



NEBRASKA EXTENSION
DIGITAL AGRICULTURE



Institute of Agriculture and Natural Resources
PLANT PHENOTYPING

Perspectives on Digitization of United States Agriculture

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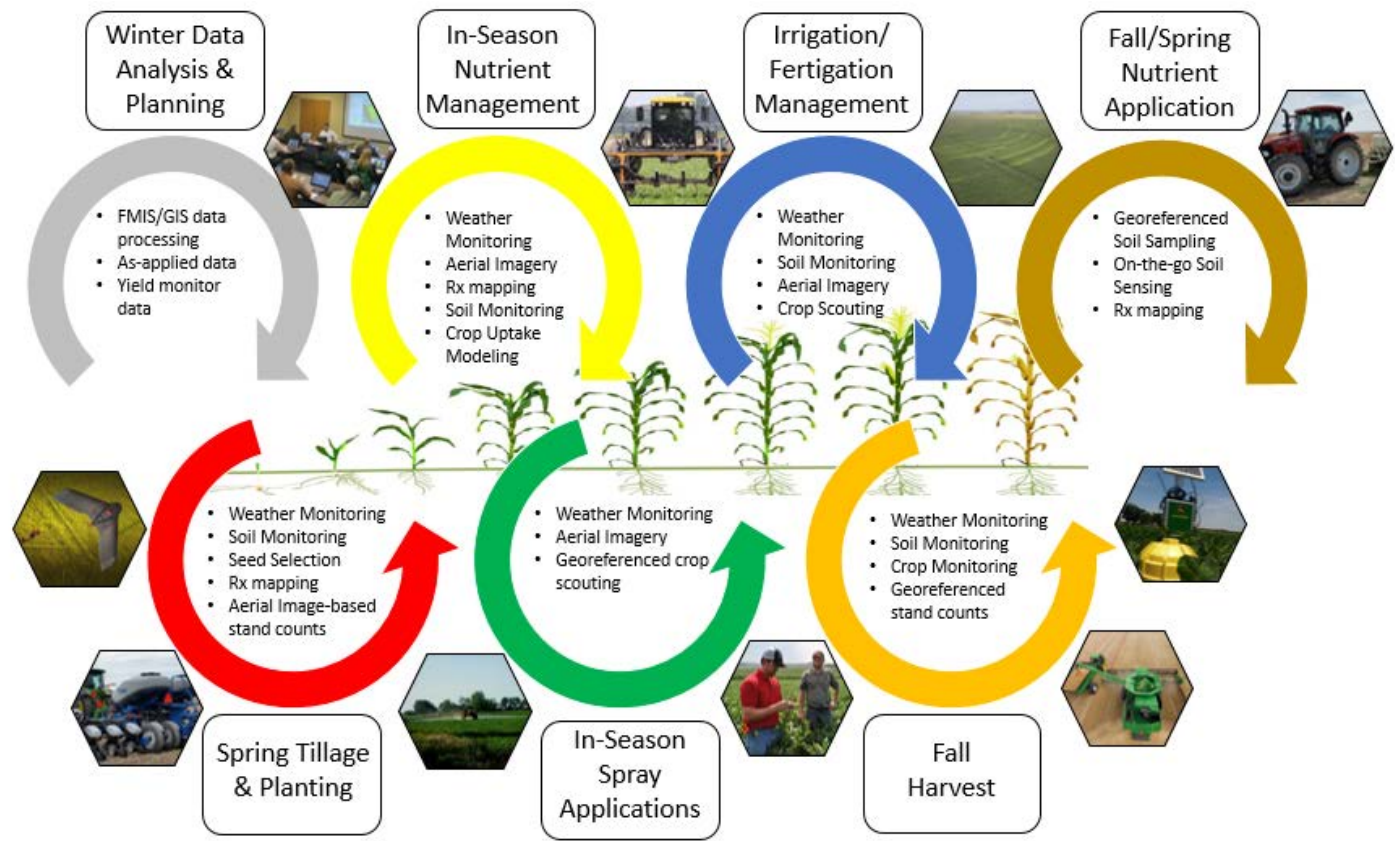
@UNLBigData



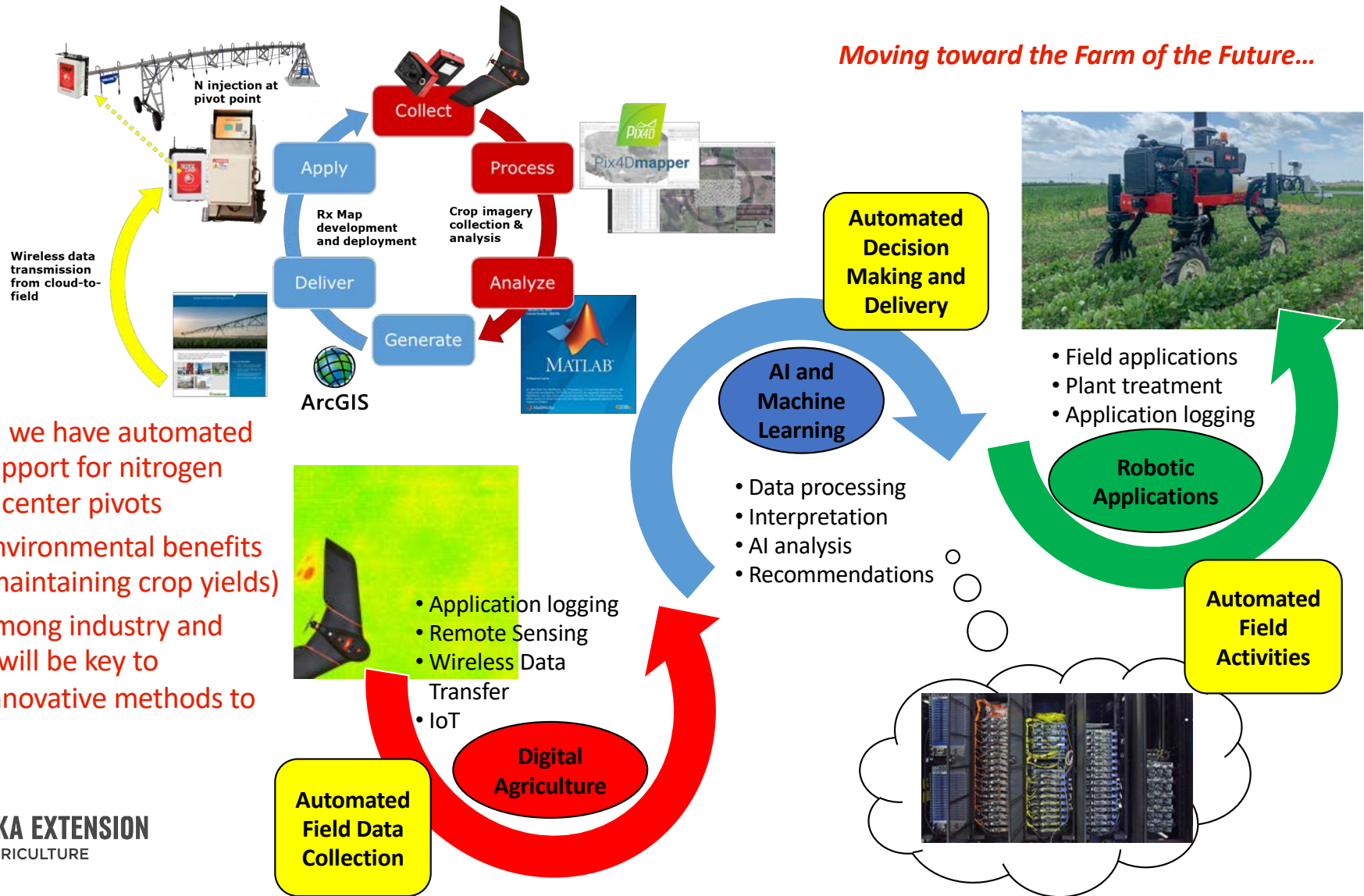
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The need for digitization and automation of U.S. crop production...

- U.S. farm sizes continue to increase which means more acres to manage, with less available labor
- Sustainability and resiliency will continue to drive crop input management decisions
- Cloud-based, data-driven decision support systems and automated solutions are the future of agricultural production
- Nearly every aspect of the cropping system today can be digitized
- Decisions occur often throughout the growing season and can rely on data collected and shared remotely



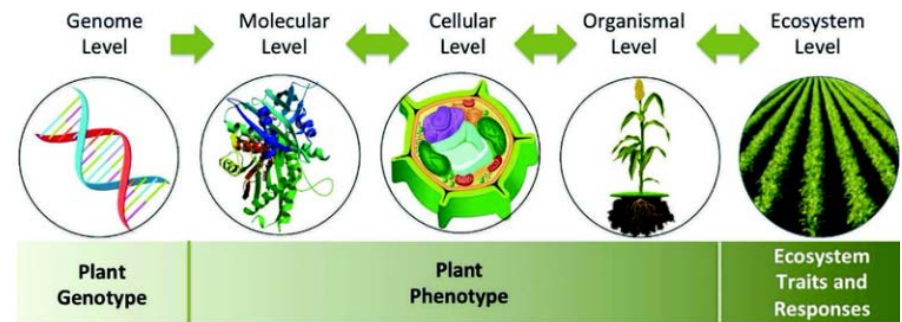
Moving toward the Farm of the Future...



- As an example, we have automated the decision support for nitrogen application via center pivots
- Potential for environmental benefits is high (while maintaining crop yields)
- Partnerships among industry and public entities will be key to transitioning innovative methods to practice

The Importance of Plant Phenomics

- Phenome: the collection of the measurable plant traits, visible or invisible
- Enable full utilization of the genomics data and tools
- Address critical societal needs: global food security, environmental sustainability, and shortage of agricultural labor forces.
- Stimulate advanced agricultural technologies and emerging data science.



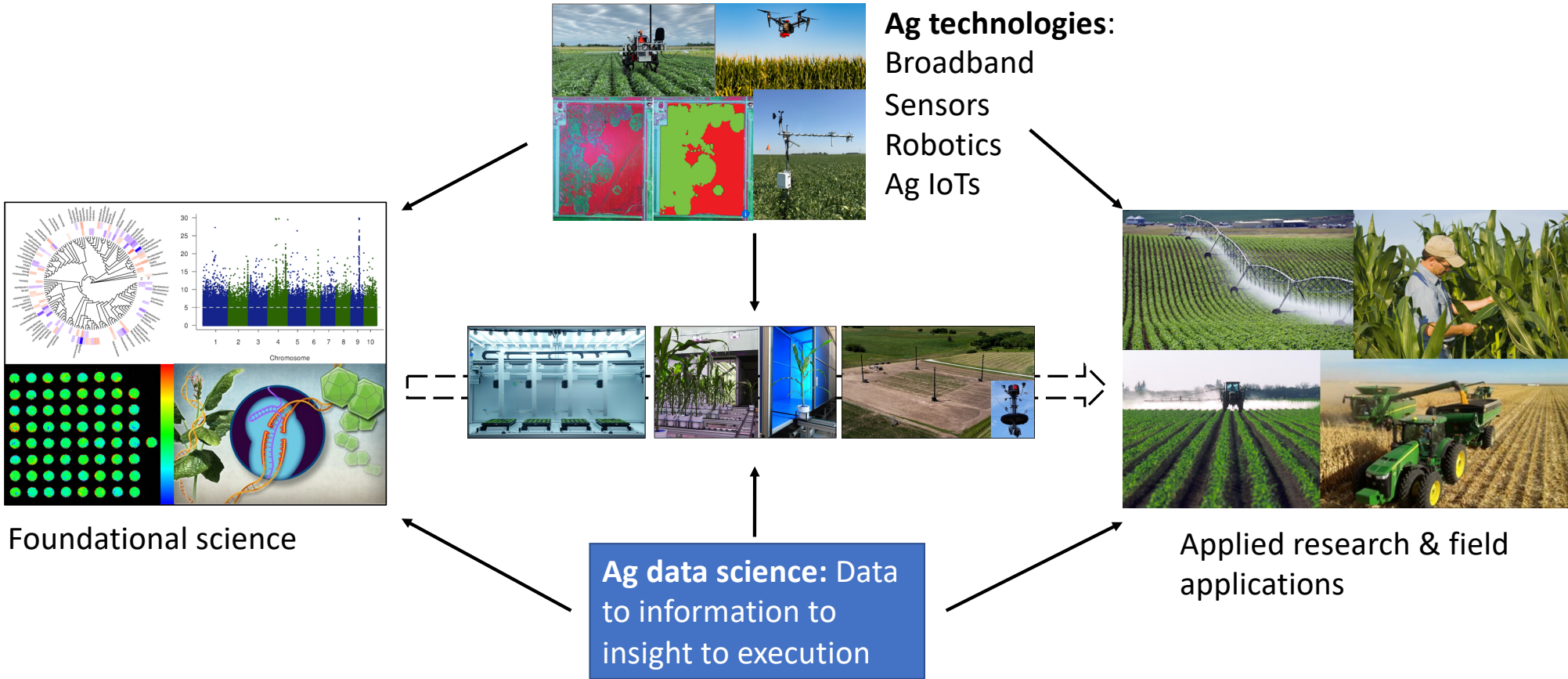
<https://arpa-e.energy.gov>



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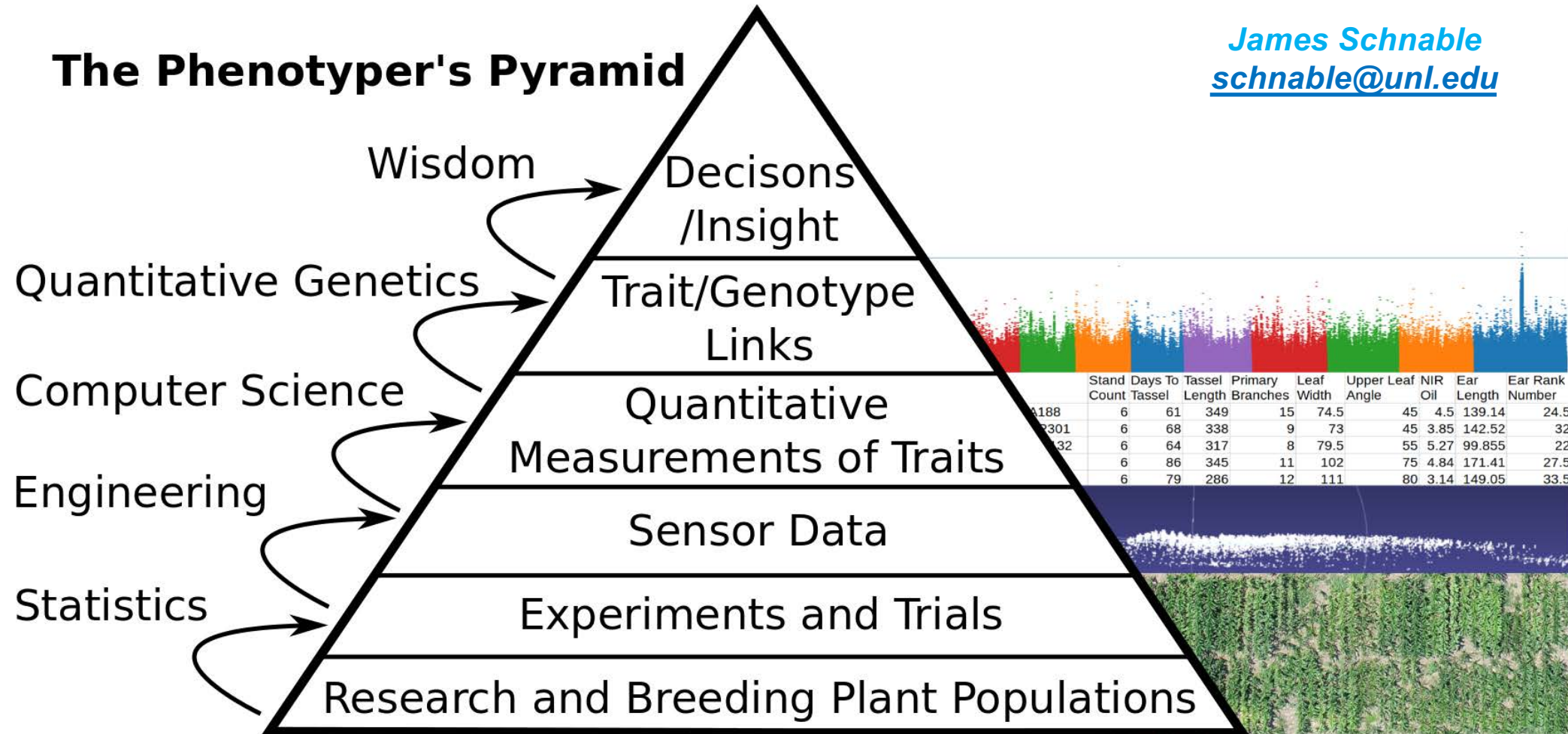
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Plant phenomics connecting foundational plant science with agricultural practices



The Phenotyper's Pyramid

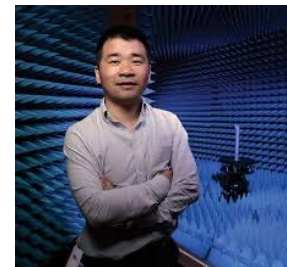
James Schnable
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Each layer depends on information from the layer below yet requires different sets of expertise and the use of techniques from different fields. Data Science!

Digital Solution for Nitrogen:

Farmers will make choices that optimize cost/benefit. Economical, fast turn-around nitrate testing can: 1) increase farmer profitability; 2) decrease energy use; and 3) reduce environmental footprint of agriculture.

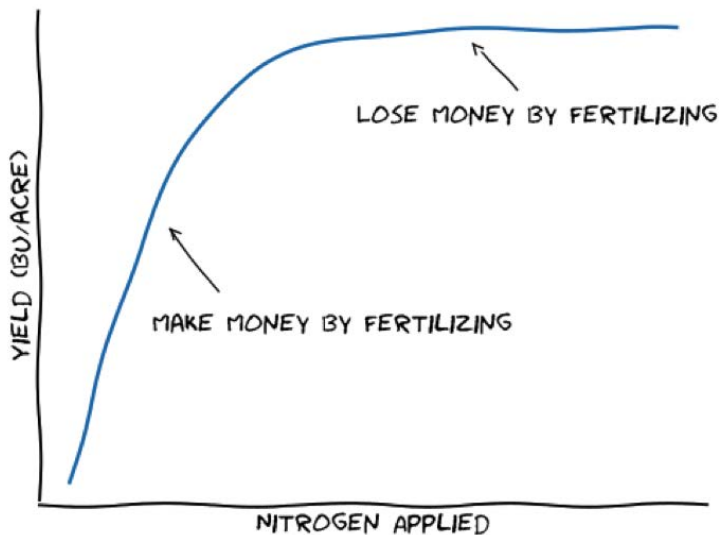


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This curve changes from field to field and year to year.



Prototype nitrogen stalk sensor in variable N rate maize trials in Nebraska



Bring engineers to the cornfield



Iowa Engineers and Nebraska Agronomists



ARPA-E Funded Collaboration between the James Schnable Lab@UNL and Liang Dong Lab@ISU



AG2PI: Creating a Shared Vision Across Crop & Livestock Communities

<https://ag2pi.org>

Overall objective: to assemble a transdisciplinary community
and to prepare this community
for an anticipated large-scale R&D effort in AG2P

Sub-objectives:

- Develop a shared vision for AG2PI
- Identify research needs, opportunities, and gaps in methods, technologies, physical infrastructure, and data management
- Support seed projects for solutions to identified challenges
- Communicate and disseminate findings of all activities through white papers, websites, and other scientific publications



University
of Idaho



AG2PI: Creating a Shared Vision Across Crop and Livestock Communities

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People



- Project Investigators
- Scientific Advisory Board



Institutional Involvement



- Partner Organizations
- Global Engagements
- Stakeholder Organizations