

IOWA STATE UNIVERSITY

OF SCIENCE AND TECHNOLOGY

FY24 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
Vice President, Office of Economic Development and Industry Relations
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Iowa State University

Annual Economic Development and Technology Transfer Report – FY2024

As the land-grant institution in the very first state to adopt the Morrill Act, Iowa State University supports the land-grant ideals of putting science, technology, and human creativity to work. Iowa State's Economic Development and Industry Relations (EDIR) team in partnership with Iowa State Extension is focused on innovation and economic prosperity in all 99 Iowa counties.

Economic development is a top priority at Iowa State, and the university is very proud of the impact it has on both the lives of its students and our 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 the 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.

Iowans can count on Iowa State to serve as a trusted resource, using our core strengths— innovation, science-based extension and outreach, and education. Our economic development and innovation efforts have also been recognized nationally and globally. 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:

- Center for Industrial Research and Service (CIRAS)
- Iowa State University Research Park (ISURP)
- Office of Innovation Commercialization (OIC)
- Iowa's Small Business Development Centers (SBDC)
- Pappajohn Center for Entrepreneurship (JPEC)

Iowa State's Economic Development and Industry Relations department is focused on innovation and economic prosperity for all 99 counties in Iowa. It was designed as a one-stop shop for businesses and entrepreneurs who want to work with Iowa State. There are countless ways for businesses, founders, and innovators to engage with Iowa State and the entities in EDIR, and our Iowa State Extension partners are many times the starting point. Our focus in EDIR is on initiating, broadening, and strengthening these interactions into meaningful engagement opportunities across campus for the betterment of the state economy.

We have been recognized both nationally and globally for our work in Economic Development and innovation. Iowa State won the 2023 Innovation and Economic Prosperity Connection Award from the Association of Public and Land-Grant Universities, which is their top award for Economic Development. This is our fifth award from the group in the last seven years, and we were a finalist one other year.

Financially, Iowa State has a major impact on the economy of the state of Iowa. This is backed up by an analysis recently completed of Iowa State University's economic impact on the state of Iowa for the fiscal year ending June 30, 2022.

- Iowa State produced a \$5 billion impact that year.
- Iowa State supports 57,142 jobs – or 1 out of every 36 jobs in Iowa.
- ISU research spending and activities created a net total of \$235.3 million in added income for the state economy.

We are one of the leading research universities in the United States. Last year Iowa State ranked in the top 3% in research funding among all universities that don't have a medical school. Our students benefit from studying at a major research university because the faculty who teach them need to be at the leading edge of their fields and they bring that knowledge back into the classroom. Many of those researchers also get engaged in research projects for industry. Areas where we engage with companies include:

WORKFORCE: Iowa State graduated almost 6,800 students this past academic year, and we provide more graduates who stay in Iowa than any other university in the United States. We work closely with industry to meet their hiring needs and achieve successful placement outcomes for our graduates. Our Career Services and corporate engagement teams partner with businesses to meet their needs by developing internship programs, offering speaking opportunities on campus, engaging with student organizations, and positioning them at our career fairs. Many companies utilize our research park as a training hub and beachhead location to help them retain interns and to serve as a continuing pipeline into recruitment.

RESEARCH: This is the driving force behind economic development at Iowa State. The resources available through the EDIR office allow businesses to access a wide range of researchers and connect with services to help businesses grow and thrive. Multiple businesses have set up innovation and technical scouting offices at our research park for a closer view into the intellectual property being generated both at the university and by our startup community.

Groups like the Translational Artificial Intelligence Consortium at Iowa State are another example of corporate engagement. In addition to hosting events on next generation technologies, businesses can access faculty expertise across the university by engaging directly with our scientific and research community through sponsored research, hiring graduate students, or a variety of other means.

UPSKILL, RESKILL, CONTINUING EDUCATION: Iowa State offers tailored curriculum and programs to upskill, reskill and support leaders with continuing education, such as the Executive MBA program. We also offer a variety of fully online programs for working professionals including masters of Seed Technology and Business; masters of Business Analytics; masters of Engineering Management; and MBA. Iowa State also recently launched fully customized education programs for individual companies to meet their needs. These include both upskill classroom and bootcamp type engagements; content is driven by corporate partners and paired with university faculty.

FACILITIES AND EQUIPMENT: Iowa State also has facilities and equipment available for industry partners to access via a fee for service model. Oftentimes, there are pieces of equipment that are costly to

purchase that a company might only need to use periodically, and those can be accessed for public use. This could include anything from scale up facilities, to field access, to milling and grinding equipment, gene sequencers and more. An example is an Off-Highway Vehicle Chassis Dynamometer for testing of complete highway vehicles.

A closer look at our EDIR organizations and partners follow:

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 leverages five federal funding programs with state and private resources, and has staff and partners located across campus and across the state. 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 it a leading integrator of solutions in Iowa. Over the past five years, CIRAS and its partners have reported impact from companies totaling more than \$3.1 billion and more than 38,000 jobs created or retained because of the assistance they received.

CIRAS FY24 HIGHLIGHTS: Last year, 2,015 businesses from 99 counties in the state received assistance on projects or attended educational workshops from CIRAS staff or partners.

Dobson Pipe Organ Builders, a world-renowned Lake City manufacturer of high-quality pipe organs lost their facility to a fire in 2021. “The minute I reached out to Derek [Thompson, CIRAS Strategic Advisor], I felt such a weight off my shoulders,” said Deanna Hoeg-Ryan, Dobson’s business manager. “He told me, ‘We’ve got this, and we will help you.’” CIRAS has supported the recovery in a variety of ways including strategic planning support, forensic accounting, lean manufacturing implementation, and connections to financial support through the Iowa Economic Development Authority’s Manufacturing 4.0 Technology Investment Grant program and the Iowa Area Development Group’s low interest loan programs. Dobson’s new factory in Lake City is nearing completion.

In partnership with the Iowa SBDC and CIRAS, Senator Joni Ernst hosted the Senator Ernst’s Entrepreneur Expo in Ames on September 22, 2023. This event connected Iowa’s small businesses with procurement and technology decision-makers from Washington, D.C. Attendees gained insights into government contracting and innovation programs. The CIRAS APEX Accelerator team contributed to panel discussions, workshops, and networking. The second annual event was held August 6, 2024.

Agri-Industrial Plastics in Fairfield maximized its Iowa Lean Consortium membership through participation in the Continuous Improvement Cohort pilot group. Chris Meyers, director of Quality & Continuous Improvement, stated, “We gained valuable connections and learned from speakers about the impact of continuous improvement. We look forward to sharing Agri-Plastics’ implemented ideas.”

Dickson Industries, a Des Moines-based producer of custom food packaging and textiles, had the potential to increase its sales. “We were looking at automation of some tasks, not because we wanted to replace workers but because we wanted to supplement what they were doing,” said President David Dickson. CIRAS was able to provide the expertise needed to perform detailed task analysis and help Dickson vet vendors and estimate equipment pricing and the impact on the company’s immediate business and long-term goals. The project included automating the fabric cutting and movement through

the process with numerous sensors to help manage the process. These changes will allow the current operator to manage multiple systems, freeing capacity for growth.

The Metrix Co. of Dubuque partnered with Northeast Iowa Community College and CIRAS for strategic guidance and coaching, resulting in a united management team actively pursuing the company's vision. Metrix anticipates a financial impact of more than \$500,000. CEO Dan Schoen acknowledges, "Thanks to our partnership with CIRAS, our leadership team is now efficient, collaborative, and results oriented."

Varsity Group of Urbandale sought SAM.gov assistance from CIRAS, securing a \$25,000 government contract. Kevin Moreland, marketing specialist, praises CIRAS for simplifying the process and being readily available, stating, "CIRAS comes with our highest recommendation."

Demco, in Boyden, has collaborated with CIRAS and Iowa State University since 2018 on capstone projects. In 2023, they recruited students at the Iowa State Engineering career fair, crediting their success to collaboration with CIRAS. Chris Dailey, manufacturing engineer, emphasized early student engagement, praising CIRAS for enabling valuable experimentation in small businesses.

The Iowa State University Research Park (ISURP) provides a resource-rich environment where innovators flourish. ISURP is a bricks and mortar real estate development, but its value to its tenants, Iowa State, and the Iowa economy lies in its concierge-style engagement for tenants with the university and the seamless coordination it offers tenant partners. This includes proximity and easy access to Iowa State for both start-ups and established companies that range from growing entrepreneurial ventures to global corporations. Tenants can seamlessly access Iowa State's vast array of workforce with customized solutions, the research enterprise, equipment and more, and the proximity to the university is a differentiator for retention and conversion of talent and innovation. ISURP offers 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.

ISURP FY23 HIGHLIGHTS: Fiscal year 2023-2024 has been a remarkable period for the ISU Research Park (ISURP), marked by significant achievements and milestones that have further solidified our position as one of the nation's leading innovation campus. This year, it has continued to foster a dynamic environment that supports the growth and success of our tenant companies, researchers, and the broader community through its holistic engagement model.

One of the standout highlights of this fiscal year has been the expansion of its facilities. A new building for PivotBio was completed in December 2023 and the Alliant Ag Innovation Lab will be completed in December 2024. These two buildings add 120,000 square feet to ISURP expanding it by 15%. This expansion has enabled us to accommodate an additional 24 tenant companies bringing the total number of tenants to 146. We've also added talent hub locations for several rural based Iowa manufacturing companies including Mason City based Curries.

Our commitment to fostering innovation and collaboration has been evident through the numerous events and programs hosted at ISURP. This year, it organized nearly 30 events, including workshops, seminars, and networking sessions, attracting more than 1,000 participants. These events have provided valuable opportunities for knowledge exchange, skill development, and partnership building.

In terms of economic impact, ISURP has continued to be a significant contributor to the local and state economy. Its tenant companies have collectively generated hundreds of millions in state revenue and created more than 1,000 high-quality jobs. Additionally, we have seen a substantial increase in research and development activities, with over \$100 million invested in R&D projects.

Looking ahead, we are excited about the prospects for ISURP. It has begun work on its first housing initiative, which will provide 125 critical housing units for tenant employees, and three additional mixed-use structures that will provide additional tenant, living and retail spaces. It has also broken ground on a 30,000 square foot facility for Strand Engineering, which will provide a pipeline to the company for civil and environmental engineering talent from Iowa State. These initiatives will further enhance its ability to support the growth and success of its tenant companies and contribute to the overall economic development of the region.

Additionally, its pipeline remains full. Currently ISURP has three large projects in its development pipeline that would bring more than 300 jobs to its market and more than \$100M in capital investment in hard infrastructure.

In conclusion, the fiscal year 2023-2024 has been a year of growth, innovation, and impact for ISU Research Park. We are proud of our achievements and look forward to continuing our mission of fostering innovation, collaboration, and economic development in the years to come.

The Office of Innovation Commercialization (OIC) serves the Iowa State University community and the state of Iowa by commercializing intellectual property resulting from the research activities 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). Both established and startup companies benefit from licensing intellectual property rights from ISURF by creating new products, decreasing manufacturing costs, improving revenue streams, and increasing market share.

OIC FY24 HIGHLIGHTS: Iowa State University researchers submitted 101 intellectual property disclosures (not including datasets) and ISURF filed 129 patent applications. In calendar year 2023, Iowa State was recognized for having 49 issued U.S. utility patents, ranking 42nd of the top 100 U.S. universities and 64th of the top 100 worldwide universities granted U.S. utility patents by the National Academy of Inventors.

In FY24, Iowa State was awarded 64 U.S. utility patents and an additional 15 patents from foreign countries for an overall total of 79. ISURF executed 25 license and option agreements for ISU technologies in FY24, 13 of which were with Iowa companies. ISURF currently has 111 license and option agreement which are yielding income. Iowa companies reported \$3.6 million of revenues from ISU-licensed technologies in calendar year 2023, and five startup companies were formed during that time period to commercialize ISU technologies. Global sales of licensed technologies exceeded \$133 million. ISURF has been self-supported since 1992 through returns on its licensed technology portfolio; in addition, ISURF has returned over \$7.8 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 net earnings

exceeding 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 non-disclosure agreements and material transfer agreements for Iowa State University. In FY24, OIPTT handled more than 1000 agreements.

Researchers at the Nanovaccine Institute at ISU have developed a revolutionary delivery method for flu immunogens involving nanoparticles that are approximately 300 billionths of a meter in diameter. Temperature stable, relieving the need that many vaccines have for cold chain storage and transportation, this technology has the potential to transform annual flu vaccinations from intramuscular injection to a sniff of a nasal spray. A new startup company has been formed and entered into an option agreement with ISURF to commercialize this technology.

Iowa State University researchers at the BioEconomy Institute have developed a high throughput method to pyrolyze biomass to produce a variety of products including biochar as a soil amendment and slow-release fertilizer as well as pyrolysis oil that can be upgraded to be used as a fuel. Members of that research team have formed a startup company to commercialize modular pyrolysis systems that will be mass manufacturable and easily deployable throughout the U.S. ISURF entered into a license agreement with the startup and is working with them to explore other applications.

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.

SBDC FY24 HIGHLIGHTS: Iowa's Small Business Development Center supports thousands of businesses every year across many different industries. In State fiscal year 2024, the Small Business Development Center (SBDC) supported 5,017 companies across Iowa-- a minimum of five distinct clients in every Iowa county.

SBDC helps businesses in a variety of ways, including business planning, customer discovery, cash flow projections, financial analysis, loan proposal/capital request assistance, business growth strategies, marketing strategies, startup assistance, export assistance, and market research. The 5,017 businesses supported by SBDC accounted for \$56,121,294 in new capital totaling 459 capital events and an increase of \$108 million in sales, including the creation of 1,202 jobs and 156 business starts.

SBDC also awards two Entrepreneur of the Year prizes. Melissa Fabian, Owner, Simply Nourished Market & Mercantile is the Deb Dalziel Woman Entrepreneur of the Year Award. Melissa has established an extraordinary local and specialty food market. She ensures that Simply Nourished primarily sources its products from local businesses in an effort to build community morale and support. She is constantly showing her thoughtfulness and admiration for her community. Melissa is the pinnacle of what it means to be a small business owner in Iowa.

The Neal Smith Entrepreneur of the Year Award honors an Iowa entrepreneur and the 2024 award winner is Dustin Rhoades, Owner, Ability Tech, a company focused upon creating adaptive technology solutions for individuals with disabilities. Dustin and his team of creative engineers have been creating custom adaptive technology for individuals with disabilities for the past 5 years. Dustin, Shanna, and kids have been working closely together as a family to make sure that their projects are personalized to meet each client's individual's needs. Dustin is dedicated to pioneering and producing adaptive technology tailored for individuals with disabilities in Sioux City and the surrounding areas. He exemplifies entrepreneurship, prioritizing quality, community investment, and involvement. Dustin serves as a community advocate and mentor, contributing significantly to the well-being of Sioux City while being a beacon of hope for all.

The Pappajohn Center for Entrepreneurship (JPEC) serves entrepreneurs on campus and in the community, providing entrepreneurial opportunities, including a statewide tech startup incubator, student accelerator, statewide and local business plan and pitch competitions, and participating in university-wide academic programs in entrepreneurship ranging from a cross-campus minor to a PhD program in entrepreneurship. JPEC has locations in ISURP and on campus in the Student Innovation Center. Flagship programs include the Iowa State Startup Factory incubator, CYstarters student accelerator, and CyBIZ Lab student consulting program.

JPEC FY24 HIGHLIGHTS: Iowa State's entrepreneurship programs have received a number of accolades in the past few years, validating its work to inspire entrepreneurship and innovation on and around campus. Iowa State remains one of the top undergraduate entrepreneurship programs in the nation as rated by the Princeton Review (#12 in 2024, #11 in 2023, 2022, and 2021). The U.S. Association for Small Business and Entrepreneurship (USASBE) awarded the program two of its top awards, USASBE Model Program (2021) and USASBE Model University Accelerator (2024). The Accreditation Council of Entrepreneurial and Engaged Universities (ACEEU) awarded Iowa State the prestigious Entrepreneurial University of the Year award (2023) and runner up Entrepreneurial Initiative of the Year (2024). The Pappajohn Center for Entrepreneurship was awarded the Global Consortium of Entrepreneurship Centers (GCEC) Nasdaq Center for Entrepreneurial Excellence Award in 2022, the organization's highest and most respected designation.

In 2023-24, the Iowa State Pappajohn Center and local Small Business Development Centers served 1,738 clients, delivering 6,545 hours of mentoring, which was responsible for 129 new ventures, 234 new jobs, and resulted in nearly \$13.4M in capital raised.

The ISU Pappajohn Center touched more than 4,600 people through its programs, workshops, competitions, and student programs (not including academic courses). More than \$245,000 was awarded to young entrepreneurs, including \$61,000 in national prize awards that helped seed new startups. Programs focus on pitching, business model canvas, food insecurity, innovation, and other topics. The Center also connects entrepreneurs to professional service providers.

With a broad-reaching academic program and close to 100 courses with an entrepreneurship focus or component across all six undergraduate colleges, more than 14,000 students took entrepreneurship courses in the past academic year. The Ivy College of Business reported 165 entrepreneurship majors,

an additional 38 students with a double major including entrepreneurship, and 161 students have pursued the minor in entrepreneurship. Many of these students participate in the Pappajohn Center's co-curricular programming opportunities or are involved in student organizations focused on entrepreneurship.

CyBIZ Lab, our interdisciplinary student consulting agency, served 48 companies and employed 65 students this year. CyBIZ Lab, which recently celebrated its 10th anniversary, provides the opportunity for cross-functional teams of undergraduate and graduate students to work on fee-based business and organizational projects. It also gives founders, entrepreneurs, and businesses a chance to solve a business problem, while working alongside student consultants. CyBIZ partners with ISU economic development to provide market validation services that support tech faculty intending to commercialize their discoveries.

Iowa State Startup Factory is a startup incubator helping researchers and inventors develop a roadmap to realize the societal and economic impact of their high-tech innovations. In FY24, Iowa State Startup Factory served 21 companies (32 participants) that attracted \$5.4M in capital. Since its inception in 2016, 137 companies have completed the program, 147 jobs have been created by those companies. The startups have self-reported \$27.6M in dilutive and non-dilutive funding raised in 2023-24, and \$98M total since 2016. Program staff and Entrepreneurs-in-Residence (EIRs) contributed just shy of 1,000 hours of individual mentoring support to companies as part of the Venture Mentoring Service, an MIT-modeled program focused on team-based mentorship for startup founders and entrepreneurs. Iowa State Startup Factory's footprint extends beyond Iowa, with collaborations in Kenyatta University in Kenya.

When Iowa State Startup Factory companies complete the program, they are oftentimes not mature enough to seek external investment. Iowa Go-To-Market (G2M), a partnership between BioConnect Iowa, the Iowa State University Startup Factory, and VentureNet Iowa, provides follow-on support for Iowa entrepreneurs who are developing technology-driven innovative products or services and need additional support to increase their livelihood of commercial success. In 2023-24, G2M served 5 companies (9 participants) that received \$1.19M in new funding. Program staff and the G2M EIRs contributed close to 700 hours of individual mentoring to participating companies.

CYstarters is an 11-week summer accelerator for Iowa State students or recent graduates to focus on their startup or business idea. In August, the summer accelerator completed its annual 11-week immersive training program for 14 student ventures (17 participants). Staff and professional service providers in the community contributed more than 200 hours of individual mentoring to program participants. An additional 33 professionals, alumni, and peer mentors volunteered time supporting the student ventures.

RESEARCH

For the second consecutive year, Iowa State University received more than \$300 million and established a new record for **external sponsored research funding**. The [\\$346.2 million received](#) during the 2024 fiscal year is an increase of \$44.9 million or 14.9% compared to the previous record of \$301.3 million set in FY23.

The new total research funding benchmark was achieved through new record levels of both federal and non-federal research funding: \$236.3 million and just under \$110 million, respectively. The \$236.3 million eclipsed the previous record of \$206.9 million set in FY23 by \$29.4 million or 14.2%, while the non-federal research funding amount of nearly \$110 million surpassed the previous record of \$94.5 million, also set in FY23, by \$15.5 million or \$16.4%. **Total external funding** for the university closed at [\\$544.6 million for FY24](#), up \$14.1 million or 2.7% from the \$530.5 million received in FY23.

Here are just four notable new projects that received initial funding in FY24:

- Partha Sarkar, a professor of aerospace engineering, will lead a national team that's designing and planning [a center that will study windstorms](#) and their effects on buildings and infrastructure. The goal is to engineer improvements that reduce structural damage. The [National Science Foundation](#) is supporting the effort with a four-year, \$14 million grant.
- Ajay Nair, professor and chair of horticulture, is leading a multidisciplinary study of [agrivoltaics](#) that's using solar farms to harvest energy and crops. Researchers are raising bees and growing vegetables, fruits, and pollinator habitat within the 10-acre [Alliant Energy Solar Farm at Iowa State University](#). The [U.S. Department of Energy](#) is supporting the project with a four-year, \$1.8 million grant.
- Lisa Schulte Moore – a professor of natural resource ecology and management, a co-director of Iowa State's Bioeconomy Institute and a 2021 MacArthur Fellow – is the Iowa State leader of a project encouraging more farmers to plant cover crops and perennial prairie grass. A potential incentive is demonstrating how harvested winter-hardy crops and grass can be processed into [renewable natural gas](#). [Roeslein Alternative Energy](#), an industry partner based in St. Louis, is supporting Iowa State's studies with an award of nearly \$10.6 million.
- Manimaran Govindarasu, an Anson Marston Distinguished Professor in Engineering and the Murray J. and Ruth M. Harpole Professor in Electrical and Computer Engineering, is leading the work to create a new [cybersecurity center](#) based at Iowa State that will protect wind and solar farms and local microgrids from cyberattacks. The U.S. Department of Energy is supporting the project with a two-year, \$2.5 million grant.

BIOSCIENCES-BASED INITIATIVES Iowa State continues to expand the impact of the university's Biosciences-focused Innovation Ecosystems with Iowa Legislature support, and in partnership with [BioConnect Iowa](#). The legislature allocated \$2.96M for FY24 to support Iowa State's research and development efforts across three Biosciences platforms: Biobased Products; Digital and Precision Agriculture; and Vaccines, Diagnostics, and Immunotherapeutics.

The state's investment has resulted in platform dollars being invested in a variety of ways to create additional opportunities in each targeted area including leveraging funds to win federal research and development awards, providing seed funds to university startups for scale up opportunities, and the purchase of shared equipment to support research and entrepreneurial scale up. Some outcomes

include:

- ISU received more than \$30 million in grant awards in the Biobased Products area in 2023, including:
 - A five-year \$20M NSF EPSCOR award that includes funding for biomaterials research initiatives;
 - A \$2.0 million NSF award for the conversion of natural gas and biomass to hydrogen and performance carbons; and
 - A \$1.8M DOE award for the development of microbial organisms and fermentation processes for the production of bioproducts.
- SoilSerdem and EnGeniousAg, two Iowa-based innovation-driven companies advised by the Digital and Precision Agriculture platform, were each awarded \$1-million NSF Phase II SBIR grants. In addition, ISU researchers leveraged a breakthrough from a previous platform seed-funded project to obtain a \$300,000 award from USDA-AFRI.
- The Vaccines, Diagnostics and Immunotherapeutics platform facilitated more than \$950,000 in external funding from a spectrum of companies ranging from smaller startups (Genevax, MAZEN) to global multi-nationals (Boehringer, MERCK, CEVA). In May 2024, the platform also supported **NANOVAX 2024** . . . *Manufacturing, Distribution, Deployment, and Regulation*, a global meeting on advanced technology with a focus on regulation and manufacturing.

IOWA STATE EXTENSION AND OUTREACH spurs economic development across the state through its Agriculture and Natural Resources, Community and Economic Development, Human Sciences, and 4-H Youth Development programs.

With agricultural commodity prices and profits declining, farmers are looking to boost productivity by optimizing the technology they rely on. For the past three years, **Planter University** has taught more than 600 farmers and ag industry professionals how to improve planter efficiency and increase profits during the growing season. With a sample of participants reporting value of greater than \$5 per acre gained from the workshop, the estimated economic impact of Planter University tops \$2.6 million. Funding from the Skilled Worker Job Creation Fund, which was part of the 2023 statehouse funding, has enabled Planter University to expand. Pilot programs for drone workshops have been launched in 2024 and Combine University is scheduled to launch in 2025.

The **Rural Housing Readiness Assessment program**, led by ISU Extension and Outreach, is making a significant difference in addressing critical housing challenges facing Iowa's rural communities. Since its launch in 2020, the program has empowered 60 communities to create actionable plans for improving their housing stock and leveraged \$360,000 in initial grant investment from the Iowa Economic Development Authority. Communities are reporting impressive results, including new housing construction, neighborhood revitalization, and increased access to affordable housing. For example, for Newton, Grinnell, Nevada, Keokuk, Creston, Rock Valley, and Emmetsburg, a combined, conservative estimate of housing value added is \$86 million, with planned housing development in these communities totaling an additional \$85 million.

A Louisa County 4-H club conducted an energy audit that ultimately led to a solar panel installation for their school, which is projected to provide nearly \$1.5 million in life-time energy savings for their school district. Their effort involved collaborating with industry leaders and high school tech mentors and

pitching their proposal to the school board. This **youth-led innovation** inspired the City of Wapello to install solar panels on 10 facilities, generating another \$1.6 million in projected energy savings over the next 30 years.

ISU Extension and Outreach continues to provide **vital workforce training across Iowa**. More than 9,500 educational contacts occurred via private pesticide applicator trainings in which participants improved their ability to safely use pesticides across Iowa’s farm fields. In Iowa’s food service industry, more than 1,600 food service managers and employees participated in ServSafe® classes, gaining the knowledge they need to protect the public from foodborne illness. In FY24, 139,140 childcare teachers and home providers participated in professional development, increasing their understanding of child development, early learning, managing children’s behavior, nutrition, and health and safety practices. Extension’s Municipal Professionals Institute and Academy improve the efficiency of municipal governments: in Federal FY23, 405 municipal professionals received training in new laws, programs, and technology.

Through the **Volunteer Income Tax Assistance program**, Human Sciences extension specialists trained and supported 128 community volunteers who completed IRS certification and then provided free tax preparation to qualified individuals with low or moderate income. With county extension administrative support at 30 locations across the state, the volunteers assisted 2,929 Iowans, saving them a total of \$593,120 on tax preparation fees. The volunteers also helped 463 of these Iowans access their Earned Income Tax Credits, resulting in an estimated benefit of more than \$1.4 million to Iowa communities.

Summary of ISU Economic Development and Innovation Data	
a. Number of disclosures of intellectual property (excluding data sets)	101
b. Number of patent applications filed	129
c. Number of patents awarded: U.S. issued patents	64
Foreign patents	15
Total issued patents	79
d. Number of license and option agreements executed on institutional technologies: in total	25
in Iowa	13
e. Number of license and option agreements yielding income	111
f. Revenue to Iowa companies as a result of licensed technology (CY23)	\$3.6M

g. Number of startup companies formed (through licensing activities)	
in total	5
in Iowa	5
h. Number of companies in research park and incubators	146
pre-incubator companies private	29
university related	22
i. Number of new companies in research park and incubators	24
pre-incubator companies private	48
university related	0
j. Number of employees in companies in research park and incubators	2651
k. Royalties and license fee income	\$3.0 million
l. Total sponsored funding received	\$544.6 million
How much of this is for research	\$346.2 million
m. Corporate sponsored funding received for research and economic development: in total	\$70.5 million
in Iowa	\$19.4 million
n. Iowa appropriations for economic development, in total	\$3.473 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, FY24):	\$319.9 million

p. Licenses and options executed per \$10 million research expenditures (2022 AUTM Survey)	0.8
q. Sales of licensed products by Iowa-based companies (CY23)	\$3.6 million

Regents Innovation Funding (RIF) supports both entrepreneurial infrastructure as well as faculty founders. Nearly half of the Economic Development & Industry Relations RIF funding supports the Innovation Acceleration Fund (IAF), a highly competitive program that awards grants up to \$50,000 to ISU faculty working on marketable research discoveries across campus. A summary of this year's grant projects is provided below.

Summary of FY24 RIF Commercialization Program Projects

Principal Investigator	FY23 RIF Commercialization Program Projects (\$447,720 of \$1,050,000 RIF Allocation)	Award Amount
Dr. Nicole Hashemi (Mechanical Engineering)	Demonstrate scale-up and effective performance of novel BBB (blood-brain-barrier) technology, as well as validate the technical and economic performance with the goal of advancing treatments for neurological disorders such as Parkinson's Disease.	\$50,000
Dr. Eric Cochran (Chemical and Biological Engineering)	Development of a new formulation of a soybean oil-based polymer system originally used as an asphalt modifier. Successfully eliminated the use of the plasticizer component, replacing it with non-VOC curable solvents.	\$50,000
Dr. Greg Curtzweiler (Food Science and Human Nutrition)	Determine the cost and environmental impact of manufacturing encapsulated prebiotic for chicken gut inflammation mitigation. Upon scaling up production, we observe a substantial increase in both capital investment and revenue. While operating costs rise, they do so at a slower pace compared to revenue, indicating potential economies of scale.	\$50,000
Dr. Tannon Daugaard and Dr. Ryan Smith (Bioeconomy Institute)	Project focused on identifying potential feedstocks and suppliers of the feedstocks for conversion in autothermal pyrolysis, as well as making MVPs from the process. Project allowed for "real world" feedstocks through autothermal pyrolysis and focused on commercial strategies not typically evaluated through an academic lens. We found it makes the commercial sense to focus on one or two of the MVPs, e.g. phenolic oil and biochar.	\$48,773
Dr. Shang Jiang (Materials Science Engineering)	Synthesis and formulation of nanoinks for advanced manufacturing of electronics. Achieved two primary objectives. First, scaled up reaction to 1-liter reactor. Second, developed a bending test to assess the flexibility of printed patterns using nanoinks. Created a new nanowire synthesis, for which we filed a patent disclosure.	\$50,000

<p>Rui Li (Apparel, Events & Hospitality Management)</p>	<p>Conducted a series of smoke generation and fabric exposure experiments to investigate mechanisms by which fine and ultrafine smoke particles interact with porous textile structures. Findings revealed particles form through physical bonding of chemical constituents, such as polycyclic aromatic hydrocarbons, into stacked clusters via dispersive or van der Waals forces. We propose applying a charged surface treatment through chemical plating to prevent particle deposition and clustering. Findings will support SBIR proposal to further explore countermeasures for PPE contamination and effective decontamination.</p>	<p>\$50,000</p>
<p>Dr. Jared Anderson (Chemistry)</p>	<p>Develop supports based on magnetic ionic liquids that can be employed to accelerate the extraction/capture of DNA and concentration of E.coli bacterial cells. A total of 17 different ion-tagged oligonucleotide (ITO) probes were synthesized and their loading measured two different magnetic ionic liquids (MIL). Commercialization of this technology is being expanded towards the analysis of bacteria and viruses from foods, where this technology can achieve high capture of low copy number nucleic acids from highly complex samples.</p>	<p>\$50,000</p>
<p>Dr. Aaron Sadow (Chemistry)</p>	<p>Develop commercialization pathway for synthesis of diesel from plastic waster. Identified initial customers for piloting and testing MFP – sustainable diesel. Initiated fundraising round and secured interest from customers for additional end uses of product, including kerosene and processing fluid.</p>	<p>\$50,000</p>
<p>Dr. Siddique Abbobucker (Agronomy)</p>	<p>Doubled haploid (DH) technology can accelerate plant breeding by reducing the time needed to produce pure breeding lines in two generation vs. greater than six generations in conventional breeding. Discovered a mutation in a single gene called parallel spindle (ps1) restoring HMF in Arabidopsis and maize. Project goal is to incorporate ps1 mutation into relevant maize germplasm, while maintaining most of the genetics of the relevant maize germplasm for potential licensing to breeding companies.</p>	<p>\$48947</p>