Advancing Digital Agriculture and Conservation: A Virtual, Multi-Day Policy Workshop

Farm Foundation

Farm Foundation is an accelerator of practical solutions for agriculture. Our mission is to build trust and understanding at the intersections of agriculture and society. We accomplish this by leveraging non-partisan objective dialogue, information and training, catalyzing solutions and creating multi-stakeholder collaboration. Our vision is to build a future for farmers, our communities and our world.

Since 1933, we have connected leaders across agricultural sectors—farming, business, academia, organizations and government.

Connect with us: farmfoundation.org

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Workshop made possible with the generous support of our sponsors and organizers:

Cornell Initiative for Digital Agriculture (CIDA)

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- During the webinar, participant audio will be muted.
- Participants can submit questions by clicking on the Q & A button at the bottom of their screens.
- When submitting questions, please include your name and company so questions may be contextually understood.
- Due to time limits, the moderator may not be able to ask all questions submitted.
- This webinar is being recorded and will be posted on our website at farmfoundation.org.
- If there are any connectivity issues during the webinar, we ask that you stay on the webinar as those generally rectify themselves after a few moments.

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Advancing Digital Agriculture and Conservation: A Virtual, Multi-Day Policy Workshop

Steven Wolf
Cornell University
Moderator

Katherine Baylis
University of Illinois

Jonathan Coppess
University of Illinois

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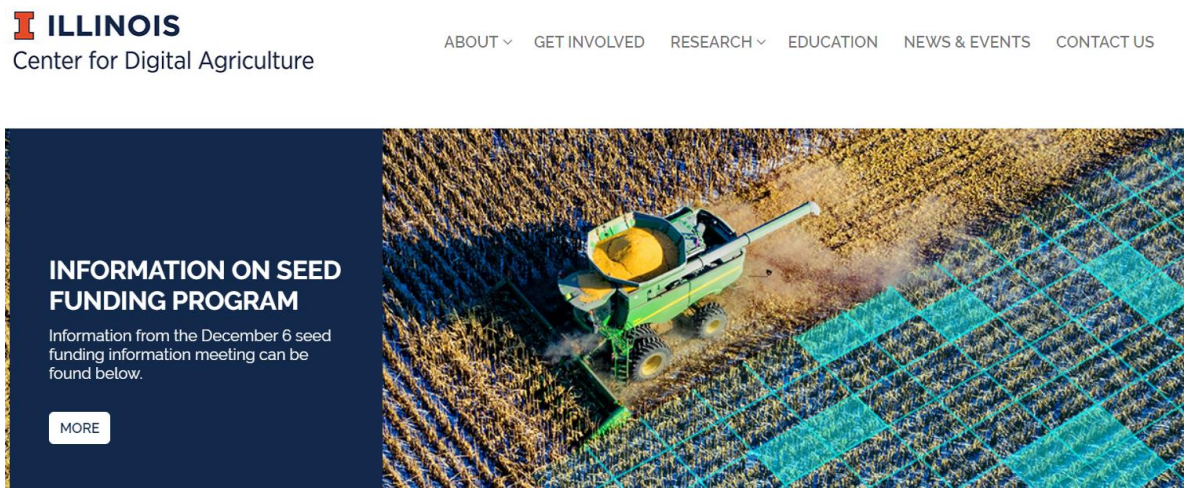
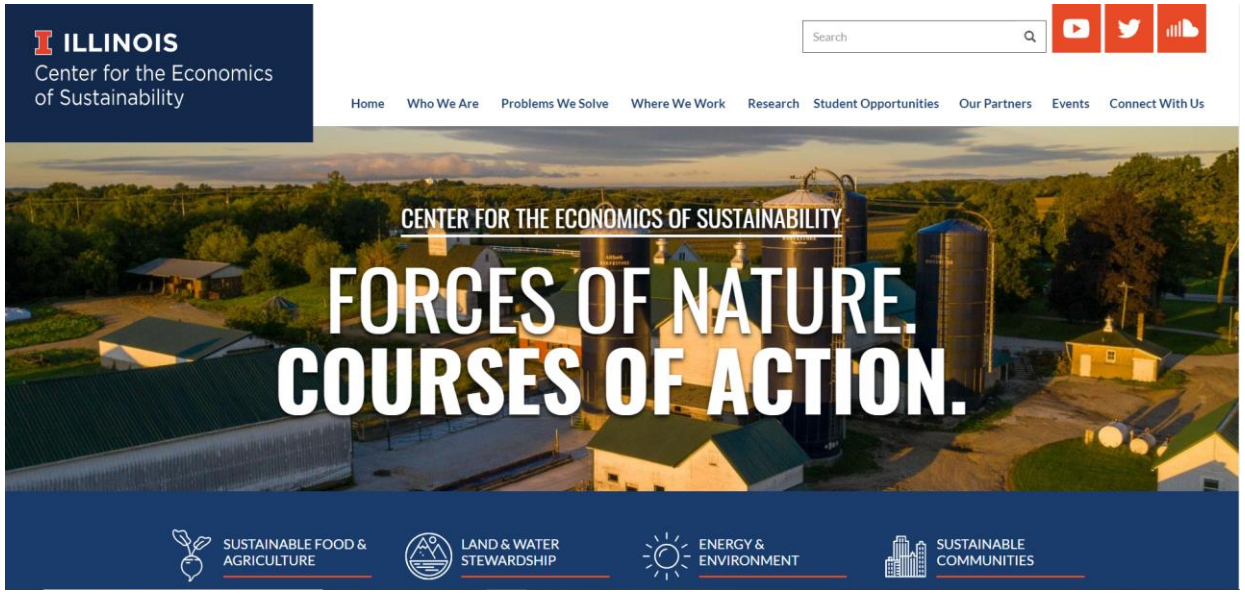
Digitalag.Illinois.edu

Farmdoc.Illinois.edu/policy

- Illinois Center for Digital Ag
- The Gardner Agriculture Policy Program
- CEOS

Gardner Agriculture Policy Program





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Cornell Initiative for Digital Agriculture

digitalagriculture.cornell.edu

- Over 100 faculty from 5 colleges
- Annual Digital Agriculture Hackathon
- Research Innovation Fund
- Curriculum
- External partnerships

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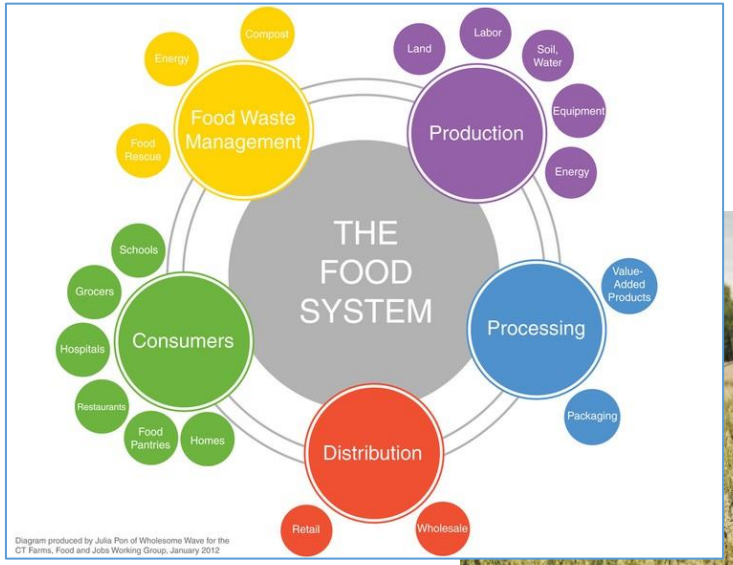
Environmental implications of the division of labor of a data-rich approach to farming? Policy implications?

Members from business, academia, government and the NGO sectors. Corporate annual turnover nearly 2 Trillion Euro

Four modes of analysis (at least)

- Value chains
- Farmers as rational economic actors
- “Betwixt and between” (i.e., farmer-centered political economy)
- Land and ecology



The policy stakes

- What are the policy implications of the divisions of labor?
- How can policy support development? What kind of development?
- How can policy shape development, and who decides in what way?

Session Three: Mobilizing Data for Conservation: On- and Off-Farm Perspectives

Panelists

Andrew Nelson

Farmer and Software Engineer, Nelson Farms, Inc., and Silver Creek Farms, Inc.

Christy Slay

Director, Technical Alignment, The Sustainability Consortium

Chuck Spencer

Executive Director, Corporate and Government Relations, GROWMARK, Inc.

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Andrew Nelson

Farmer and Software Engineer, Nelson Farms, Inc., and Silver Creek Farms, Inc.

Andrew Nelson is a fifth-generation farmer in the Palouse Region of Eastern Washington. Before moving back to the family farm, Andrew was a software consultant in the Seattle Area and led software teams in developing solutions for multiple Fortune 100 companies. Since he has moved back to the farm, he has increased the size of his operation by 50 percent. He continues to do software consulting for clients around the U.S., as well as manage his farm. His approach to technology on his farm is to make his operation run more efficiently, reduce costs, increase yield or improve the ground for future generations. His farm has hosted numerous members of the U.S. Congress, as well as international trade delegations. Andrew holds a dual degree from the University of Washington, a Bachelor of Science degree in computer science, and a Bachelor of Arts in business administration. He lives on the farm with his wife and two sons.

Microsoft

FarmBeats: Using Data to Advance Conservation

Andrew Nelson

Microsoft

Agenda:

- Drone Data Collection
- Panoramas for Precision Spraying
- Drone Precision Spraying
- Panoramas for monitoring field trials
- Sensor placement
- Micro-Climate

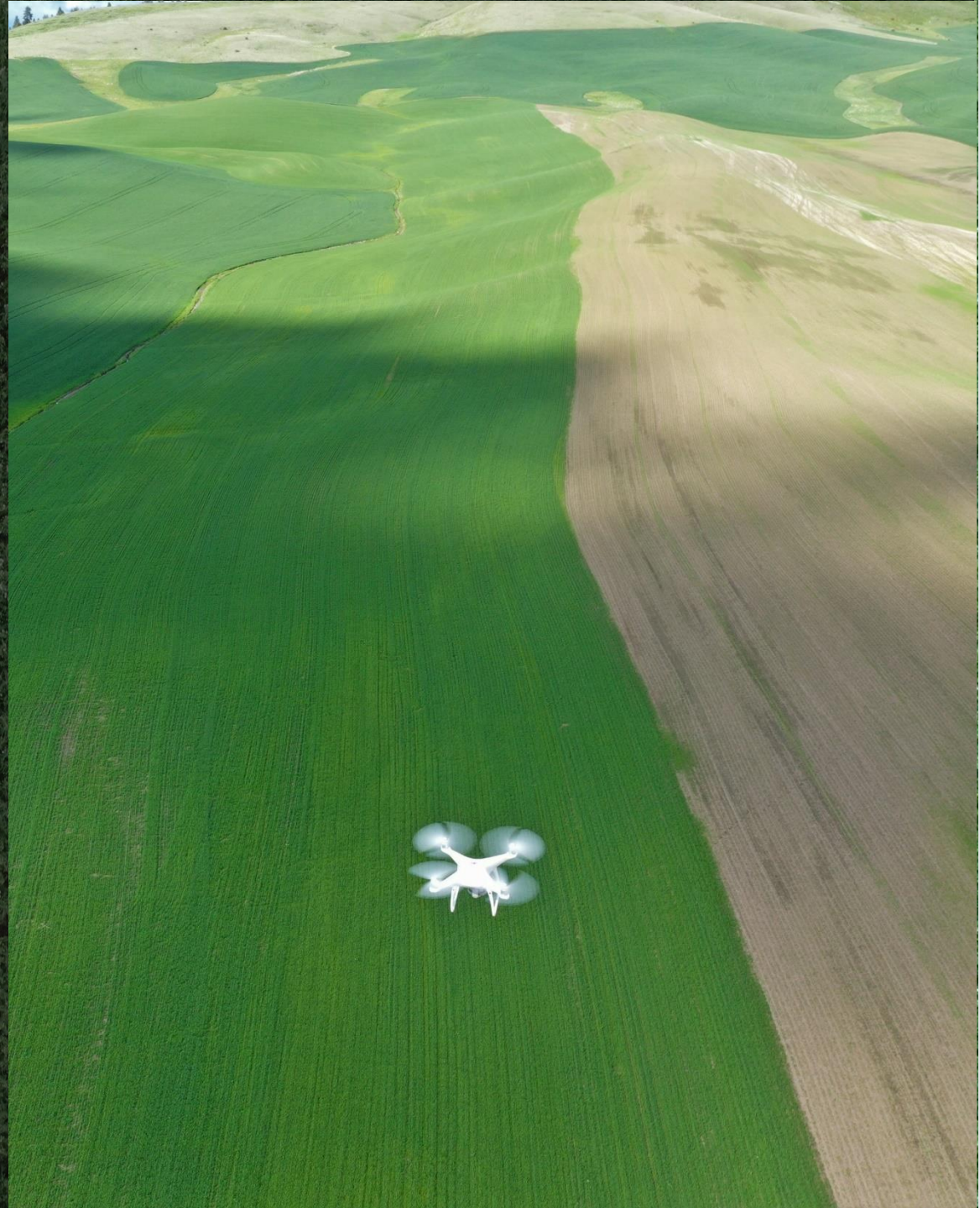
Data Collection – Intelligent Edge

Problem:

- Bandwidth on the farm is limited or the internet connection unreliable. Uploading stitched drone images and originals is very time consuming.

Solution:

- One click solution for imagery stitching.
- Intelligent stitching and uploading utilizing AI on a computer at the farm.
- Uploads to the cloud do not take all of the available bandwidth.
- If internet goes out, the data is still accessible.



Example: Panorama for Precision Spraying

Example: Drone precision spraying – Italian Rye

Example: Panorama for Direct Seed Field Trial

Precision Map : Sensor Placement

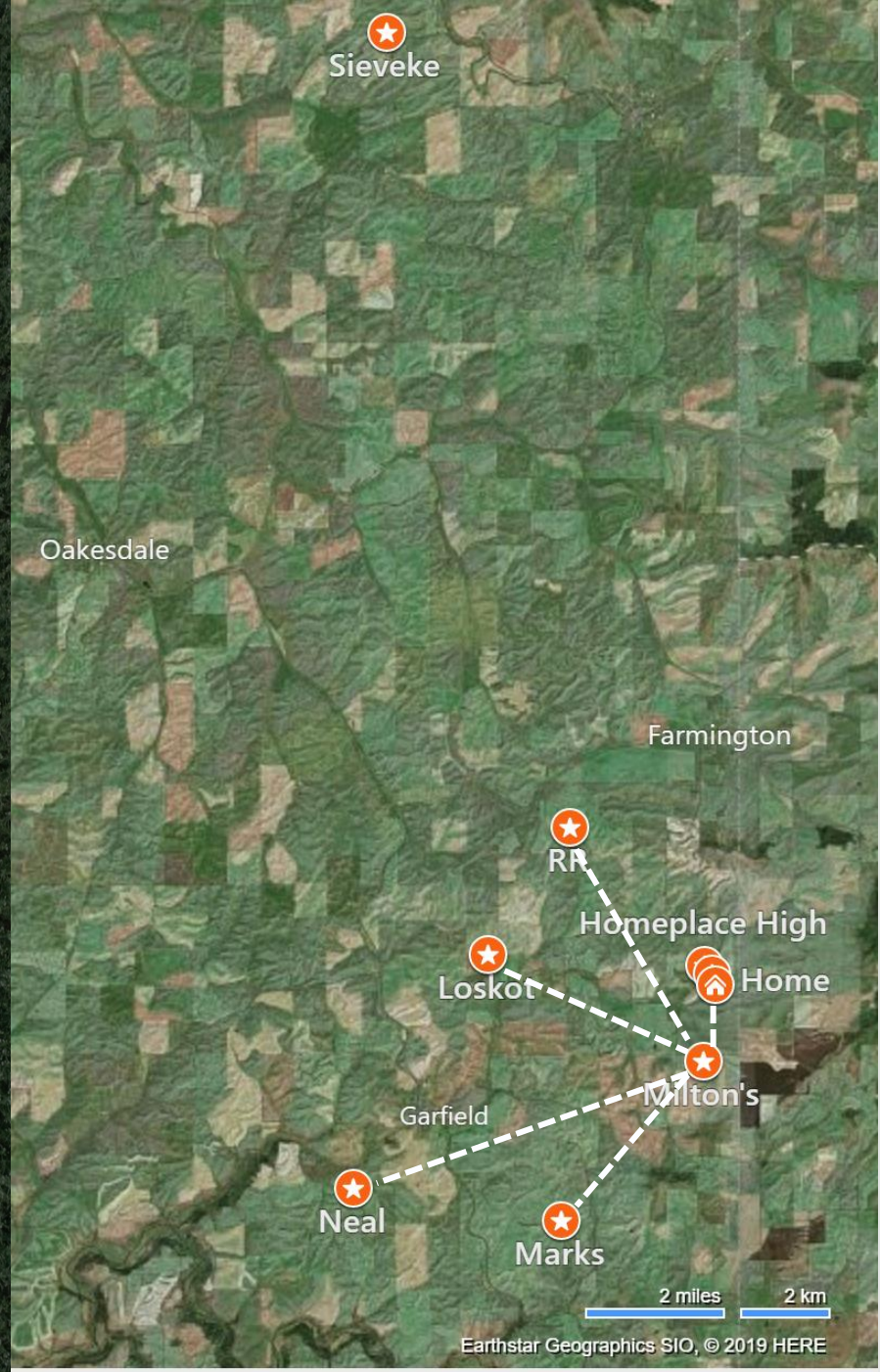
Micro-Climate Variability

Goal:
Have a better understanding of weather impacts on all fields and soil types.

Impact:
Knowing micro-climates enables better application timing, risk management, yield forecasting, and use of appropriate farming techniques.

Challenges:
The farm is spread out over 30 miles(through the air) and the terrain is very hilly. All the mountains around the farm make radar unreliable.

Real World Results:
Utilizing TVWS, we are able to get better coverage on the farm to be able to know what weather conditions are like in all fields. Aggregate data is used to show which fields would be best suited for different conservation practices.



Christy Slay

Director, Technical Alignment, The Sustainability Consortium

Christy Slay directs the technical alignment and partnership activities for The Sustainability Consortium (TSC) to develop a global, transparent, scientifically based measurement and reporting system for product sustainability. She leads efforts with strategic partners to ensure TSC's metrics, tools and reporting systems are harmonized and interoperable with existing initiatives. Slay leads TSC's Agriculture Metrics Task Force, which focuses primarily on data mobility solutions in agriculture supply chains and farm metrics alignment with key organizations. She also leads TSC's Commodity Mapping Program to develop spatial models for identification of agricultural and wood fiber source regions and works with companies to map their commodity supply chains and related environmental and social risks. Slay develops and leads hands-on training and field courses, as well as other projects to implement TSC tools within businesses.

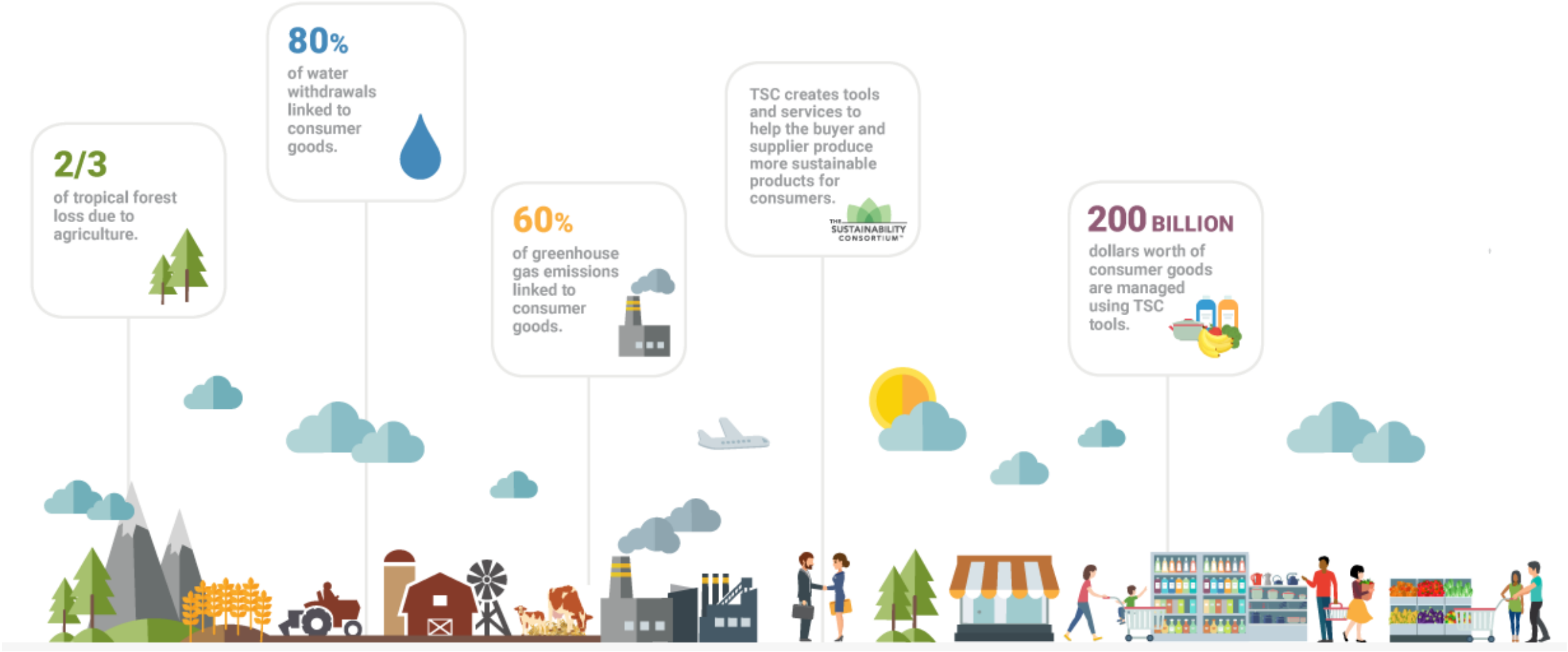
About The Sustainability Consortium (TSC)

All Consumer Products Sustainable

Science based **Stakeholder informed** **Impact focused**

TSC Translates the Science of Sustainability

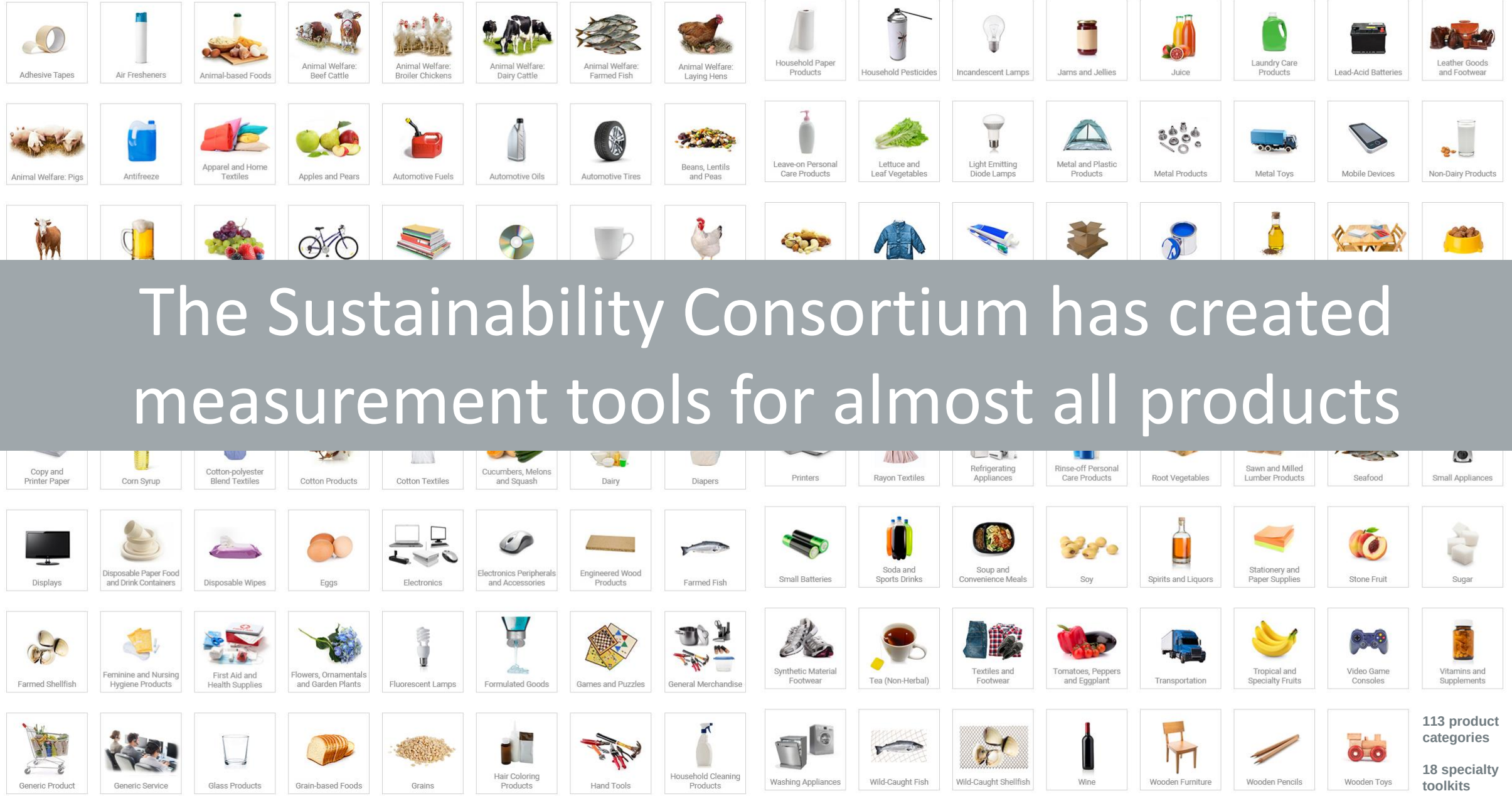
Helping suppliers and buyers address issues in supply chains



OUR MEMBERS

TSC members are leading together to drive action and innovation, making the everyday products we use better and more sustainable. Members represent multiple aspects of the consumer goods supply chain. We bring these perspectives together to drive positive impact at scale.

Members make TSC possible.



The Sustainability Consortium has created measurement tools for almost all products

113 product categories

18 specialty toolkits

THESIS

BY THE SUSTAINABILITY CONSORTIUM

powered by SupplyShift

A science-based performance management system for companies to understand and solve the most important sustainability issues across 90% of consumer goods supply chains.

Learn more:

sustainabilityconsortium.org/supplier-resources/
supplyshift.net/thesis

THESIS scales supply chain sustainability across retailers

The Index currently covers:

125+ categories

1,800 suppliers

300 buyers across Walmart, Sam's Club and Walmart.com.

In the categories covered by the Index, **70 percent** of our goods come from suppliers that have participated in the Index.

From corporate.walmart.com

High-Impact Commodities: **For the past few years, Kroger has been a member of The Sustainability Consortium (TSC), a multi-stakeholder non-profit organization that designs and implements measurement and reporting systems that improve product sustainability. TSC's technical experts have been a valuable resource to Kroger as we continue to evaluate and prioritize high-impact commodities in our supply chain.**

From sustainability.kroger.com

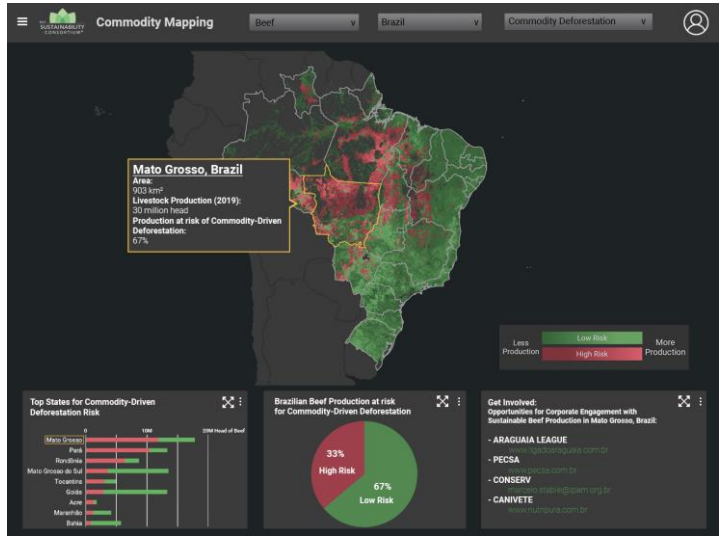
The “I Don’t Know” Barrier

Food, Beverage, and Ag Products: 2015-2017

Main Barriers to Sustainability and Digital Agriculture

Lack of Traceability

Companies don't know or can't know origins of agricultural ingredients therefore don't know what risks they are exposed to



Growers Lack Trust and Want $ Incentive

Even if origins are known growers don't share data for many reasons but will if there are financial incentives

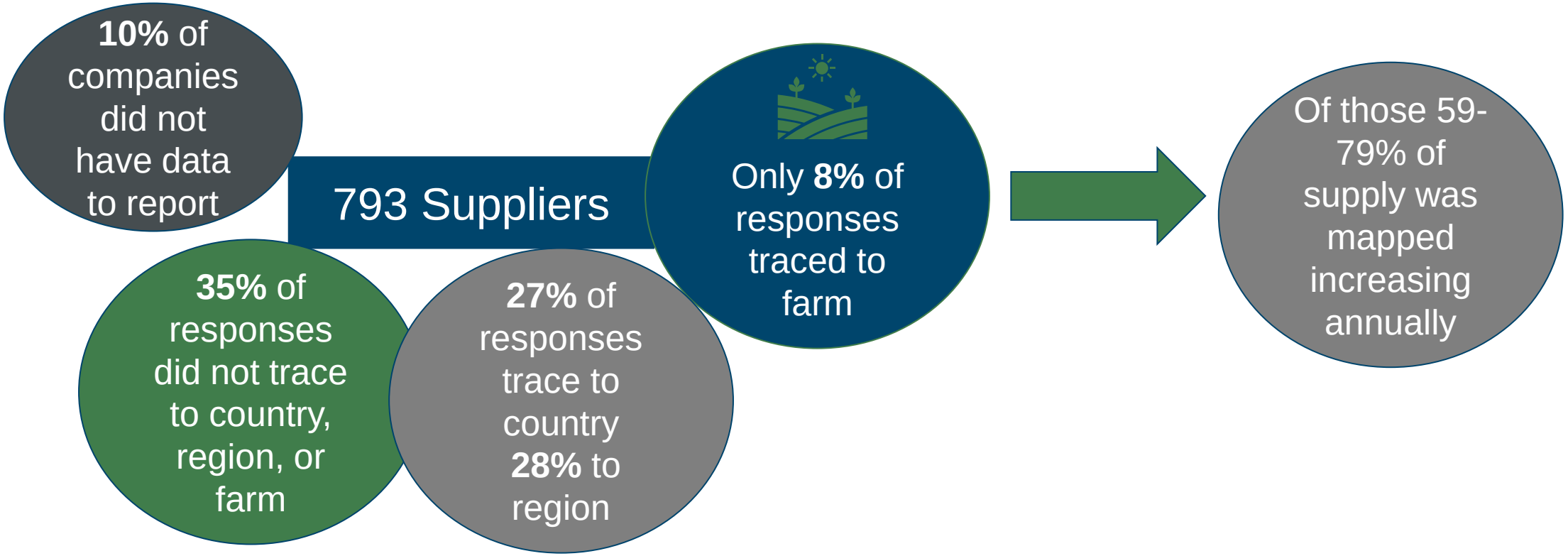
Connectivity Issues

Reporting systems aren't connected, growers have broadband issues, majority of growers use paper records, those using data systems aren't happy with software

Lack of Traceability

Lack of Traceability

Supply Chain Mapping Key Performance Indicator: For what percentage of your crop supply can you identify the **country**, **region**, or **farm of origin**?



*from 2016-2019, on average

Where is my crop from?
TSC's Commodity Mapping Tool for transparency

https://www.sustainabilityconsortium.org/projects/commodity-mapping/

WHERE...

...commodities are produced for different supply chains

WHAT...

...potential issues or risks occur in these commodity producing regions

HOW...

...a user can address these issues by utilizing TSC KPIs and working with partners on the ground

THE SUSTAINABILITY CONSORTIUM™

Growers Lack Trust and Want $ Incentive

Photo credit United Soybean Board

FARMER PERSPECTIVES ON DATA

Improving engagement with farmers around data through an increased understanding of their perspectives.

TRUST IN FOOD
A FARM JOURNAL INITIATIVE

THE SUSTAINABILITY CONSORTIUM

TSC and Trust in Food report "Farmer Perspectives on Data"

Key Findings
Farmer Perspectives on Data Collection and Sharing

Transparency is not a Right

49% said they do not believe their customer(s) has a right to know how they manage their farm

Unequal Profit Distributions

Farmers identify unequal financial gain from data sharing, where downstream organizations profit from farm-level data sharing at higher levels than farmers

Minimal Advocacy by Trusted Advisers

71% said their primary agronomic advisor or retailer has not recommended that they increase their data collection

Trust Issues are Widespread and Nuanced

More than half said they do not trust the federal government or private companies with their data

TSC and Trust in Food report “Farmer Perspectives on Data”

Key Findings

Barriers and Incentives to Farm-Level Data Efforts

Lack of Access Prevents Collection

Lack of access to the required capital, equipment and training scored highest as barriers to data collection

Fear of Additional Regulatory Impact

The threat of potential new regulations being enacted scored as the primary barrier to data sharing

Profitability Relaxes Trust Issues

A potential government incentive payment program scored high as an incentive to increase data collection and sharing

Clear Benefits to Collection

A lack of benefits to the farmer is the lowest scoring barrier to data collection

Profitability Matters Most

Incentives which provide direct financial benefit scored the highest as potential incentives to increase farm-level data efforts

Limited Benefits to Sharing

18% more respondents named a lack of benefits to the farmer as a barrier to data sharing compared to data collection

Conservation is Important but Disconnected

Farmers show a high conservation ethic, yet this remains disconnected from data collection and sharing

Connectivity Issues On-Farm

TSC and Trust in Food report "Farmer Perspectives on Data"

Key Findings

Farmer Perspectives on Data Collection and Sharing

Low Software Usage & Digitization

62% did not use farm-level data software in 2019; **46%** store and manage their data primarily on paper records

Low Satisfaction Rates

70% of those who did use data software in 2019 are not having all of their needs met by the software

Lack of Access Prevents Sharing

63% said their operation's data network connectivity and access is at least somewhat of a barrier to sharing data

Connectivity Issues Along the Ag Value Chain

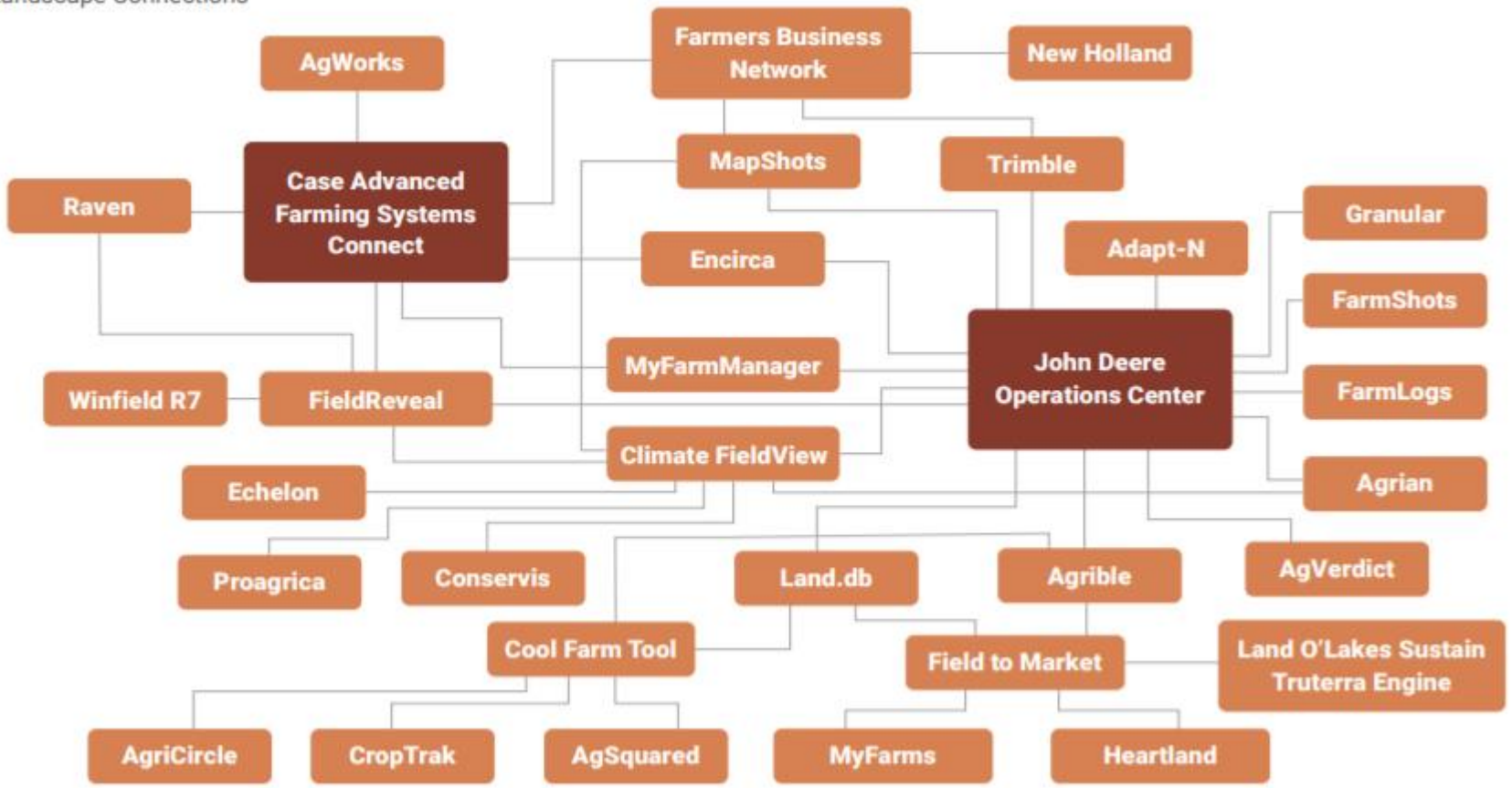
Modeling & Precision Ag Technology	Farm Management Software	Farm Sustainability Metrics Tools & Programs	Supply Chain Software & Programs	CPG Company Software & Programs	Retail Software & Programs
Adapt-N	Agrian	BASF AgBalance +	Athena Intelligence +	Agrible +	Carbon Disclosure Project (CDP) +
Agrible	Agrible	Bonsucro *	Carbon Disclosure Project (CDP) +	MGIS (Mars) +	Global Reporting Initiative (GRI) +
Arable	AgriEdge Excelsior	Bunge Centerfield +	Ecoinvent +	PRè Sustainability * +	SAP +
aWhere	Agrivi	California Almond Sustainability Program * +	EcoPractices * +	Quantis +	The Sustainability Consortium (TSC) * +
Case IH Advanced Farming Systems tech	AgSolver	California Sustainable Winegrowing Alliance * +	Ecovadis +	SAP +	
Compass Grower Advanced	AgSquared	COMET-Farm +	ExtendAg +	Sow Organic +	
Echelon	AgVerdict	Cool Farm Tool +	Global Reporting Initiative (GRI) +	SureHarvest Sustainability MIS +	
Encirca	AgWorks	EDF N Balance +	MyFarms +		
Farmers Business Network	Agworld	Field to Market * +	Muddy Boots +		
Farmers Edge Smart Solutions	Case IH Advanced Farming Systems software	Land O'Lakes SUSTAIN/Truterra * +	PRè Sustainability +		
FarmShots	Climate Fieldview	NRCS Resource Stewardship Evaluation * +	Proagrica +		
FarmWorks	Compass Grower Advanced	Pesticide Risk Tool +	Quantis +		
FieldReveal	Conservis	Potato Sustainability Initiative * +	ResourceMAX +		
John Deere technologies	Encirca	Protected Harvest *	SAP +		
MapShots	Farm at Hand	SureHarvest Sustainability MIS +	SimaPro +		
New Holland technologies	FarmLogs	SAI Platform * +	Sow Organic +		
OptiGro	Farmplan Gatekeeper	Stewardship Index for Specialty Crops +	SupplyShift +		
Pioneer Field360	Farmers Edge FarmCommand		SureHarvest Sustainability MIS +		
Raven	Granular Business		Thinkstep +		
SureHarvest Farming MIS	John Deere AgLogic				
WEEDSCOUT	John Deere Operations Center				
Winfield United R7 Tool	Land.db				
Zoner	myAGCentral				
	New Holland				
	Pioneer Field360				
	Proagrica				
	SAP				
	SureHarvest Farming MIS				
	Trimble				

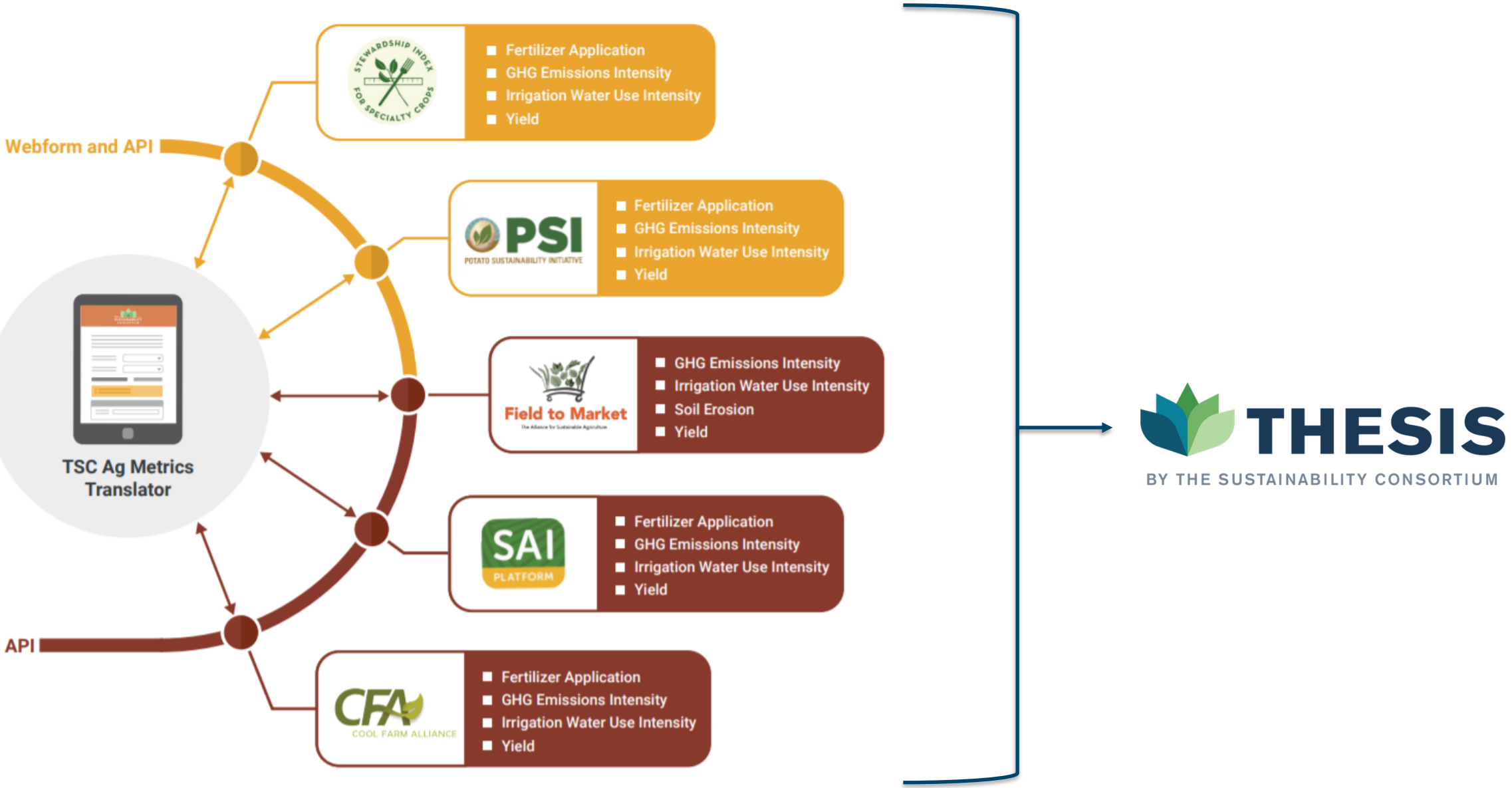
* Program or initiative

\+ IT platform or software

Note: For purposes of this map, TSC defined a program or initiative as a set of standards, industry code of practice, and/or sustainability assessment that includes metrics and that uses farm-level information to identify opportunities for the implementation of best practices, development of continuous improvement strategies, grower education, and communications. TSC defined IT platforms and software as systems that are focused on data collection for purposes of measurement or reporting only. The companies and organizations that developed the platforms and software identified in the systems landscape map might oversee or implement sustainable agriculture programs, but these programs are not linked to the tool or platform itself or the data that the tool or platform handles. Also, platforms listed under the Modeling & Precision Ag Technology and Farm Management Software nodes are not denoted with a "+", since all are IT platforms or software to varying degrees.

Figure 8: Systems Landscape Connections




Webform and API
TSC Ag Metrics Translator
API
Stewardship Index for Specialty Crops
Fertilizer Application
GHG Emissions Intensity
Irrigation Water Use Intensity
Yield
PSI
Potato Sustainability Initiative
Fertilizer Application
GHG Emissions Intensity
Irrigation Water Use Intensity
Yield
Field to Market
GHG Emissions Intensity
Irrigation Water Use Intensity
Soil Erosion
Yield
SAI Platform
Fertilizer Application
GHG Emissions Intensity
Irrigation Water Use Intensity
Yield
CFA
Cool Farm Alliance
Fertilizer Application
GHG Emissions Intensity
Irrigation Water Use Intensity
Yield
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Main Barriers to Sustainability and Digital Agriculture

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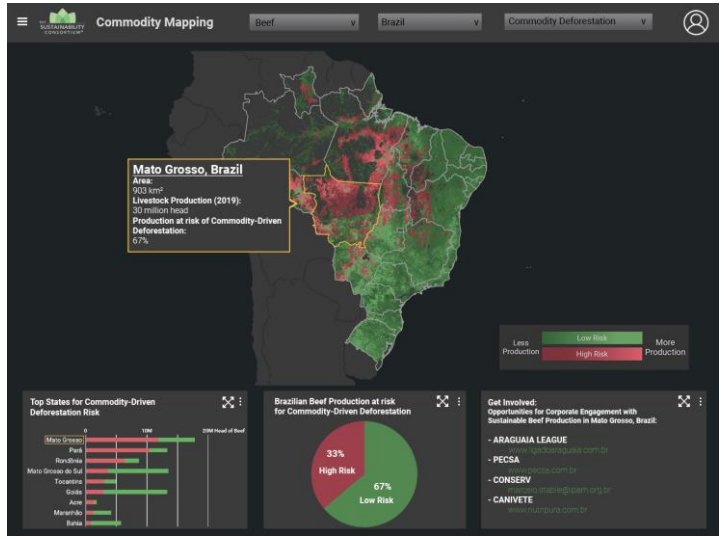

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www.sustainabilityconsortium.org

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@TSC_news

The Sustainability Consortium® is jointly administered by Arizona State University and University of Arkansas with additional operations at Wageningen UR in the Netherlands and Tianjin, China.

Chuck Spencer

Executive Director, Corporate and Government Relations,
GROWMARK, Inc.

Charles (Chuck) Spencer is GROWMARK, Executive Director, Government Relations. In this position, he is responsible for developing, leading and administering the government relations team that involves corporate legislative and regulatory activities and programs for the GROWMARK System. Spencer serves on the National Council of Farmer Cooperatives (NCFC) Governmental Affairs Committee as chairman. He is on the board of directors for the Chemical Industry Council of Illinois. He also serves on federal affairs committees for the Ag Retailers Association, American Seed Trade Association, The Fertilizer Institute, and CropLife America. He was recognized as the McLean County Chamber of Commerce Outstanding Agribusiness Person in 2019. Chuck joined GROWMARK on April 20, 2009. He has more than 25 years of professional experience in state and federal legislative and regulatory affairs. He served as director of national legislation and policy development for the Illinois Farm Bureau, responsible for directing the organization's policy program, promoting the organization's position on federal legislative and regulatory issues, and directing grassroots advocacy programs. He also held positions of associate director of state legislation and assistant director of natural and environmental resources, both at Illinois Farm Bureau. Spencer served as a county Farm Bureau manager in Mason and Henry (Ill.) counties. Spencer holds a B.S. degree in agriculture from the University of Illinois at Urbana-Champaign. Spencer, his wife, Debbie, and their daughter live in Bloomington, IL.

Expectations of Sustainability at the Farmer Level

- Farmer controlled, flexible, data driven
- Data is owned and controlled by the farmer
- Must improve the return on investment
- Paid for practices or cost share to offset costs
- Farmers understand the income potential from carbon capture markets
- Practice change is typically expensive due to planter and equipment.

Ag Retailers = Partners

Focus on farmer's farm Plan objectives

Practices must be flexible to grower, farm, and the field.

Ag Retailer/CCA Team must provide increased conservation and compliance knowledge to match up with farmer

Cooperation between government and private sector should be voluntary and incentive based system

Private sector programs must allow innovation, flexibility, and maximum return to investment for the farmer/landowner

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Session Three: Mobilizing Data for Conservation: On- and Off-Farm Perspectives

Q&A

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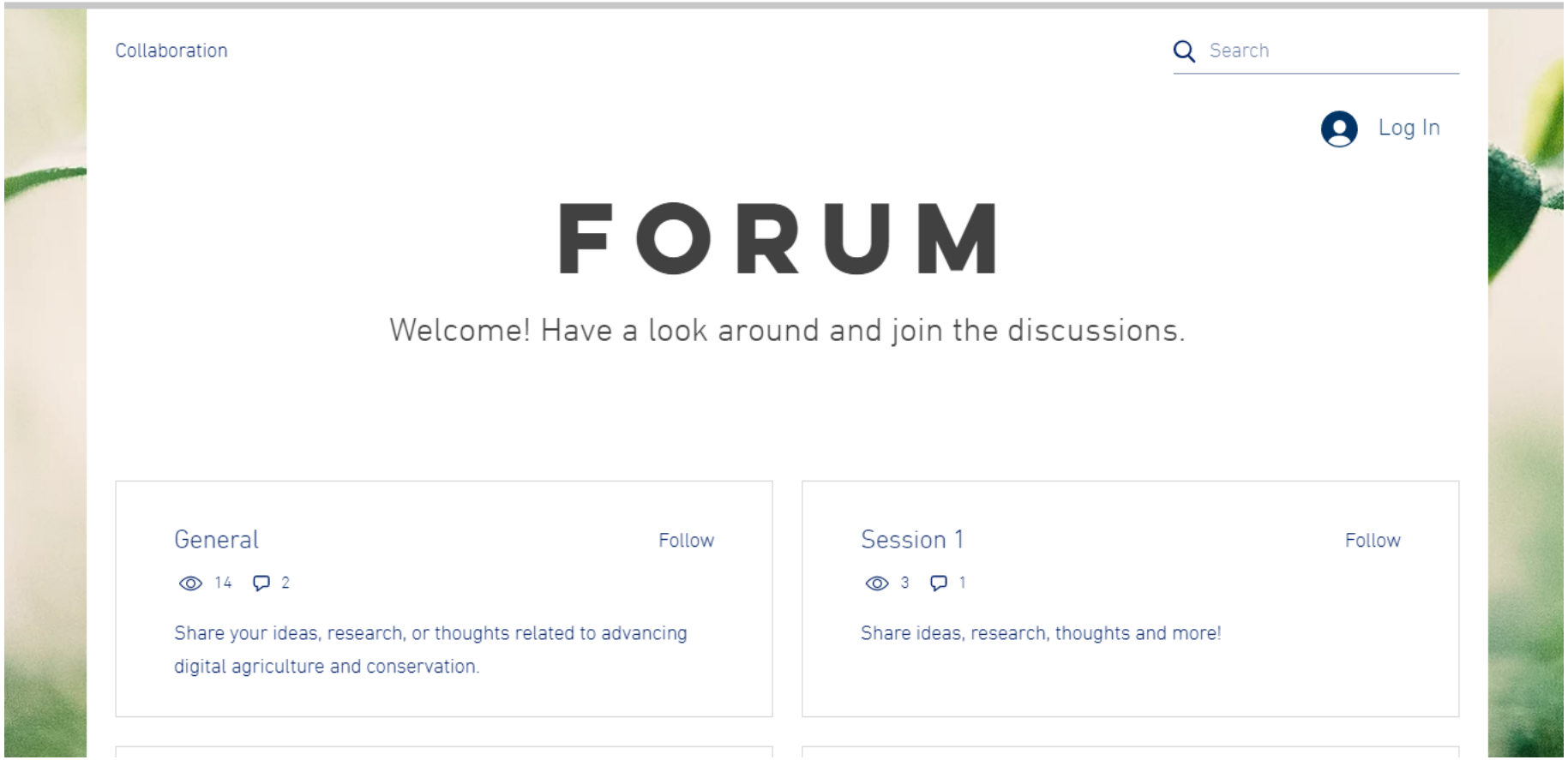
Let's continue the conversation…

advancingdigitalagandconservation.com/collaboration



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Session Four – Research Opportunities

This session is intended to be a working, collaborative opportunity for researchers and policy experts to network and plan opportunities for further action and research.

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