Creating a Semantic Web for Smart Foodsheds

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AT030 Committee on Agriculture and Food Transportation

National Academies of Science Transportation Research

March 29, 2023

nature food

ARTICLES

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

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

ENVIRONMENTAL RESEARCH
INFRASTRUCTURE AND SUSTAINABILITY

OPEN ACCESS

RECEIVED
7 October 2021

REVISED
1 April 2022

ACCEPTED FOR PUBLICATION
14 April 2022

PUBLISHED
7 June 2022

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

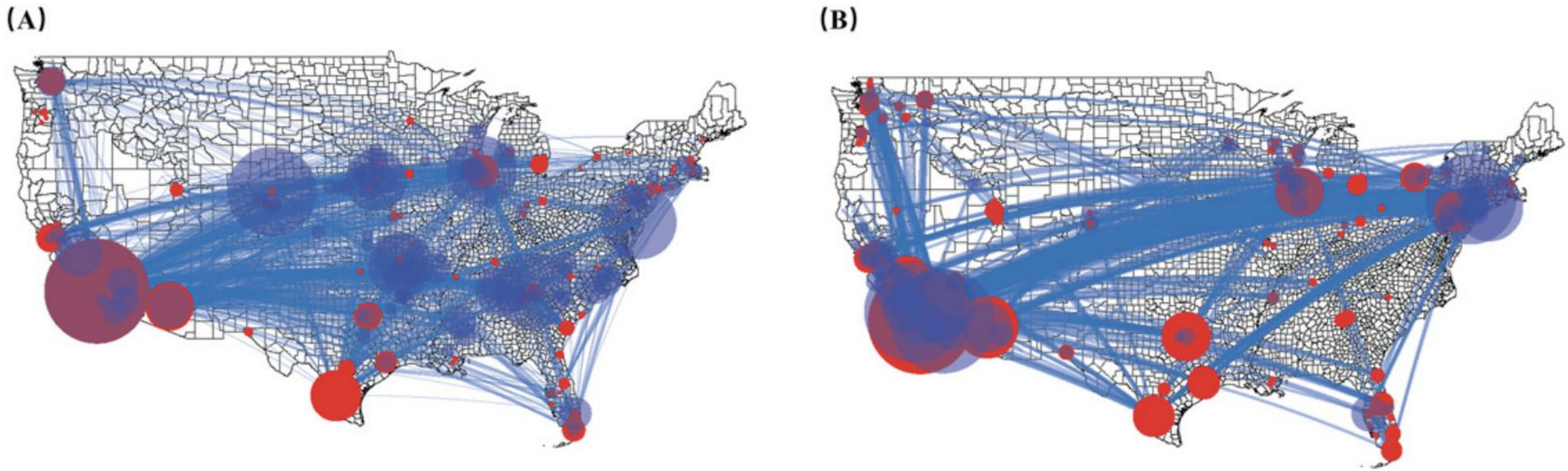
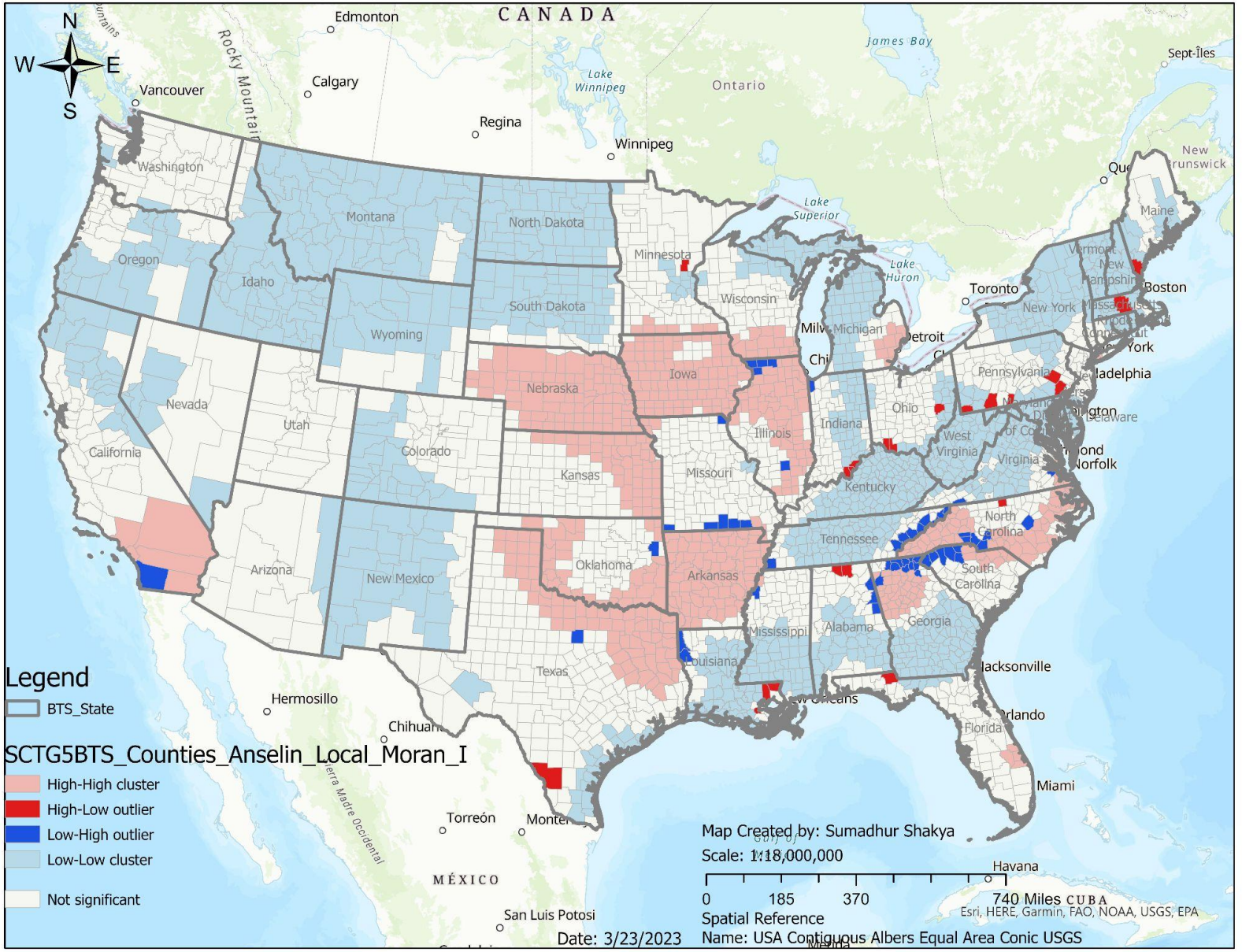


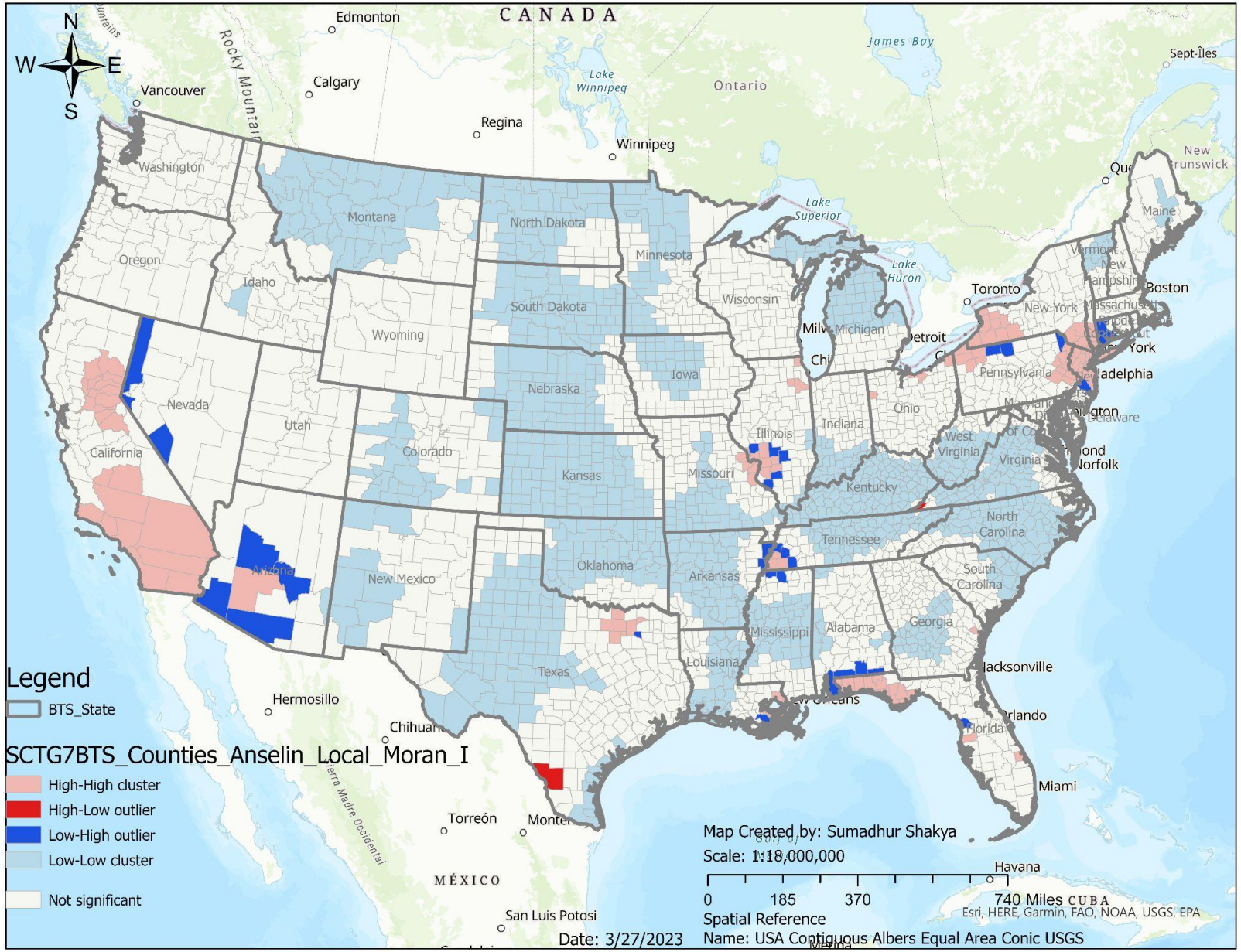
Figure 5. Map of carbon emissions associated with cold chain food trucking in the United States in 2017. The carbon footprint of county-level cold chain food flows for (A) 'meat' and (B) 'prepared foodstuffs'. The counties that have the highest carbon footprint inflow (red) and outflow (blue) are represented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

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

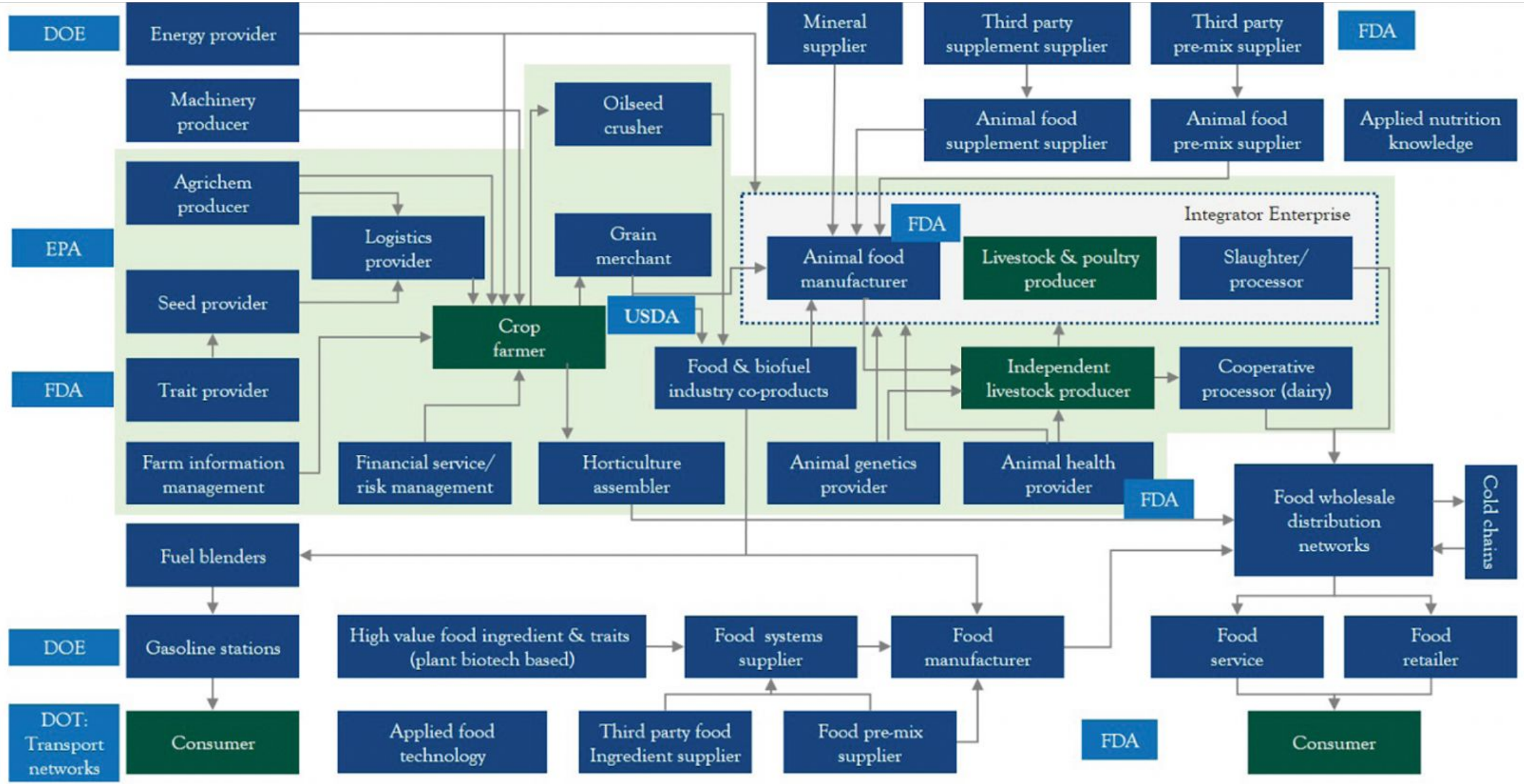


Map by Sumadhur Shakya, USDA-AMS-TSD & NIFA AFRI supported research

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



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

Transportation Research Part C 89 (2018) 53–82

Contents lists available at ScienceDirect

Transportation Research Part C

journal homepage: www.elsevier.com/locate/trc

Review

Ontologies for transportation research: A survey

Megan Katsumi*, Mark Fox

University of Toronto 5 King's College Road Toronto, Ontario M5S 3G8, Canada

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.

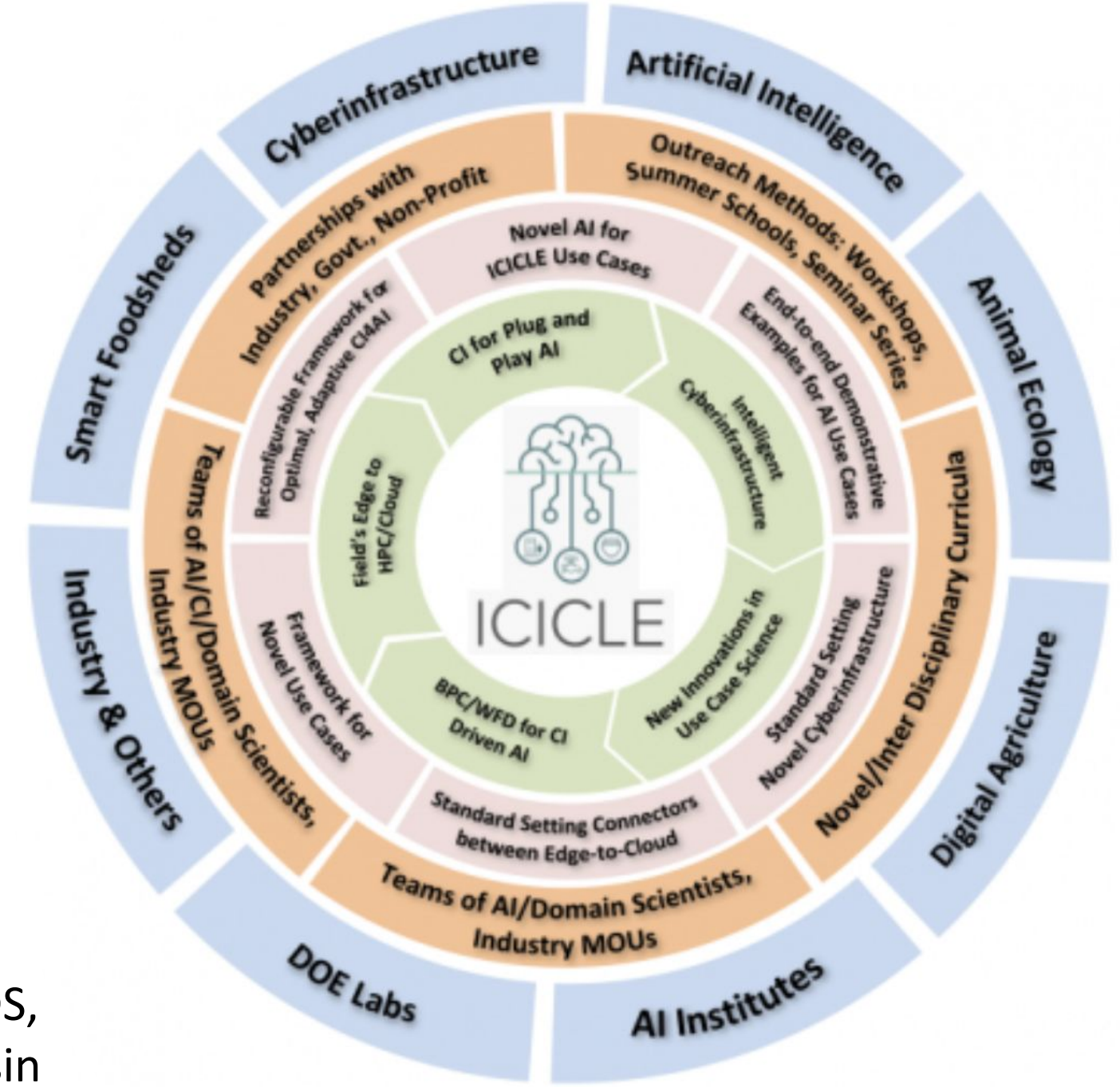
   ex. FoodOn

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

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

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

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

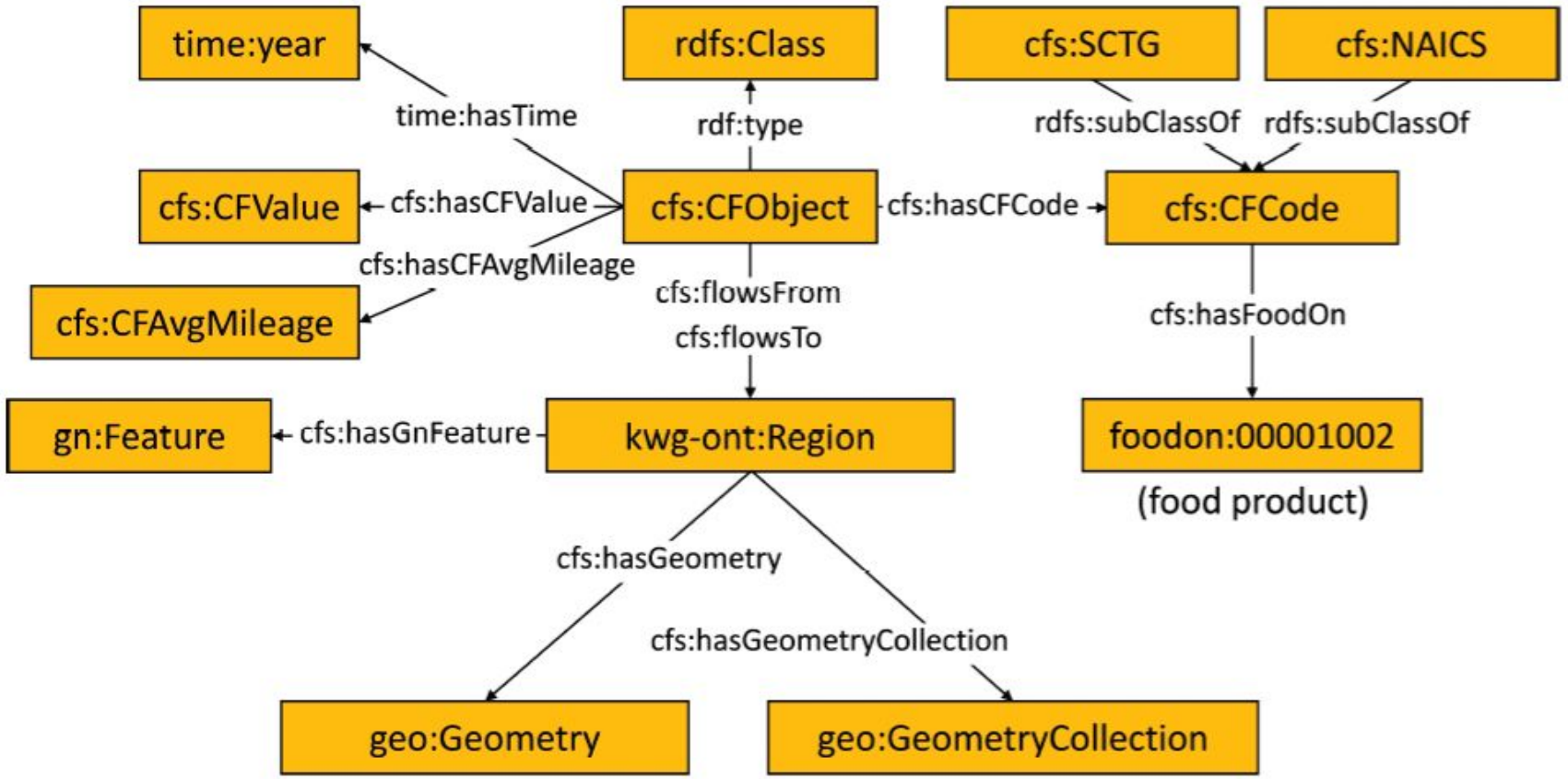
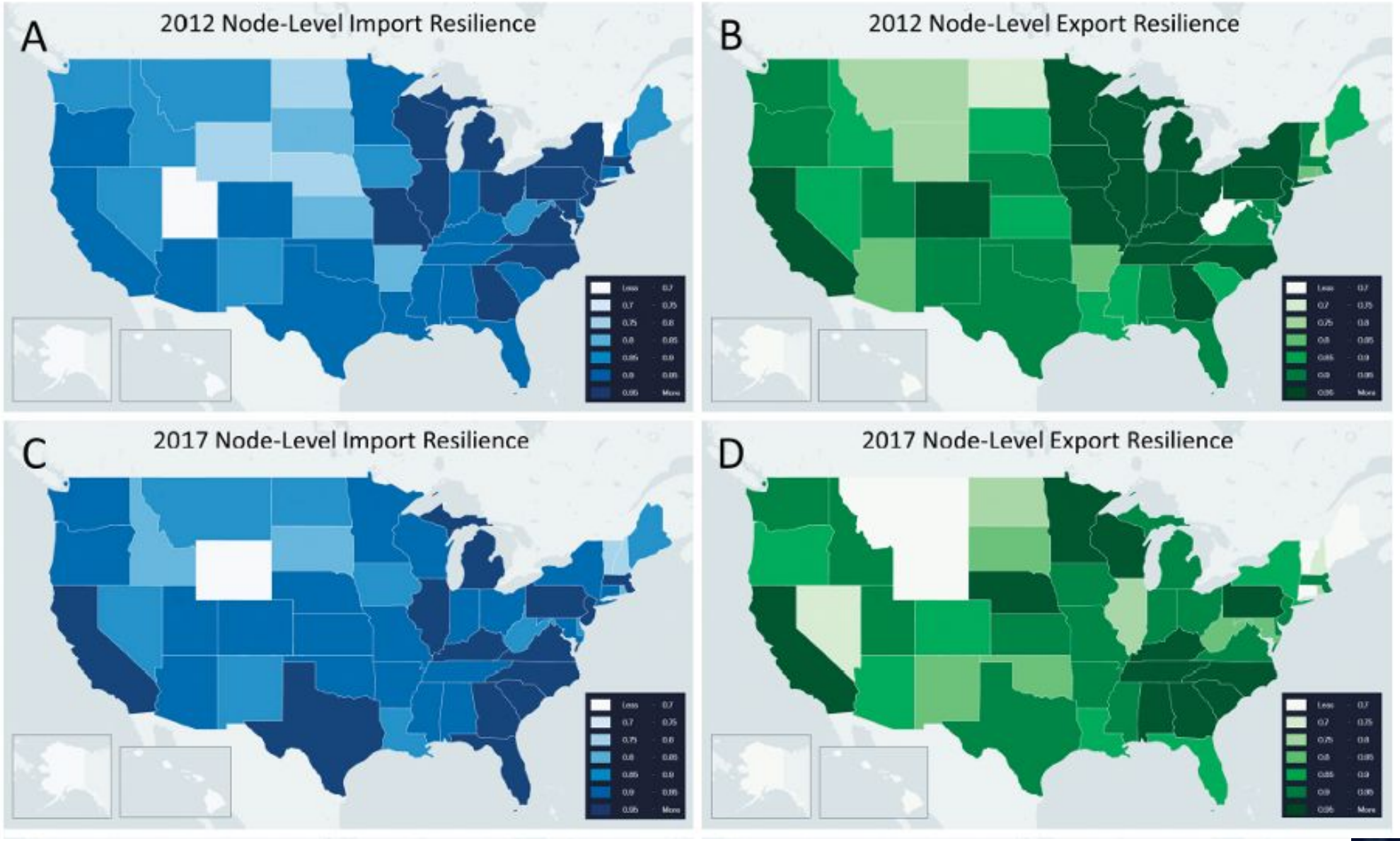


Figure 1: The ontology design of CFS-GeoKG.


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

Yamei Tu, Xiaoqi Wang, Rui Qiu, Han-Wei Shen
The Ohio State University

Michelle Miller, Jinmeng Rao, Song Gao
University of Wisconsin-Madison

Patrick R Huber, Allan D Hollander
University of California Davis

Matthew Lange
International Center for Food Ontology Operability Data and Semantics (IC-FOODS)

Christian R Garcia, Joe Stubbs
The University of Texas at Austin Texas Advanced Computing Center

Under review
IEEE Computer Graphics and Applications


A
B
Ontology Filter
C
Knowledge Graph Querier
KG Endpoint
Github URL of KG
https://raw.githubusercor
QUERY
D
ERE {
?role rdfs:label ?role_label .
?role dcterms:title ?role_title .
?role a obo:BFO_0000023 .
?person rdfs:label ?person_label .
?person a foaf:Person .
?role obo:RO_0000057 ?person .
?person fsls:FSI_000239 ?integratedissue .
Filter (?integratedissue IN (fsl:IS0043,fsl:IS0042
E
Table Viewer
Search
?role_label
?person_label
Chair
Bryce Lundberg
Director
Mary Power
Executive Director
Cynthia Powell
Executive Director
Lily Verdone
Agricultural Industry Member
Bryce Lundberg
Lasso: true
Role
Person
PositionType
IntegratedIssue
Literal
GuidelineMandateType
UseCases
GuidelineMandate
ProjectType
GovernmentLevelType
Project
ComponentIssue
ProgramType
Dataset
Tool
Program
OrganizationActivity
Organization
County
CWHRHabitatType
OrganizationType
EcoRegion
CommodityType
GovernmentLevelType
CWHRHabitatType
CommodityType
UseCases
PositionType
Advisor
IntegratedIssue
Water
ComponentIssue
b_1
b_2
b_3
P_1
A
PREFIX org: <http://www.w3.org
PREFIX dbr: <http://dbpedia.org
PREFIX xsd:
http://www.w3.org/2001/XMLScl
SELECT DISTINCT *
where{
?field rdf:type
https://makg.org/class/FieldOfSt
foaf:name ?name ;
mag:citationCount ?citation ;
mag:paperCount ?paper ;
dcterms:created ?create .
filter contains(?name, "food")
}
P_2
B
Knowledge Graph Querier
KG Endpoint
https://makg.org/s
Github URL of .
QUERY
c_1
citation
create
2017
2018
2019
2020
name
Animal food
Curing (food preservation)
Fermentation in food proces
Functional food
Health food
Healthy food
Microbial food web
Plant foods
Solid food
Staple food
c_2
name
Animal food
Curing (food preservation)
Fermentation in food proce
Functional food
Health food
Healthy food
Microbial food web
Plant foods
A resilience
B influence
$(a_1)import, 2012$
$(a_2)export, 2012$
$(a_3)\ import, 2017$
$(a_4)\ export, 2017$
$(b_1)import, 2012$
$(b_2)export, 2012$
$(b_3)\ import, 2017$
$(b_4)\ export, 2017$
P_3

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