



## Foundation for Food and Agriculture Research Convening Event Summary Report

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### Breaking Down the Barriers: Overcoming Obstacles to Innovation Adoption Across the Food System

*November 30 – December 1, 2017 | Washington, D.C.*

On November 30 – December 1, the Foundation for Food and Agriculture Research (FFAR) held a convening meeting at the Association of Land-grant and Public Universities in Washington, D.C., to analyze barriers to adoption of innovations and technological advances aimed at improving agricultural sustainability. This event provided a unique forum for thought leaders across diverse sectors to identify knowledge gaps, high-impact targets for FFAR program development and opportunities for cross-sector collaboration.

The event agenda, individual presentations, and graphic recordings from the event can be viewed [here](#).



*Participants of the FFAR Convening Event on barriers to innovation adoption.*

### Forging the Innovation Pathway to Sustainability Challenge Area

Through this Challenge Area, FFAR aims to understand the barriers and decision-making processes that prevent the adoption of technology and research results across the U.S. food system. As part of FFAR's mission to **build unique partnerships to support innovative science addressing today's food and agriculture challenges**, FFAR is seeking groundbreaking research that investigates, across the agriculture and food production system, the adoption dynamics and distribution patterns of technologies and practices that incorporate the latest research results, identifies factors that affect their adoption, and recommends solutions for addressing barriers. FFAR aims to continue to leverage public-private partnerships to fund the most innovative research to address these important challenges, forge greater food security and decrease negative environmental impacts by tackling barriers to innovation adoption across the food system.

## Goals of the Convening Event

The goal of this event was to address issues that impede the adoption of innovation, where research support from FFAR would have the greatest impact.

Attendees explored areas of research and scientific innovation related to:

- How trends in farming and food production practices and structures, consumer tastes, and agro-food industries impact innovation.
- Public, private and nonprofit sectors' role in stimulating adoption of innovations in food and agricultural production chain.
- Examples of successfully adopted innovations (both low cost and large capital intensive) – lessons learned.
- Identifying common barriers to adoption of innovations across the food and agricultural production chain, and research gaps in this area.

*“The most innovative and impactful research programs are informed by broad expertise and stakeholder input. On behalf of the Foundation for Food and Agriculture Research, thank you to the attendees of this event for your engagement on the important topic of innovation adoption. We look forward to advancing research on addressing the barriers to innovation adoption across the food system.”*

-Sally Rockey, Ph.D., FFAR Executive Director

Throughout the three panel discussions featuring prominent experts in the field, attendees were encouraged to engage in active exchanges with the panelists, which led to a rich discussion of the challenges in innovation adoption.



A snapshot of a graphic recording from the FFAR convening event on barriers to innovation adoption.

## Convening Event Overview

Dr. Sally Rockey, FFAR Executive Director, provided opening remarks, including a brief introduction to FFAR. One objective of the event was for attendees to learn from one another's experiences and unique perspectives. Bringing diverse stakeholders together to leverage collective knowledge, the event was designed to uncover opportunities for new research that could inform more effective and data-driven solutions.

Dr. Rockey's remarks were followed by an overview of the agenda and meeting objectives presented by FFAR Senior Scientific Program Director, Lucyna Kurtyka, who oversees the Challenge Area on Forging the Innovation Pathway to Sustainability.

## Plenary Sessions and Panel Discussions

The morning **plenary session** was moderated by Dr. Sheila Reddy, Associate Director of Strategic Initiatives at the Nature Conservancy. In the introduction to the session, Dr. Reddy explained the difference between invention and innovation, and noted that not all bright ideas have to be implemented. The plenary session set the stage for the day's discussion on barriers to innovation with talks covering the following topics:

- Definition of innovation across the food system.
- Research needs on motivation and barriers to innovation adoption based on the review of the U.S. literature.
- Novel successful technology transfer and adoption models.
- Innovative approaches to engaging potential innovation adopters.

Following the plenary session, the **first panel** discussion was moderated by Constance Cullman, President of Farm Foundation, and addressed research needs on motivations and barriers to innovation adoption across the food system. The objective of this session was to encourage participants to challenge how they think and talk about research in the hope of producing innovative approaches that would bring game-changing solutions and the “why” and “how” that research can be accomplished.

Each panelist provided a brief overview of the issues affecting innovation adoption and opportunities to overcome barriers to adoption based on their experiences and research findings to-date. Challenges identified by this panel included:

- Improving the perception of One Health approaches by challenging the current system.
- Transformation of the labor system in U.S. agriculture.
- Growing opposition to new technologies results in a growing cost to innovate and move products through the regulatory process.
- Adoption of innovation in agriculture takes longer than in other areas (e.g., automobiles, fossil fuels).
- Conflation between economic/social perspectives and producing the best arguments for alternate courses of action.
- Differing views from social scientists about what innovation is acceptable.
- Creating value in the food chain – the organization models are a challenge in agriculture.

## PLENARY SESSION: SETTING THE STAGE

### Moderator

Sheila Reddy, Ph.D., The Nature Conservancy

### Panelists

Gregory Graff, Ph.D., Colorado State University

Linda Prokopy, Ph.D., Purdue University

Mojdeh Bahar, J.D., USDA Agricultural Research Service

Charles (Chuck) Hibberd, Ph.D., University of Nebraska-Lincoln

## PANEL 1: IDENTIFYING RESEARCH NEEDS ON MOTIVATIONS AND BARRIERS TO INNOVATION ADOPTION ACROSS THE FOOD SYSTEM

### Moderator

Constance Cullman, Farm Foundation

### Panelists

Ilaria Capua, Ph.D., University of Florida

Paul Thompson, Ph.D., Michigan State University

Bryan Norton, Georgia Institute of Technology

Steven Sonka, Ph.D., University of Illinois at Urbana-Champaign

- Land altered by human activities but not repurposed to provide public services (challenges in land restoration). These changes are mostly irreversible and must be addressed with a very long temporal horizon, rather than short-term approaches.
- Need to involve users of innovation in the development process and allow more time for engaged product development to meet user needs.
- Recognizing the importance of user values and understanding that values are not constant in time.
- Recognizing that “big data” is innovation in itself. Data management across the food system is critical. An example is a sector-wide Digital Value Chain Strategy for the Australian red meat and livestock industry. The strategy is being crafted and executed by Meat and Livestock Australia, a farmer-based organization. It aims to enable the capture, integration and interpretation of data generated within the livestock industry through a range of new technologies. It is designed to empower participants at every point in the value chain through data-driven commercial decision making. It also aims to address the cultural change required across the value chain to embrace the digital strategy and resulting technology and innovations.

Dr. Linda Prokopy of Purdue University moderated the **second panel**, which provided the innovator’s and user’s perspectives, the latter one focusing on farmers and farmland owners. Challenges/barriers to innovation adoption identified by this panel included:

- The Innovator’s Perspective
  - Range of difficulties--from “selling” the vision to stakeholders (early stage), to research and development to commercialization (middle stage), to regulatory issues (late stage).
  - Need to engage regulators early in the development process to avoid regulatory burdens related to launching and using the product.
- The User’s Perspective
  - Avoiding mistakes made with introduction of crops derived through biotechnology when introducing innovative products or technologies.
  - Working with new generation of farmers; understanding and developing incentives that attract younger people to agriculture.
  - Addressing generational changes.
  - Understanding how fluctuation in net farm incomes and return on investment affect innovation adoption.
  - Engaging and explaining to land owners the value of technology to the environment.
  - Understanding “social license” for what one can do.
  - Lacking clarity about who owns data generated on farm.



PANEL 2: A HOLISTIC VIEW  
ON BARRIERS TO ADOPTION  
INNOVATION AIMED AT  
IMPROVING AGRICULTURAL  
SUSTAINABILITY



**Moderator**

Linda Prokopy, Ph.D., Purdue University

**Panelists**

Ken Giles, Ph.D., University of California, Davis

Blake Hurst, Missouri Farm Bureau

Randy Dickhut, Farmers National Company



The afternoon **plenary session**, moderated by Dr. Sheila Andrew from the University of Connecticut, focused on digital approaches for programs, research, extension and corporate engagement and their impact on innovation adoption. The session also looked at technology with a focus on the internet and its effect on the food system. Challenges identified during this session included:

- Need for agricultural research with social and behavioral components embedded within the research.
- Understanding the impact of innovation on family structure.
- Importance of activating the Cooperative Extension network in local communities.
- Need to research innovations that have been successfully adopted, looking at drivers/motivations for adoption as precedents.
- Need to weave discussions of ethics into the development process.
- Evolution of the Internet (from information to actions—a global network of autonomous robots and intelligent systems).
- Artificial Intelligence and machine learning are optimized for speed and scalability, not liability and oversight.
- Open source and “do it yourself” communities provide shared resources and create low-cost alternatives, but they are not integrated with institutional research.
- Engineered food systems come with great opportunity, but the rush to commercialize may outweigh benefits.

The final, **third panel** provided a platform to discuss institutional and legal structures on technology transfer and translation. This session was moderated by Dr. Gregory Graff of Colorado State University. Key challenges identified by this panel included:

- Governance/regulatory considerations for innovation adoption
  - Issue framing
  - Who decides what gets developed? Focus on innovations that are needed, not simply on an idea.
  - When/where does governance occur? How does it differ from regulation?
  - Balancing (e.g., pre- and post-approval oversight, science- and value-based concerns)
  - Speed of policy/decision-making commensurate with urgency of need.

## AFTERNOON PLENARY SESSION

### Moderator

Sheila Andrew, Ph.D.,  
University of Connecticut

### Panelists

Christine Geith, Ph.D.,  
eXtension Foundation

Rebecca Chesney, Institute for  
the Future

### PANEL 3: IMPACT OF INSTITUTIONAL AND LEGAL STRUCTURES ON TRANSFER OF INNOVATIONS INTO COMMERCIAL PRACTICES

### Moderator

Gregory Graff, Ph.D., Colorado  
State University

### Panelists

Larisa Rudenko, Ph.D., DABT,  
Massachusetts Institute of  
Technology

David Rejeski, Woodrow  
Wilson Center

William Tucker, Ph.D.,  
University of California, Davis

Sam Khoury, Next Stage  
Partners

- Single country vs. regional decision-making vs. *post hoc* harmonization.
- Need to inform the regulatory process by scanning for new products and processes that could present novel risk pathways.
- Need to develop a long-range strategy for risk analysis of future biotechnology products, focused on identifying and prioritizing key risks for unfamiliar and more complex biotechnology products.
- Need to build and maintain the capacity to triage products entering the regulatory system.
- Public sector strategies for technology commercialization—challenges for academic institutions
  - What protection (if any) is needed to stimulate commercialization (e.g., patent, copyright, trademark)?
  - Who funds the data generation to take the technology from the laboratory to the field and eventual commercialization?
  - Startups are important in technology development and validation. Who and how to support them financially and operationally?
  - Universities are not equipped to address regulatory issues. Who will move the technology through the regulatory system and take it to the market? And who will fund that move?
- Private investment risks
  - Issues related to the understanding of complex technologies, commercialization risk, and conversion to business use.
  - Regulatory burdens.
  - Competition and market needs.
  - Competition between a new upcoming innovation and the currently established technologies of mainstream industry.
  - Long sales cycles vs. changing customer behavior.

## Challenges & Research Questions

During the convening meeting, participants were given the opportunity to work in small groups during “at-your-table” discussions to identify pressing challenges and research gaps to innovation adoption. The outcomes of these discussions are presented in the Appendix.

From the individual comments gathered, the image on the right represents the challenges that were identified, many of which align with those identified during the “at-your-table” discussions. The main challenges identified during these discussions included:

- Regulatory burdens;



Challenges identified by individual participants during the FFAR convening event.

- Public acceptance of innovation in the food system;
- Data management – risk, privacy, and ownership;
- Economic barriers to innovation and innovation adoption;
- Lack of access to data, especially those generated by the private sector, and
- Lack of consideration of social values.

## Next Steps

Recommendations from this convening event and from the FFAR Innovation Pathways Advisory Council will be used to inform FFAR research priorities in innovation adoption, including the development of future funding opportunities at FFAR that may take the shape of requests for applications (RFAs), prize competitions, and/or direct-funding of a multi-partner public-private consortium to achieve FFAR’s research objectives.

In addition to these efforts, FFAR will offer funding opportunities under the 2018 [Seeding Solutions program](#). This will be an open call to the scientific community to come forward with bold, innovative, and potentially transformative research proposals in each of FFAR Challenge Areas, including Innovation Pathways. Please [visit our website](#) to find out more information on our current opportunities.

## Join the Conversation on Barriers to Innovation Adoption

Submit your comments, questions, and suggestions or tell us about your research on barriers to innovation adoption online: <http://bit.ly/ffarbarriers>.

*Many thanks to our steering committee for their support of this event!*

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### Steering Committee for Breaking Down the Barriers: Overcoming Obstacles to Innovation Adoption Across the Food System

<i>Sheila Andrew, Ph.D.</i>	<i>University of Connecticut</i>
<i>Mojdeh Bahar, J.D.</i>	<i>USDA Agricultural Research Service</i>
<i>Constance Cullman</i>	<i>Farm Foundation</i>
<i>Wesley R. Dean, Ph.D.</i>	<i>USDA National Institute of Food and Agriculture</i>
<i>Scott Dockum</i>	<i>USDA National Institute of Food and Agriculture</i>
<i>Greg Graff, Ph.D.</i>	<i>Colorado State University</i>
<i>Charles “Chuck” Hibberd, Ph.D.</i>	<i>University of Nebraska-Lincoln</i>
<i>Clint Nesbitt</i>	<i>Biotechnology Innovation Organization</i>
<i>Linda Prokopy, Ph.D.</i>	<i>Purdue University</i>
<i>Sheila M.W. Reddy, Ph.D.</i>	<i>The Nature Conservancy</i>

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*FFAR is also pleased to recognize the following event sponsors for their generous support:*

Platinum Sponsor



Special thanks to the Association of Public and Land-grant Universities for supporting this event.

### **Join Us**

FFAR looks forward to continuing to build strong public-private partnerships within the agriculture community and welcomes your input. Please feel free to contact our Scientific Program team at [innovation@foundationfar.org](mailto:innovation@foundationfar.org) to learn about how you can engage with FFAR.



## Appendix. Summary of “At-your-table” Discussions

The chart below summarizes “at-your-table” discussions that followed each panel discussion during the FFAR Convening Event, *Breaking Down the Barriers: Overcoming Obstacles to Innovation Adoption Across the Food System*. Participants at each table discussed barriers to innovation adoption and research that could address these barriers.

Identified Barriers	Research Questions/Ideas	Potential Collaborators
<ul style="list-style-type: none"> <li>• Turning collective perception into collective acceptance (social license)</li> <li>• Marketization of the Innovation</li> </ul>	<ul style="list-style-type: none"> <li>• How to stimulate acceptance of an innovation? How do we market innovation?</li> <li>• Develop a methodology for the dialogue with potential users.</li> <li>• Marketization - Develop a curriculum or a toolkit in a series of steps that could be reviewed and researched.</li> <li>• Identify the existing institutional mechanisms that support innovation.</li> <li>• Decide if there a need to have the stakeholder values discussion during the innovation pipeline development.</li> <li>• Determine the value of stakeholder engagement to the success or risks to innovation adoption across the value chain</li> <li>• Identify the greatest barrier between innovation and adoption</li> <li>• Develop scenarios that would bring political, social and other aspects that impact innovation</li> <li>• Conduct horizon scans of other technologies as they impact the food system?</li> <li>• Research to understand the tradeoffs of the implementation of new technology</li> <li>• Understanding the winners and losers of the supply chain as new alternative proteins come to market through scenario modeling</li> </ul>	<ul style="list-style-type: none"> <li>• Social license - Farmers, philosophers, manufacturers, consumers, retail associations (restaurants), foundations</li> <li>• Incubators, accelerators, Extension, international food manufacturing associations</li> <li>• Cooperatives</li> <li>• Regulatory agencies</li> </ul>
<ul style="list-style-type: none"> <li>• Lack of a trustworthy source of information</li> </ul>	<ul style="list-style-type: none"> <li>• Analyze trends in social media to anticipate outcomes</li> <li>• Identify the influencers</li> </ul>	<ul style="list-style-type: none"> <li>• Academic institutions ranging from conservation through biomedicine, members of</li> </ul>

Identified Barriers	Research Questions/Ideas	Potential Collaborators
<ul style="list-style-type: none"> <li>• Different values lead to different degrees of trust among groups</li> <li>• “Fake news”</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the users</li> <li>• Identify the consumers in the value chain</li> <li>• Identify the right level of transparency/information that would be a win-win for producers and consumers</li> <li>• Determine the value of having an institution that would organize and consolidate discussion across various groups</li> <li>• Research the dynamics of social acceptability as issues in the food system are discussed in social media</li> <li>• What are all the dynamics that are creating people’s positions?</li> <li>• Understanding the role of public opinion in creating niche markets</li> </ul>	<p>the public, foundations, the government</p> <ul style="list-style-type: none"> <li>• Stakeholders across the value chain</li> </ul>
<ul style="list-style-type: none"> <li>• On a macro level, user’s perception of the value of innovation</li> <li>• Lack of understanding that research does not equal innovation</li> </ul>	<ul style="list-style-type: none"> <li>• A review of the behavioral or ethical aspects that motivate innovation</li> <li>• How to incentivize people to adopt and innovate?</li> <li>• Understanding the value of innovations in other areas outside the food system</li> </ul>	

Identified Barriers	Research Questions/Ideas	Potential Collaborators
<ul style="list-style-type: none"> <li>• Innovation at the farm level is not happening at a fast-enough rate</li> <li>• Risk of adopting innovation and risk of failure</li> <li>• Lack of a consumer report-type of assessment of innovations available to farmers</li> </ul>	<ul style="list-style-type: none"> <li>• Determine the value of a proposition.</li> <li>• Utilize life cycle analysis as a tool to determine where the impact of innovation occurs</li> <li>• Map the attributes of innovations that were successfully adopted and those that failed</li> <li>• Engage producers from the beginning of the development process</li> <li>• Study network support for farmers to help capture learning and facilitate that process</li> <li>• Identify and gain better understanding of other, larger risk factors to farming</li> <li>• Need to develop a mechanism/system to evaluate technologies. Who could evaluate them?</li> <li>• What are the policies that could minimize risk of adoption?</li> </ul>	<ul style="list-style-type: none"> <li>• Generational aspects for stakeholders, encourage bringing in the younger generation and incorporating their values into the system</li> <li>• Individuals who could capture knowledge and facilitate transfer</li> <li>• Engage specifically with socioeconomically disadvantaged farmers</li> </ul>
<ul style="list-style-type: none"> <li>• Age of users</li> <li>• Difficulty in accessing space for young people</li> <li>• Limited ability to look at the big picture</li> <li>• Rapidly changing workplace</li> </ul>	<ul style="list-style-type: none"> <li>• The interface of humans and robots across the value chain and how this would encourage innovation</li> <li>• Identifying the barriers to new farmers</li> <li>• Funding projects that develop the next generation of leaders</li> </ul>	<ul style="list-style-type: none"> <li>• Academia, businesses, technical schools</li> </ul>
<ul style="list-style-type: none"> <li>• Issues around proprietary information/data</li> <li>• Privacy issues and data management – the relationship between farmer and owner of the data</li> <li>• A lack of standardization of Big Data</li> <li>• A lack of secondary market for aging innovation</li> </ul>	<ul style="list-style-type: none"> <li>• Lessons learned from the health sector in protecting the privacy of data</li> <li>• Looking at emerging industries and how we could work with IP pools</li> <li>• Research secondary markets (e.g., “cash for clunkers” program). How large is the secondary market?</li> <li>• Determine if there is a career force that can operate and service aging innovation.</li> <li>• Identify the opportunities to evaluate cybersecurity platforms to enable innovation across the supply chain</li> </ul>	<ul style="list-style-type: none"> <li>• Big retailers (e.g., Walmart), economists, people involved in the “cash for clunkers” idea, standardization community</li> </ul>

Identified Barriers	Research Questions/Ideas	Potential Collaborators
<ul style="list-style-type: none"> <li>• Regulatory burdens (especially for smaller companies)               <ul style="list-style-type: none"> <li>○ Categories for regulation are not flexible</li> <li>○ Lack of addressing regulatory protocols ahead of innovation release</li> </ul> </li> <li>• Perceived conflict of interest for sabbaticals in government institutions funded by private sector</li> </ul>	<ul style="list-style-type: none"> <li>• Address regulation using a pre-competitive collaborative model</li> <li>• What is the barrier to innovations being developed outside the U.S. and being adopted in the U.S.?</li> <li>• Can the regulatory environment help create a common set of data and how many innovations failed?</li> <li>• What regulations might we want to change as we look to future directions?</li> <li>• Communication about regulation should change to improve public trust</li> <li>• Research how innovation process works, how people can understand the regulatory process</li> <li>• Conduct legal research to determine how far the regulatory system extends</li> <li>• How to make platform regulation less burdensome?</li> <li>• Create clarity around regulatory guidelines</li> </ul>	<ul style="list-style-type: none"> <li>• Google, Amazon, and other players who demonstrate value of knowledge across the supply chain</li> <li>• Regulatory agencies</li> <li>• Developers, investors, private sector</li> <li>• Users</li> </ul>
<ul style="list-style-type: none"> <li>• Valley of death between innovation and adoption</li> <li>• Cost to ensure success before adopting an innovation regarding avoiding possible litigation</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluating the importance of local food markets vs. global food retailers – will local sources become more important?</li> <li>• How on farm experimentation could be encouraged?</li> </ul>	<ul style="list-style-type: none"> <li>• Local food producers, larger food producers, manufacturing and distribution</li> </ul>
<ul style="list-style-type: none"> <li>• Diminishing funding for basic research</li> <li>• Shift in values in land grant institutions to financial incentives</li> <li>• Some innovation is done outside the academia</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrating successful models of innovation that are working</li> <li>• Determining new research partnerships</li> <li>• What are emerging research partnership models?</li> <li>• How can we front load research with a participatory approach?</li> <li>• How could incentives for researchers be aligned?</li> <li>• How do you incentivize innovation?</li> </ul>	<ul style="list-style-type: none"> <li>• All stakeholders across the food system</li> </ul>