

IOWA STATE UNIVERSITY

OF SCIENCE AND TECHNOLOGY

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

PRESENTED BY:

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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.

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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.

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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

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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.