Governor's Task Force on Workforce and Artificial Intelligence

Northcentral TECHNICAL COLLEGE

Dr. Jeannie Worden

President, Northcentral Technical College

Governor's Task Force on Workforce and Artificial Intelligence

DWD

Jennifer Sereno

Assistant Deputy Secretary,
WI Department of
Workforce Development

Governor's Task Force on Workforce and Artificial Intelligence

Agenda Overview


DWD
Amy Pechacek
Secretary, Wisconsin Department of Workforce Development
Governor's Task Force on Workforce and Artificial Intelligence

WISCONSIN
DEPARTMENT OF ADMINISTRATION
DOA.WI.GOV

Kathy Blumenfeld

Secretary, Wisconsin Department of Administration

Governor's Task Force on Workforce and Artificial Intelligence

WISCONSIN
ECONOMIC DEVELOPMENT

Missy Hughes

Secretary and CEO,
Wisconsin Economic Development Corporation

Governor's Task Force on Workforce and Artificial Intelligence

Northcentral TECHNICAL COLLEGE

Dr. Greg Cisewski

Dean, School of Agricultural Sciences, Utilities and Transportation, Northcentral Technical College

Governor's Task Force on Workforce and Artificial Intelligence

ARTIFICIAL INTELLIGENCE IN AGRICULTURE

FEEDING OUR COMMUNITIES WITH THE TECHNOLOGY OF TOMORROW

Northcentral TECHNICAL COLLEGE

NTC'S AGRICULTURE CENTER OF EXCELLENCE

- ✓ State-of-the-Art Facilities
- ✓ Hands-on Learning
- ✓ Industry Partnership
- ✓ Focus on Sustainability
- ✓ Diverse Program Offerings
- ✓ Career Preparation
- ✓ Community Engagement

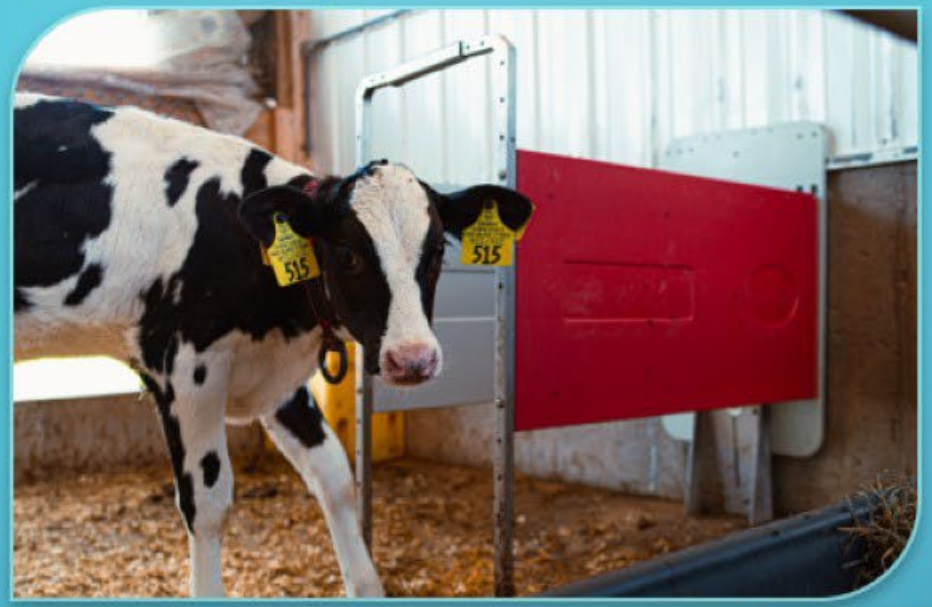
APPLICATIONS OF ARTIFICIAL INTELLIGENCE

- ✓ Precision Farming
- ✓ Crop Monitoring & Management
- ✓ Predictive Analytics

- ✓Resource Optimization
- ✓Livestock Management
- ✓Sustainable Agriculture

Current AI Technology Used at NTC's Ag Center

ROBOTIC MILKER



AUTOMATED FEEDING SYSTEM

AUTOMATED CALF FEEDER

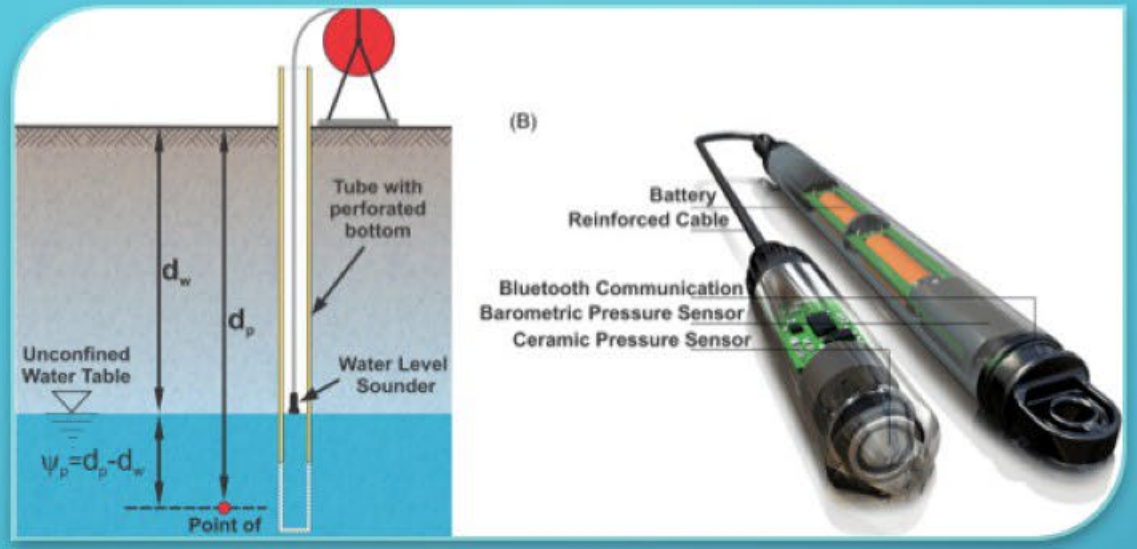
Future AI Technology Used at NTC's Ag Center

ROBOTIC GARDENING

ELECTRIC SEMI-AUTONOMOUS TRACTOR

DRONES

SUSTAINABILITY



WATER QUALITY TESTING

SOLAR PANELS

REDUCING FIELD RUNOFF

BENEFITS OF AI IN AGRICULTURE AT NTC

- ✓ Demonstration & Outreach
- ✓ Career Opportunities in Emerging Fields
- ✓ Sustainable Agriculture Practices
- ✓ Economic Development
- ✓ Enhanced Education & Training
- ✓ Applied Research Opportunities
- ✓ Industry Collaboration
- ✓ Skill Development in AI and Agriculture

ARTIFICIAL INTELLIGENCE IN AGRICULTURE

FEEDING OUR COMMUNITIES WITH THE TECHNOLOGY OF TOMORROW

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College of Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN-MADISON

Troy Runge

Associate Dean for Research, UW–Madison College of Agricultural & Life Sciences

Governor's Task Force on Workforce and Artificial Intelligence

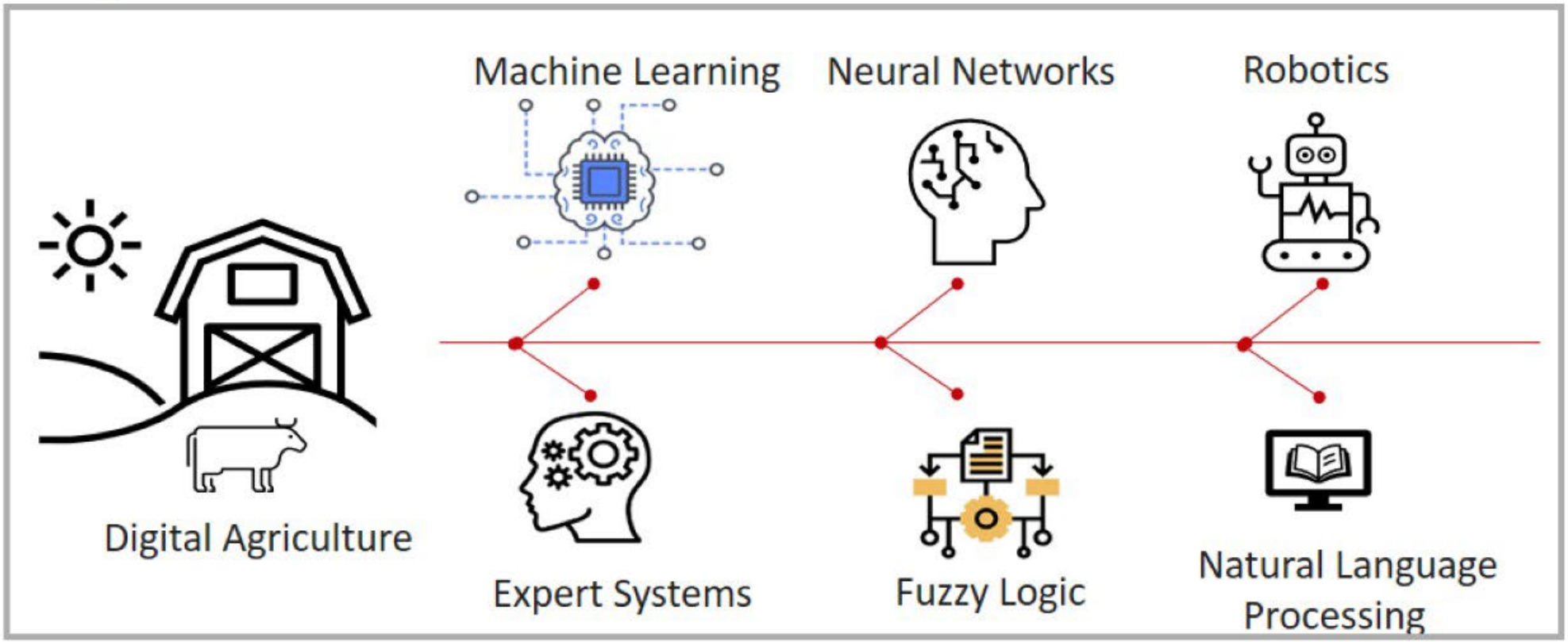
Artificial Intelligence in Agriculture

Troy Runge, UW Madison CALS ADR

Governor's Task Force on Workforce and Artificial Intelligence

May 6, 2024

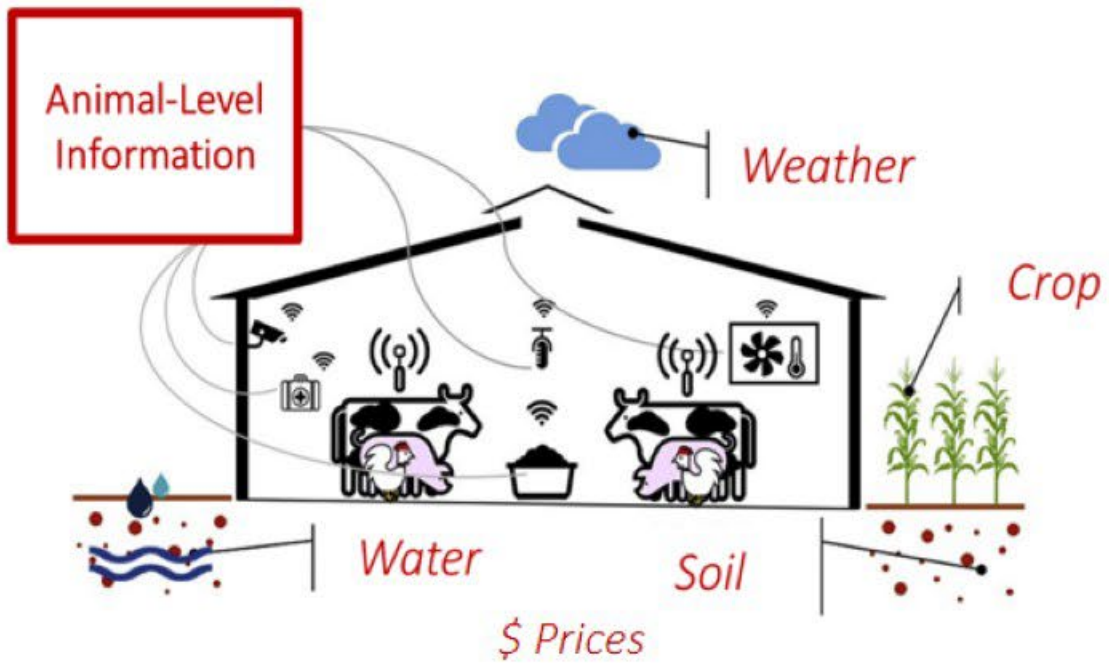
AI in Agriculture - do we need it?



- Population 9.3 billion by 2050; require 60% more Agricultural Output per area
- Precision Agriculture: drones, GPS, sensors, more data, difficult for decision making
- Precision Ag Data + AI; provides informed decisions to enable greater efficiency

AI on the Farm

High-Throughput Sensors collect
"Big Data"



Terabytes of Data / Cloud computing and storage

Rural Broadband will be critical

Multi-Sensor Systems

Ag Data

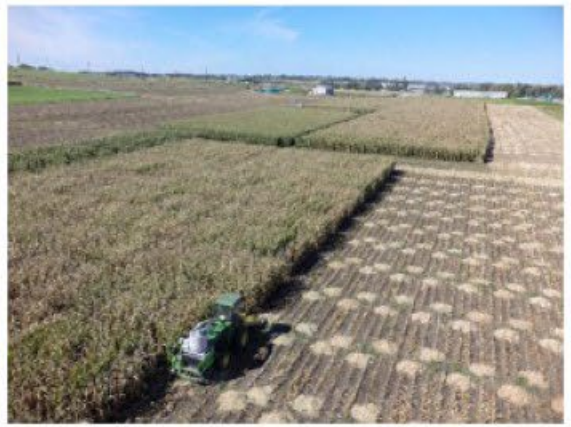
On-farm management Decisions (short term)

Autonomous Decision (long term)

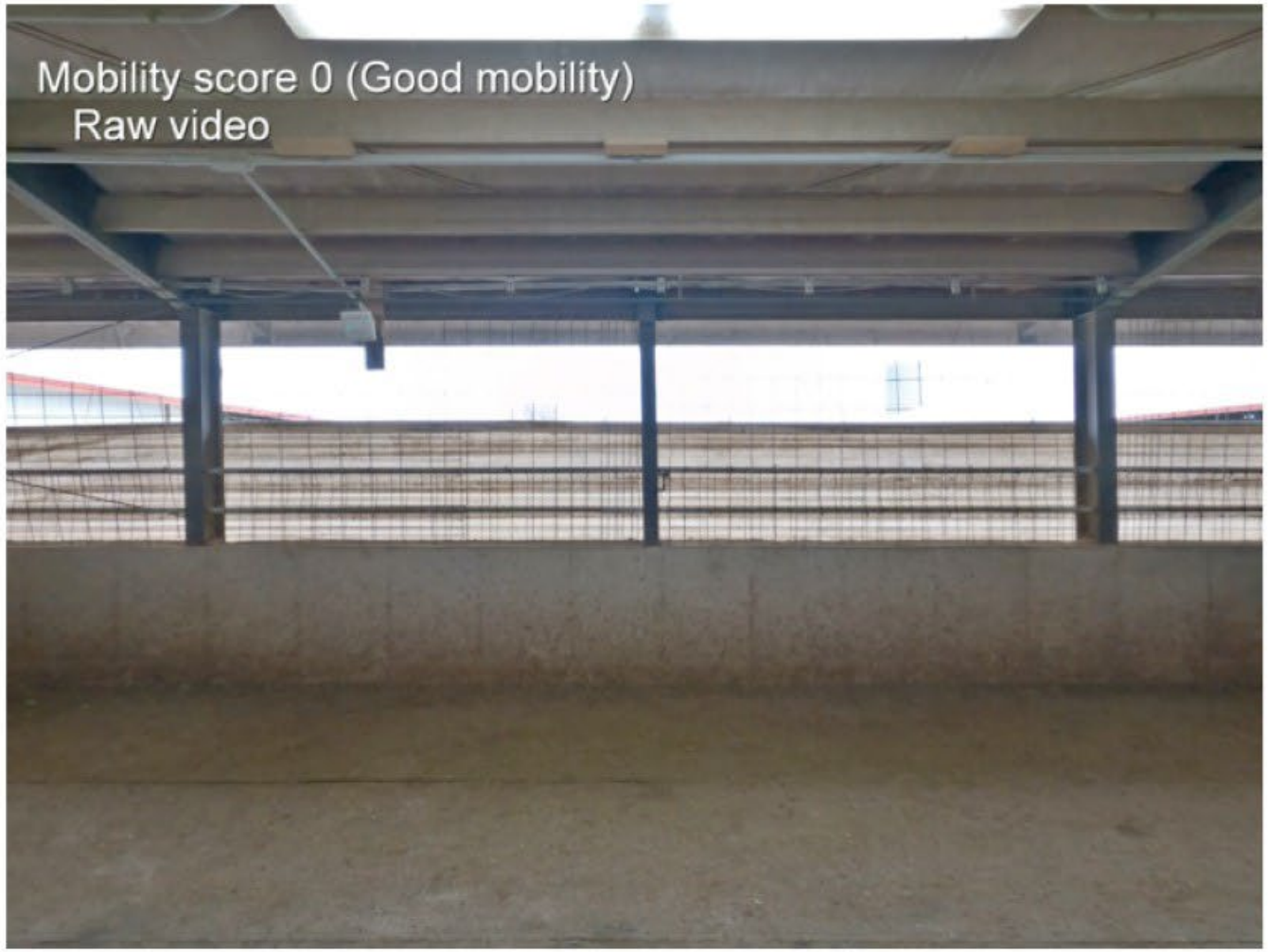
Image courtesy of Prof. J. Dorea

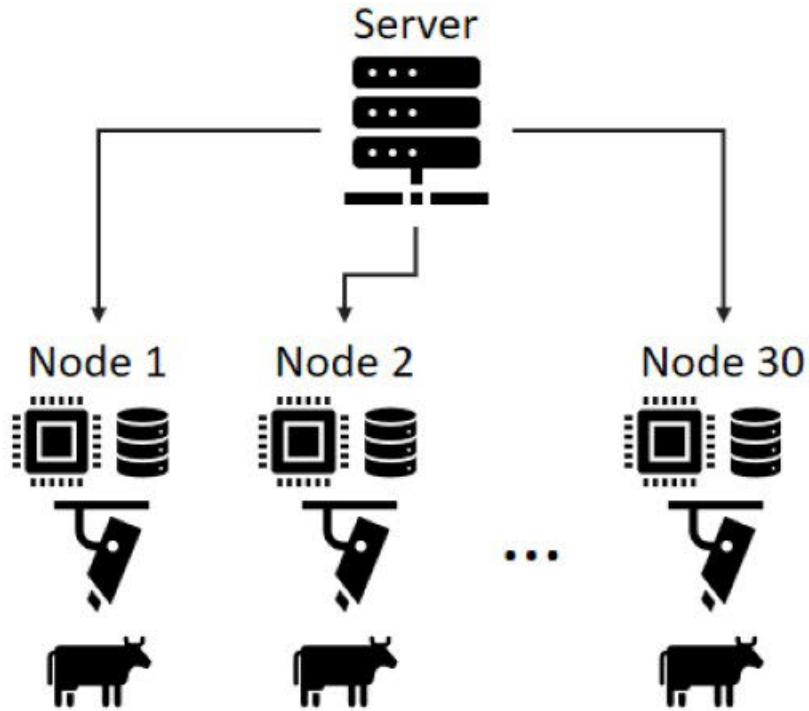
AI Research Areas at UW Madison

- All areas of research at UW have some AI use
- Notable areas
  - Matching genetic data with performance
  - Plant, animal & microbe phenotyping for health
  - Autonomous vehicles and smart implements to enable precision agriculture



Example: Animal Mobility





Each camera generates **~10 GB per day**;

Need high-speed connectivity

Images courtesy of Prof. J. Dorea

Computer and Electronics in Agriculture - Higaki et al., 2023

Developing the workforce

University level:

- Data Science / Computer Science
- Investing in the AI area through the RISE initiative

CALS:

- Agriculture majors are including new data science classes
- Exploring new technology degrees and certificates
- Extension programs incorporating these tools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College of Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN-MADISON

Dr. Shawn Conley

State Soybean and Small Grains Specialist, UW–Madison College of Agricultural & Life Sciences

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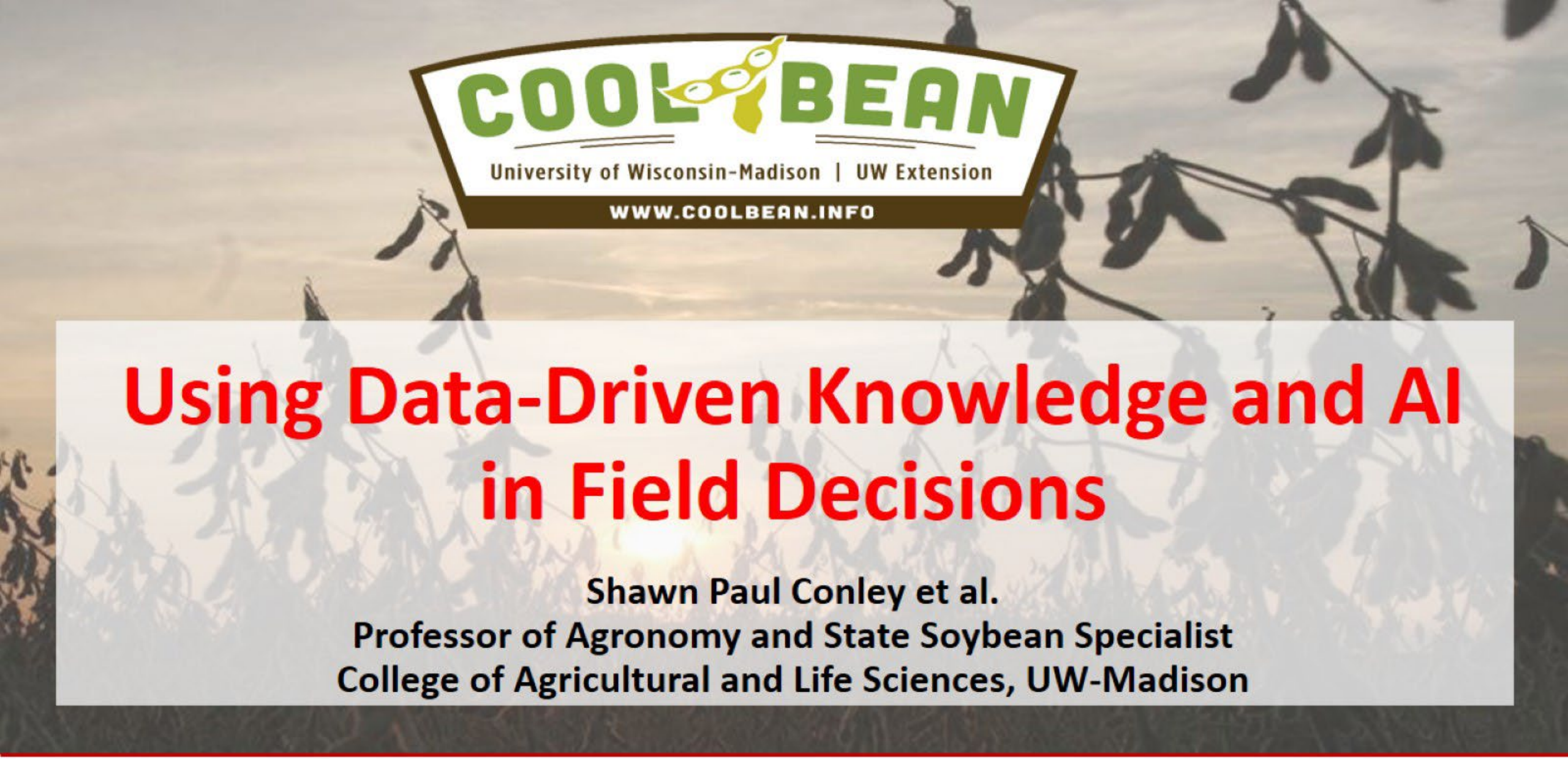

Using Data-Driven Knowledge and AI in Field Decisions

Shawn Paul Conley et al.
Professor of Agronomy and State Soybean Specialist
College of Agricultural and Life Sciences, UW-Madison

UW Extension
University of Wisconsin-Extension

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WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

Darin @Darin_W_Hadley · 5h
Replying to @badgerbean

Nick Viney @badgerlandgrain · 5h
Replying to @badgerbean

18% WI Farmers Use Precision Ag Practices

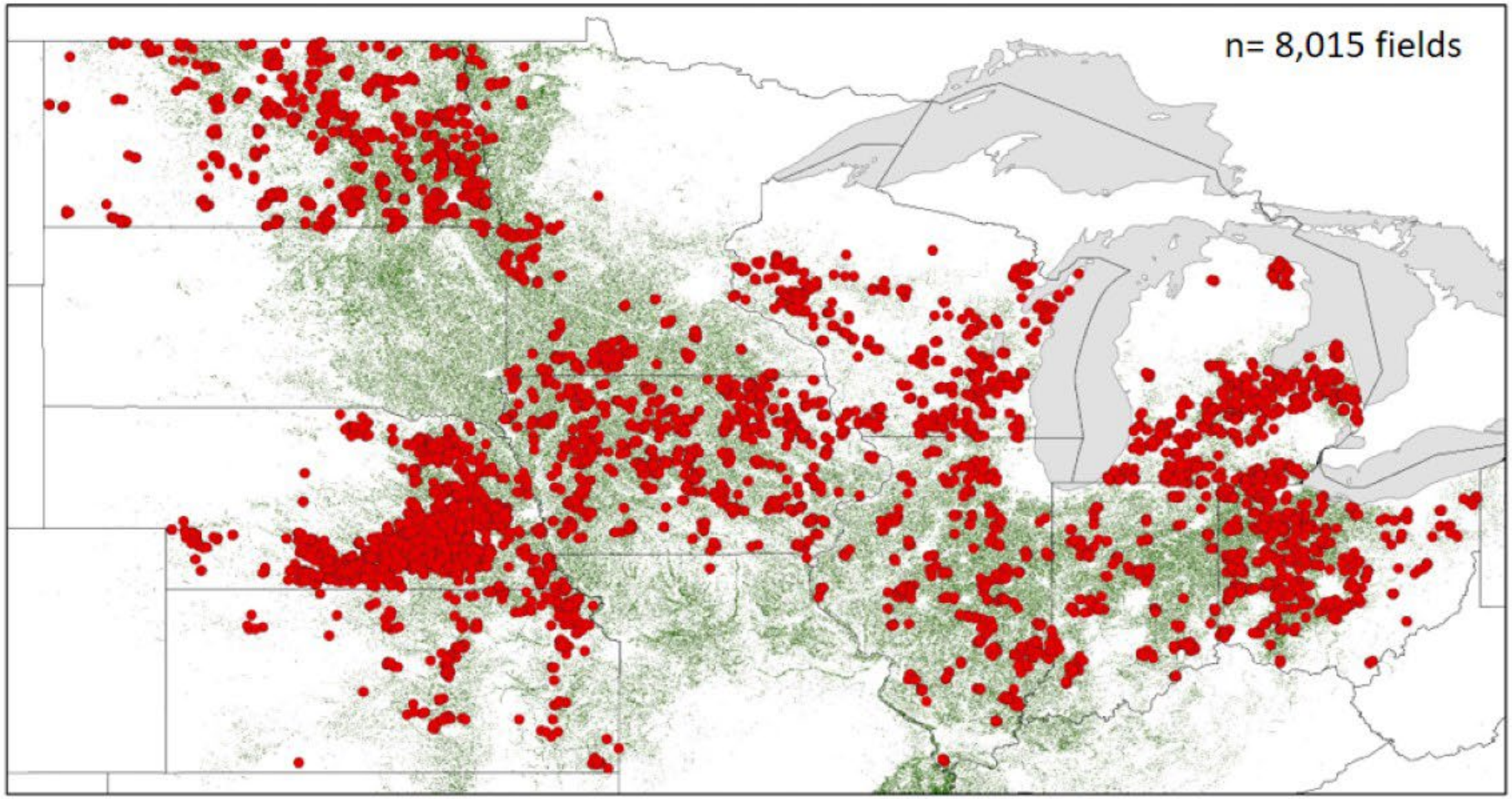
…

www.nass.usda.gov 2023 report

Clem Bowman @Channel_seedman · 5h
Replying to @badgerbean

145

Boots on the Ground On-Farm Validation



University of Nebraska Lincoln

NCSRP North Central Soybean Research Program

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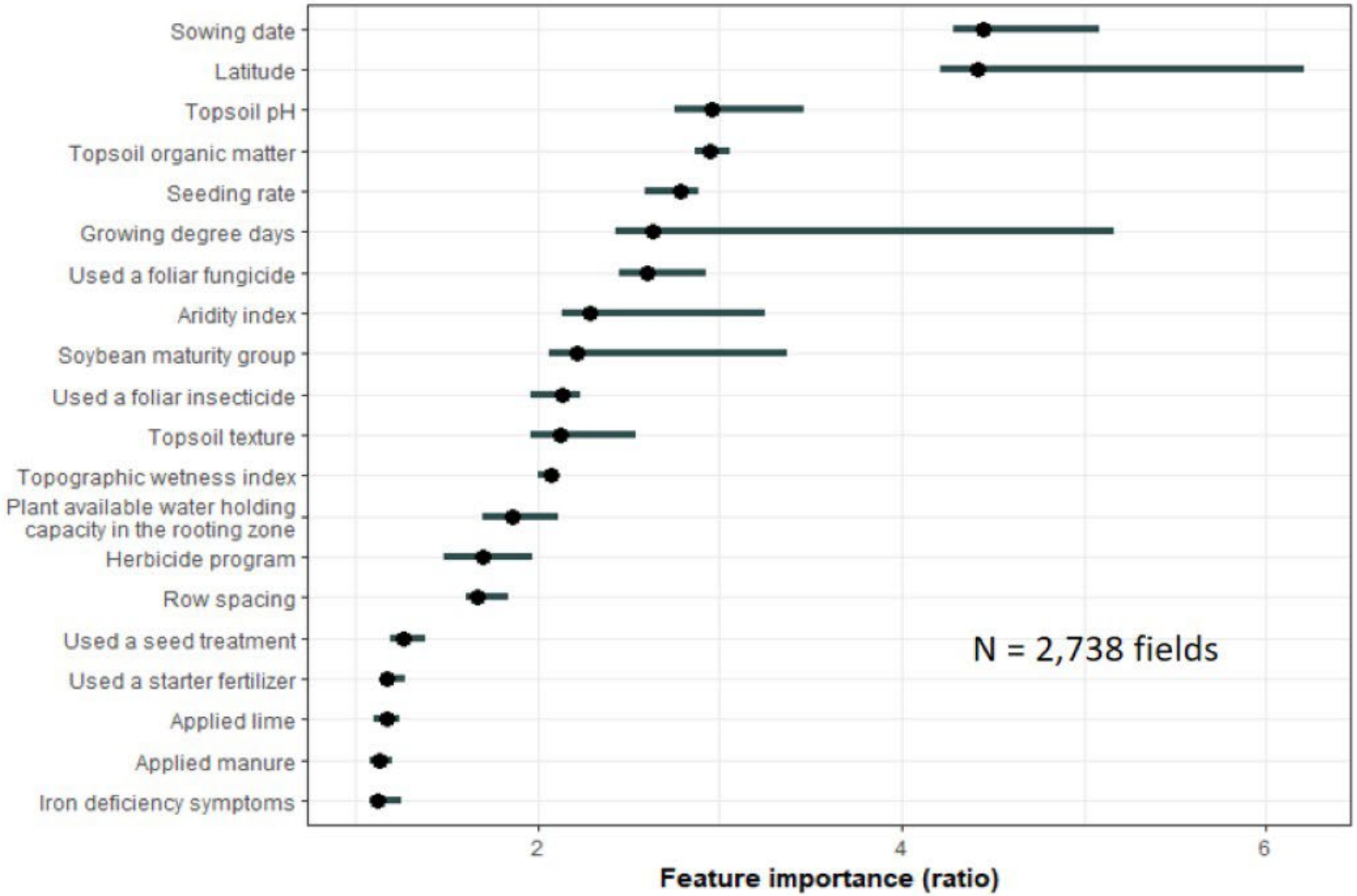
The University of Wisconsin Madison

Importance of management-based variables in a random forest model predicting soybean yield.

Shah, A.D., T. R. Butts, S. Mourtzinis, J. I. Rattalino Edreira, P. Grassini, S. P. Conley and P. D. Esker. 2021. An interpretable machine learning assessment of foliar fungicide contribution to soybean yield in the north-central United States. Scientific Reports 11:18769. https://doi.org/10.1038/s41598-021-98230-2.



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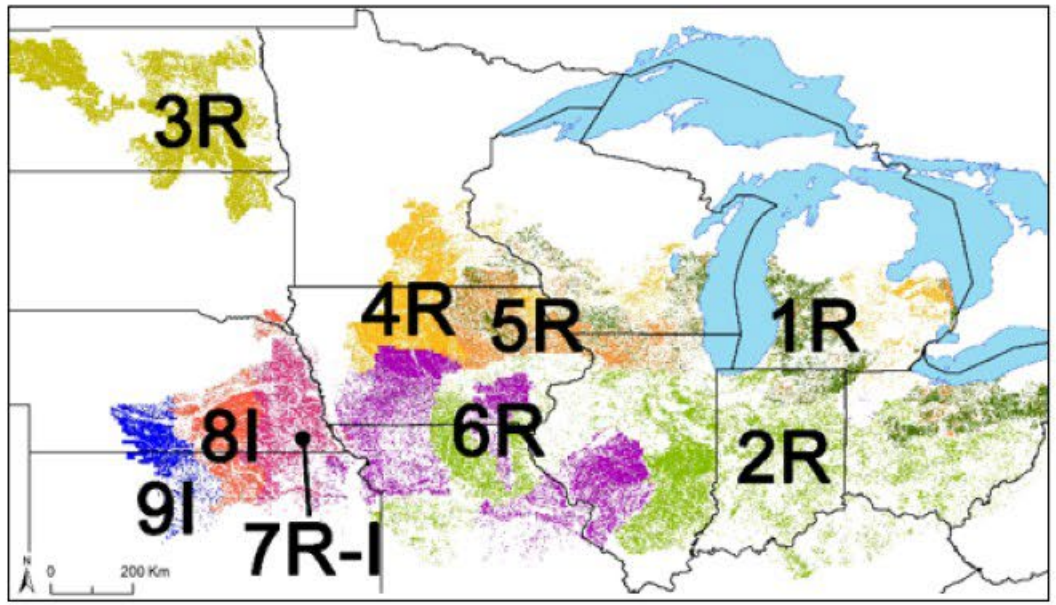
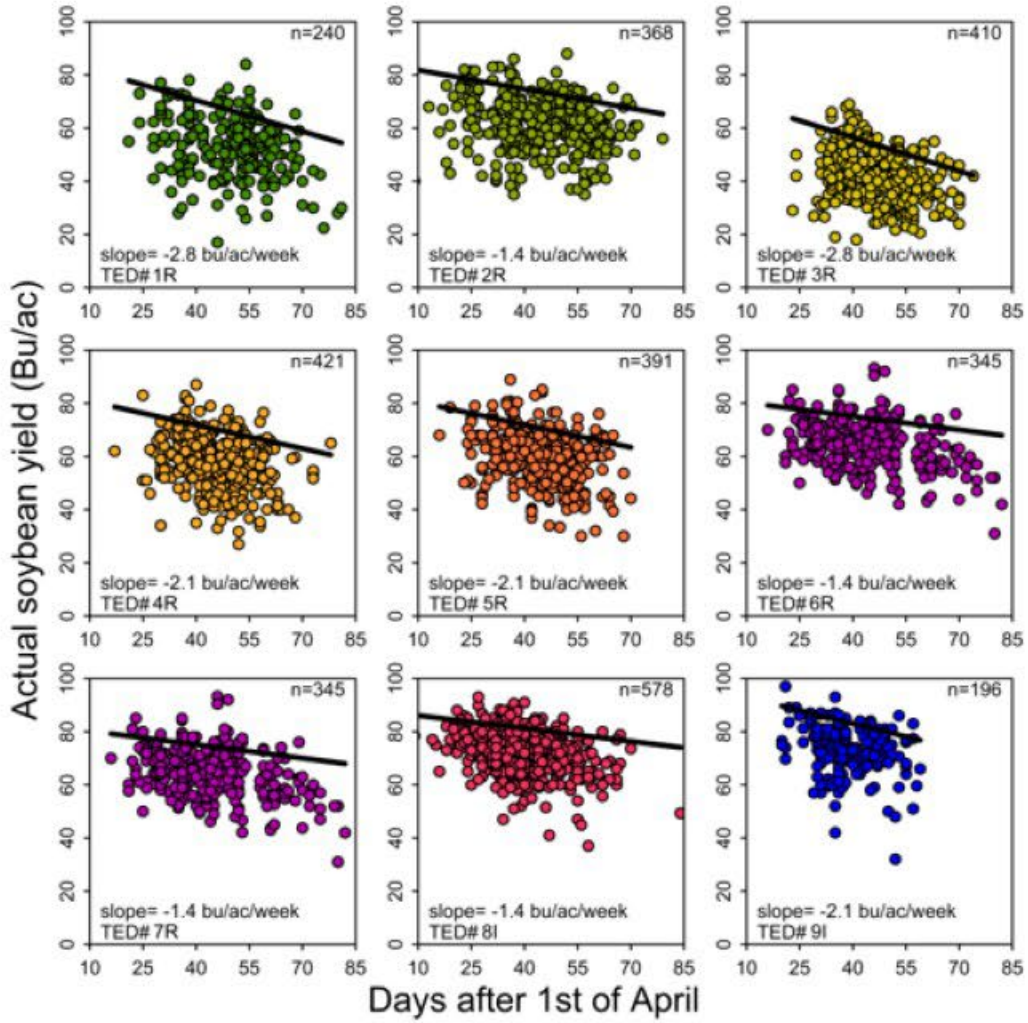
Influence of planting date on soybean yield by TED



(Rattalino Edreira et al. 2017a, Agric. For. Meteorol. 247, 170-180)



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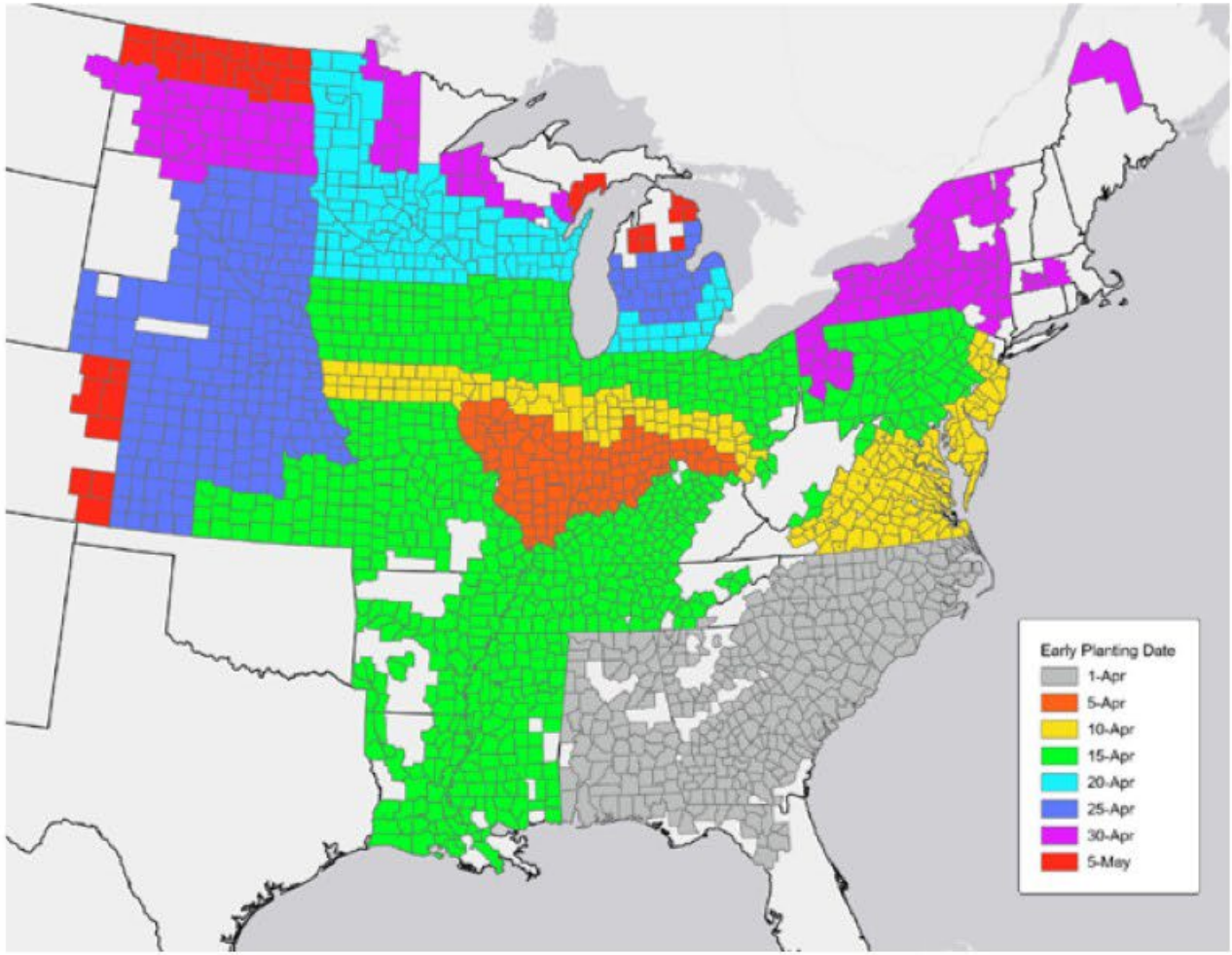
- Informed policy changes
  - Updated RMA replant coverage

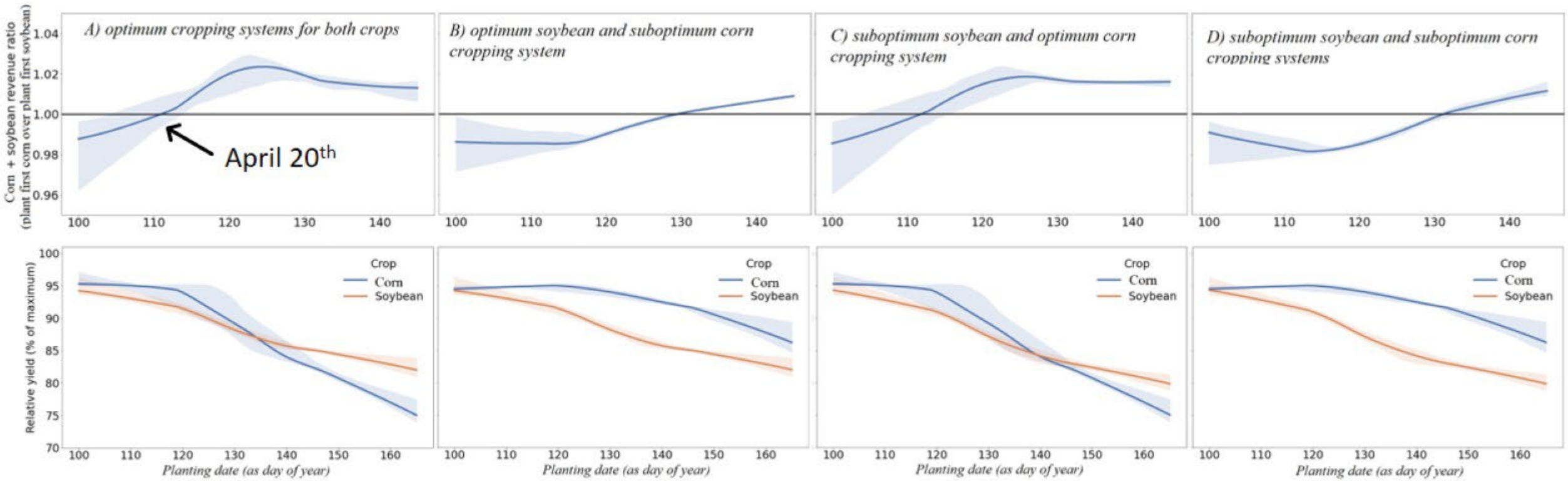
$5M Ag Sector



The spatial coverage of our database is extensive and coincide with the region where most of corn and soybean are grown across the US

What do I Plant 1st Corn or Beans?

By calculating the ratio of corn + soybean gross revenue for each planting date for two scenarios (plant corn first and then soybean over plant soybean first and then corn), we can examine the trend of gross farm revenue across the examined sowing dates



Arlington 5-year average (2014-18)

Crop planting order decision support tool

Field name	Crop	Acres	Production cost $/ac
Arl-North	corn	500	990
Arl-South	soybean	450	820
Arl-East	corn	280	1060
Arl-West	soybean	600	810

Assumptions

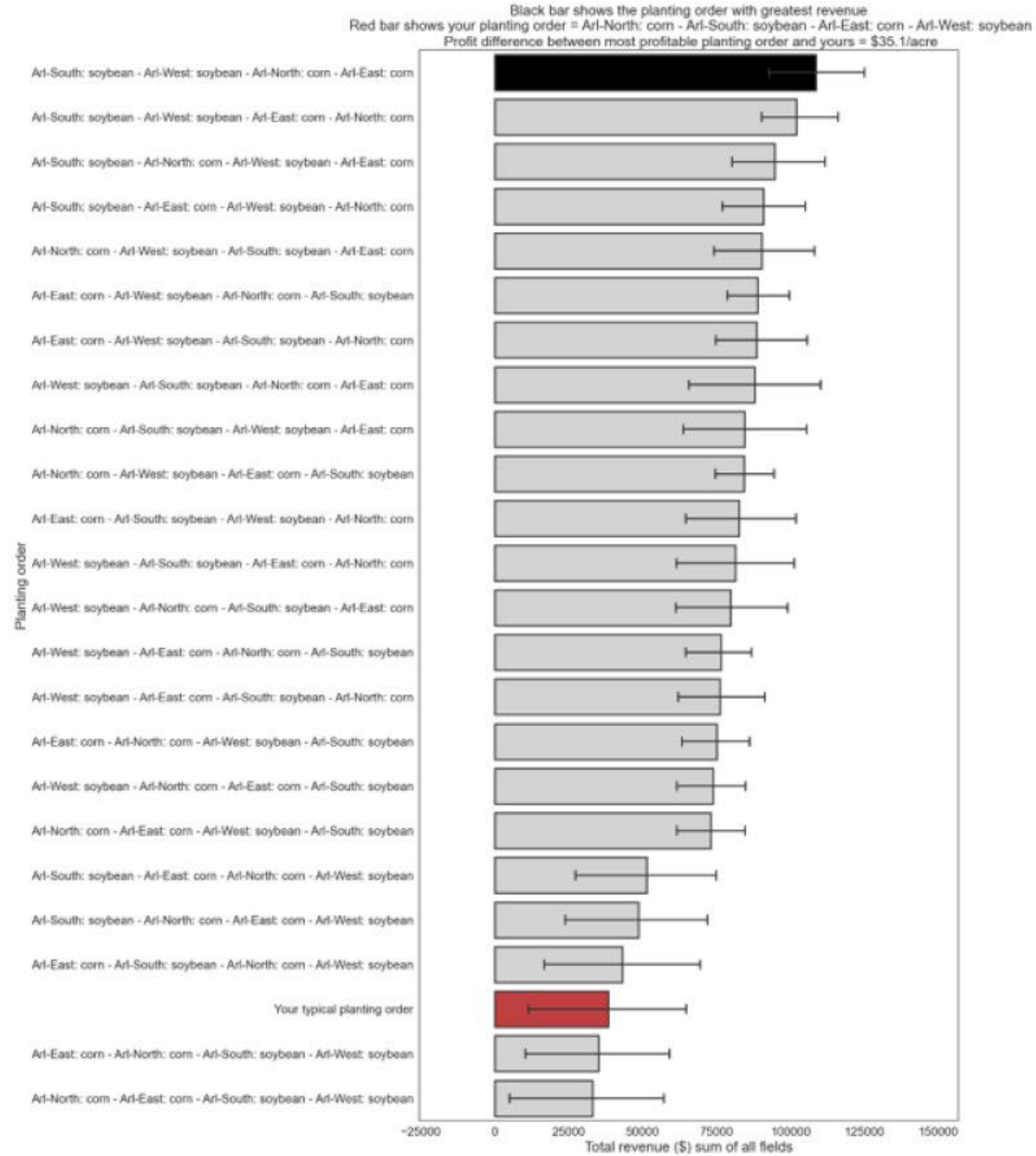
Planting capacity in ac/d =100

Corn price=$5/bu

Soybean price=$13/bu

Target date that planting will start =**April 30**

↑ $64,233 profit



Open Crop Manager (OCM)

found at open-crop.vmhost.psu.edu

Goal: Serve as a central location to store data and develop value-adding tools

- Facilitate data collection
- Protect data privacy
- Host value-adding services and tools

OCM is where ALL project data is recorded, such as:

Field location 

Production survey 

Yield files 

Scouting reports (and their images) 

Data collected in OCM is protected with help from the Penn State Institute for Computational and Data Sciences and Information Sciences and Technology.

If it comes from your field, or you create it, it's your data – you control them and what they can be used for.

For more information about our data privacy protection policies, please email Miranda DePriest at mnd20@psu.edu.

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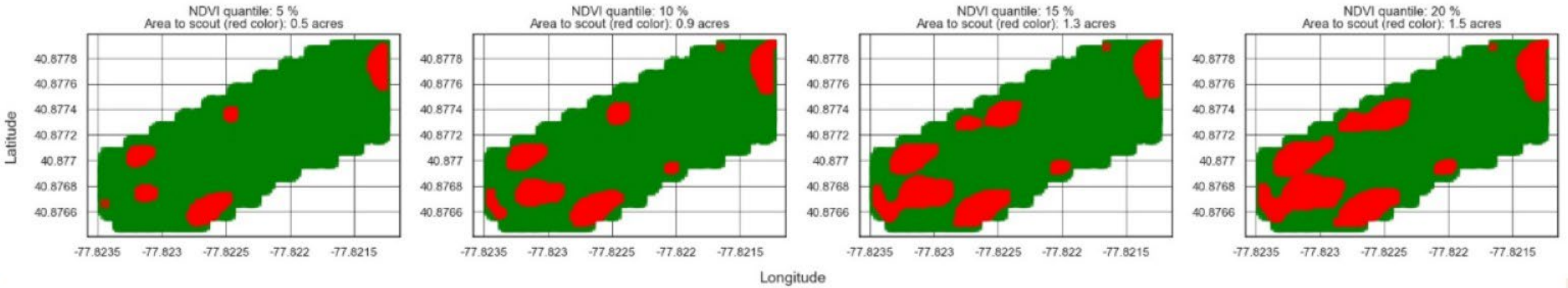
Data-Driven Project

Major goals and status

- 1: Identification of field stressors using mobile pictures and app.
- 2: monitor fields within the growing season for identification of potential yield stressors and action recommendation (e.g., check field for yield stressors).

Data Driven project that uses Sentinel-2 satellite images and automatically extracts the Normalized Vegetation Difference Index (NDVI) for every 60 x 60 ft section in a field.



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Data-Driven Project

Major goals and status

- 1: Identification of field stressors using mobile pictures and app.
- 2: monitor fields within the growing season for identification of potential yield stressors and action recommendation (e.g., check field for yield stressors).
- 3: create "what-if" scenarios for field-average management recommendation before the growing season.
  - Example1: What is the best combination of planting date and maturity in my field (for my specific soil type, tillage practices, previous crop etc.).
  - Example2: For the seed I am about to purchase, what would be the best combination of planting date, seeding rate, row spacing, and use of foliar fungicide/insecticide to increase **yield and profit** (for my specific soil type, tillage practices, previous crop etc.).

SCIENCE FOR SUCCESS

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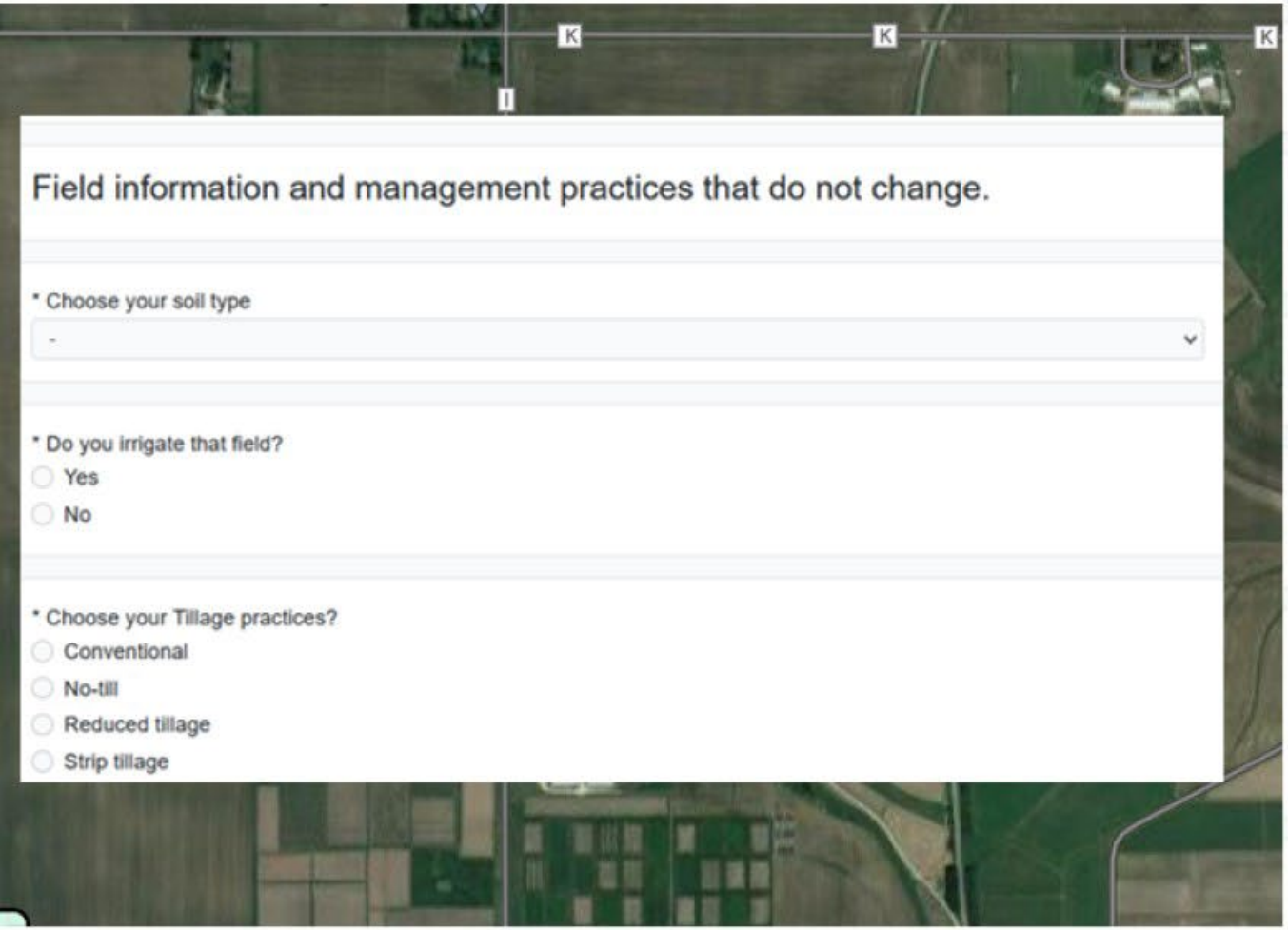


Field information and management practices that do not change.

* Choose your soil type

-

* Do you irrigate that field?

- Yes
- No

* Choose your Tillage practices?

- Conventional
- No-till
- Reduced tillage
- Strip tillage

* What was the previous crop in the field?

-

* Is there an artificial drainage system installed in the field?

- Yes
- No

* What is your typical seeding rate (x1000 seeds/ac) 150

* What is your row spacing (inches) 30

* Do you typically apply foliar fungicide and/or insecticide?

- Yes
- No

* How much Nitrogen (lb/ac) do you normally apply? 0

* Choose the trait of your seed

- Genetically modified
- Conventional non-GMO

* Choose the seed treatment of your typical seed

- None
- Fungicide
- Fungicide + Insecticide
- Fungicide + Insecticide + Nematicide

* Choose the maturity group of your seed. 2

Maximum Profit

Maximum Profit

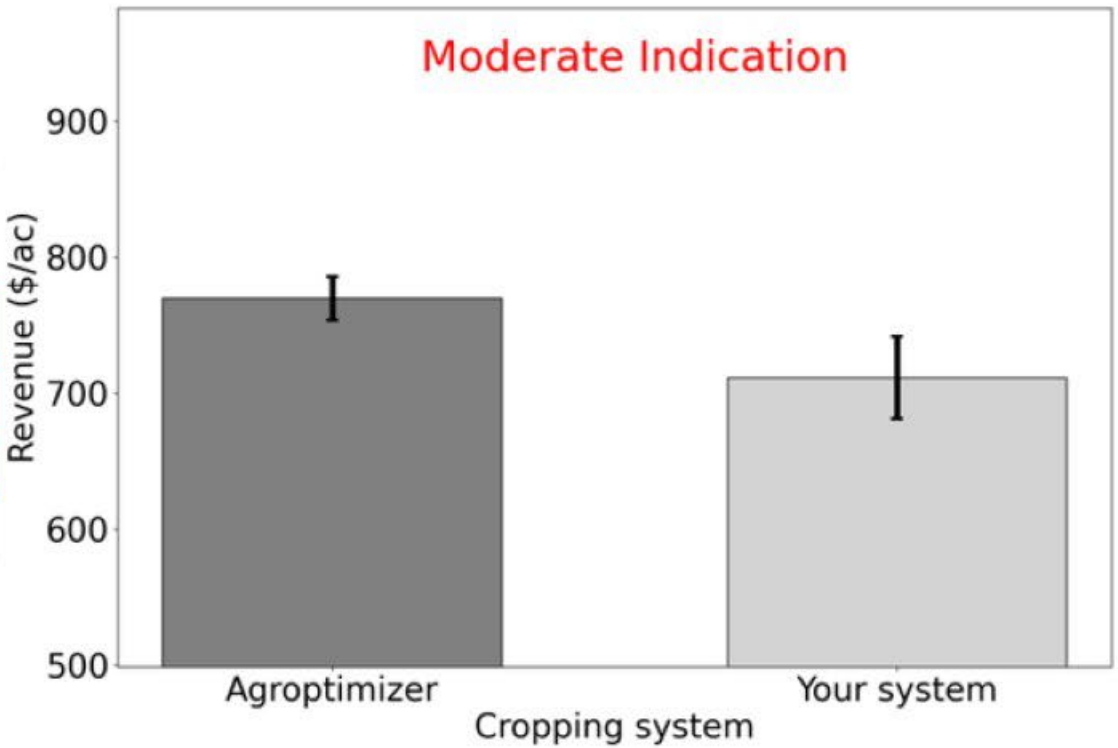
Here you see the yield and profit difference between your practices and what Agroptimizer recommends for maximum profit.

As before, the confidence we have for these yield and profit differences may be weak, moderate, or strong.

Management	Your practice	Agroptimizer
Planting date	April 30	April 30
Seeding rate (x1000 seeds/ac)	140	80
Row spacing (inches)	30	15
Foliar Application	no	yes
Nitrogen rate (actual lb/ac)	0	0

Yield difference (Agroptimizer vs. your system)= 4.2 (bu/ac)

Profit difference (Agroptimizer vs. your system)= 58.1 ($/ac)



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Final Thoughts….

- Its clear that technology and AI are going to be a significant tool in agriculture moving forward so here are my thoughts ..
  - Move the 18% mark in WI and improve efficiencies!
  - Cross training of data scientists and the ag practitioners
  - Train the boots on the ground workforce to use these tools
    - Drone pilots license, data integrity (e.g. high-quality data required to inform these models), data security
    - Workforce to service and fix the tools we break in agricultural settings
  - Common sense policies and regulations
    - Data sharing and privacy, platform compatibility, easements and infrastructure development

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SWIDERSKI EQUIPMENT INC SEI

Melissa Heise

Corporate Marketing and Human Resources Director,
Swiderski Equipment, Inc.

Governor's Task Force on Workforce and Artificial Intelligence

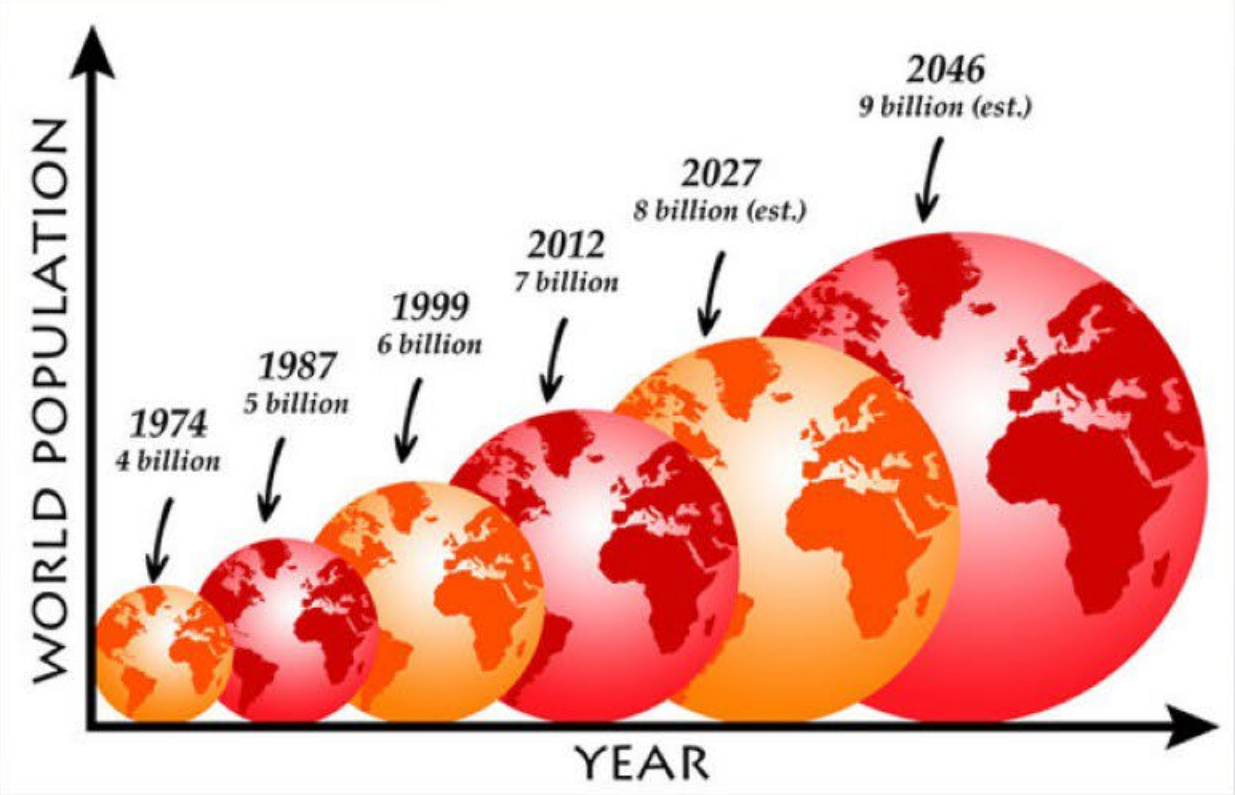
Technology Opportunities in Ag Equipment

Melissa Heise, Corporate Marketing & HR Director

Swiderski Equipment Inc.

Farmers face the same challenges as any other business or industry…

- *Rising cost of inputs*
- *Declining resources*
- *Labor shortage*



Technology, Data & Automation…Oh My!

- *Tractors are no longer just 4 wheels & HP*
- *Minimize inputs & maximize yields*
- *AGCO + Precision Planting (2017)*
- *New Holland + Raven (2021)*
- *AGCO + Trimble (2024)*
  - *Single largest ag tech deal in the industry (to-date)*
  - *Precision ag revenue expected to exceed $2.0B by 2028*

Data Driven Decisions

- *Efficiency*
- *Accuracy*
- *Control*
- *Data, data, data!*

- ***Autonomy is the goal.***


AUTONOMY

Grower/Producer Integration

- Introduces a whole new world of opportunities for customers
  - Aligning technologies
  - Retrofitting older equipment
  - Training employees
- There is no single solution across agriculture…yet!

Industry Opportunities

- *Opens a whole new world of opportunities for our industry*
- **…and Swiderski Equipment!**
  - Precision Solutions Division
    - Combining skills sets
    - Creative training & up-skilling
    - New employee opportunities

Speaker Q&A

Governor's Task Force on Workforce and Artificial Intelligence

Draft Task Force Action Plan

Governor's Task Force on Workforce and Artificial Intelligence

Education

Education Policy Proposals

Universities of Wisconsin

- Investments in AI research
- Curricular development and pedagogical enhancements for improved teaching and learning
- EAB Navigate – advising toward student success
- Faculty recruitment and retention in AI fields

Wisconsin Technical College System AI Initiatives

Government

Government Policy Proposals

Wisconsin Department of Administration

- Incentivizing the implementation of AI solutions and infrastructure to increase effectiveness, efficiency, and workforce opportunities
- Broadband expansion and accessibility
- Office of Data and Privacy
- Interagency Technology Governance Work Group


Workforce Development

Workforce Development Policy Proposals

Wisconsin Department of Workforce Development

- Enhanced apprenticeship infrastructure to account for technological advancements, including AI, in trades and industry
- Worker Connection to increase access to training for workers displaced or otherwise affected by AI in the workplace
- Artificial intelligence layoff aversion program

Workforce Development Policy Proposals (cont.)

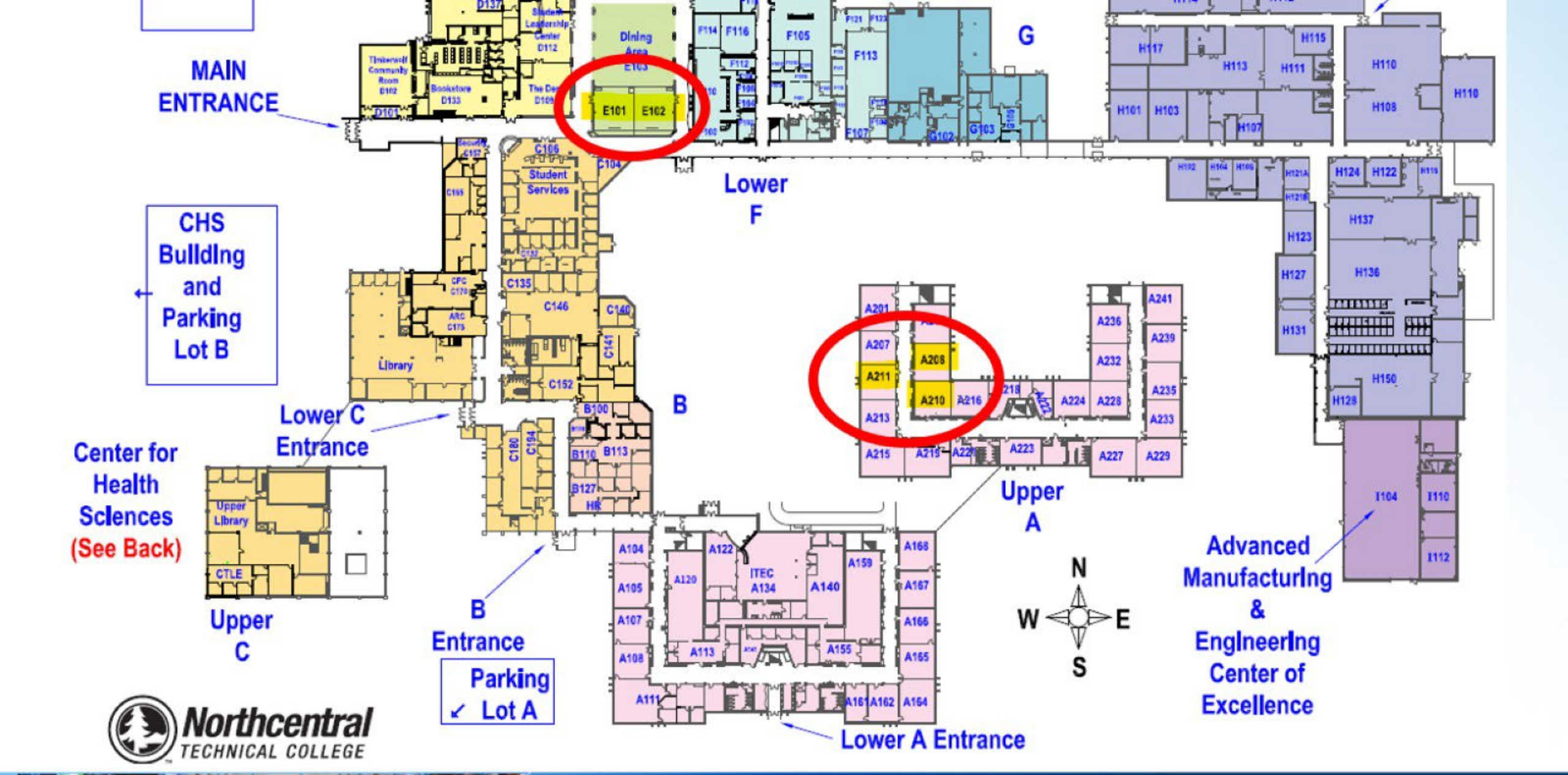
- Wisconsin Fast Forward AI expansion funds for employer-led worker training; workforce retention; community tech hub training, and K-12 technology and training
- AI workforce talent pipeline
- AI digital literacy campaign
- Enhanced statewide data infrastructure to answer AI and workforce related questions

Economic Development

Economic Development Policy Proposals

Wisconsin Economic Development Corporation

- AI supports for Wisconsin businesses
- AI innovation hubs
- AI roadmap for Wisconsin businesses



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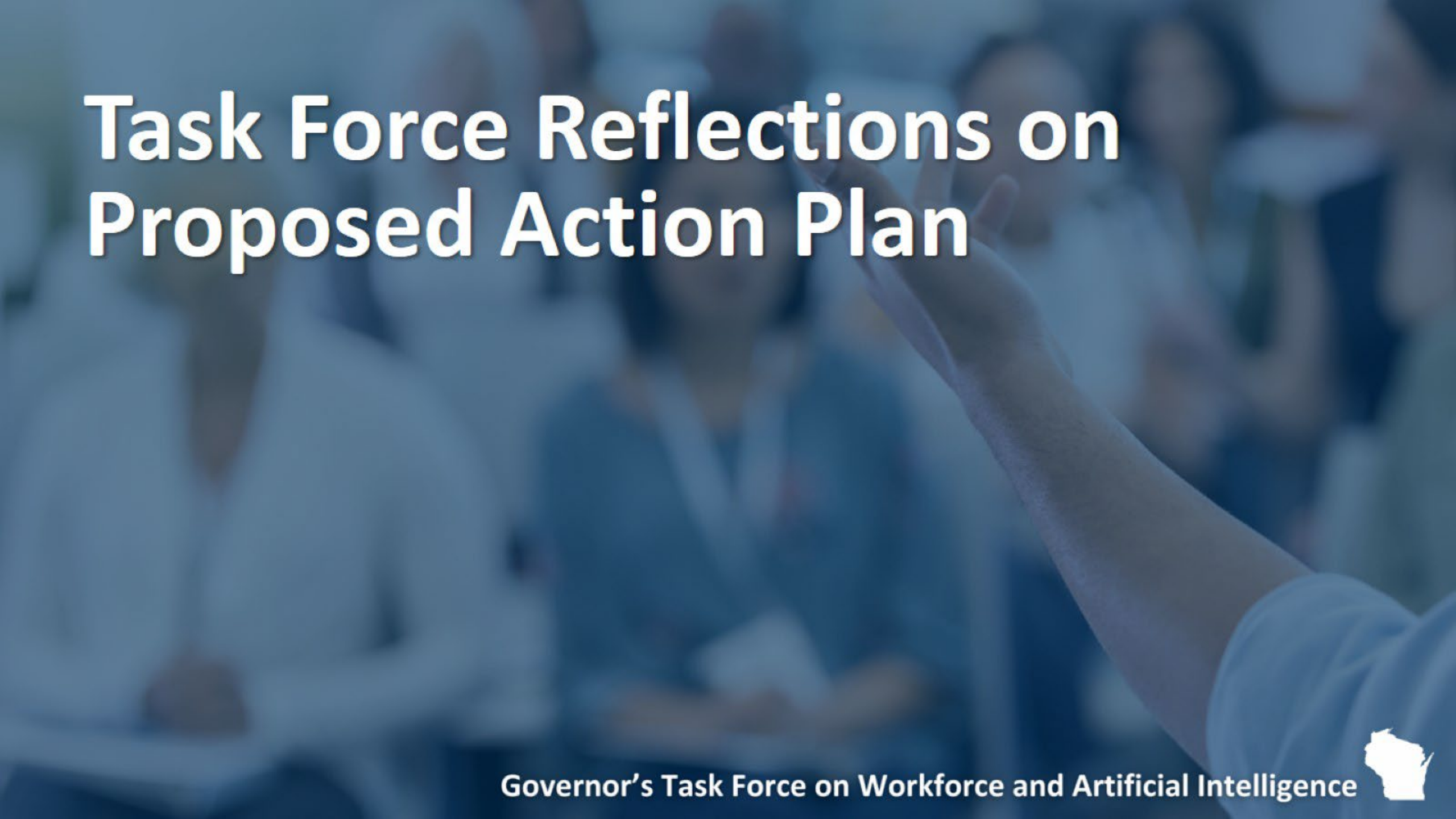
Task Force Reflections on Proposed Action Plan



Governor's Task Force on Workforce and Artificial Intelligence

October 2023

CONVENE

Identify priorities, working groups, processes, timelines, and expected outcomes/ deliverables.

December 2023

FIRST REPORT

Report out from Industries, Occupations, and Skills, and Equity and Opportunity Subcommittees on priority opportunities and challenges related to workforce and AI.

January 2024

SECOND REPORT

Report out from the Industries, Occupations and Skills; Equity and Opportunity; and Workforce Development and Educational Solutions Subcommittees on potential initiatives to advance workers, employers, job seekers, and a thriving economy.

March 2024

TOPIC REPORT

Report out from the Workforce Development and Educational Solutions Subcommittee plus staff on proposed guiding principles and initial policy concepts related to education, government, workforce development, and economic development. The concepts will incorporate the priorities and initial findings of the two other subcommittees as well as labor market data and other research findings.

May 2024

INITIAL SUMMARY

Provide initial summary of findings and proposals as well as draft final report content.

July 2024

ACTION PLAN

Provide final presentation and approve action plan.

Governor's Task Force on Workforce and Artificial Intelligence

Questions?

Thank You

Governor's Task Force on Workforce and Artificial Intelligence