

F2F

Opportunities and Needs in AI and CI for Direct Market Farming and Farmers Markets

Sadia Khan, PhD student, Informatics, Indiana University

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Beth Plale, Burns McRobbie Bicentennial Professor of Computer Engineering, Executive Director of the Pervasive Technology Institute, Indiana University

Gabriel Wilkins, MS student, Urban and Regional Planning, UW-Madison



The Kaufman Lab

Alfonso Morales, Edna Ely-Ledesma

The Kaufman Lab supports food system actors around the country. Food distribution, regulation and law, and marketplace organization are among our topics. Our *farm2facts.org* toolkit makes farmers market managers the PI of their market. For instance, the F2F toolkit (since 2014 supported by 19 USDA, NSF, and NIH grants, subawards, and contracts) is used around the country to foster food security, entrepreneurship, and climate smart agriculture. Our work with the Bloomington, IN farmers market addressed their problem with racist speech by restructuring the market's bylaws to increase DEI.



F2F collects key data

For institutions, farmers, and markets



ECOLOGICAL IMPACT

...on ecosystem services

To support good environmental practices



ECONOMIC IMPACT

...and economics

To support good purchasing decisions

Who We Are



EDNA LEDESMA

Director, Principal Investigator

Edna Ledesma is an Assistant Professor of Planning and Landscape Architecture at the University of Wisconsin-Madison. She researches markets through an emphasis on place and inclusion. Edna is a native of Brownsville, Texas located on the U.S.-Mexico border.

[More About Edna](#)



PHILLIP WARSAW

Staff Economist

Phillip Warsaw is an Assistant Professor of Ecological Economics and Environmental Justice at Michigan State University. Before joining MSU, Phil was a postdoctoral fellow at the Center for Integrated Agricultural Systems at the University of Wisconsin-Madison.



ALFONSO MORALES

Founder, Research Associate

Alfonso Morales is a Professor of Planning and Landscape Architecture at the University of Wisconsin at Madison, who has pioneered policy-relevant research on street vendors. He is originally from rural New Mexico with roots in family farming.

[More About Alfonso](#)



CATIE DEMETS

Research Associate

Catie is a PhD student in Urban and Regional Planning at UW-Madison. She has worked closely with farmers and the agricultural community to build more resilient, sustainable regional food systems over the last decade. Catie has an MS in Environmental Studies from the University of Montana and a BA from Lawrence University.



LAUREN SUERTH

Founder, Program Director

Lauren was a PhD Candidate in Urban and Regional Planning at the University of Wisconsin - Madison, and is now a Inclusive Excellence Research Analyst at American Family Insurance. She has been the lead research assistant for Farm 2 Facts since the pilot project started in 2014.

[More About Lauren](#)



ARDEN HE

Research Associate

Arden is a student of economics, math & data science, with an interest in using mixed-method research for social good. Arden contributes to the design of economic surveys and metrics, grant and report-writing, and evaluations of F2F partners.



MARKO PETROVIC

Research Associate

Dr. Marko Petrovic is a research associate at the Social Geography Department of the Geographical Institute "Jovan Cvijic", Serbian Academy of Sciences and Arts in Belgrade (Serbia) and a Visiting Scholar in the UW-Madison Department of Planning and Landscape Architecture. He is a human geographer and contributes as a visiting professor to the ISTIS institute, South Ural State University in Chelyabinsk (Russia) and contributed as a visiting scholar to the DFLA, UW-Madison. His research is centered on rural development, agritourism, community wellbeing, and local economic planning.

[More About Marko](#)



ANNA FELDMAN

Communications Intern

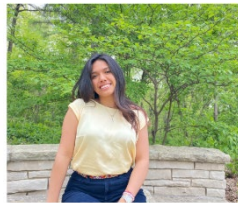
Anna Feldman is an undergraduate student studying Biology and Journalism. She is interested in using her skills to help with environmental, social justice, and global health issues. Anna has previously done research in various fields



JESSICA CHAVEZ

Graphic Design and Member Services Intern

Jessica Chavez is an undergraduate student studying Marketing and Chinese and Latin@ Studies. Jessica contributes to F2F's blogs, graphic design work, and social media. In her free time, she loves drawing, baking, and playing tennis.



ERIKA SANDOVAL

Consumer Research and Food System Analyst Intern

Erika Sandoval is an undergraduate student studying Consumer Behavior and Marketplace Studies in conjunction with an Entrepreneurship certificate. She aspires to improve food systems by bettering communication and awareness in consumer and producer relations. She is also interested in culturally and environmentally appropriate agroecology practices. In her free time, she enjoys working on DIY projects, practicing embroidery, and mindfully keeping her body active. Erika primarily contributes to F2F's research and marketing efforts.



HANBING LIANG

Project Assistant (PA)

Hanbing Liang is a PhD student in Urban and Regional Planning. Her background is rooted in the disciplines of urban planning and landscape architecture, where she earned both degrees during her undergraduate study at



EVELYN MENDOZA NUNEZ

Marketing and Web Development Intern

Evelyn Mendoza Nunez is an undergraduate student studying Consumer Behavior and Marketplace Studies. Evelyn primarily contributes to F2F's blogs and marketing efforts. She enjoys learning languages, going for walks, and watching films in her free time.



MAGGIE TOMASHEK

Senior Graphic Design and Member Services Intern

Maggie Tomashek is an undergraduate student studying fine arts with interests in printmaking and watercolor illustration. She also has experience with digital design. In her free time, she enjoys watching films, traveling, and eating delicious food.

OUR PHILOSOPHY of F2F METRICS



PHILOSOPHY

Practicing the co-creation and use of common and unique metrics.



MISSION

Amplifying farmer market manager's voice by delivering impactful tools (software and storytelling) to collect, analyze and visualize data.



VISION

Co-producing empowered markets enhancing communities in achieving their objectives.



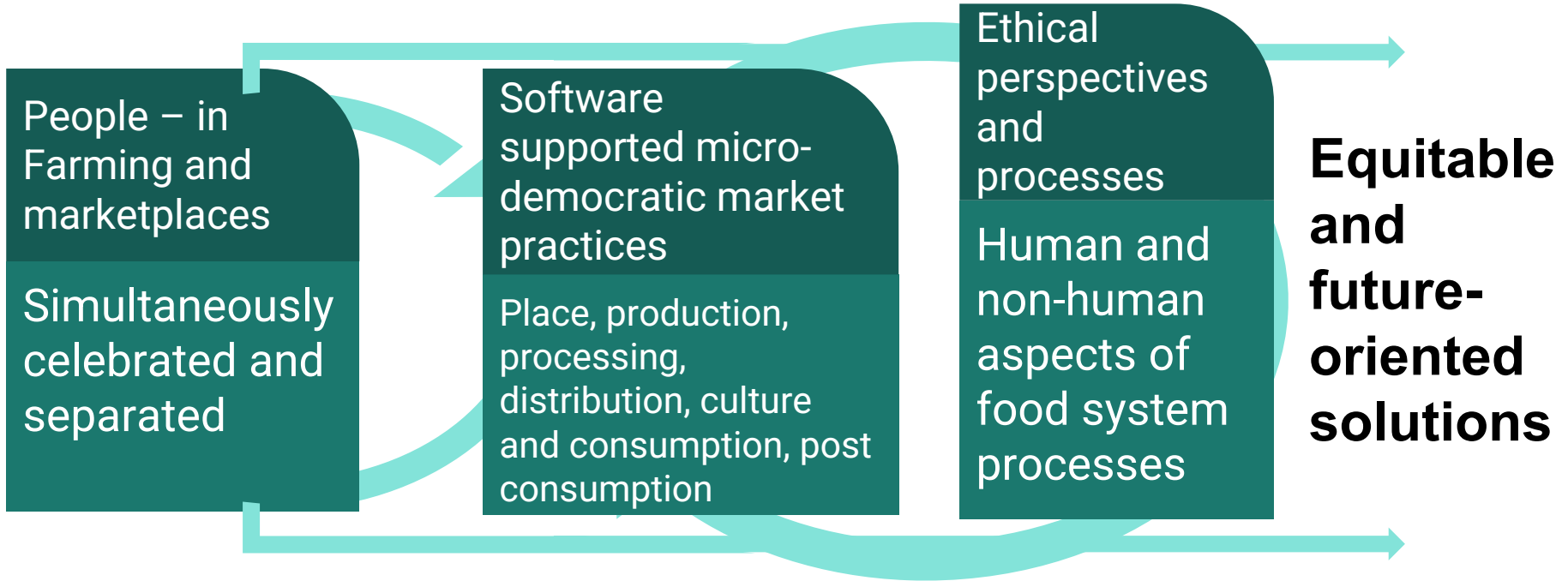
ETHICS and VALUES

Ethics relate ends, interests, and values. Market managers vary all three. We foster JEDI, engagement, integrity, and innovation.

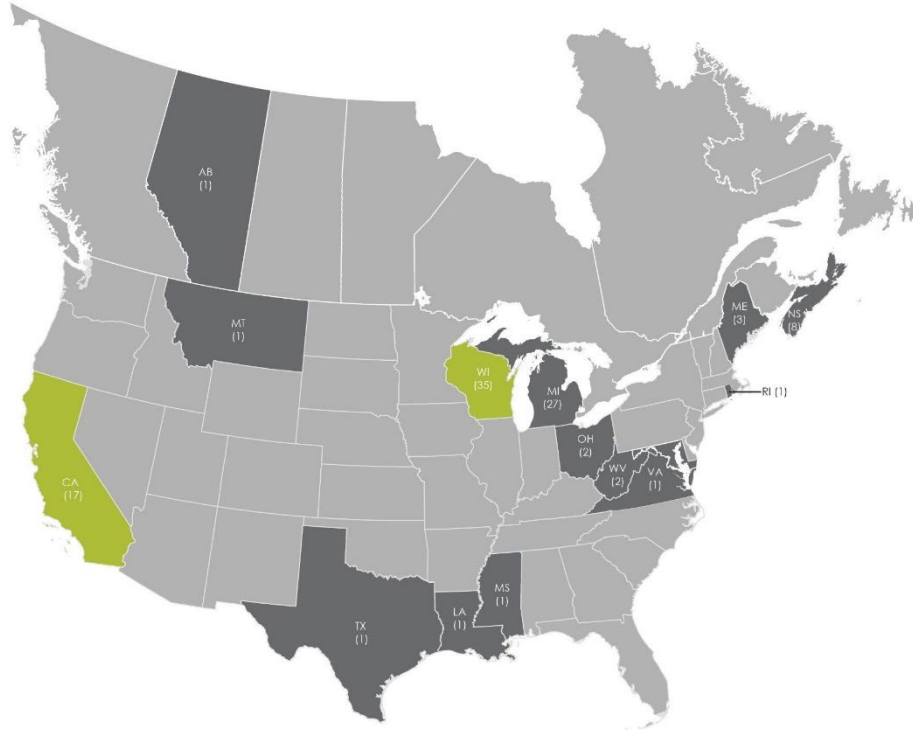


F A R M 2 F A C T S

On Wicked Opportunities...



FARM 2 FACTS REACH



WISCONSIN

FoodWise
FarmShed



CALIFORNIA

ACE



MICHIGAN

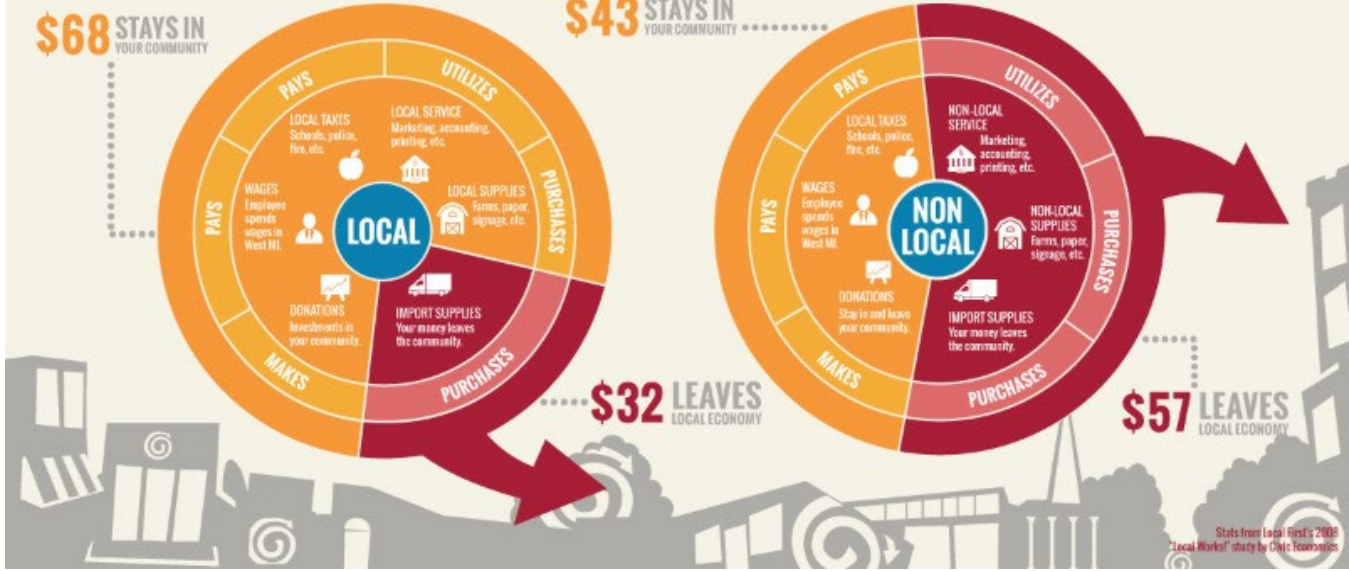
Michigan
Farmers Markets
Association

Economics Metric

WHY BUY LOCAL?

SPEND \$100 AT A LOCAL BUSINESS

SPEND \$100 AT A NON-LOCAL BUSINESS



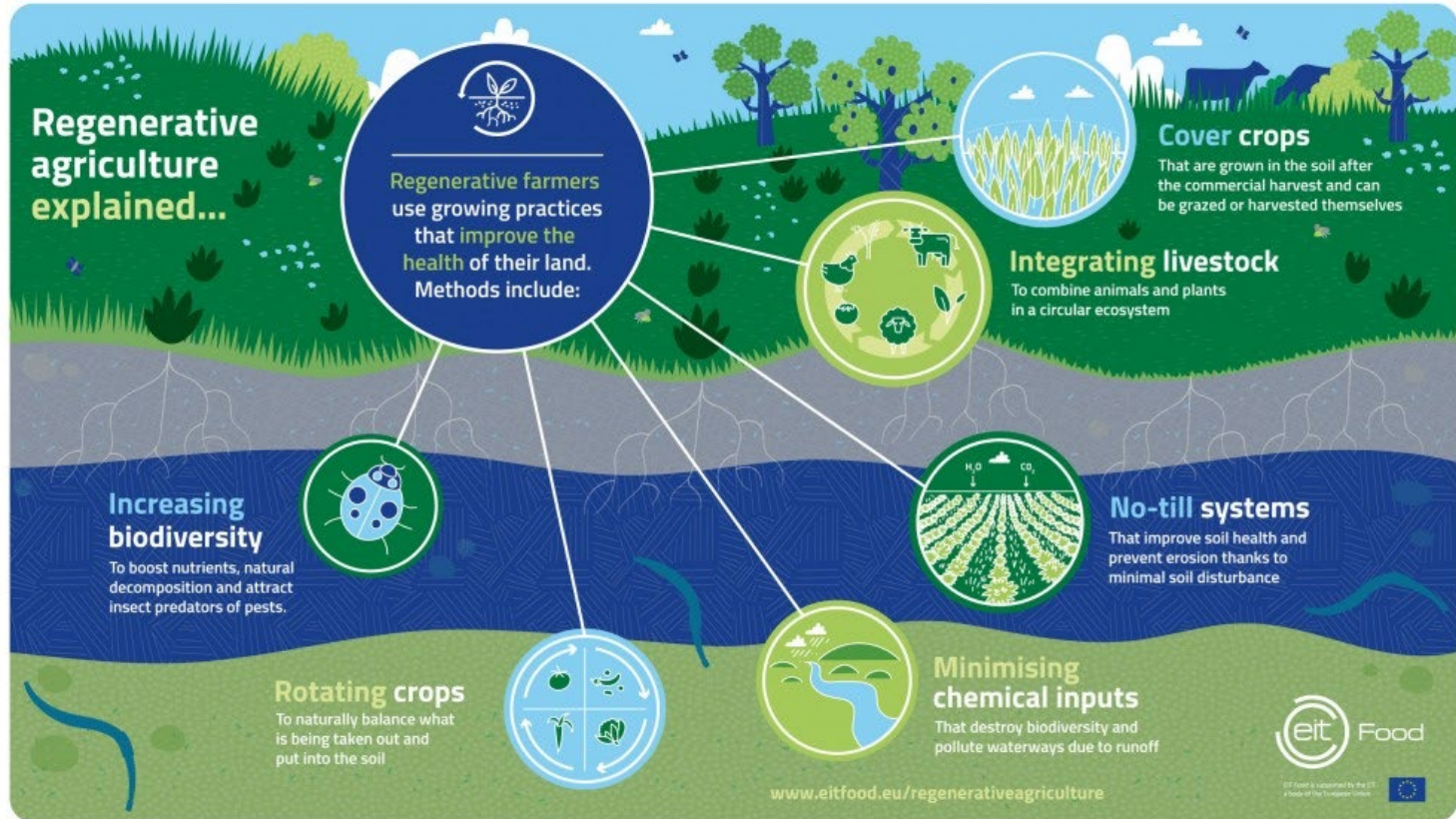
Economics Metrics

Metrics Include:

- Annual sales of vendors
- Years in operation of vendors
- Economic Impact/Jobs created
- Sales of products
- Annual spending by customers
- And 264 more from the USDA FM/LFPP application as well as custom metrics....



Ecosystem Services Metric



Ecosystem Services Metric



© Plowshares & Prairie Farm

???



© Michigan Urban Farming Initiative



© growingproduce.com

Ecosystem Services Metric



Ecosystem Services Metric

Soil Health Practices

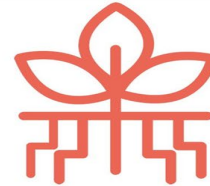
Do you practice diversified crop rotations with 3 or more crops?

What percentage of your farm is covered in perennials?

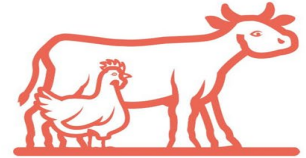
Includes grass, trees, perennial products etc. (Plants that live 2 or more years)

Do you practice reduced-till or no-till on your farm?

Cala Farm 2021



**Agroforestry, Organic,
Permaculture, Silviculture
Practices**



**Weekly to Monthly
Rotational Grazing**



**25
Acres in Conservation**



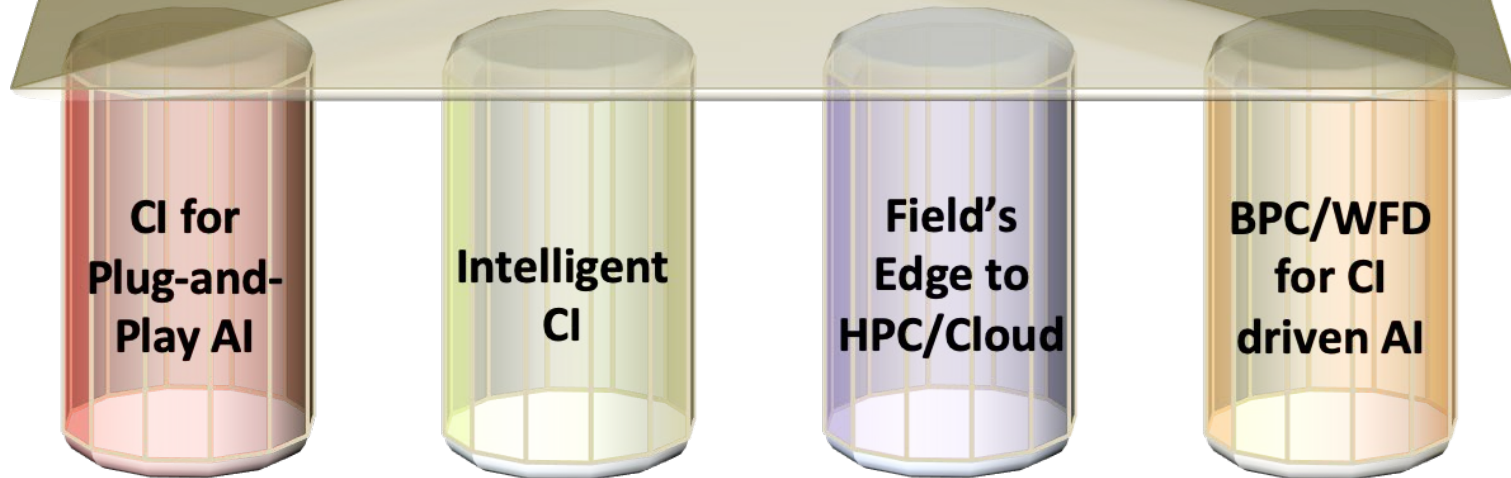
**30%
Perennial Crops**

www.sharedgroundcoop.com/cala-farm
calafarm@gmail.com



Use-Inspired Science
*(Smart Foodsheds,
Animal Ecology, Digital Agriculture)*

Icicle.net 20m NSF AI/CI institute
OSU-DK Panda and 13 organizations
Democratizing AI ethically



Integrating software into CI

Cyberinfrastructure is a set of cloud-hosted services

Frameworks exist, and are being improved, for integrating desktop tools to work with cloud services

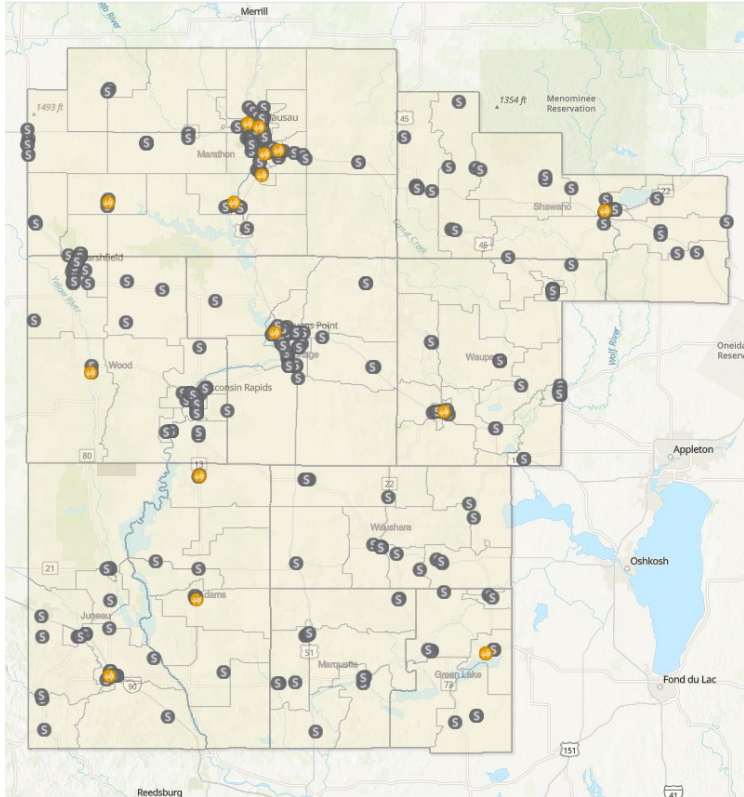
Tools often communicate with cloud services through Application Programming Interfaces (APIs)

New digital tools (e.g., drones, smart devices, field sensors) pose new challenges to integration

AI could facilitate this cyber communication and improve human-machine interaction

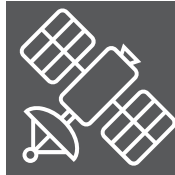


Incorporating Geographic Information Systems



Maps for Metrics

Foodsheds, supply chains, and market networks



Remote Sensing

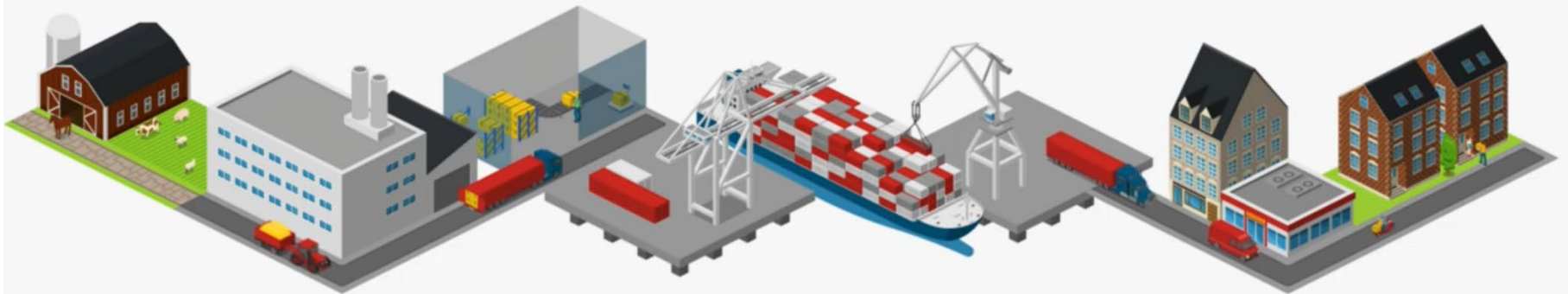
Monitoring crop health, biodiversity, and trends over space and time



Maps for Marketing

Showcase local food networks, farm organization, wildlife habitat restored

ICICLE AI Institute – Supply Chain Processes/Practices



Farm → Manufacturing → Packaging → Transportation → Distribution → Market → Consumer

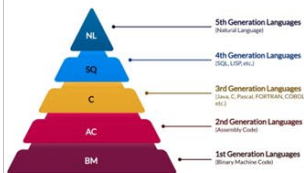
Market creativity in context: how AI helps



Conversational AI



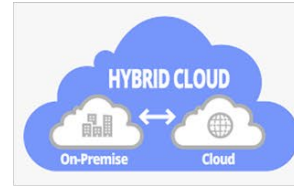
A PROGRAMMING LANGUAGE HIERARCHY



AI and non-AI Cyberinfrastructure



Models: Edge & Near Edge



Data/Models: Cloud



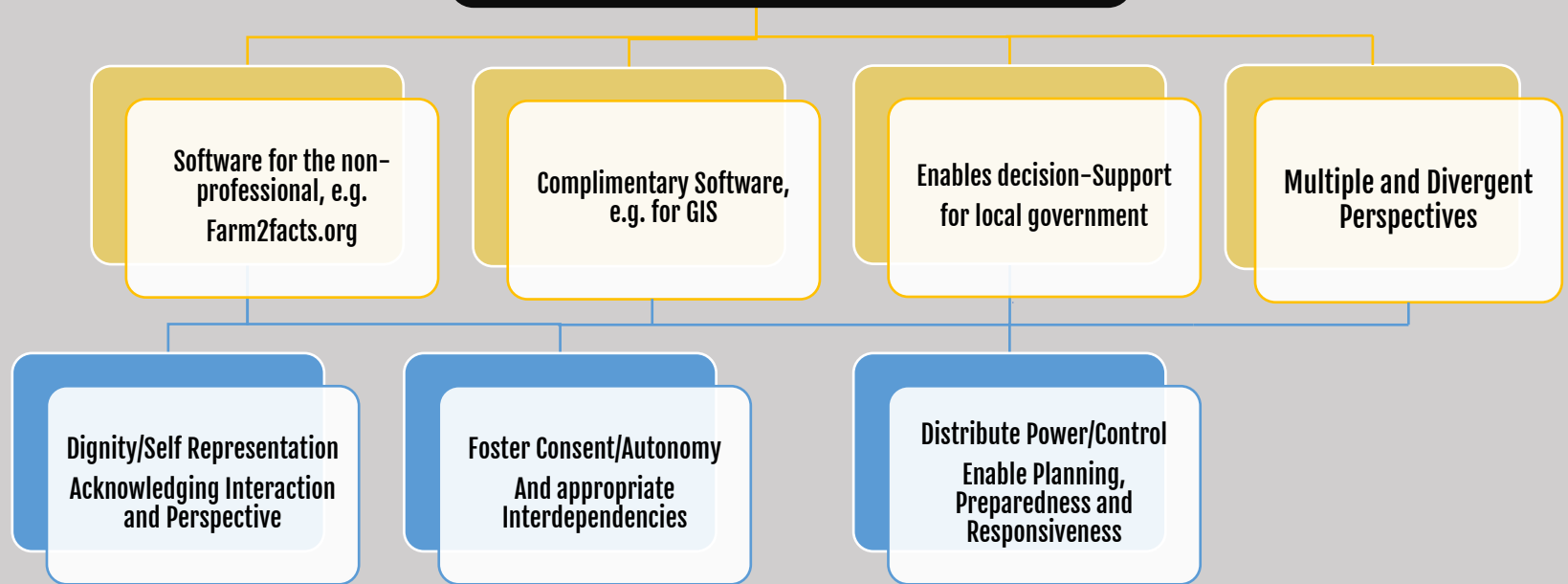
Data/Models: HECs



ICICLE-enabled Computing Continuum



Dimensions of Software Integration



Centering ICICLE within the landscape of AI ethics:



**Drawing on
contemporary work
on AI ethics**

(participating in the discourse on
FAIR /FACT and ethical AI)

**Implementing
contemporary data
security best-practices**

(Building off the Census Bureau's
differential privacy and statistical
safeguards)

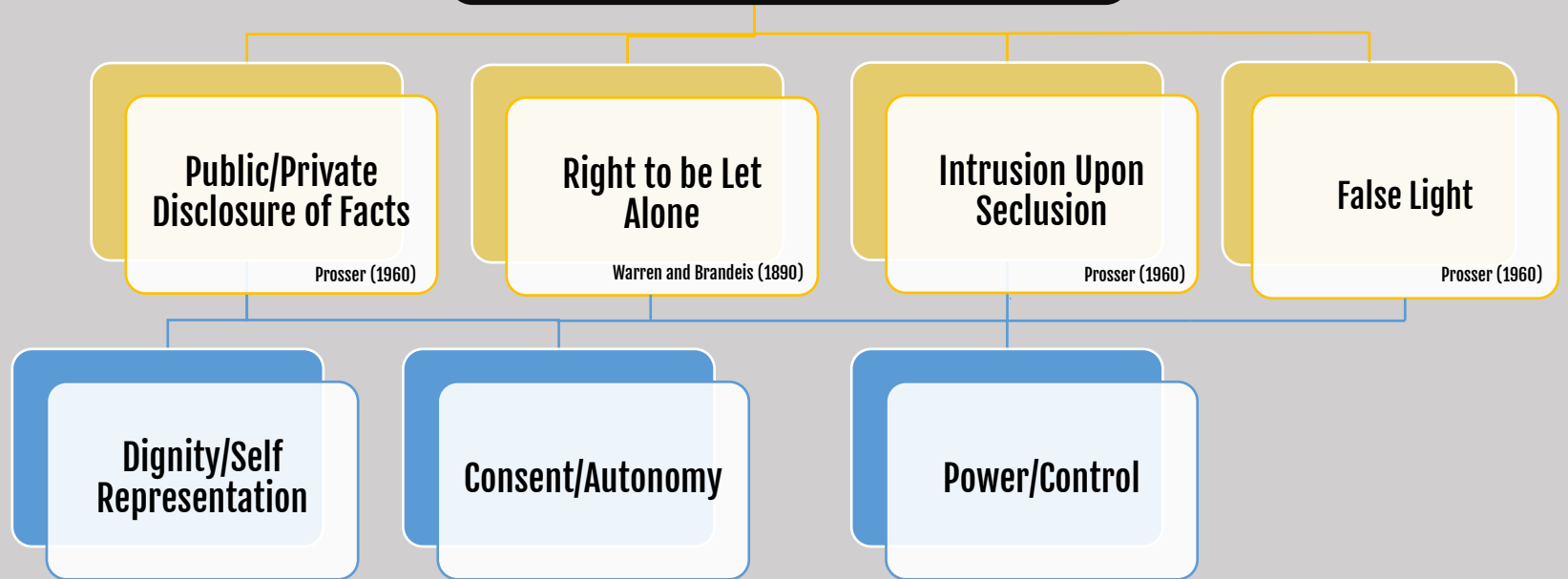
**Bringing real-world
issues of bias and
social harm into
focus**

(thinking about stakeholders in the
context of the risks of AI)

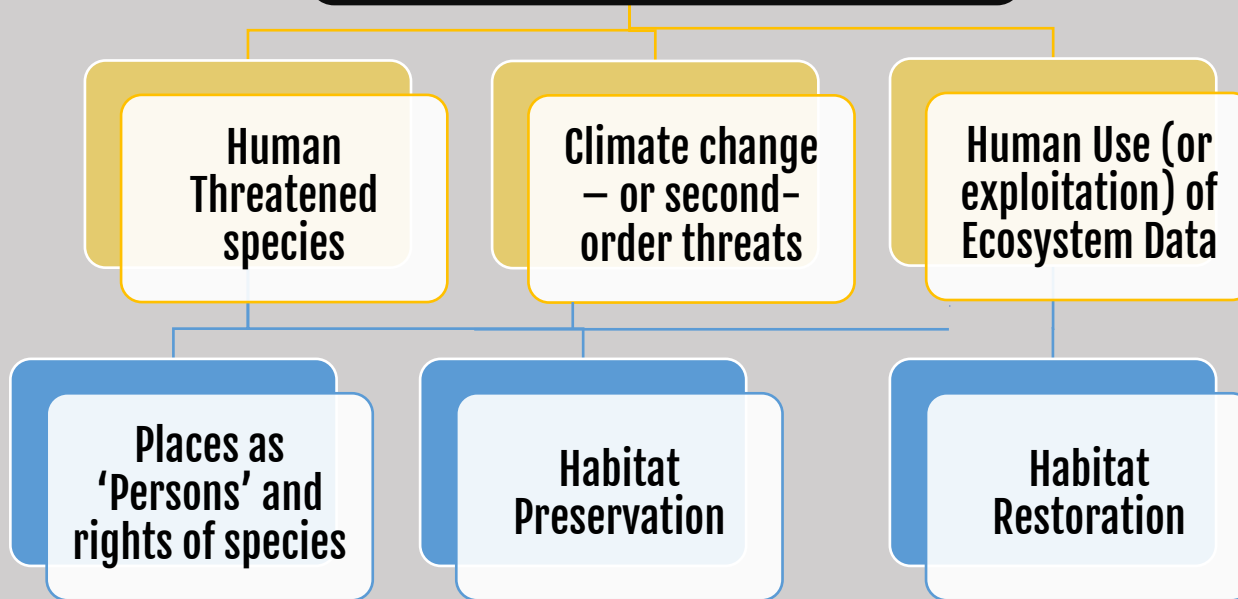
**Resurfacing
historical concerns
around moral
norms and justice**

(STS and Information Theory)

Dimensions of Privacy



Aspects of Non-human Privacy



Use **model cards** to build trust through accountability and contextuality.

Model cards need regular revisiting as conditions/perspectives (e.g., regulatory) change

Method

MODEL CARDS: a mechanism for improving accountability in AI/ML development

- Model cards offer a standardized method of documentation for model building which encourages transparent model reporting.
- Model card reporting requires model developers to specify the context in which models are intended to be used, the performance statistics on a variety of conditions (such as cultural, demographic, and phenotypic groups) and other relevant information.
- Model cards must be regularly revisited as conditions (e.g., regulatory, technical) change

Ontology Foundry

- drawing on ontology from SDO, PPOD and etc.,
- Ontology components:
 - MINT Model ontology
 - process
 - input variables
 - output variables
 - ...
 - Privacy
 - ownership
 - copyrightHolder
 - conditionsOfAccess
 - ...
 - FAIR / Transparency
 - downloadURL
 - documentationURL
 - installation instructions URL
 - ...
 - Trustworthiness
 - citation
 - license
 - ...

Farms, Markets, AI, and Trust

Vendors and Consumers start with interest(s),

Markets realize those in a trusting context, produced by vendors, and stakeholders

Trust developed and modified by relationships and knowledge of data/AI tools/processes

AI may enable data synthesis across existing data tools and data collection practices

Earning and deserving that trust depends on transparency and ethical AI development



Summary & Conclusion

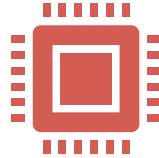
How do we know?

Assumptions, research, risks, relationships, trust (iterative and reciprocal)



F2F collects key data

On ecology and economy for institutions, farmers, and markets



Cyberinfrastructure adds capabilities

ICICLE enhances and grows these efforts



Ethics must be prioritized

From the conceptual beginning through to flexible, in-field improvements



F A R M 2 F A C T S



FARM 2 FACTS

FARM 2 FACTS

GROW YOUR MARKET WITH US.

GET STARTED

Questions?

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