FOUNDATION FOR FOOD & AGRICULTURE RESEARCH

Unlocking the Agricultural Data Revolution

September 24 & 25, 2020 | Virtual Conference

Introduction and Context Setting

Agriculture and food systems are complex and rapidly changing and we are currently at a critical juncture for agriculture as we undergo a major shift in data and digitization. Data enables us to better serve everyone - from farmers to consumers to the environment itself - while simultaneously creating a more sustainable and healthier world. As climate change impacts worsen and the need for resilient systems increases, the value of data only grows. We have an opportunity for unprecedented coordination and collaboration in this space to truly effect change.

However, this is not without complexity. Despite the widespread recognition of data's value, using and optimizing agricultural data remains a challenge. The Foundation for Food & Agriculture Research (FFAR) recognizes the importance of collaboration to address the complex challenges and the opportunities that exist across the agriculture data landscape. In November of 2019, FFAR along with key stakeholders hosted an inaugural convening entitled "A Dialog on Agricultural Data Ownership and Value Creation" at the Tri-Societies International Annual Meeting: Embracing the Digital Environment. The results of that convening indicated a need for continued connection and discussion, which led to a follow up event: Unlocking the Agricultural Data Revolution held on September 24-25, 2020, which focused on how agricultural data is transformed into information and decision-making through novel approaches for data analysis while managing and maintaining privacy and protection for the farmers and consumers whose data are being utilized. The Foundation for Food & Agriculture Research (FFAR), in collaboration with the Conservation Technology Information Center, the Institute for Research on Statistics and its Applications (at the University of Minnesota), the Minnesota Supercomputing Institute, Open Rivers Consulting Associates, OpenTEAM, Purdue University Oats and the University of Minnesota GEMS

initiative, aimed to identify areas where we can implement existing technologies and address gaps that are preventing better utilization and application of these data.

Objectives and Outcomes

"Unlocking the Agricultural Data Revolution" was not designed as a stand-alone meeting, but a series of engaging dialogues centered around unlocking new value from agricultural data by developing and connecting more organizations around this critical topic. These dialogues were framed as a pre-conference webinar series which covered a wide range of topics including the barriers, agricultural data privacy, organizational roles and how organizations evaluate potential opportunities and culminated in a two-day virtual conference. For more information on the preconference webinar series, please visit the landing page here.

The two-day virtual conference was focused on cross-sector collaboration and leveraging the ability to analyze and use agriculture data through a coordinated data strategy. As agriculture becomes increasingly data-dependent, the importance of providing producers with decision-making support grows. Agricultural and food systems are critical and building for the future requires significant shifts in the use of agricultural data and ensuring that farmers feel secure in the use of their data and empowered in their data ownership. The wide variety of ongoing work in this field accelerates the development of technologies; but has yet to address the lack of coordination, protection and strategy alignment across the supply chain which added layers of complexity. This report summarizes the objectives and outcomes of Unlocking the Agricultural Data Revolution, hosted online September 24 and 25, 2020.

Overarching Conference Objectives:

- Focus on the two sides of data:
    - The ability to manage it well (e.g., privacy, interoperability)
    - How to utilize it fully (e.g., innovative research, answering farmers questions)
- Bring together a diverse group of participants who are active in various parts of this work.
- Create a series of engaging dialogues for facilitating the significant opportunities in the use of agricultural data and digitalization.

- Elevate and engage students' involvement in this research and practice area

Key Outcomes

To provide attendees with the most value, this conference was designed with several with the following clear outcomes in mind:

- **Networking**: Attendees gain a clear sense of who is involved in the agricultural data revolution.
- **Planning for Action**: Attendees leave with a strong understanding and sense of action items of what we can do to improve data usage in agriculture.
- **Exploration & Research**: The conference provides attendees with a view of possible and existing research that answers tough questions in agriculture.
- **Cross-Sector Engagement**: Incorporate of other viewpoints and perspectives across sectors, including from other industries
- **Seeding the Future**: The conferenceand supporting activities, engages and involves the next generation in these significant questions through the student competition.
- **Encouraging Further Exploration and Interaction:** In advance of the conference, we hosted four webinars discussing agricultural data privacy, how organizations are stepping up to the challenge and what is at stake for farmers and beyond. The webinars were intended to prep and inform attendees and encourage them to come to the event in September with questions around these topics for our speakers and panelists. For more information, see the "References and Resources" section at the end of this document.

To create an engaging and informative virtual environment, the conference included a variety of formats, including cross-sector panels, technological demonstrations, a student poster competition and breakout sessions for participants to interact directly with speakers.

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Agenda

Thursday, September 24, 2020: Data Research, Applications and Impact

All times EST.

11:00 AM **Welcome & Opening Remarks**

- Dean John Coleman, College of Liberal Arts, University of Minnesota
- Dean Brian Buhr, College of Food, Agriculture and Natural Resources, University of Minnesota
- Dean Karen Plaut, College of Agriculture, Purdue University
- Executive Director Sally Rockey, Foundation for Food & Agriculture Research

11:30 AM **The "burning platform" - what's at stake for agriculture and data?**

- Ranveer Chandra, Chief Scientist, Microsoft Farmbeats
- Moderated by Dorn Cox, Farmer & Researcher, Wolfe's Neck, OpenTEAM

12:30 PM **Building sustainability and resilience: the role of data**

- Kellee James, Founder & CEO, Mercaris
- Steve Rosenzweig, Soil Scientist, General Mills
- Meredith Ellis, Rancher, G Bar C Ranch
- Moderated by Amanda Raster, Science Director, U.S. Farm and Ranchers in Action

1:00 PM **Integrating data in a private partnership: the PIP consortia for indoor plants**

- Roger Buelow, Chief Technology Officer, AeroFarms
- Mohammed Oufattole, Vice President of Research & Development, Benson Hill
- Steve Graves, Vice President of Business Development, Fluence
- Moderated by John Reich, Scientific Program Director, Foundation for Food & Agriculture Research

1:35 PM **Ideation breakouts on key topics**

- Imagine what's possible by sharing interoperable data - Phil Pardey, Professor, University of Minnesota
- Analyze this - data analytic techniques - Senait Senay, Researcher & Adjunct Assistant Professor, University of Minnesota
- Improving sustainable agriculture production with data - Steve Rosenzweig, Soil Scientist, General Mills

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- Collaborating and creating with farmers - Aaron Ault, OADA Project Lead and Senior Research Engineer, Purdue OATS
- Running successful healthy private public partnerships - Rod Snyder, President, Field to Market

3:00 PM **Demonstration of innovative applications of data and technologies**

- Jenette Ashtekar, Vice President of Sustainability & Regeneration, CIBO Technologies
- Jay McEntire, Founder & CEO, Arva Intelligence
- Chelsea Carey, Working Lands Research Director, Principal Soil Ecologist, Point Blue Conservation Science
- Moderated by Mike Komp, Executive Director, Conservation Technology Information Center

4:00 PM **Wrap-up and closing remarks**

4:10 PM **Virtual networking (optional)**

Friday, September 25, 2020: Data Privacy and Management

11:00 AM **Opening & Welcome**

11:10 AM **Barriers for access and diversity in ag: overcoming the digital divide**

- Kellee James, Founder & CEO, Mercaris
- Meredith Ellis, Rancher, G Bar C Ranch
- LaKisha Odom, Scientific Program Director, Foundation for Food & Agriculture Research
- Moderated by Dorn Cox, Farmer & Researcher, Wolfe's Neck, OpenTEAM

11:35 AM **Student poster presentation**

- "Hyper-local Soil Management Made Possible: Handheld Reflectometer Informed by Bayesian Analysis of Local and Remote Data" - Xinyi Tu
- "Dynamic High-Precision Field Shape Generation via Combine GPS Tracks" - Yaguang Zhang
- "CONTxT" - Alex Layton

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12:50 PM **Data privacy: where's the benefit?**

- Barath Raghavan, Assistant Professor, University of Southern California
- Michael Sykuta, Associate Professor, University of Missouri-Columbia
- Trey Hill, CEO & President, Harborview Farms
- Moderated by Kevin Silverstein, Scientific Lead for the Research Informatics Solutions, Minnesota Supercomputing Institute

1:20 PM **How industries outside of ag overcome data challenges**

- Pasha Sternberg, Associate of Tech Transactions & Data Privacy Practice, Polsinelli
- Samit Shah, Executive Director of Growth Analytics, Aetna
- Moderated by Shefali Mehta, Founder & Lead Principal, Open Rivers Consulting Associates

2:05 PM **Demonstration of data and technologies facilitating data management**

- Rikin Gandhi, Co-Founder & Executive Director, Digital Green
- Aaron Ault, Farmer and Farmware, Trellis & Purdue OATS
- Liron Brish, CEO and Founder, Farm Dog
- Moderated by Dennis Buckmaster, Professor, Purdue OATS

3:05 PM **Breakout sessions on critical topics in data usage**

- Supply chain/logistics management with data - Corina Ardelean, Manager of Product Management, Data Integration & Logistic Management, Global Fuse - AGCO
- Data privacy and cybersecurity - Barath Raghavan, Assistant Professor, University of Southern California
- Improving the data pipeline and interoperability - Rikin Gandhi, Co-Founder and Executive Director, Digital Green and Lin Nease, HPE Fellow and IoT Chief Technologist, Hewlett Packard Enterprises (HPE)
- Creating and managing healthy data privacy and standards- Jim Wilgenbusch, Director of Research Computing, Minnesota Supercomputing Institute and Michael Sykuta, Associate Professor, University of Missouri-Columbia
- Overcoming pre-competitive challenges - Samit Shah, Executive Director of Growth Analytics, Aetna

3:40 PM **Call to action, next steps and closing remarks**

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Insights and Key Takeaways

With over 440 registrants and representation from 6 different countries, the event brought together academia and students, industry, NGOs and nonprofits, government, farmers and farmer organizations, as well as trade associations. The breadth of registrants and attendees highlighted the importance and urgency of this topic and was a testament to the desire to engage in meaningful discussion of these challenges.

This event demonstrated the opportunities to bring together different disciplines and backgrounds to solve the major agricultural challenges facing us today and the role that data and technology plays in the shift towards sustainable and resilient agriculture. Building on earlier discussions, this event revealed significant gaps in how the agriculture industry collects, shares, manages and utilizes data. Throughout these panels, a clear need for widespread collaboration emerged. The demonstrations and experts ***revealed the wealth of knowledge at all levels of the supply chain - but failure to share the data lessens its value. While the data exists, it is impossible to optimize at the individual leveland these types of big challenges require diverse perspectives across the value chain.***

Many panelists highlighted the value of field-level data, collected by producers. ***It is critical to explore ways to engage and connect with producers to facilitate data sharing and support decision-making on the ground. Clear communication about how, where and why producer-collected data is being utilized is absolutely essential to encourage future data sharing and to bring the most value to producers***. Discussions revealed the current gaps between research and producers and the opportunity to design outreach focused on building trust.

Similarly, the meeting emphasized the criticality for designing research and programs that take historical distrust and accessibility barriers into account. ***Allocating resources early-on demonstrates a commitment to producers in this work and builds trust required for true data interoperability.***

Finally, experts from other industries revealed and reinforced ***the significant opportunities that lie ahead for agricultural data and digitization*****.** The lack of regulation and standardization around agricultural data provides an exciting opportunity to design a system that worksand is built with all the different players in mind. There is a need to design comprehensive security and data privacy protocols to encourage field-level use of emerging technologies. Designing clear guidelines and policies for data privacy and consent will improve interoperability and facilitate much-needed data sharing. As the speakers continuously emphasized; the data exists and is being collected, but there are no clear data-sharing standards or agreements to allow for wider use. Other industries, such as healthcare, have demonstrated how to collect, protect and optimize user-generated dataand there is a clear gap in the current regulatory environment of the agricultural industry.

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At the core of these conversations is the ongoing reminder that data is an integral part of what producers are doingand bringing data to life in the field benefits us all. Finding ways to utilize existing tools to translate data into knowledge and knowledge into action is key; and will be facilitated through novel and established partnerships, continued discussions and a commitment to building relationships across the supply chain to truly unlock the possibilities within agricultural data.

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Participants highlighted several challenges and opportunities they would like to explore:

"Technology adoption across scale - what works, what needs improvement and what is ready to be discarded"

"Data standards that allow disparate data sets to be joined and analyzed"

Scale

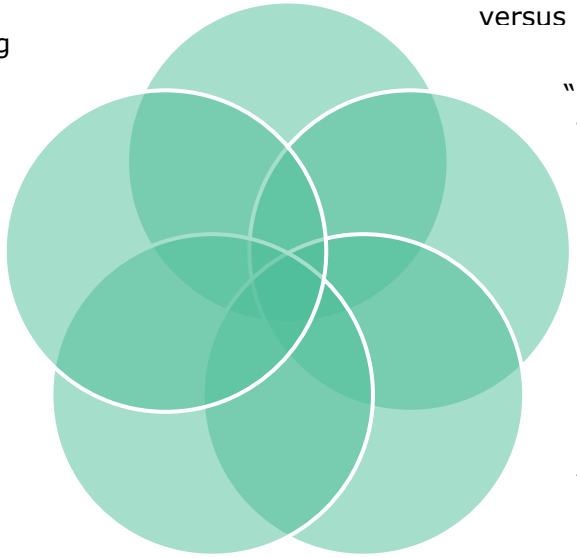
"I'm really interested in data use at different scales...a lot of "big data" doesn't feel relevant to [small scale farmers] … but they are really interested in how to use data as a tool for growing AND to influence policy"

"Needs regarding access to agricultural data - perspectives from innovators and technology creators versus perspectives from farmers"

"Anything related to turning data into actionable decisions on the farm"

Data becoming decisions

"How can researchers better include farmers in the research process; from forming collaborative research questions to performing data analysis"



"Data needs of small and rural farmers...broadband access"

Access

"How do we help farmers leverage the data revolution to their advantage...is it possible to level the playing field"

"Equity or justice in access to and control over technology and data"

Collaboration and data sharing

"The opportunity to interact with people working [at companies] and the people working in academia"

"Enabling access to farm level data for research while protecting farmer data privacy"

"Model agreements for data use and aggregation, preserving privacy and control"

Privacy and Ownership

"Licensing and registration, regulation"

"Who owns the data collected from farmers; Do farmers maintain the right to use their data"

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Next Steps

Providing space and opportunities to connect data across the value chain is essential to continue unlocking the value of agricultural data and digitizationand exploring the possibilities for building resilience throughout our food system. With such a broad landscape of players, this work can benefit from continued networking opportunities to facilitate connectivity and collaboration. FFAR has continued to engage with several key stakeholders as well as the conference working committee to address and explore the opportunities to continue this work.

Calls to Action:

1) Future convening

2) Movement around agricultural data privacy

3) Focus around interoperability

Join the Conversation!

FFAR looks forward to continuing to build strong public-private partnerships within the agriculture community and welcomes your input. Please feel free to contact Dr. LaKisha Odom at lodom@foundationfar.org to learn more about how you can engage with FFAR.

To stay up to date on future funding opportunities, please join the FFAR Newsletter mailing list: https://foundationfar.org/newsletter-signup/

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The Mission and Vision of the Foundation for Food & Agriculture Research

As a major component of our research, we conduct science that results in thriving farms, environmental resilience and well-being.

We build public-private partnerships to fund audacious research addressing the biggest challenges in food and agriculture.

Our world is changing rapidly. The global population is increasing, climate change is causing extreme weather events and natural resources are diminishing. FFAR brings together leading experts to identify and investigate the researchable questions whose answers have the potential to enhance the economic and environmental resilience of our food supply.

We envision a world in which ever innovating and collaborative science provides every person access to affordable, nutritious food grown on thriving farms.

We believe that this common goal can be met by working together with our research community of nonprofits, foundations, governments, individual researchers and producers, colleges and universities and companies who can support and implement the science we need. Our research aims to achieve this vision by producing food in an economically and environmentally sustainable way. Part of our role in this collaborative effort is to convene individuals and groups who can pool creative ideas, expertise and resources so that we can make a difference, together.

Event Partners

- Institute for Research on Statistics and its Applications (IRSA) at the University of Minnesota
- GEMS Agro Informatics Initiative and Minnesota Supercomputing Institute (MSI), University of Minnesota
- OpenTEAM
- Purdue Open Ag Technology and Systems Center (Purdue OATS), Purdue University
- Conservation Technology Information Center (CTIC)
- Open Rivers Consulting Associates

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References and Resources

Webinar Series

In preparation for the virtual conference, there were four webinars discussing agricultural data privacy, how organizations are stepping up to the challenge and what is at stake for farmers and beyond. View the individual webinar recordings by clicking on the links below or by visiting the webinar series event page.

Webinar 1: Community Call to Action: What do we need to Unlock the Ag Data Revolution?
This webinar discusses why we chose to hold "Unlocking the Ag Data Revolution", the organizations involved with this convening and the areas we would like to address. The latter half of the webinar covered the limitations and constraints that prevent us from fully utilizing data and digitization in agriculture.

Speakers: Shefali Mehta (Open Rivers), Ankita Raturi (Purdue University), Kevin Silverstein (University of Minnesota)

Webinar 2: Retrospective on the 2019 Data Privacy Panel
This webinar reflects on the Data Privacy meeting held in San Antonio, Texas in November 2019. The webinar discusses the key motifs in the data privacy discussion from who is impacted to the concerns and potential solutions. The panel also explored advances in this area since the November 2019 discussion. More details and materials from the November 2019 meeting can be found below.

Speakers: Mike Komp (CTIC), LaKisha Odom (FFAR), James Wilgenbusch (University of Minnesota)

Webinar 3: Farmers' Perspectives on Agricultural Data & Decision Making
This webinar looked at the importance of data and research from the producer perspective. The webinar explores how the agricultural industry is unique in its ability to merge public and private research effortsand the importance of interoperability. The panel also discusses the real impact of data on farming and the role of open-source data.

Speakers: Aaron Ault (Purdue OATS), Dorn Cox (OpenTEAM), Meredith Ellis (G Bar C Ranch)

Webinar 4: Ag Tech Answering the Farmers' Needs
This webinar focuses on how ag tech is involving and innovating to meet the needs of farmers. The panel shares their insights on the major barriers to apply ag tech in existing space, what's driving the adoption of ag tech and what is still needed in science and technology.

Speakers: Karen Hildebrand (Amazon Web Services), Wade Kent (Syngenta), Abinaya Konduru (M25), Billy Tiller (Grower Information Services Cooperative), moderated by Bryan Runck (University of Minnesota)

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Many thanks to our working committee members for their hard work and support!

Working Committee for the "Unlocking the Agricultural Revolution" Convening Event

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