IOWA STATE UNIVERSITY

Economic Development and Industry Relations

Building Our Innovation Ecosystem in Iowa

Economic Development Appropriations Subcommittee

January 25, 2023

PETER K. DORHOUT

Vice President for Research Iowa State University

LISA SHIMKAT

America's SBDC Iowa State Director

Innovation Ecosystem

Brings jobs and capital to Iowa to invest in Iowa

Faculty
Students
Staff
Collaborators
Community
Extension

Talent

Place

Ames
Facilities
Programs
Student Innovation Center
Research Park
Ames Lab

To have impact through innovation…

Research

…create a University and community of systematic change-making.

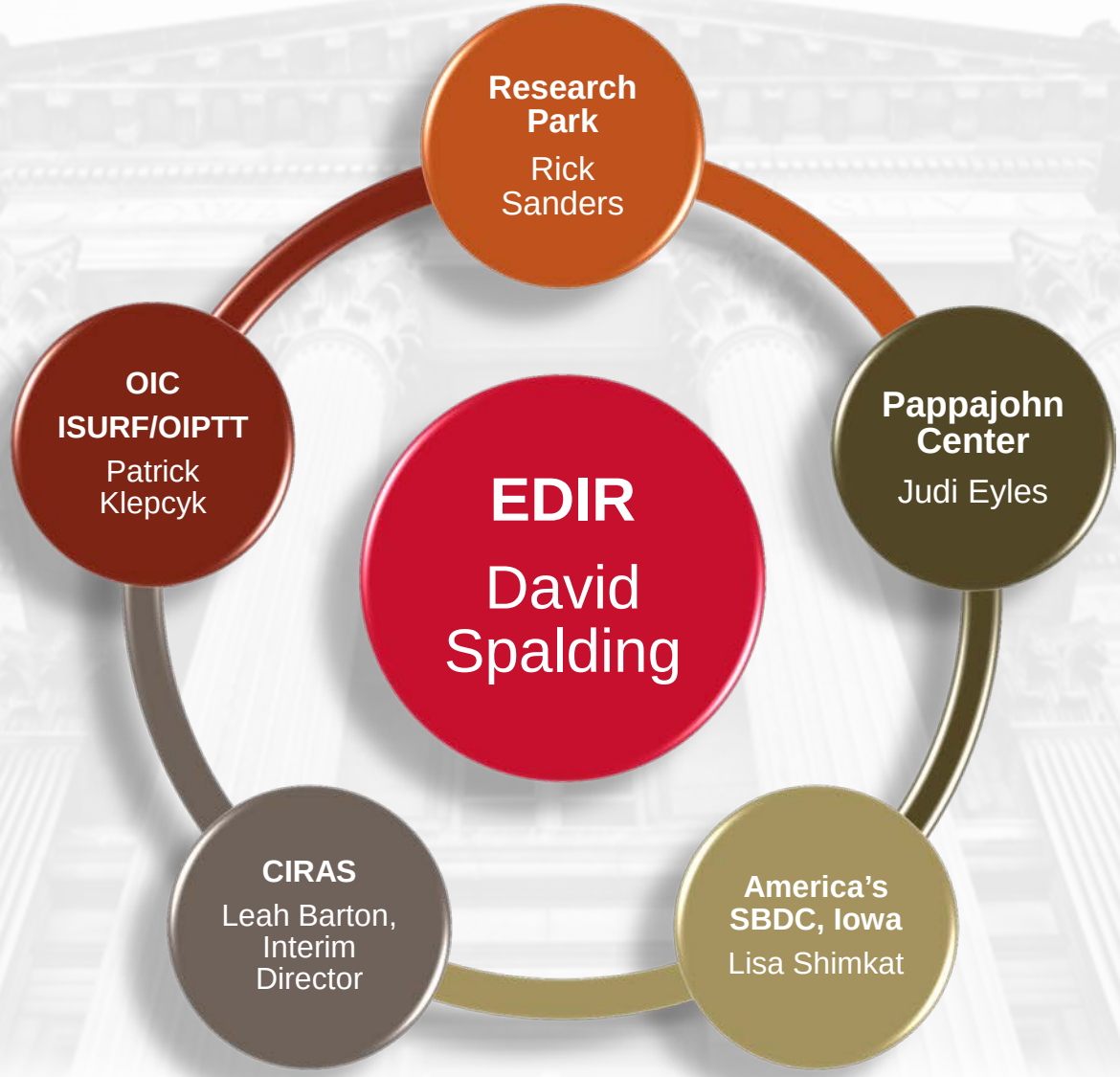
IOWA STATE UNIVERSITY

Economic Development and Industry Relations

DRIVING ECONOMIC GROWTH AND OPPORTUNITY IN IOWA

LISA SHIMKAT

America's SBDC Iowa State Director


Research Park
Rick Sanders
Pappajohn Center
Judi Eyles
America's SBDC, Iowa
Lisa Shimkat
CIRAS
Leah Barton, Interim Director
OIC
ISURF/OIPTT
Patrick Klepcyk
EDIR
David Spalding

APLU Innovation & Economic Prosperity University Designee

Innovation & Economic Prosperity University awards go to APLU member universities that demonstrate excellence and leadership in planning, implementing, and evaluating programs and initiatives that support regional economic development and engagement. Institutions are only eligible to apply for IEP Awards once they have earned the IEP University designation.

Iowa State has had an IEP University designation since 2016.

IEP Awards:

2022 – Innovation Award Winner
2021 – Place Award Winner
2020 – Innovation Award Winner
2018 – Innovation Award Finalist
2017 – Talent Award Winner

America's Small Business Development Center Iowa

15 regional centers across the state and serves all 99 Iowa counties

Rural Business Innovators brings tech expertise to rural communities

Helps to start new companies

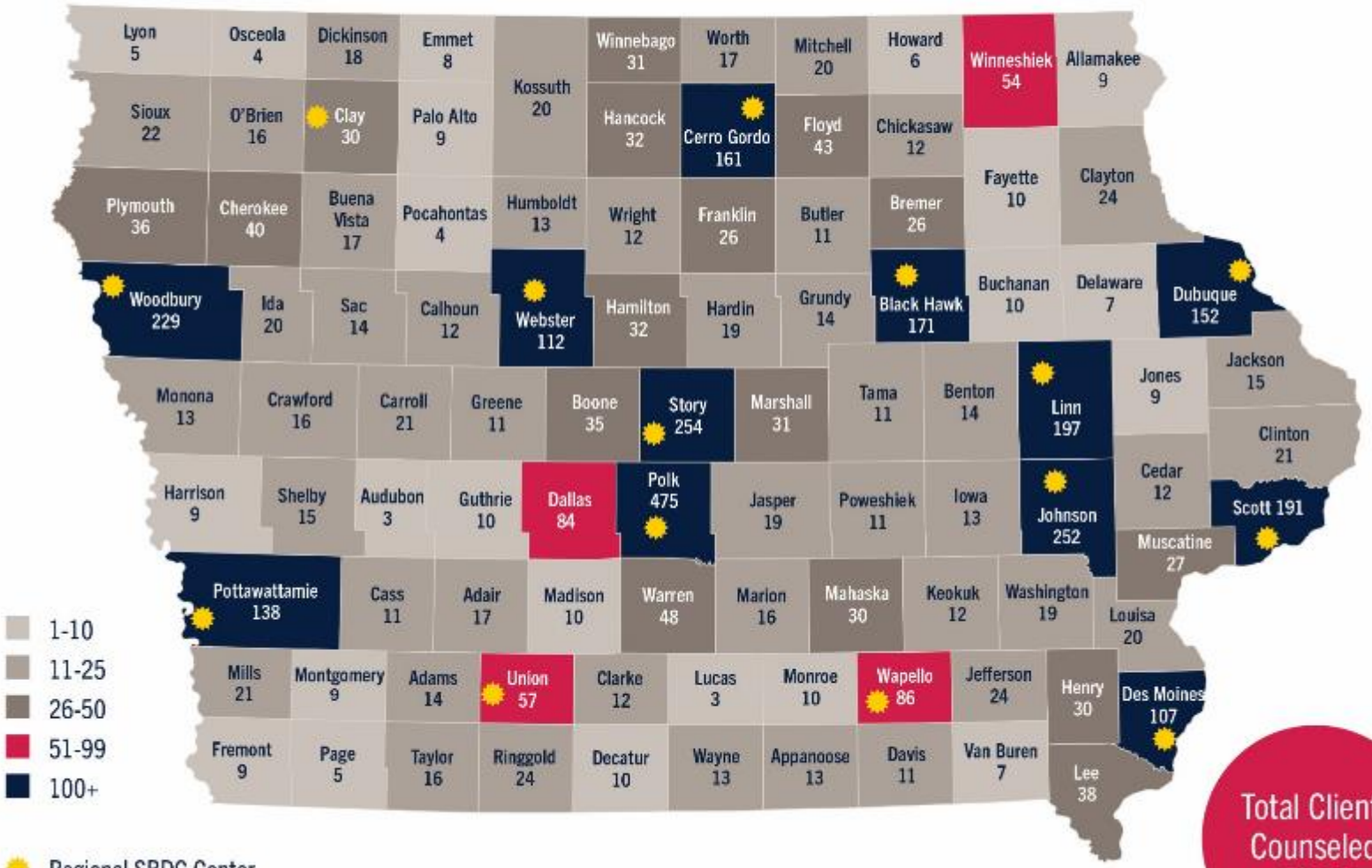
Provides business services/counsel to existing companies to:

- **Solve management problems**
- **Improve operations**
- **Seek financing**
- **Pursue new opportunities**

Impact of State Funding

State funding accounts for nearly 50% of program dollars.
Federal funding requires a 1:1 match, half of which must be in cash.

America's SBDC Iowa – Clients Counseled FY22



*An additional 80 clients were also seen from other states.

Total Clients Counseled 4,217

Case study: Rural Business Innovators

RURAL BUSINESS INNOVATORS™

- The Rural Business Innovators program provides customized one-on-one counseling and group training to help rural, tech/innovation entrepreneurs develop their business ideas and create wealth in rural Iowa

Current RBI Client's Hometowns

- Garrison, IA
- Weldon, IA
- Fort Dodge, IA
- Shannon City, IS
- Creston, IA
- Chariton, IA
- Sioux City, IA
- Tabor, IA
- Ames, IA
- Lamoni, IA
- Fairfield, IA
- Red Oak, IA
- Afton, IA
- Bode, IA
- Leon, IA
- Spencer, IA
- Chariton, IA

METRICS AND FEEDBACK

"The RBI program was amazing!!! Ethan and Ray are very helpful."

"Thank you for assisting us with the POCR and REV applications! We are hoping we have success and land funding that will get us closer to development and revenue."

"RBI has been instrumental for (us) and has been a great experience from A-Z. Another thing we are thankful for is they are willing to continue working with us and stay engaged after the program"

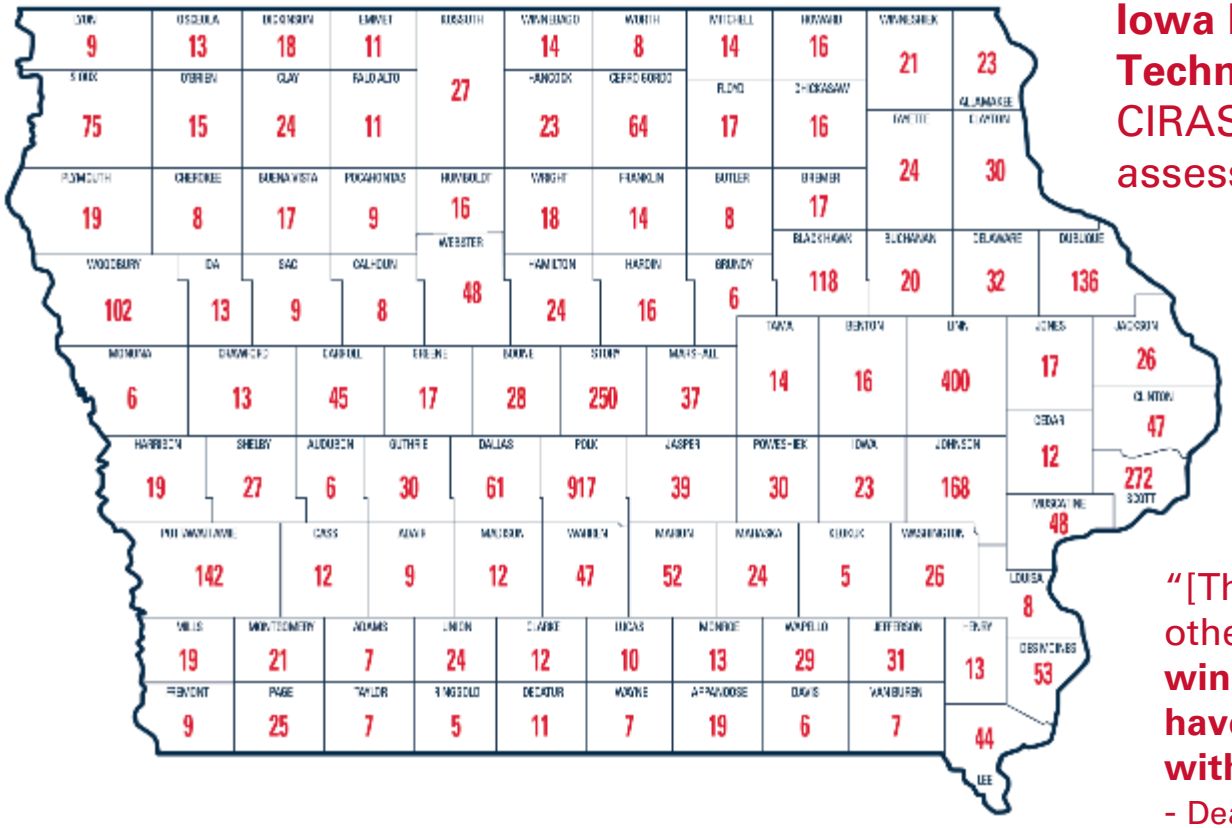
"Ethan was amazing! He was accessible and all-in to help with anything and everything we worked on, from the beginning to the end. Ray is amazing as well. They have a ton of knowledge and are great to work with and truly care, and we are very thankful."

Center for Industrial Research and Service (CIRAS)

- Services, counseling, and training for Iowa businesses
- Focus on small- to medium-sized enterprises (SMEs)
- Manages Technology Assistance Program - Iowa Legislature Economic Development Committee
- Typical client achieves a 200% ROI – $2 return for every $1 invested

CIRAS: Impacting Iowans in 99 counties

Distinct Clients Served Last 5 Years



Iowa Manufacturing 4.0 Technology Investment Grants

CIRAS conducted 230 on-site assessments leading to:

$7M total funding to manufacturers

$70M manufacturer-reported results to date

"[The Cobot] freed up workers to do other, higher-level tasks. **It's been a real win-win for us. To be honest, we would have never purchased it at this point without the grant** "

- Dean Sonquist, Plas-TechTooling, *Hancock County*

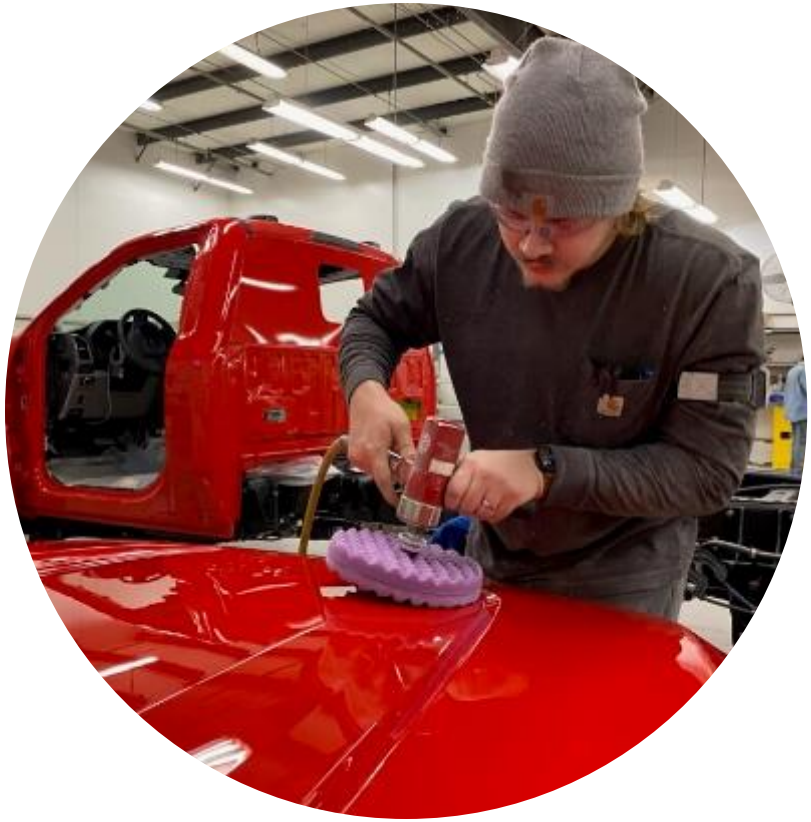
CIRAS: Generating Results Across Iowa

Connecting ISU with Iowa Industry

- 60 Engineering student capstone projects with Iowa businesses
- Digital Manufacturing Lab powered by Alliant Energy provides access to new technologies
- Hosted over 225 events across the state

CIRAS Results over the past five years:

- 4,408 distinct Iowa businesses served by CIRAS and its partners
- Economic impact of $2.8 billion
- Over 30,000 jobs created or retained



Life Line Emergency Vehicles
Bremer County

OIC

Mission: To commercialize technologies for the public good

ISURF

Foundation formed in 1938 to own IP generated at ISU & the Ames Lab

OIPTT

Team that negotiates Industry Research and IP partnerships

ISU Research Foundation

- ISURF works to facilitate and enhance Iowa State's inventive and creative works, and to transfer these works for the benefit of society
- ISURF owns and protects the intellectual property developed at Iowa State
- ISURF manages intellectual property protection and licensing for the Ames Laboratory
- ISURF collaborates with UNI and Drake University on technology transfer services

Impact of State Funding
The ISU Research Foundation is self-supportive and provides funding back to the university to support research and economic development efforts.

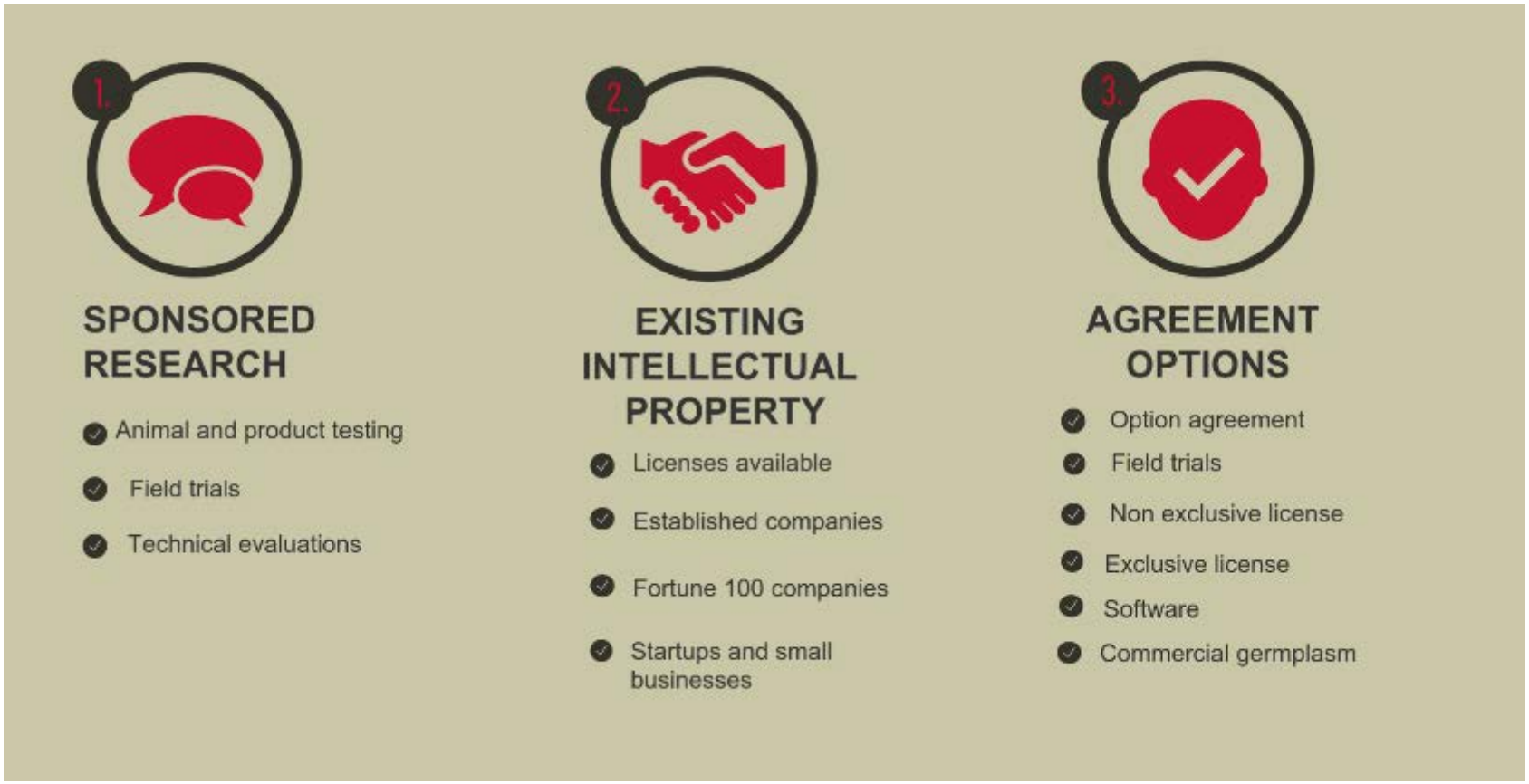
Innovation Acceleration Fund

- 172 projects supported since inception
- More than 100 Iowa companies have participated
- 59 startups assisted, including 36 that were started as a direct result of GIVF/RIF funding
- Funding invested in commercialization R & D projects has been leveraged 3:1 over the life of the program

Impact of State Funding ($1,050,000)
RIF is the primary source of flexible funding to support economic development, research for initiation of startup companies, and to seed early-stage research that has high potential for commercial success.

Office of Innovation Commercialization

WORKING WITH COMPANIES



Technology Transfer Lifecycle FY2022

$601.7 million
Total External Research Funding Received

Research & Development

Invention

82
IP Disclosures

Evaluation

94
New Patent Apps Filed

IP Protection

37 US/69 TOTAL
U.S. Patents Issued

Marketing

Licensing

113
License and Option Agreements Yielding Income

34
Licenses & Options Executed Worldwide,
10 in Iowa

Product Development

Public Use & Financial Returns

1
Startup Formed

$5.5 million
Iowa Companies: Licensed Product Sales (CY22)

Iowa State University Research Park

99 companies

call the ISU Research Park home (+20 paid affiliates)

2,328 people

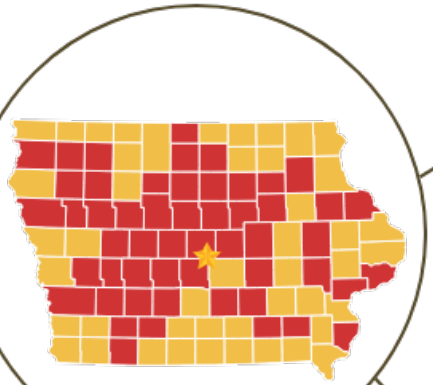
are employed at ISU Research Park (tenants and coworking/affiliates)

550 acres

approximately 850,000 square feet of building space

ISU Research Park

Statewide Impact



53
COUNTY LOCATIONS IN ADDITION TO THEIR ISURP PRESENCE

200+
INTERNS WORK AT ISURP AT ANY GIVEN TIME

$68,000
AVERAGE ISURP SALARY

445
EMPLOYEES LOCATED THROUGHOUT IOWA FOR ISU RESEARCH PARK FOUNDED COMPANIES

2,328
TENANT EMPLOYEES

IOWA STATE UNIVERSITY ResearchPARK

5 IPO's

Five companies that were started at ISURP have had initial public offerings

Liquidity

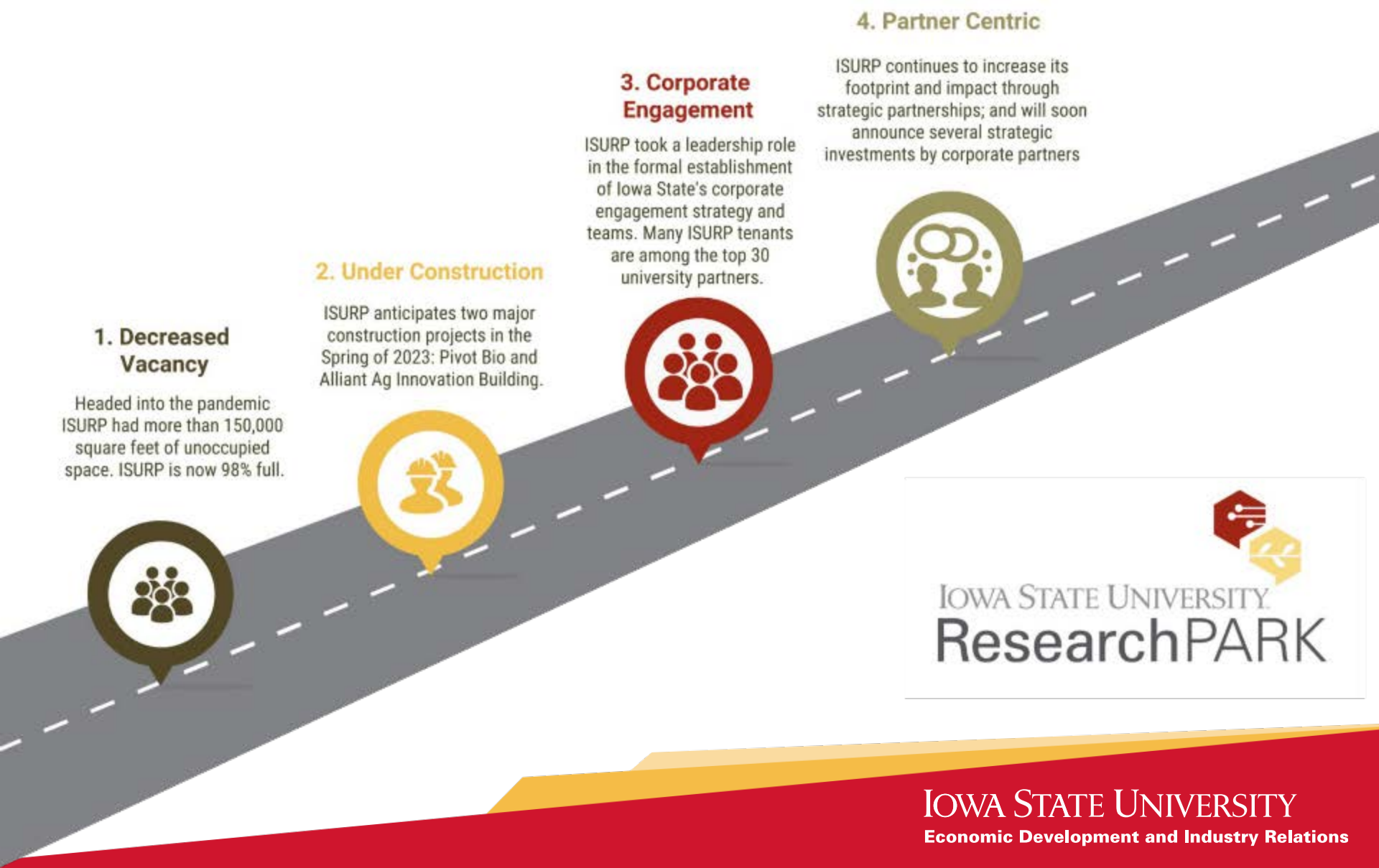
Multiple ISURP companies have achieved liquidity events

Global Brands in Iowa

Boehringer Ingelheim Vetmedica, Merck, BASF, Raven Technologies, and Zoetis have all aquired ISURP companies and stayed in Iowa post acquisition

ISU Research Park

2023: ON THE ROAD TO PROGRESS



IOWA STATE UNIVERSITY
ResearchPARK

Award Winning ISU Pappajohn Center for Entrepreneurship

Recent Awards:
2021, 2022 & 2023 - Ranked #11 Princeton Review
2021 – USASBE Model Program Award
2022 – Nasdaq Center for Entrepreneurial Excellence from the GCEC

$250,000 awarded to students through competitions and creating new ventures

$110,000 funded 14 ventures in CyStarters

11,293 individuals participated in programs and classes focused on entrepreneurship, startups, and small businesses

54 interns placed in ISU Research Park startup companies

To Date: 92 Student Business ventures, 122 students

ISU Startup Factory

# of companies that have graduated the Startup Factory program:	# of companies currently enrolled in the program:	Amount raised in venture financing since 2020:
88	10	$52M

#11 in the nation

#3 in the midwest

#1 In Iowa

For undergraduate entrepreneurship

Princeton Review 2021, 2022 & 2023

Entrepreneurship Model Program 2021

US ASSOCIATION FOR SMALL BUSINESS AND ENTREPRENEURSHIP

USASBE

2022 GCEC GLOBAL CONSORTIUM OF ENTREPRENEURSHIP CENTERS
NASDAQ CENTER FOR ENTREPRENEURIAL EXCELLENCE
Iowa State University, the Pappajohn Center for Entrepreneurship

2022 Nasdaq Center for Entrepreneurial Excellence from the GCEC

IOWA STATE UNIVERSITY
Economic Development and Industry Relations

IOWA STATE UNIVERSITY

CAREER-READY GRADUATES

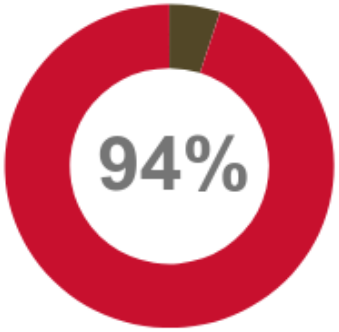
2052
EMPLOYED IN IOWA

474
FURTHERING EDUCATION IN IOWA

94.3%
POSITIVE CAREER OUTCOMES

6,651 IOWA STATE GRADUATES 2021

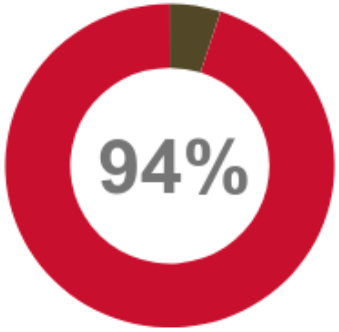
BACHELOR GRADS



POSITIVE CAREER OUTCOMES

A positive career outcome is a combination of graduates with accepted employment or who are pursuing additional education.

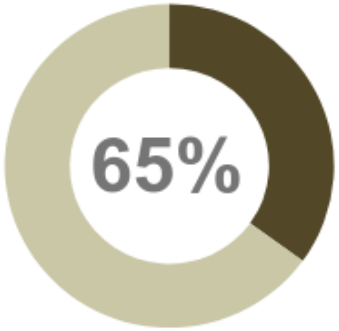
ENGINEERING GRADS



POSITIVE CAREER OUTCOMES

Six months after graduation, 95% of engineering grads secured their next destination positions with an average starting salary of $63,500.

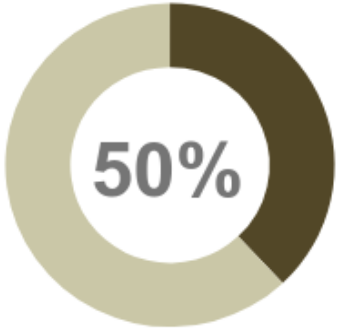
STEM + BUSINESS



DEGREES IN THESE DISCIPLINES

STEM + Ivy College of Business graduates are consistently the most in demand graduates and the highest paid majors.

RESIDENT GRADS



STAYING IN IOWA

49.9% of graduates who are Iowa residents are staying in the state after graduation.

IOWA STATE UNIVERSITY

Office of the Vice President for Research

Bioscience Platforms Update

Dr. Peter K. Dorhout

Vice President for Research

The Iowa State Focus in the Biosciences

- Iowa State continues to support and grow innovation ecosystems and foster tech transfer from the three ISU-advantaged Bioscience Platforms

BioBased Products (BBP)

Vaccines and immunotherapeutics (V&I)

Digital and Precision Agriculture (D&PA)

- Experts working with ISU research teams to ID innovations with strong commercial potential; growing commercial partnerships with industry

Bioscience Platforms – Return on Investment

- Three years of investments have:
  - Launched/helped over **27** startup companies
  - Involved over **153** researchers/students
  - Created new partnerships with over **29** companies though the seed grant mechanisms
  - Garnered over **$80.2 M** in federal/industrial funding that has been added to the innovation ecosystem in these platform areas

BBP: The Future of Chemical Manufacturing

USDA CERTIFIED BIOBASED PRODUCT
PRODUCT 87%

BIOBASED CHEMICALS

Fermentation will grow as a way to make chemicals

by ***Craig Bettenhausen***

Most consumer-facing markets are seeing increased demand for low-carbon, plant-based products. In 2023, the volume and diversity of biobased chemicals made via fermentation will grow as microbe engineering gets better and synthetic biology unlocks a wider range of molecular targets.

One example of this trend is the growth of the industrial biotechnology firm **Genomatica**, which is rapidly commercializing fermentation routes to large-volume

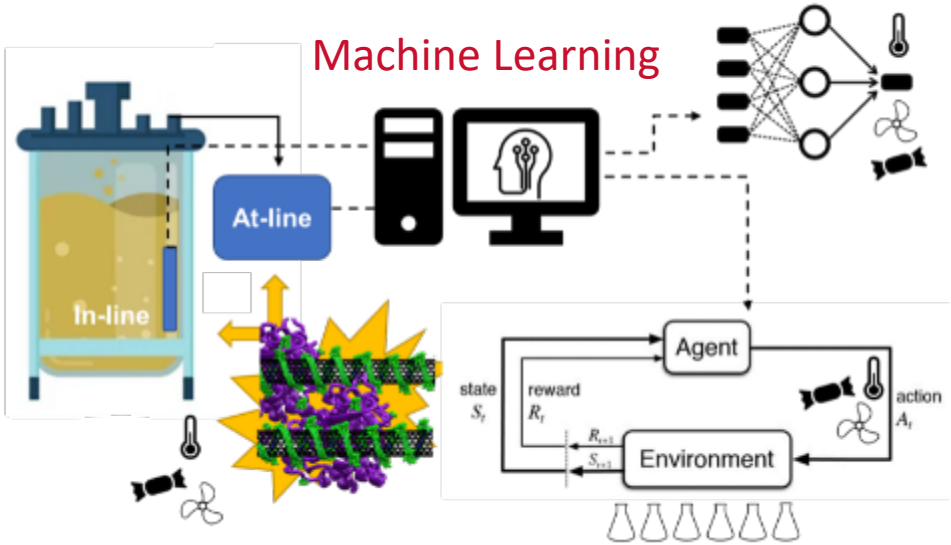
TAKEAWAYS

- Improved process engineering is enabling larger-volume chemical fermentation.
- Genetic engineering is opening up more molecular targets to microbial manufacturing.

BBP Corporate Engagement - BioMADE

The Bioindustrial Manufacturing and Design Ecosystem (BioMADE) Institute was established to improve production efficiency and scale-up of biobased products

- Within the *past year*, ISU awarded **>$2.6 million** in grants with key industrial partners
  - Cargill
  - Genomatica
  - Novozymes



Optimization project funded by BioMADE

BBP Startup – Pyrone Systems

PYRONE SYSTEMS INC.

- Commercializing ISU-developed biopesticide technology
- Naturally occurring molecule delivers positive environmental impact. Novel mode of action combats pest resistance
- Closed initial funding round

Repellency

Performance equivalent to DEET

Insecticide

Efficacy for corn rootworm and soybean aphid

BBP Startup – Soylei Innovations

Soylei Innovations is and Iowa-based startup commercializing ISU technology for soybean oil derivatives used as asphalt modifiers

- More than 30 patents issued
- Current portfolio of 5 products marketed with Ames-based channel partner Colorbiotics
- Won $5 M USDA/NIFA grant for 2023

Longer life / higher-performance asphalt products

BBP Infrastructure – Project Gemini

- Addresses critical need for scaleup biomanufacturing capacity to support the pipeline of products in ag biologicals, animal and human nutrition, bio-materials and renewable chemicals
- Iowa ideally suited to host – feedstock, existing critical mass of bioprocessing facilities, renewable power, and talent
- Announced federal government support for funding of biomanufacturing facilities
- Project Gemini initiated to gather Iowa stakeholders to capture this opportunity – preliminary engineering, siting, budgeting in process

V&I: CYVAX – Concept and Objectives

- Dedicated licensed space (1500 GSF) for vaccine pilot scale production
- Increase the value of ISU faculty-based research and associated IP for license with focus on regulatory compliance
- Increase the speed/efficiency of commercial development by Iowa based startup companies
- ISU-Industry Training of USDA and regulatory requirements

V&I: CYVAX Results

Startup Support

- 3D Health Solutions (ISU Faculty Startup)
- Initiated commercial activity at CYVAX
- Graduate student > Full Time Employee

Existing Industry

- ELANCO needed a laboratory to evaluate new technology; CYVAX provided easy access to new Iowa location
- New Scientists hired for Iowa site, with expansion possible

V&I: CYVAX Results

Advanced regulatory & commercial manufacturing training

- Regulatory product release (Potency Training) with JESS partnership
- 35 participants including students, faculty, startups and existing industry
- Additional sessions planned for 2023

V&I: MERCK Strategic Partnership

- 4 - year agreement with $300K/yr in committed funding
  - Options to expand for specific projects
- Managed by a joint ISU-MERCK Steering Committee
- First year – actual funding was nearly $900K
  - 15 Active projects funded by MERCK AH
  - 3 projects funded by MERCK Human
  - 11 projects under discussion
  - Vet Med, Nanovaccine, Engineering, Library, Internships

V&I: Commercial Fellowship

Challenge – Graduate students are top talent associated with new technology. New startups often have funding gaps that prevent talent retention.

Solution – A portion of BioScience platform funds was invested to establish a fellowship program to support talent retention, industry training, and job creation/retention in strategic areas

V&I: Fellowship Results

Halide Biologics

- University of Iowa based startup
- Technology focused on Biotherapeutic protein stabilization
- Billion-dollar market
- Post-Doc essential for company development

Halide Biologics

V&I Commercial Fellowship Awarded

- 6-month runway of funding while SBIR and other funding in progress
- Commercial milestones and progress defined and monitored
- 4-person commercial advisory team monitors and supports efforts
- Two other applications under consideration

D&PA: Startup Success: Dryland Genetics

Dryland Genetics

Sustainable food for a world with less water

Challenge – the world needs more grain but is running out of water

Solution – Prosso Millet: "The Greener Grain"

"It is an amazing crop . . . It will grow in adverse conditions . . ."

Harry Stine

Stine Seed Co. & DLG Investor

Startup Success: Dryland Genetics

- Under water-limiting conditions millet produces 2x more grain per gallon of water than corn. Currently grown on ~700,000 acres in arid western Great Plains.
- Drivers for 10x to 20x expansion of domestic acreage
  - Drop-in substitute for corn in livestock feed
  - Water and carbon efficiency
  - 20% yield increases double farmer profits
  - DLG improved varieties exhibit 10 to 40% yield advantage over best alternative varieties
- DLG recorded 11x growth in seed sales in 2022 compared to 2021
- **Viable third crop for Iowa** – in 2022 Iowa growers realized $800/A revenue wo/use of N fertilizer; no new equipment needed to grow the crop

Dryland Genetics

D&PA: Startup Success - Vet Med Telehealth

Challenge – Foreign animal diseases (FAD) not found in the U.S. can spread quickly and make animals sick, causing production losses and death

Solution – Vet Med Telehealth, rapid and scalable response to foreign animal diseases

"Any set of eyes, on any set of pigs, anywhere in Iowa, within one hour."

D&PA: Startup Success - Vet Med Telehealth

If a FAD was detected in the U.S., responding quickly to protect Iowa's farmers, stop disease spread, and eliminate the disease requires disease detection, containment and elimination

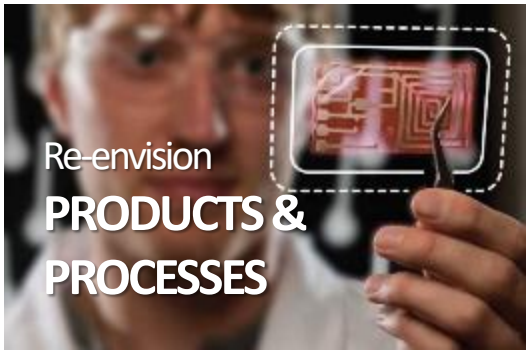
- **Challenges:**
  - Limited data connection to farm sites (network reliability, physical barriers)
  - On-farm hardware requires specialized engineering (e.g., dust, low light, antimicrobial properties)
- **Opportunities:**
  - Validated clinical skill transfer and site evaluation via telehealth
  - Wearable hands-free devices connected to automated data collection and analysis platform

ISU Bioscience Platforms Request



The BOR request: an additional **$377,000** to continue to grow partnerships with BioConnect Iowa and Iowa industry, to accelerate technology transfer, and to grow the innovation ecosystem for all three platforms. At the full $1 million per platform, we will:

- Identify and accelerate development of commercial opportunities that provide benefit to Iowa-based companies and startups.
- Attract external funding and provide innovation ecosystem services.
- Incubate start-ups and accelerate technology transfer.
- Develop a skilled workforce with an innovation mindset.



Thank You
Questions?