Creating a Semantic Web for

Smart Foodsheds

Michelle Miller, University of Wisconsin-Madison

Geography 309 People, Land and Food

April 6, 2023

“Without a great food system transformation, the world will fail to deliver both on the United Nations Sustainable Development Goals and the Paris Climate Agreement.”

Rockström, J.; Edenhofer, O.; Gaertner, J.; DeClerck, F. (2020) Planet-proofing the global food system. Nature Food 1 p. 3–5 ISSN: 2662-1355
https://hdl.handle.net/10568/106652

BRIEFING ROOM

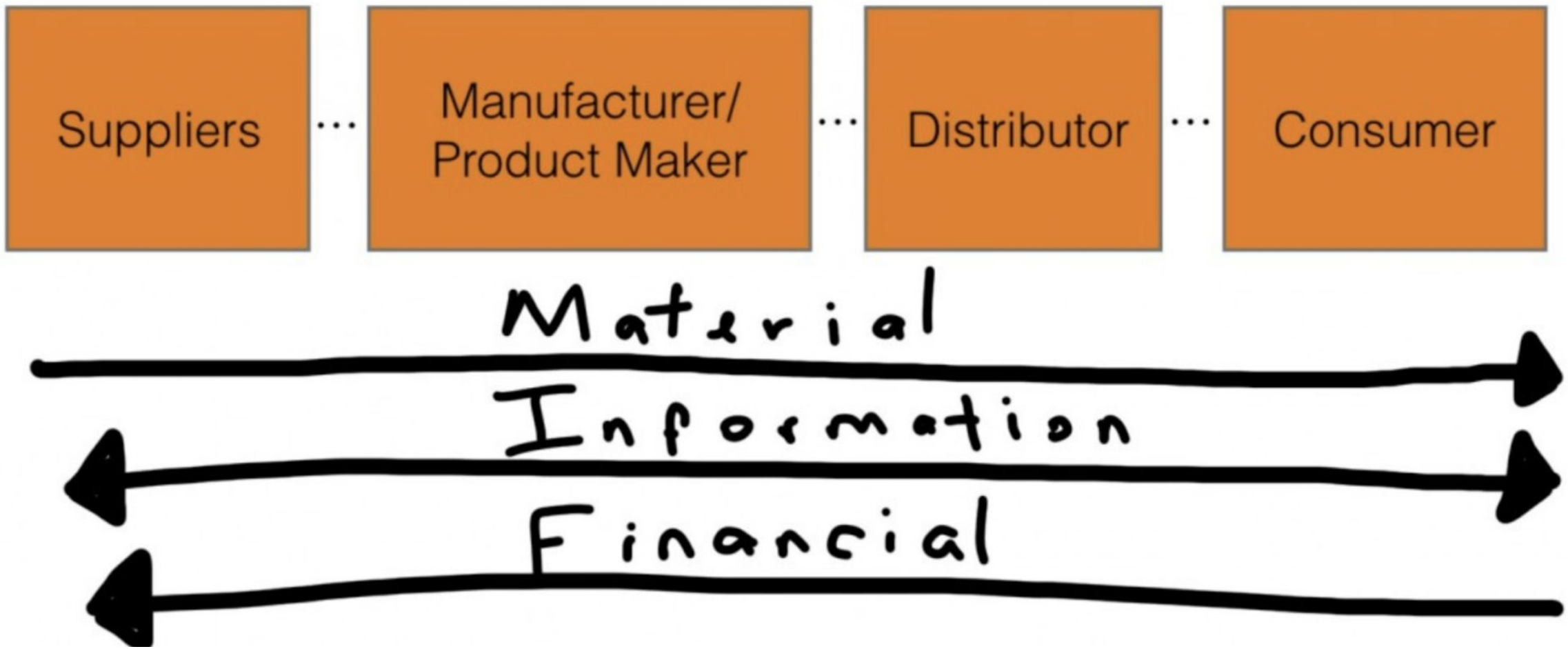
Executive Order on America's Supply Chains

FEBRUARY 24, 2021 • PRESIDENTIAL ACTIONS

February 2022, USDA report

https://www.ams.usda.gov/supply-chain

The 3 flows of supply chain



nature food

ARTICLES

https://doi.org/10.1038/s43016-022-00531-w

Check for updates

Global food-miles account for nearly 20% of total food-systems emissions

Mengyu Li[1], Nanfei Jia[2], Manfred Lenzen[1], Arunima Malik[1,3] ✉, Liyuan Wei[1,4], Yutong Jin[1] and David Raubenheimer[5]

IOP Publishing Environ. Res.: Infrastruct. Sustain. 2 (2022) 021002 https://doi.org/10.1088/2634-4505/ac676d

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LETTER

The carbon footprint of cold chain food flows in the United States

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Keywords: carbon footprint, cold chain, food flows, United States

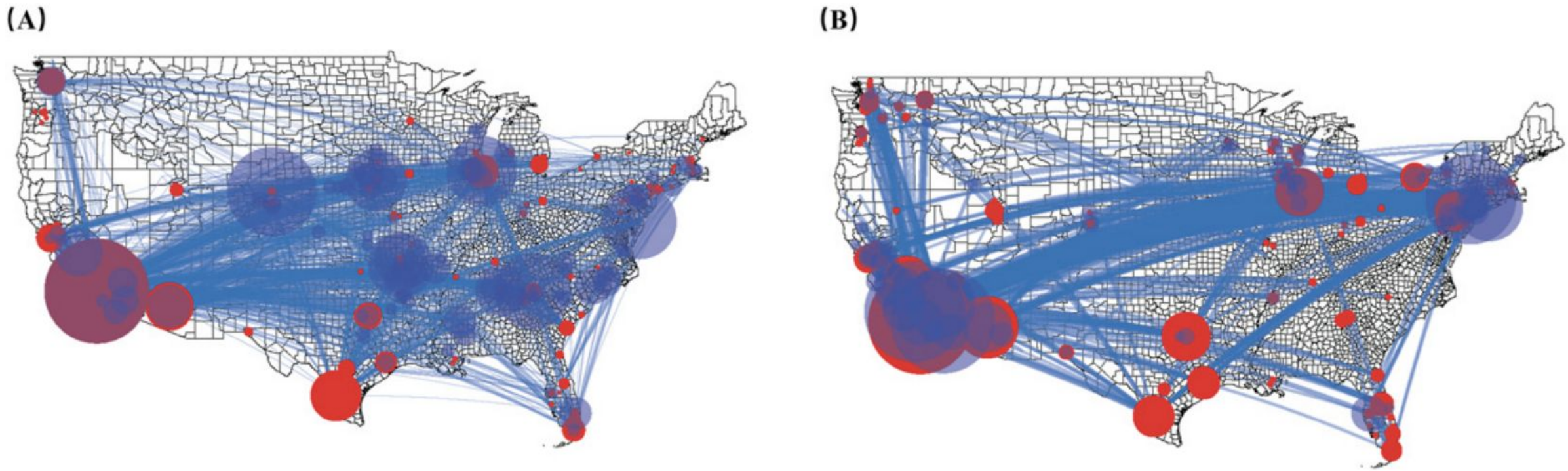


Figure 5. Map of carbon emissions associated with cold chain food trucking in the United States in 2017. The carbon footprint of county-level cold chain food flows for (A) 'meat' and (B) 'prepared foodstuffs'. The counties that have the highest carbon footprint inflow (red) and outflow (blue) are represented with bubbles, where the sizes of the bubbles are proportional to the carbon footprint.

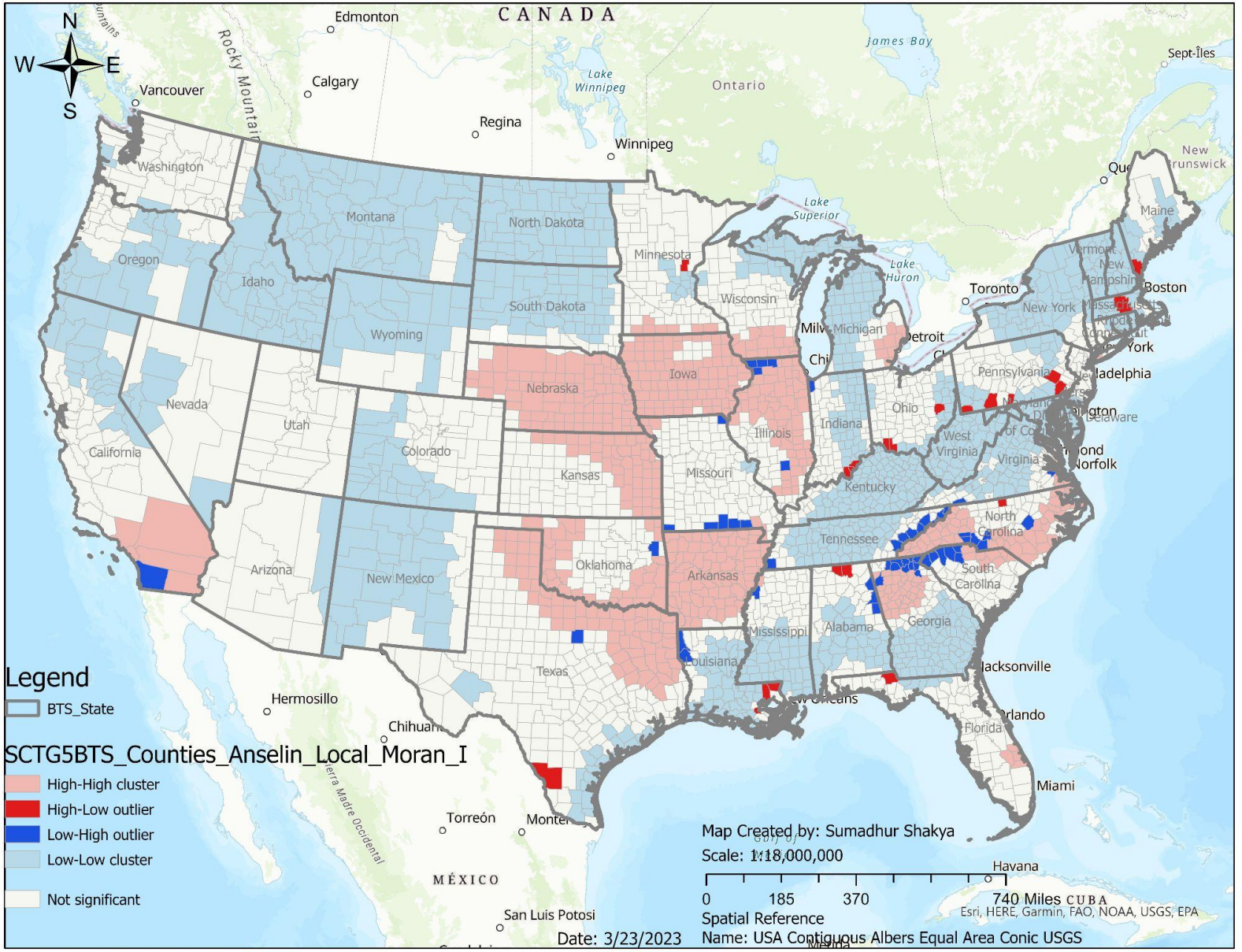
BRIEFING ROOM

Executive Order on Promoting Competition in the American Economy

JULY 09, 2021 • PRESIDENTIAL ACTIONS

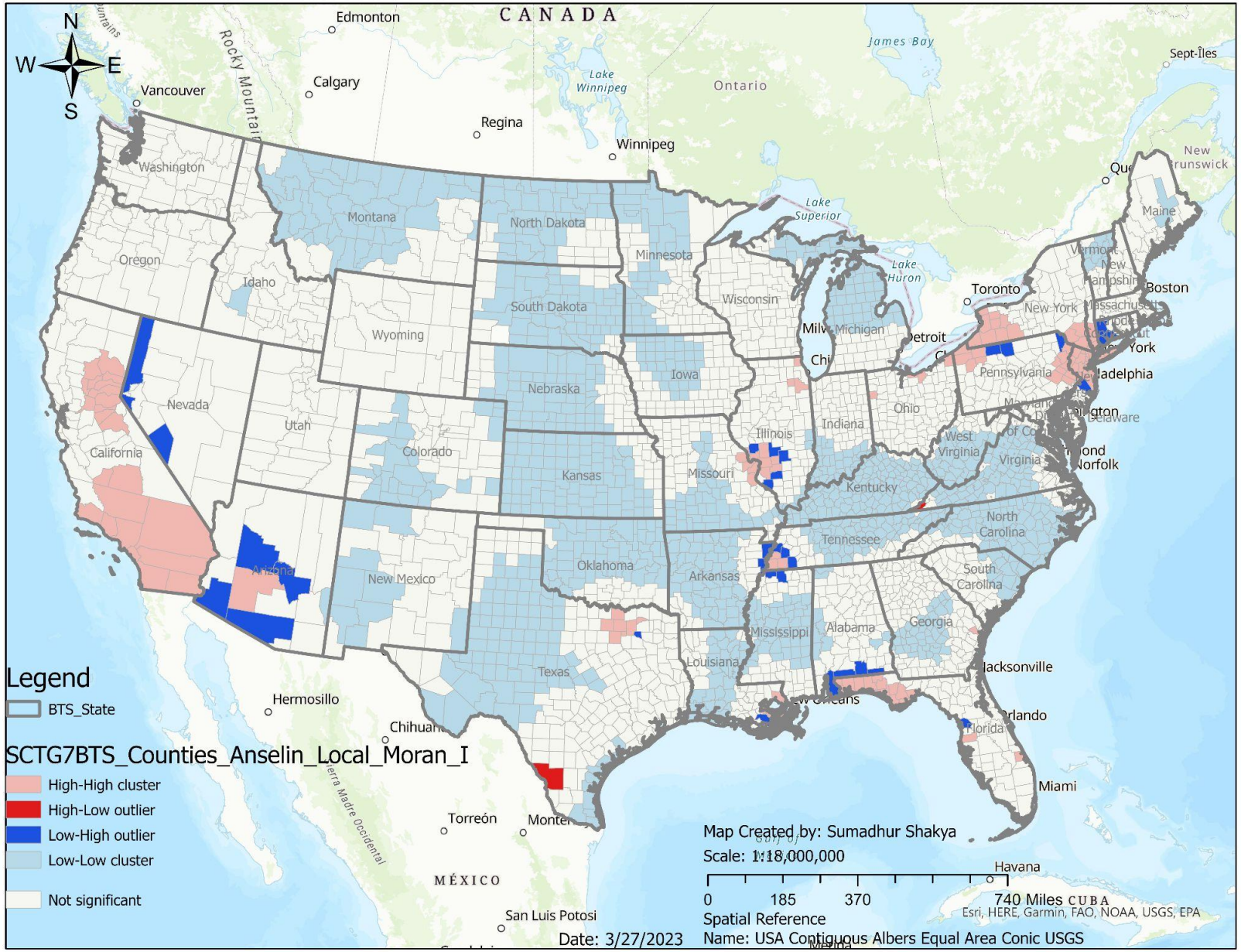
- “reforming markets so that farmers can farm”
- “new, more, better, and fairer” markets
- “whole-of-government” approach
- defining / measuring competitive capacity at national & regional scales

Hotspot analysis of 2017 food flow model for US cold chain network by county for meat

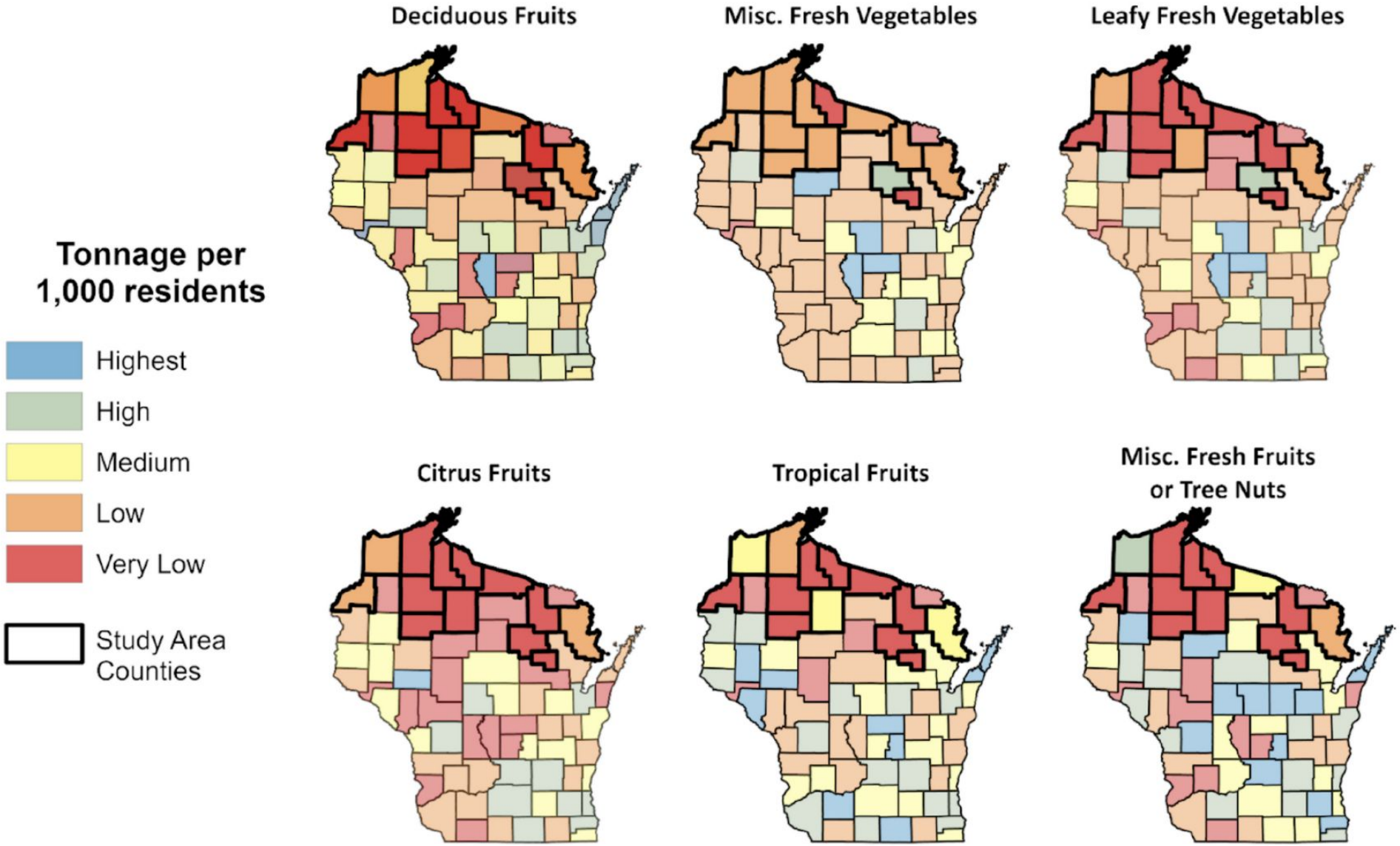


Map by Sumadhur Shakya, USDA-AMS-TSD & NIFA AFRI supported research

Hotspot analysis of 2017 food flow model for US cold chain network by county for prepared foods



Map by Sumadhur Shakya, USDA-AMS-TSD and NIFA AFRI supported research



USDA-AMS-TSD funded research

…traditional wholesale distribution provides less than 0.1 pound per person per year of each of the six categories of produce to rural counties. More wealthy urban regions in Wisconsin had 19-37 pounds of these foods available in grocery stores.

“...distant corporate store headquarters are driving decisions that affect our community’s access to food.” – 2022 participant at the Wisconsin Health and Hunger Summit and rural food pantry volunteer

Kroger / Albertsons

Baker’s, City Market, Dillons, Food 4 Less, Foods Co, Fred Meyer, Fry’s, Gerbes, Jay C Food Store, King Soopers, Kroger, Mariano’s, Metro Market, Pay-Less Super Markets, Pick’n Save, QFC, Ralphs, Ruler, and Smith’s Food and Drug

Albertsons, Safeway, Vons, Jewel-Osco, Shaw's, Acme, Tom Thumb, Randalls, United Supermarkets, Pavilions, Star Market, Haggen, Carrs, Kings Food Markets, and Balducci's Food Lovers Market


NAM DAE MUN
Farmers Market

MARKET POWER AND DIGITAL BUSINESS ECOSYSTEMS:

ASSESSING THE IMPACT OF ECONOMIC AND BUSINESS COMPLEXITY ON COMPETITION ANALYSIS AND REMEDIES

DIANA L. MOSS
GREGORY T. GUNDLACH
RILEY T. KROTZ

JUNE 1, 2021

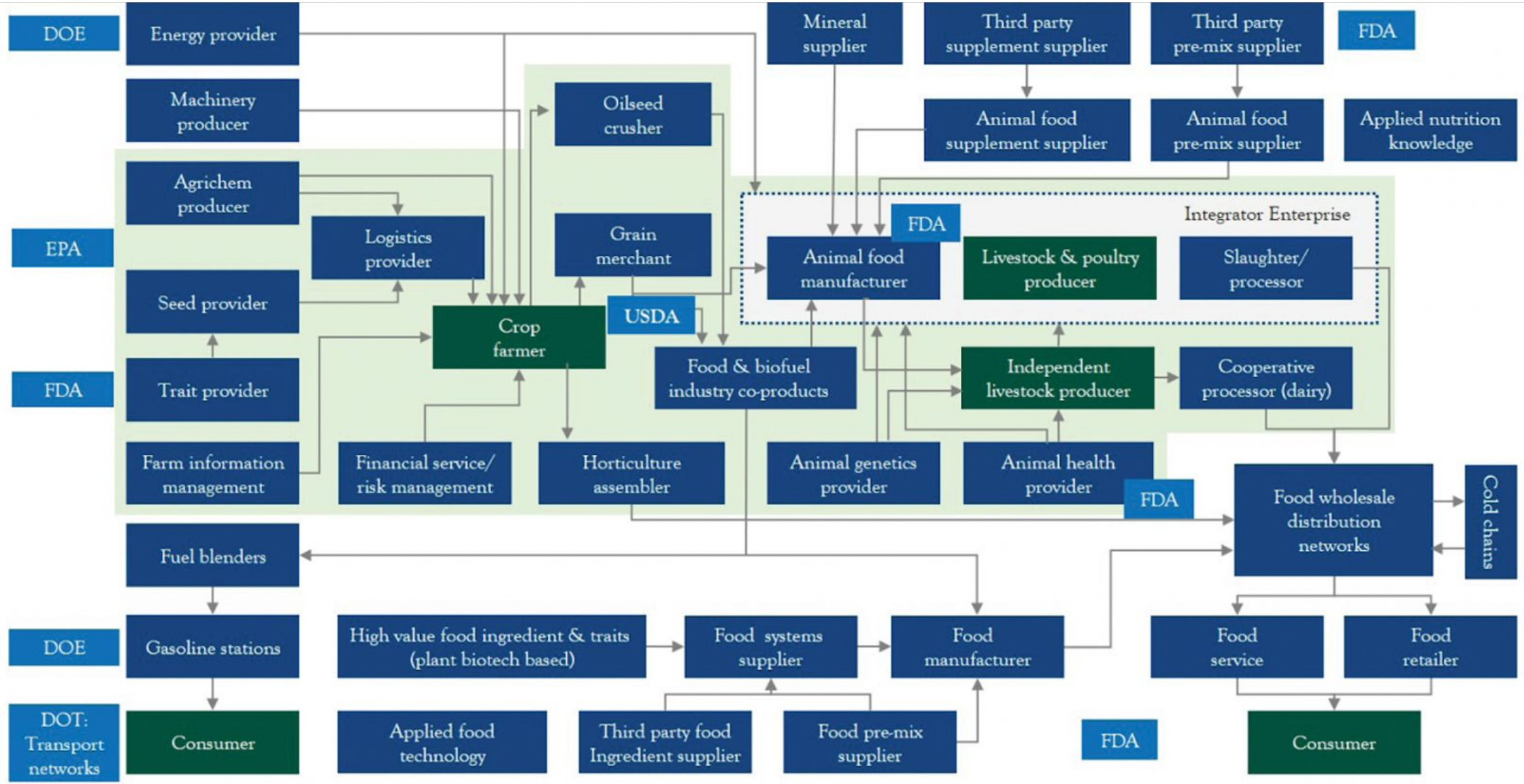
AAI AMERICAN ANTITRUST INSTITUTE

JAFSCD
Journal of Agriculture, Food Systems, and Community Development
ISSN: 2152-0801 online
https://www.foodsystemsjournal.org

From online cart to plate: What Amazon's retail domination means for the future of food

Carly Livingstone [a] * and Irena Knezevic [b]
Carleton University

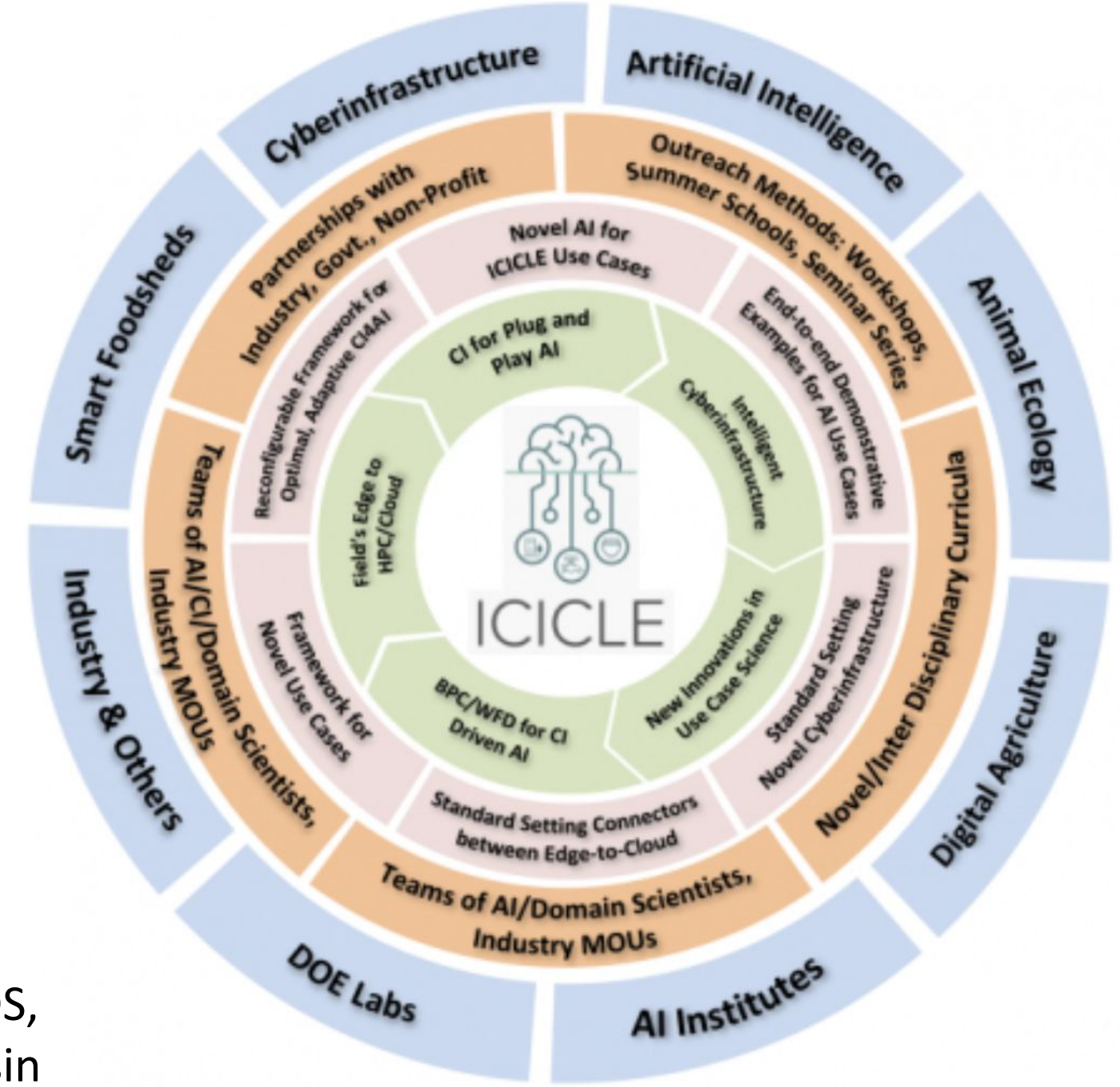
Livingstone, C., & Knezevic, I. (2020). From online cart to plate: What Amazon's retail domination means for the future of food. Journal of Agriculture, Food Systems, and Community Development, 9(4), 311–329.
https://doi.org/10.5304/jafscd.2020.094.017



DOE = Department of Energy; DOT = Department of Transportation; EPA = Environmental Protection Agency; FDA = Food and Drug Administration

Democratizing data and models

Intelligent Cyberinfrastructure with Computational Learning in the Environment (ICICLE)



Smart Foodsheds Use Cases: IC-FOODS, UC Davis, Ohio State, Univ of Wisconsin

ICICLE Project Partners

- Case Western Reserve University
- IC FOODS
- Indiana University
- Iowa State University
- Ohio Supercomputer Center
- Ohio State University
- Rensselaer Polytechnic Institute
- San Diego Supercomputer Center
- Texas Advanced Computing Center
- University of California, Davis
- University of California, San Diego
- University of Delaware
- University of Utah
- University of Wisconsin

Interoperable database management for the semantic web

1. **Subject - Predicate - Object (Resource Description Framework - RDF)**

2. **Ontology - a related set of RDFs**

3. **Foundry - related ontologies**
   ex: OBO Foundry, Open Biological and Biomedical Ontology *Foundry*
   Community development of interoperable ontologies for the biological sciences.

   ex. FoodOn

4. **Ontological Knowledge Graphs (KGs) built from ontologies**

5. **Interactive Knowledge and Learning Environment (IKLE)**
   querying knowledge graphs.
   visualizing queried results from knowledge graphs

Measuring Network Resilience via Geospatial Knowledge Graph: a Case Study of the US Multi-Commodity Flow Network

Jimmeng Rao, Song Gao, Michelle Miller, Alfonso Morales

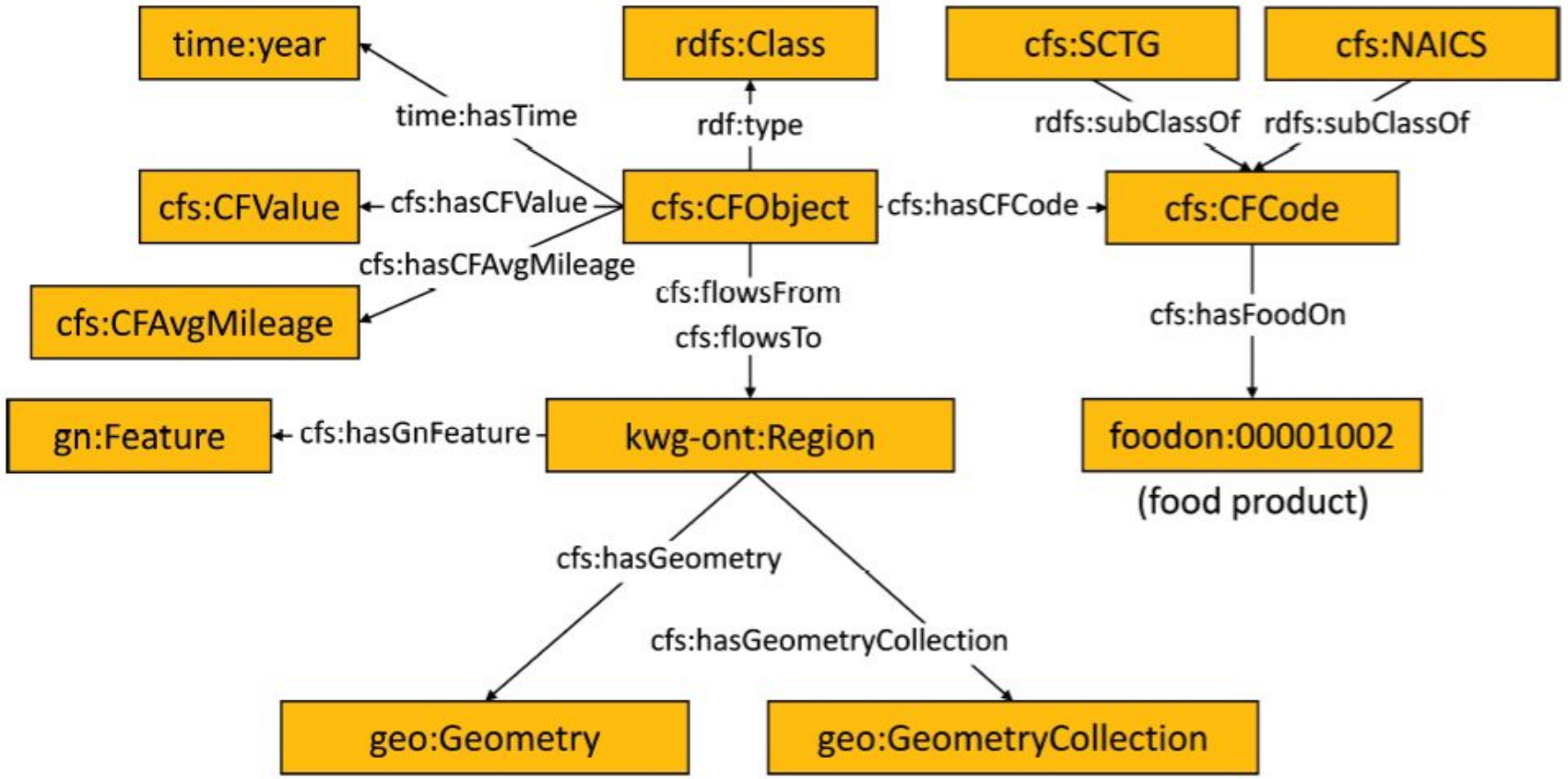
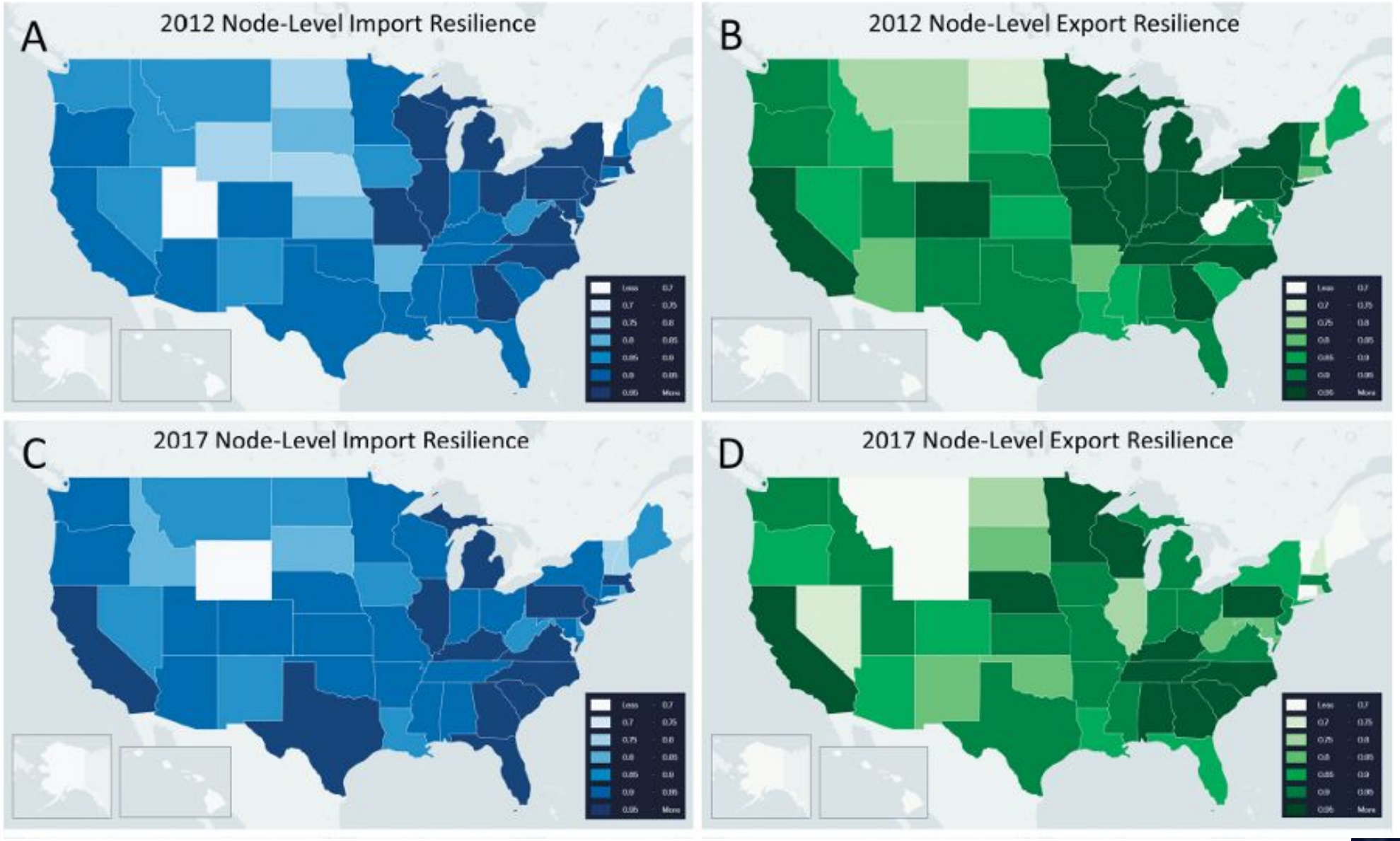


Figure 1: The ontology design of CFS-GeoKG.


A
2012 Node-Level Import Resilience
B
2012 Node-Level Export Resilience
C
2017 Node-Level Import Resilience
D
2017 Node-Level Export Resilience

REEDOO Food: Resource, Environment, Equity, Domain, and Organizational Ontologies for Food Systems Modeling

Matthew Lange & Courtney Riggle, IC-FOODS

Patrick Huber & Allan Hollander, UC-Davis Food Systems Lab

Michael Roberts, UCLA, Center for Food Law and Policy

Beth Plale, Indiana University, IT

Hande Küçük McGinty, Kansas State University, IT

Megan Konar, UIUC Civil Engineering

Barry Smith, University at Buffalo, Philosophy, ontologist

Joe Stubbs, Texas Advanced Computing Center

Damion Dooley & Will Hsiao, Simon Frazier University, founders FoodOn

Andrea Borghini, University of Milan, Philosophy

Michelle Miller, Univ of WI-Madison

An Interactive Knowledge and Learning Environment in Smart Foodsheds

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The University of Texas at Austin Texas Advanced Computing Center

Under review
IEEE Computer Graphics and Applications

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