the University of Iowa. The Chief Innovation Officer oversees: Protostudios, UI Research Park, Translational Research Incubator, UI Ventures, and MADE.

In FY22, several broad themes served as the central organizing principles of the Innovation Office, including:

Focus on MedTech and EdTech. External reviews commissioned by the State of Iowa identified highly concentrated capabilities in the medical technology and education technology sectors. UI efforts are focused on exposing faculty, staff and students to the system of support which exists

at the university and in the surrounding community to assist them in transitioning their research or other ideas towards commercialization.

Mobilizing an External Network. The Innovation Office is exposing UI start-ups and entrepreneurially minded faculty, staff and students to skills and connections drawn from a network of contacts in the healthcare innovation and venture capital space. The network of individuals able to assess start-ups, offer strategic and experiential assistance, and connect them to talent not resident to Iowa.

Creating a Concierge Service to Support UI Faculty Innovations. Under the direction of UI Ventures, the Innovation Team established a comprehensive suite of services to assist UI faculty looking to engage the commercialization process. This service has and will continue to connect entrepreneurial faculty and companies with strategic support from medtech venture capital and industry knowledge, FDA guidance, intellectual property or clinical study guidance and reimbursement strategies.

Extending Advanced Prototyping Services to Medical Innovators. Protostudios, the UI's advanced 3D printing, prototyping and design service, maintains three locations on the UI campus to better serve its growing clients list of UI faculty and innovators from around the state. Approximately 70% of the work of Protostudios in FY22 supported healthcare innovation and more than 80% of their design service clients engaged with them through the newly opened office in UIHC.

Expansion of Innovation Funding Programs. Building on the successful Innovation fund programs in partnership with the Colleges of Medicine, Engineering and Department of Nursing to promote faculty innovation in medical device and software and College of Education to support Edtech, UI Ventures expanded Innovation Funding to College of Dentistry and College of Pharmacy in FY22. Encouraging proof of concept and translational projects is a key building block in the Economic Development pipeline. In addition to meeting practical and clinical needs, the projects provide a resource for innovative faculty to promote a more inventive culture. In FY22, 11 awards were made across 5 colleges for a total of \$480,000 granted. The majority of the awards supported medical device (55%), followed by software (27%), and training tools (18%).

III. University of Iowa Economic Development Infrastructure



University of Iowa
Research Foundation

In Yorkshire, England, a newspaper published a story about an 81-year-old great grandfather whose ankle caused him so much pain he could barely walk. After he underwent surgery and received an artificial ankle that reproduces a natural ankle's full range of motion, he was able to fulfill a lifelong dream of flying a Spitfire plane. Although he may not know it, his new lease on life is courtesy of innovative researchers at the University of Iowa who designed the artificial ankle and brought their invention to the UI Research Foundation for patenting and licensing into the commercial market.

This is just one example of how UIRF helps our university researchers amplify the impact of their work to directly benefit people's lives. UIRF's efforts reflect the broad scope of research across our campus: certainly in the medical space like with the artificial ankle and with the first-ever FDA-approved AI diagnostic for diabetic retinopathy, but also in engineering, for example with efficient, high-powered infrared LEDs designed for industrial applications, and in education with curricular content for mobile study guides that help students with professional certification and licensure exams. UIRF also helps our researchers share their critical tools with other researchers worldwide, as seen with the distribution of Iowa's COVID mouse model to hundreds of institutions across the globe.

Revenue from the licensing agreements UIRF negotiates with our company partners is shared with our inventors personally and also supports department, collegiate, and cross-campus research efforts. Many licensing relationships also lead to sponsored research at the university. And in fact, the connection between research grants and inventions goes both ways—federal agencies, non-profit-foundations, and corporations usually include intellectual property provisions in their grants, and UIRF takes the lead in helping our researchers satisfy these requirements.

In the past five years, UIRF has worked with over 800 researchers from thirteen colleges on over 500 invention disclosures.

protostudios

Protostudios (<https://protostudios.uiowa.edu/>) is a state-of-the-art, rapid-prototyping facility located in the MERGE co-working space in downtown Iowa City, Van Allen Hall and at UIHC. It works with UI researchers, researchers from other Iowa universities and healthcare institutions and community members to develop fully functional prototypes of product ideas, allowing innovators to test, redesign, and determine manufacturing paths and demonstrate usability to investors. Protostudios primary focus is on biomedical and electronics prototyping with access to 3D printers (plastics, metals, ceramics) milling, laser/wet jet cutter, printed circuit board fabrication, and consulting from on-staff industrial designers and engineers. Anatomical modeling of human organs prior to complex surgeries is developing into a key value add of Protostudios.

The creation of Protostudios was funded through a \$1.5 million Strategic Infrastructure Fund grant from the Iowa Economic Development Authority, and the authority approved a \$500,000 grant to outfit additional space for new equipment that expands the organization's capabilities.

UI Research Park

EXPANDING TECHNOLOGIES AND COMPANIES

The UI Research Park (<https://researchpark.uiowa.edu/>) leases building sites and space to growing technology companies that require sustained research relationships with the university. The Park is home to a business incubator program that has nurtured over 100 UI start-ups and other new ventures since its founding. Incubator tenant companies can draw on both the research and business resources of the university, including access to UI libraries, hazardous waste management services, support for SBIR/STTR grants (Small Business Innovation Research/Small Business Technology Transfer federal grants), educational seminars, networking opportunities, and shipping/package handling.

The BioVentures Center (BVC) in the park contains wet laboratory modules that can be shared for life science companies and office/dry laboratory modules for engineering and technology-based companies. The BioVentures Center wet lab space is currently full and has a waiting list.

The Park is also home to three of the university's specialized core facilities. These facilities provide technical support services critical to the growth of start-up companies as well as existing industry partners:

- Center for Biocatalysis and Bioprocessing operates a microbial fermentation facility and specializes in both upstream and downstream bioprocessing with expertise in process scale up for food products, biofuels, biopharmaceuticals, and other biotechnology products.
- National Advanced Driving Simulator conducts research and development on driving safety for the government, military, and industry partners.

- State Hygienic Laboratory is the state’s environmental and public health laboratory, serving all ninety-nine Iowa counties as well as out-of-state clients by testing and tracking infectious diseases and illnesses.



The Translational Research Incubator (TRI) (<https://uiventures.uiowa.edu/translational-research-incubator>) serves as the wet-lab counterpart to Protostudio’s dry-lab program. The TRI space, located in the Medical Laboratories building, can house up to four early-stage research-based biomedical or life science companies focused on commercializing technology developed at the University of Iowa.

Much of the support for TRI goes to purchasing equipment that can be shared among the company tenants. This allows companies to focus their limited resources on technology-specific development to maximize their funding -and do so in close proximity to their day jobs. The space is ideal for small start-ups that need to conduct early-stage proof-of-concept experiments, often with SBIR/STTR funding, to attract the investment needed to expand operations at the UI Research Park and other locations in the eastern Iowa region. The TRI space is currently full with a waiting list for occupancy.



UI Ventures (<https://uiventures.uiowa.edu/>) assists university faculty and staff in creating new companies based upon their research. It facilitates connections between the faculty and outside mentors, services and investors and serves as a liaison between the company and university services. Working closely to support the University of Iowa Research Foundation, UI Ventures actively engages with outside investors and business experts to improve visibility of UI companies and bring business expertise to campus. In addition, UI Ventures manages the TRI incubator and operates the MADE program to encourage faculty and staff innovation and entrepreneurship throughout campus.



Iowa MADE (<https://iowamade.org/>) is a first of its kind program, in the nation, whose mission is to encourage and facilitate the UI community to bring innovative, need-based products to market with the goal of enhancing economic development at the university as an extension of research and scholarship.

MADE is a manufacturing and e-commerce initiative launched in FY18 with 3 objectives: 1) bring simple, low volume technology to market utilizing local Iowa manufacturing whenever possible; 2) contribute to a cultural transformation around innovation on campus; and 3) provide students with an opportunity to learn first-hand the tools necessary to bring a product to market. The program crosses several departments with products from Ophthalmology, Anesthesiology, Dentistry, Cardiothoracic Surgery, and General Surgery. Products are available for sale through the iowamade.org website and revenue is used to reimburse development costs to encourage continued support of innovation and development. All technologies remain available for licensing to an external company through UIRF.

An undergraduate student operations team maintains the FDA compliant quality system, manufacturing, product management, marketing, and sales. These students have the unique opportunity to gain in depth real-world experience and leadership skills on campus to complement their classroom education.



The John Pappajohn Entrepreneurial Center (Iowa JPEC) (<https://www.iowajpec.org/>) offers nationally recognized comprehensive entrepreneurial education programs that are available to all Iowans. At the undergraduate level, Iowa JPEC and the Department of Management and Entrepreneurship offer a BBA in Management with an Entrepreneurial Management Track to Tippie College of Business students. Iowa JPEC and the College of Liberal Arts and Sciences offer a BA in Enterprise Leadership (on-campus and online). In addition, Iowa JPEC offers the Technological Entrepreneurship Certificate for engineering students, and the Certificate in Entrepreneurial Management for all undergraduate students. The Tippie College of Business offers a Graduate Innovation Certificate. Advanced entrepreneurship courses are also offered to MBA students at several locations across the state of Iowa as well as virtually.

Iowa JPEC and its university partners also play an important role in the development of Iowa-based technology and high-growth start-up companies. Whether providing one-on-one consulting services and group training, working with start-up companies on technology transition, directing UI students on advanced field study projects, or providing training and seminars to business executives, Iowa JPEC seeks to support the next generation of entrepreneurs and business leaders.



The University of Iowa Center for Advancement's (UICA) (<https://www.foriowa.org/>) Corporate and Foundation Relations group promotes economic development through connecting corporate partners with the UI's strengths. In addition to connecting established companies with the university, the Center for Advancement is a key player in tapping UI's extensive alumni base to support entrepreneurship and technology commercialization through monetary resources and, equally important, advice and expertise.



UI Pharmaceuticals

UI Pharmaceuticals (<https://uip.pharmacy.uiowa.edu/>) is a fee for service entity on the University of Iowa Campus that provides contract drug manufacturing (CDMO) services to academic, biotech, and pharmaceuticals clients. These services range from early-stage formulation development, analytical method support, clinical trial material manufacturing, to commercial product manufacture and support. It is organizationally structured as a division of the UI College of Pharmacy and employs approximately 85 pharmaceutical professionals. UI Pharmaceuticals has been operating for nearly 45 years and supports the manufacturing and testing of both clinical and commercial products. The seven departments that comprise the program are as follows:

- Sterile Manufacturing
- Non-Sterile Manufacturing
- Quality Assurance
- Analytical Services
- Preformulation and Formulation Development
- Business Development
- Engineering and Facilities

Center for Biocatalysis and Bioprocessing

The Center for Biocatalysis and Bioprocessing (CBB) (<https://cbb.research.uiowa.edu/>) is an academic center at the UI focused on advancing biotechnology through the creation and dissemination of discoveries in the biocatalytic sciences.

As an internationally recognized contract development and manufacturing operation (CDMO), the CBB facility specialized in the optimization and scale-up of complex bioprocesses to produce pilot-scale, high valued bio-based chemicals. Most notably, the CBB's facility fills a worldwide niche to produce recombinant proteins of commercial and research value.

A fraction of these proteins is produced under strict standards defined by the FDA, referred to as *current good manufacturing practices* (cGMP). The CBB's cGMP suite operates under the 2008 FDA guidance for Phase I clinical studies, which means the products produced under this standard can be used to determine the safety and efficacy of putative therapeutics. The CBB's

cGMP operation is ideally suited for startup companies with limited budgets who need information for the Chemistry, Manufacturing, and Control (CMC) section of their Investigative New Drug (IND) applications required by the FDA before Phase I clinical trial testing can begin. The CBB operates the only facility in the State of Iowa that manufactures vaccines and therapeutic proteins for Phase I clinical trials in people.

Clients range from international corporations to virtual startups. In addition, the facility's professional staff supports clients who are preparing SBIR/STTR grant applications and staff consults for companies preparing IND applications for the FDA.

III. University of Iowa's Economic Development Activities in FY22

- **UI Research Park**
 - The UI Research Park is home to 32 companies, employing over 1500 total employees, 800 of those located on the park. Total payroll associated with Park companies is more than \$3 million.
 - Companies residing on the Research Park, and in particular those residing in the BioVentures Center, have access to a variety of services, including: Shared laboratory equipment room; Executive board room and conference rooms; Multi-purpose room seating 70; Breakroom/vending area, atrium and lounge areas; Shipping/receiving area; High-speed wired & wireless internet; Emergency backup generator; Shared equipment room that includes: Autoclave, Laboratory glassware washer/dryer, RO/DI water system, Ice machine, -80° freezer; and Access to the UI libraries and the vast resources at the UI's CCOM via their core facilities.
- **UI Ventures**
 - UI Ventures currently supports 36 companies including 2 that formed in FY22.
 - Faculty and staff founded companies raised over \$74 million in equity funding in FY22.
 - UI Ventures continues to build a stronger economic development pipeline through programs that support business executive interactions, coaching and connections with investors, business strategy support, and other startup resources. In FY22, two UI faculty/staff companies were awarded \$620,569 in SBIR/STTR grants.
 - In FY22, 11 Innovation Fund awards were made across 5 colleges for a total of \$480,000 granted to faculty to aid the translation of their research towards commercial potential.
- **Iowa MADE**

- MADE had 4 products on the market in FY22 and students continued to develop an additional 4 products originating from the Colleges of Medicine and Dentistry, and the UIHC Dept of Nursing.
- MADE alumni continue to receive competitive job offers directly related to their work at MADE and are 100% employed upon graduation.
- MADE utilizes suppliers in Iowa to support the state economy and most of the MADE alumni remain in the region upon graduation
- **Protostudios**
 - The Protostudios UIHC office opened in August of 2020. UIHC Client traffic has been high with meetings almost every day.
 - Protostudios worked with 36 unique design clients in FY22 and another fabrication only projects for 50 clients.
 - The first student employed by Protostudios graduated in May and accepted a job in Johnston Iowa. His job is a virtual parallel to his Protostudios job experience.
- **Iowa JPEC**
 - Key metrics

○ Start-up Companies Served (New Business Starts)	493
○ Program, Seminar & Workshop Participants	5,531
○ Estimated Job Creation	347
○ Hours dedicated to Clients	12,533
○ Total Clients (Individuals receiving assistance)	807
○ Total Youth Impacted (K-12)	53,648
○ Seed Money Awarded	\$399,000
○ Total Participants Across All Programs	10,919

(Including Academic, Outreach, and Youth)
 - Academic Program – Iowa JPEC delivers campus-wide and online undergraduate education and technology innovation coursework in the MBA program. Majors (BA or BBA) and certificate programs exist for all undergraduate students at UI including specialized programs for students in engineering, performing arts, and journalism. During FY22, 4,566 students enrolled in 137 classes, 289 students received a degree and 139 students earned an entrepreneurship certificate.
 - Bedell Lab Student Incubator – The student incubator housed at the 10,000 sq. ft. Bedell Entrepreneurship Learning Laboratory has 17 private offices for the most advanced start-ups, numerous co-working spaces for the others, and several conference rooms. This campus-wide program is open to students from every college and major. The students receive intense mentoring and support as they launch or expand their businesses. The program, one of the first of its kind in the nation, has impacted 1,545 students since opening in 2004. During FY22, the Startup Incubator supported 38 student start-ups made up of 51 students.
 - Startup Incubator Summer Track - Throughout the twelve-week program, accelerator teams meet daily to launch their start-up by using Lean

LaunchPad methodologies. Through brunch-and-learns, work sessions with experienced mentors, weekly pitches, and lectures, the program aims to drive the start-up process for students, while increasing their start-ups' chance for success. In FY22, 18 teams and 26 students participated.

- Business plan and pitch competitions – Iowa JPEC hosts and sponsors a variety of elevator, business model and business plan competitions for UI students. During FY22, a total of \$399,000 was awarded to start-ups.
- Innovation Challenge – In order to increase campus-wide entrepreneurial activity and accelerate technology commercialization, a new year-long training program and competition launched in FY20. Administered by the John Pappajohn Entrepreneurial Center and co-sponsored by the Office of the Vice President for Research, UI Research Foundation and Office of the Chief Innovation Officer, the program had 127 participants in FY22.
- IdeaStorm Competitions are entry level pitch competitions that require no prior experience. Students simply share their idea with the crowd in two minutes or less. This introduced 71 new students to entrepreneurship in FY22.
- Jacobson Institute for Youth Entrepreneurship – The Jacobson Institute is a comprehensive program that enriches K-12 students' lives through classroom and practical educational experiences. Programming and impact include:
 - BizInnovator Program – Curriculum and teacher training focused on entrepreneurship and business. In FY22, 289 teachers from 231 schools in 42 states used the curriculum nationwide and impacted 12,668 students.
 - STEM Innovator Program – This professional development program for teachers infuses innovation and entrepreneurship into K-12 classrooms. In FY22, 378 educators from 147 schools in 17 states received curriculum, training, and support, impacting 40,091 students.
- Alumni-Student Mentoring Program – This program was established to connect entrepreneurship students with esteemed alumni to enhance students' professional and personal development for future success. In FY22, 127 students were paired alumni mentors.
- Okoboji Entrepreneurial Institute - Iowa JPEC established the annual, week-long Okoboji Entrepreneurial Institute (OEI) in a partnership among state of Iowa universities and colleges, as well as Iowa Lakes Corridor Development in 2006. To date, this summer program continues to provide students with an immersion into entrepreneurship and business strategy and develop an outstanding network of peers and business professionals. In FY22, 7 students participated for a total of 192 since inception.
- Student Organizations – Several campus-wide clubs and organizations focused on entrepreneurship are sponsored by Iowa JPEC.
- Venture School Entrepreneurial Training Program – Iowa JPEC offers an immersive “Lean LaunchPad”, business model canvas, seven-week boot

camp training program named Venture School to accelerate start-ups. Venture School is offered in multiple locations across Iowa. The program emphasizes real-world entrepreneurship through experiential learning, a flipped classroom, and immediate feedback. During FY22, workshops were offered in Coralville/UI, Davenport/EICC, Iowa City, Cedar Falls/UNI, Des Moines, Sioux City, Dubuque and Mason City/NIACC. There were 86 teams made up of 118 entrepreneurs.

- UI Small Business Development Center – The UI hosts an SBDC that serves a five-county area (Cedar, Johnson, Iowa, Poweshiek, and Washington counties). During FY22, the UI SBDC served 314 start-ups. This contributed to the creation of 103 jobs and \$12,680,630 in equity being raised.
- Institute for International Business (IIB) – The IIB is dedicated to advancing knowledge and international skills in business and educational communities through research, education, and consulting. During FY22, 4 International consulting projects were completed by University of Iowa students and faculty.
- Business Consulting Program – Iowa JPEC offers business consulting services to entrepreneurial and start-up companies around the state. During FY22, 88 projects were completed for 52 clients in 19 counties
- Iowa Innovation Associates Internship Program – Iowa JPEC provides funding support enabling Iowa start-ups to hire UI student interns as they work to grow their businesses. In FY22, 19 students were placed in 15 start-ups in these Iowa counties: Linn, Johnson, Polk, Dubuque, Scott
- Pappajohn Entrepreneurial Ventures Competition – In partnership with the Pappajohn entrepreneurship centers at ISU, UNI, Drake, and NIACC, Iowa JPEC sponsors this annual competition to support start-ups around the state. Each year, over \$50,000 is awarded in total to three companies.
- Wellmark Venture Capital Fund – Iowa JPEC is the regional administrator of the \$5 million Wellmark Venture Capital Fund that supports the creation and growth of new businesses throughout the state.
- NSF I-Corps Training Program – The University of Iowa was awarded a multi-year National Science Foundation (NSF) I-Corps Site grant in FY15 to support UI faculty, staff, and student entrepreneurs. This program is a joint effort between the Office of the Vice President for Research and Economic Development, the UI Office of Innovation, UI Ventures, and Iowa JPEC. The goal of this program is to accelerate 90 faculty and staff start-ups. During FY22, 44 start-ups made up of 61 faculty and staff participated.
 - Viewpoint Molecular Targeting, Firefly Photonics, and Juggernaut Life Sciences are examples of an early-stage businesses being supported by this program.
- Regional Partnerships / Eco-system Development – Iowa JPEC partners and engages with numerous local, regional, and statewide organizations to support entrepreneurs and contribute to the vital entrepreneurial ecosystem. These organizations include chambers of commerce, economic

development organizations, business accelerators, state agencies, other universities, and community colleges.

- National Engagement – Iowa JPEC engages with several national and international organizations focused on small business, entrepreneurship, economic development and technology commercialization. This includes not only membership but also committee participation and invitations to present best practices.
- **UI Center for Advancement**
 - Assists with aligning recruiting efforts and providing access to UI faculty and staff. It promotes corporate partner and foundation student scholarship and programming opportunities. UICA facilitates UI’s partnership with ICR Iowa to promote “Boomerangs” to return to the state to fill job openings.
- **UI Pharmaceuticals**
 - In FY22 UI Pharmaceuticals worked with ~100 different clients to manufacture and testing ~120 individual lots of material, resulting in ~\$22 million in total revenues UI Pharmaceuticals currently supports client programs across the United States as well as in Europe, Asia, Africa, and South America.
- **Center for Biocatalysis and Bioprocessing**
 - The Center generated \$3 million in annual revenue working with biopharma, commodity proteins and food products projects.
- **UI Research Foundation**

	FY16	FY17	FY18	FY19	FY20	FY21	FY22
Disclosures	151	93	143	83	95	101	103
Licenses + options	40	58	51	48	37	47	48
Patent applications	297	148	153	160	146	95	188
Issued patents	67	42	74	54	72	86	80

Regents Innovation Funds Spent to Promote Economic Development in Iowa

- Protostudios: \$248,350 for personnel and general expenses
- UI Research Park: \$85,962 for BioVentures Center personnel, operating/general expenses
- UI Ventures and MADE: \$553,486 for personnel, consultants, student interns, award and general expenses

The University of Iowa recognizes the important role it has to play in the state’s economic development ecosystem. The university is committed to improving the quality of life in Iowa through a sustainable cycle of research and creative activity. Research at the University of Iowa makes Iowa a healthier, more prosperous, and attractive place to live. The university will continue to ensure that every dollar invested in research is leveraged by developing new economic opportunities for Iowans.

**University of Northern Iowa
Annual Economic Development and Technology Transfer Report – FY2022**

Section 1. UNI’s Economic Development Activities to Enhance Economic Growth in Iowa – Highlights and Summary

The University of Northern Iowa (UNI) provided economic development assistance to all of Iowa’s 99 counties for the 23rd consecutive year. UNI’s economic development outreach programs are housed in the Business and Community Services (BCS) division and work toward supporting UNI strategic goal 2, to “Empower Communities to Shape Their Future.” Since 2000, BCS has engaged the entire university community in its outreach efforts, including faculty, staff, students, and alumni – all of whom play a critical role in Building a Better Iowa. Client interaction reached 3,756, a record for BCS outreach centers and programs.

Specific areas of service offered by UNI BCS include: entrepreneurship, community and economic development, market research, environmental research and sustainability, metal casting, and manufacturing 4.0.

Some exceptional recognition and milestones in the past year include:

- The UNI John Pappajohn Center (JPEC) was the recipient of the President's Civic Engagement Leadership Award by the Iowa & Minnesota Compact Engaged Campus Awards for work with the Black Business Entrepreneurship Accelerator.
- The Institute for Decision Making (IDM) and the Iowa Waste Reduction Center (IWRC) are celebrating 35 years of serving communities, businesses, state agencies and nonprofit organizations across Iowa. Collectively, the two centers have served 840 Iowa communities and organizations, and 6,750 small businesses.
- The UNI Foundry 4.0 Center and the Center for Business Growth and Innovation (CBGI) were awarded a \$10 million competitive grants from the Defense Logistics Agency in partnership with Youngstown State University to enhance the Department of Defense casting supply chain with Manufacturing 4.0 assistance and innovations.
- Experiment 529, a workshop series facilitated by the UNI JPEC, was recognized with the Veridian Community Engagement Award. UNI student entrepreneurs tutor Black business owners on a variety of essential business tools. More than 100 UNI students supported 35 Black business owners to date.
- Two UNI student entrepreneurs were in the top 25 national finalists advancing at eFest, a global student business pitch competition hosted at the University of St Thomas.

Summary of BCS' key economic development program outcomes for FY2022:

Overall Outcomes

- Provided service in all 99 counties to 3,756 unique businesses, communities, nonprofit organizations, and governmental entities and served an additional 63,447 unique visitors to IASourceLink.
- Reached more than 305,000 Iowans through BCS programs and projects.
- Engaged 128 faculty members and 216 students in the direct delivery of BCS client services, and another 2,816 students were reached by BCS programs.
- Leveraged each \$1 invested by the state with \$5 in private grants, fees or federal funding.

Summarized Impacts on the Iowa Economy

- Two additional cohorts of the Black Business Entrepreneur Accelerator (BBEA) were assisted by the UNI JPEC. Overall, assistance has been provided to 37 BBEA graduates.
- The Institute for Decision Making (IDM) partnered with the statewide Industry 4.0 Partner Consortium organized by Iowa's community colleges and Iowa State's Center for Industrial Research and Services (CIRAS) to offer Industry 4.0 training.
- IDM and Strategic Marketing Services (SMS) conducted the fourth COVID impact survey and assisted with the completion of a human resources survey with business organizations across the state to learn about their primary workforce issues, then outlined strategies to address these challenges.
- The UNI Family Business Program received formal status as the Family Business Center (FBC), the only family business center in Iowa.
- More than 500,000 acres of Iowa roadsides have been planted with native vegetation through the assistance of the Tallgrass Prairie Center (TPC).
- Green Iowa AmeriCorps has now provided energy-efficient services to 7,000 homes in Iowa and has engaged 350 community organizations in this service work.

Entrepreneurship, Business Development and Incubation

- Launched a new entrepreneur mentoring program in partnership with other John Pappajohn Centers in Iowa and the Massachusetts Institute of Technology (MIT).
- Completed 21 business valuation projects for Iowa companies through Advance Iowa.
- Assisted 143 family businesses in 51 counties through UNI Family Business Center with programs such as the breakfast series, peer group meetings and the first-ever Iowa Family Business Conference.
- Supported 1,677 Iowa businesses—a record high—with market information by the Business Concierge team, which is part of IASourceLink, a joint program of the UNI JPEC and the Iowa Economic Development Authority (IEDA).
- Assisted 102 second-stage Iowa companies in 23 counties through Advance Iowa.
- Incubated 16 student businesses in the JPEC's R.J. McElroy Student Business Incubator, with 23 additional students who were affiliate tenants.
- Attracted 8 new companies to the UNI incubators.
- Offered 3 cohorts of the Early Founder Program with 25 student entrepreneurs.
- Hosted 19 peer group meetings and 46 business succession workshops/education sessions.
- Served 307 new clients through UNI's Small Business Development Center (SBDC).

Local Economic Development

- Assisted IEDA with the creation and analysis of the 4th COVID-19 business impact survey.
- Completed a survey of human resource professionals regarding current and projected workforce challenges and potential solutions.
- Provided strategic planning and comprehensive technical assistance to 84 community partners, 11 additional regional groups and 36 service providers across Iowa through IDM.
- Partnered with Iowa utility companies to develop an analysis of statewide existing industry survey data collected by local economic developers.
- Trained an additional 125 economic developers through the Heartland Economic Development Course.

Waste Reduction, Environmental Assistance, and Sustainability

- Convened Iowa stakeholders to develop a statewide plan to strengthen Iowa's food system.
- Installed 62 vegetable gardens for underserved families through Green Iowa AmeriCorps.
- Completed more than 1,000 residential energy efficiency projects for Iowans through Green Iowa AmeriCorps.
- Distributed native seed for 43 county roadsides and more than 1,000 acres as part of the Tallgrass Prairie Center's (TPC) roadside vegetation project and published an interactive map to showcase native roadsides.
- Provided customized environmental technical assistance and on-site reviews through the IWRC to 230 Iowa small businesses.
- Certified 32 craft breweries across the state through the Iowa Green Brewery project, a nationally recognized program of the Iowa Waste Reduction Center (IWRC).
- Expanded CEEE's Local Foods Program impact to \$30 million worth of locally grown food products purchased by institutional buyers from hundreds of Iowa farmers.
- Edited mapping of 50 watersheds for the National Hydrography Dataset for the Iowa Department of Natural Resources with students in the GeoTREE Center.
- Provided project funding and outreach services for recycling and reuse to 5 companies and organizations through the Recycling Reuse Technology Transfer Center (RRTTC).

Advanced Manufacturing and Market Research

- Added 3 new military painter satellite training sites and certified an additional 135 painters through the STAR4D military painter program.
- Provided market research and competitive intelligence to 19 Iowa companies and organizations by Strategic Marketing Services (SMS).
- Conducted research among Iowa businesses for the IEDA to better inform economic assistance and programming related to recent economic conditions by SMS.
- Served 48 Iowa foundries and supply chain companies with custom 3D sand-cast core and mold printing services through the Foundry 4.0 Center.
- Launched a major supply chain resiliency program with the Defense Logistics Agency to enhance the Department of Defense supply chain.
- Hosted nearly 900 visitors to demonstrate additive manufacturing and Manufacturing 4.0 innovations at the Foundry 4.0 Center.
- Received recognition as a national center of excellence by The Smart Manufacturing Institute for the Foundry 4.0 Center's work with advanced sensors.

Section 2. Technology Transfer and Intellectual Property

FY2022	
	UNI
Number of disclosures of intellectual property	12
Number of patent applications filed	2
Number of patents awarded	1
Number of license and option agreements executed on institutional intellectual property	2
Number of license and option agreements yielding income	12
Revenue to Iowa companies as a result of licensed technologies	\$4,300,000
Number of start-up companies formed, in total and in Iowa	98
Number of companies in research parks and incubators	20
Number of <u>new</u> companies in research parks and incubators	8
Number of employees in companies in research parks and incubators	33
Royalties/license fee income	\$35,600
Total sponsored funding	\$46,499,000
Corporate-sponsored funding for research and economic development and revenue generation (excludes corporate philanthropy - all in Iowa)	\$1,267,000
i. Annual appropriations for economic development	\$1,460,740
ii. Regents Innovation Fund	\$900,000

Section 3. Overview of UNI’s Economic Development Programs

UNI outreach services for the community and economic development activities are outlined in a table format on the following four pages. The format provides a brief overview of each program, its purpose, populations served, outcomes from the past year, and some aggregate outcomes. Together, the programs served 3,756 unique businesses and organizations in the past year and another 63,447 individuals through the IASourceLink.com entrepreneurial development system and the Business Concierge.

Section 3. Overview of UNI’s Economic Development Programs (continued)

Services	FY22 Results	Cumulative Results
Advance Iowa (AI)		
<p>Rural/urban consulting program focused on small- and medium-sized existing businesses to provide succession planning, strategic planning, training, peer round tables</p> <p>Serves: Small and medium enterprises (SME)</p>	<ul style="list-style-type: none"> ✓ 102 companies assisted ✓ 21 seminars on succession planning, employee ownership, financial literacy & value building ✓ 19 peer group meetings ✓ Hosted and supported 46 networking and educational events ✓ Service to clients in 23 counties 	<ul style="list-style-type: none"> ✓ Project work with 102 SMEs, impacting 3,672 employees across the state in all quadrants and industries.
Family Business Center (FBC)		
<p>Programs and services for Iowa family-owned businesses including business succession, next-generation leadership development, peer learning and events</p> <p>Serves: Small and medium family-owned enterprises</p>	<ul style="list-style-type: none"> ✓ 5-part seminar series for Family-owned companies ✓ 32 Peer Group Meetings ✓ Annual Conference with 136 attendees ✓ 6 Learning Sessions ✓ Annual Hosted Family Workshop with 84 attendees ✓ Service to clients in 51 counties 	<ul style="list-style-type: none"> ✓ Worked with 143 small- and mid-sized family-owned companies across the state in all quadrants and industries.
Center for Energy and Environmental Education (CEEE)		
<p>Technical assistance, educational programs and leadership in residential energy efficiency services, local food systems, improving community food security and environmental health, and sustainability efforts for K-12 schools</p> <p>Serves: Iowa residents, nonprofit organizations, local governments, school districts, and counties</p>	<ul style="list-style-type: none"> ✓ Secured grants to convene stakeholders across Iowa to develop a statewide plan to strengthen Iowa’s food system ✓ AmeriCorps members installed 62 vegetable gardens for underserved members of our metro community 	<ul style="list-style-type: none"> ✓ Green Iowa AmeriCorps provided energy efficiency services to 7,000+ homes and educated 95,000+ people for 13 years. Completed 5,000+ service projects with 350+ community organizations and 22,000+ volunteers. ✓ 850+ members will have given over 822,500 hours to our communities. The program has leveraged \$23 million+ in support for our state.

Geoinformatics Training, Research, Education and Extension Center (GeoTREE)		
<p>Geospatial technologies, education, research and outreach activities for federal, state, local and tribal agencies</p> <p>Serves: Federal, state, local and tribal governmental agencies</p>	<ul style="list-style-type: none"> ✓ Pre-conflation editing of 50 National Hydrography Dataset for the Iowa Department of Natural Resources ✓ Designed temperature collection instrumentation for urban temperature collection in Iowa 	<ul style="list-style-type: none"> ✓ Project work with public agencies, academic groups/departments and private companies to deliver geospatial data and custom applications. Conducted Iowa focused research.
Institute for Decision Making (IDM)		
<p>Hands-on community and economic development guidance and research</p> <p>Serves: Economic development organizations, chambers commerce, city councils, communities, utilities and others</p>	<ul style="list-style-type: none"> ✓ Assistance and research provided to 84 community organizations, 11 regional development groups, and 36 services providers and utilities ✓ Partnered with the IEDA and Iowa utilities for an analysis of statewide existing industry survey data ✓ Assisted with a fourth statewide COVID-19 impact survey, and a statewide survey of human resource professionals about workforce challenges ✓ Partnered in a statewide Industry 4.0 Partner Consortium 	<ul style="list-style-type: none"> ✓ Served more than 840 communities, counties and groups in all of Iowa's counties to date ✓ Trained more than 1,250 economic development professionals
Iowa Waste Reduction Center (IWRC)		
<p>Free, confidential, non-regulatory environmental and energy efficiency assistance for small businesses, public entities, food waste reduction, and education.</p> <p>Serves: Small businesses in Iowa; food waste generators; military and industrial painters</p>	<ul style="list-style-type: none"> ✓ Detailed one-on-one environmental assistance was provided to 230 Iowa small businesses, including 3 food waste reduction visits and 24 energy efficiency visits ✓ Military painter training was conducted by IWRC staff and at 3 new satellite sites training a total of 135 painters 	<ul style="list-style-type: none"> ✓ Provided detailed assistance or on-site review to 6,570 Iowa small businesses. ✓ Certified 32 Iowa craft breweries. ✓ Provided 4,578 certifications to military painters and DoD contractors.

John Pappajohn Entrepreneurial Center (JPEC) and Small Business Development Center (SBDC)		
<p>Entrepreneurship education, business consulting & training, research, and capital investment programs serving entrepreneurs.</p> <p>Serves: Student entrepreneurs, faculty and staff, small and medium-sized businesses, entrepreneurs, and entrepreneurial service providers</p>	<ul style="list-style-type: none"> ✓ JPEC served 5,847 individuals. ✓ 16 student businesses incubated ✓ 2 cohorts of BBEA served 17 business owners ✓ IA SourceLink (ISL) served 1677 small businesses ✓ ISL website was accessed by 67,000 unique visitors ✓ SBDC served 307 clients. 	<ul style="list-style-type: none"> ✓ Student Business Incubator has provided space to 226+ business owners since FY05 ✓ Since FY13, 3,404 College of Business students have learned about/crafted an elevator pitch ✓ Since FY12, 400,000+ unique users have been served on ISL. ✓ Contributed to the start of 98 businesses
Metal Castings Center (MCC) and Additive Manufacturing Center (AMC)		
<p>Metal casting technologies, applied research, testing, training and manufacturing 4.0 technologies</p> <p>Serves: Iowa casting users, foundries and foundry suppliers</p>	<ul style="list-style-type: none"> ✓ Active contracts with 48 companies, provided outreach projects to 11 Iowa foundries and technical assistance to 50 additional foundries ✓ Conducted DOD-sponsored research into front line manufacturing of cast parts ✓ Conducted projects in Manufacturing 4.0 technologies 	<ul style="list-style-type: none"> ✓ 2,200+ industry-funded projects have been completed to date and more than 100 clients assisted with additive manufacturing and cast metals technology.
Panther Initiative for Environmental Equity and Resilience (PIEER)		
<p>Environmental social justice awareness, education and research</p> <p>Serves: Iowans affected by environmental equity issues</p>	<ul style="list-style-type: none"> ✓ Outreach awareness and education related to environmental social justice to organizations in the Cedar Valley 	<ul style="list-style-type: none"> ✓ Outreach and educational awareness provided to 5 organizations and 800+ individuals this year, including community, UNI and governmental organizations.
Recycling and Reuse Technology Transfer Center (RRTTC)		
<p>Recycling and by-products research, education and outreach</p> <p>Serves: Iowa businesses and citizens, recycling industry</p>	<ul style="list-style-type: none"> ✓ Research project funding and outreach services related to recycling and reuse was provided to 5 companies and organizations 	<ul style="list-style-type: none"> ✓ Over 42 RRTTC-funded research projects and 170 reports and publications available. ✓ Outreach and services provided to 7,000+ people.

Strategic Marketing Services (SMS)		
<p>Market research and analysis</p> <p>Serves: Businesses, entrepreneurs and nonprofit organizations</p>	<ul style="list-style-type: none"> ✓ Market research and analysis services provided to 19 Iowa organizations ✓ Conducted research among Iowa businesses for the IEDA to inform timely economic assistance needs ✓ Conducted research among Iowa human resource professionals for the IEDA to understand workforce experiences 	<ul style="list-style-type: none"> ✓ Since 1990, market research and analysis services have been provided to 329 Iowa companies.
Tallgrass Prairie Center (TPC)		
<p>Coordination of county roadside managers, farmers and agricultural conservation professionals; native seed industry; educational materials on the tallgrass prairie ecosystem; restoration to support recommendations</p> <p>Serves: Iowa county governments, ag technical service providers/buyers, UNI and local educators, community, county conservation boards, and academic researchers</p>	<ul style="list-style-type: none"> ✓ Distributed more than 1,100 acres of native seed for 40 county roadsides ✓ Developed an online “Botany Beginners: Grasses for the Masses” course attracting 210 learners ✓ Produced Iowa-source foundation seed from over 30 ecotypes ✓ Planted 15 acres of the 77-acre Irvine Prairie ✓ Published a list of prairie seed, plant, and service providers to assist watershed coordinators 	<ul style="list-style-type: none"> ✓ More than 50,000 acres of Iowa counties rights-of-way have been planted to native vegetation. ✓ 47 Iowa counties use ecologically integrated management on 500,000 acres of public roadsides. ✓ Public and private land managers have access to 85 species of genetically diverse, source-identified seed including grasses, sedges and many species of wildflowers.

Section 4: Regents Innovation Funding Report

The UNI FY2022 Regents Innovation Funding (RIF) Annual Report (also known as the Skilled Worker and Job Creation Fund) is on file at the University of Northern Iowa and was submitted separately. Projects and outcomes partially supported by the RIF are included in this annual report.

Section 5: Collaborative Projects

Each year, UNI works closely with the other Regent institutions and state and federal agencies on collaborative projects. The following projects represent a sampling of these collaborative projects.

Advance Iowa facilitates partnerships with state agencies and foundations

- Advance Iowa collaborated with the Iowa Rural Development Council to support the challenges faced by enterprises in rural Iowa communities. This includes a focus on succession planning, specifically in the areas of operational improvement and employee ownership.
- Advance Iowa continued the work started with the Kauffman Foundation by partnering with the Governor's Empower Rural Iowa initiative and the IEDA to advance employee ownership as an option to the challenges rural business owners face in identifying qualified buyers and improving employee wealth.

SBDC assists the small business community

- The UNI Small Business Development Center director served as an instructor for the 24/7 BLAC Black Business Entrepreneurship Accelerator (BBEA) Venture School Spring Cohort. Eleven additional Black-owned small businesses participated in this cohort.

Center for Energy and Environmental Education (CEEE) collaborated on projects with ISU and UI

- CEEE collaborates with Volunteer Iowa to host a significant AmeriCorps Program with more than 120 service members serving many Iowa communities, school districts and municipalities.
- CEEE and ISU Extension are working closely, through a planning grant from the Kellogg Foundation, to develop a plan to strengthen Iowa's food system.

The GeoTREE Center worked collaboratively with state agencies and multiple organizations

- The GeoTREE Center works collaboratively on projects with various faculty, students and staff from across the campus including academic departments, the Iowa Governors STEM Advisory Council and many others.
- The GeoTREE Center worked on projects with the Iowa Department of Natural Resources, Iowa Energy Center, Iowa Department of Education, Waterloo Water Works, Black Hawk Soil and Water Conservation District, Vacation Okoboji, Iowa Geographic Information Council, Cedar Trails Partnership, and Iowa Governor's STEM Advisory Council.

Institute for Decision Making (IDM) collaborated with economic development partners

- IDM, in partnership with Strategic Marketing Services (SMS), assisted the BEST of Iowa Management Team. Based on the analysis, SMS and IDM developed the 2021 BEST Annual Report and an executive summary that was provided to the legislature. The findings were used in evaluating and revising the economic development assistance provided to Iowa companies by the state of Iowa, the utilities and economic development organizations around Iowa.
- IDM and SMS assisted IEDA and IWD with a statewide survey of human resource professionals to inform their public policy efforts and programming centered on talent attraction and retention. IDM and SMS presented the survey findings at the Iowa Human Resources Summit sponsored by IEDA and other many other organizations.

Iowa Waste Reduction Center (IWRC) collaborated with state and national partners

- The IWRC has partnered with the Iowa Culinary Institute at Des Moines Area Community College, Drake University Agricultural Law Center, the Iowa Brewer’s Guild, the Iowa Association of Energy Engineers and Odyssey Renewables to bring two events to the greater Des Moines metro area focusing on energy efficiency and reducing food waste.
- The IWRC has partnered with the University of Iowa’s Environmental Policy Research Program to further research the impacts of PFAS and other emerging contaminants while working jointly to develop public education materials raising awareness of the potential impacts of these “forever chemicals.”

John Pappajohn Entrepreneurial Center (JPEC) collaborations benefit students and community

- JPEC staff developed and delivered programming for two cohorts of the Black Business Entrepreneur Accelerator (BBEA), a program of 24/7 BLAC serving 17 Black-owned businesses in the Cedar Valley. The Experiment 529 workshop series provides additional skills to business owners in 10 specific areas including how to build a website, financials, brand awareness, social media presence, eCommerce site, pitch deck, sales funnel and mobile apps.
- JPEC and the IEDA partnered on the IASourceLink program to serve 63,447 Iowans with business information and assistance, and the JPEC provided direct interactions with 1,677 business owners via the Iowa Business Concierge services.

Metal Casting Center (MCC) collaborates with regent institutions and technical organizations

- The MCC collaborated with the University of Iowa Mechanical Engineering department on several projects, the largest of which involves the Defense Logistics Agency and Steel Founders Society of America, integrating additive manufacturing into their operations and supply chain.
- The Foundry 4.0 Center and the Foundry Educational Foundation hosted seven university students from around the country to learn and work in additive manufacturing and applied research projects during the summer semester.

Recycling Reuse Technology Transfer Center (RRTTC) collaborates with area organizations

- The RRTTC has developed a new outreach partnership between Unity Point Health Clinic and the Cedar Falls Lions Club through the new and expanded Parkway Garden and Education Center. This garden has quadrupled its growing capacity this year and added 50 fruit trees and multiple garden beds.
- The RRTTC partnered with Cedar Falls Library, Hearst Center for the Arts, Healthy Cedar Valley Coalition and North Iowa Farm Partnership to organize the Cedar Valley Food and Film Festival.

Strategic Marketing Services (SMS) partners with Iowa organizations.

- The IEDA, IDM and SMS surveyed human resource professionals from businesses and organizations across the state about what they are experiencing and how the businesses and organizations are handling current workforce challenges. The IEDA utilized the study findings to better inform their statewide workforce policy and programs.
- SMS assisted Iowa 4-H in learning general opinions and perceptions of their brand and messaging from parents of children grades 4 through 12 across the state. Two phases of research were conducted. Iowa 4-H utilized the findings in developing a statewide marketing strategy and campaign.

Tallgrass Prairie (TPC) Partners with Iowa universities and associations

- The Prairie on Farms Program provided technical assistance on prairie reconstruction in collaboration with technical services providers like the Iowa State University STRIPS team, Practical Farmers of Iowa, Hertz Farm Management, agricultural landowners and Natural Resources Conservation Service; the Iowa Department of Natural Resources and Iowa Flood Center; and watershed coordinators in eight priority watersheds.
- The Research and Restoration Program supplied the USDA Farm Service Agency with an assessment of the Conservation Reserve Program in eastern Iowa, including enhancement practices for monarch habitats. TPC provides research-based recommendations on seed mix design and CRP implementation as requested by the state NRCS office and the USDA Farm Service Agency.
- The Plant Materials Program hosted a STEM Teacher Extern through the Iowa Governor's STEM Advisory Council and hosted the third Native Seed Stakeholders meeting. Major seed buyers, seed producers, and regulators attended. Collaborators include DNR Prairie Resource Center, USDA North Central Regional Plant Introduction Station, Polk County Conservation and Xerces Society for Invertebrate Conservation.