



United States
Department of
Agriculture

National Institute
of Food
and Agriculture

INVESTING IN SCIENCE | SECURING OUR FUTURE | WWW.NIFA.USDA.GOV

Knowledge Discovery at NIFA: Understanding and Communicating Science

Charlotte Baer
Robbin Shoemaker

December 18, 2015

Science agencies strive to answer ...

- Are we funding the right research questions?
- What is the level of resources we are committing to various issues?
- Are we supporting the appropriate individuals/institutions?
- What are we getting from our investments?
 - Are we getting what we're paying for?
- What is the societal impact of those investments?

Are we doing the right thing and are we doing it well?





Dramatic changes in understanding science

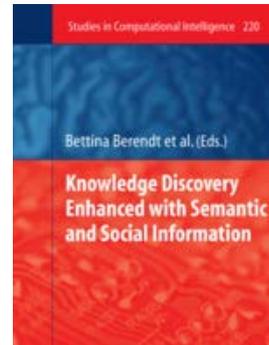
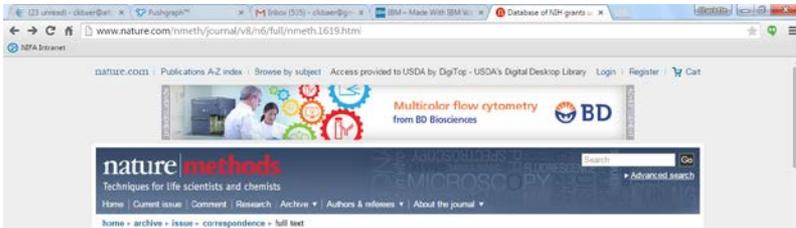
- What has changed since our data and reporting systems were built?
- Between 1988 and 2003 computing power has increased 43m-fold. (Brynjolfsson & McAfee, 2012)
 - Better processors only account for a fraction of improvement.
 - The lion's share came from increasingly efficient algorithms, resulting in knowledge discovery.

Knowledge Discovery Tools

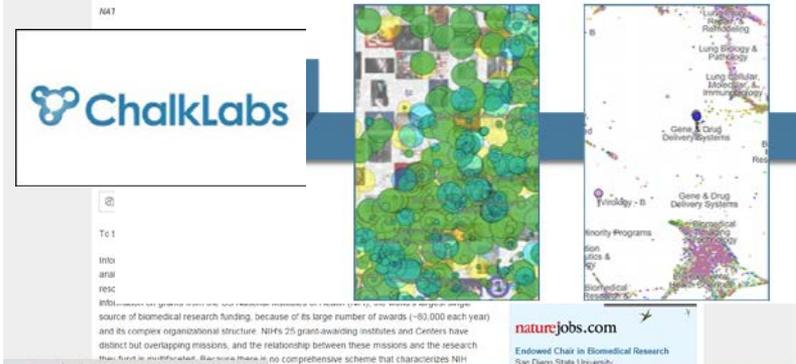
- Data mining
- Mapping
- Network analysis

Big Data Matters

Interactive Predictive Modeling
with SAS® Visual Statistics



...suggests tailored treatment options—along with supporting evidence—to clinicians by extracting key information from each patient's health record and cross-referencing that with MSK expertise, curated texts and case histories.





What does NIFA's science look like?

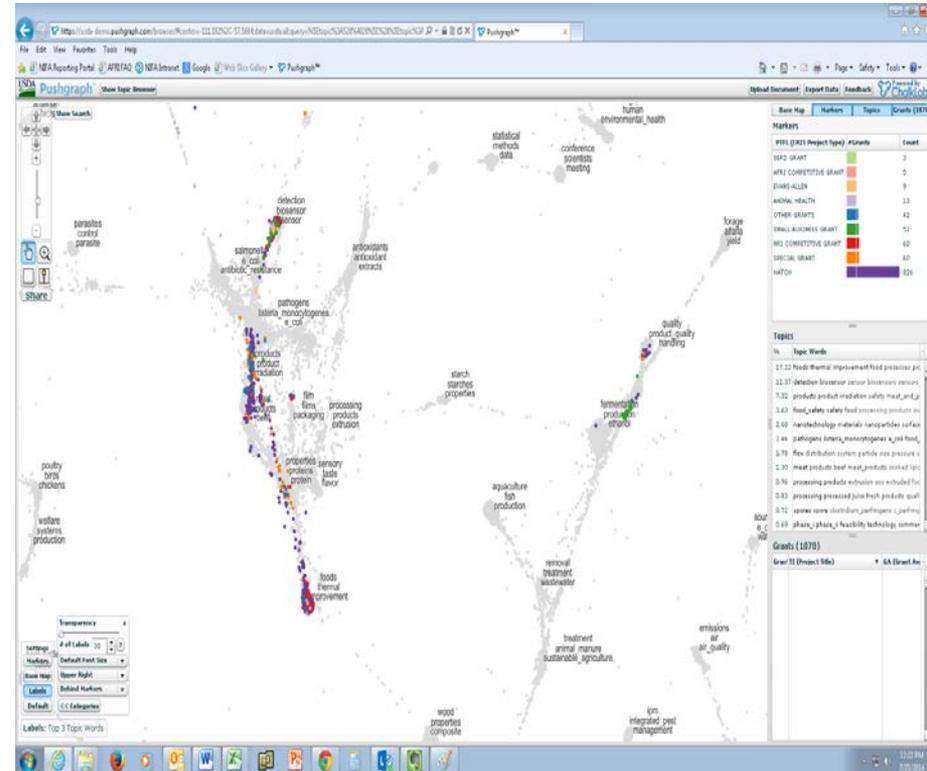
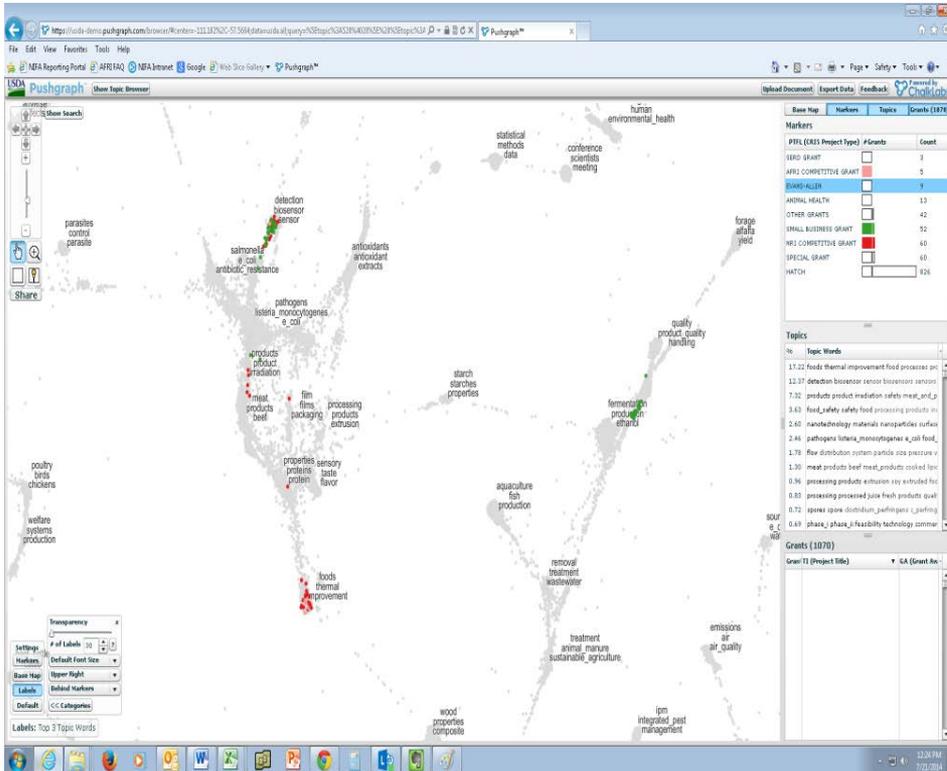
- Scientific realm and characteristics
- Complementarity or overlaps with others
- People conducting it
- People managing it
- Input received about it



Characteristics: Capacity and Competitive Research

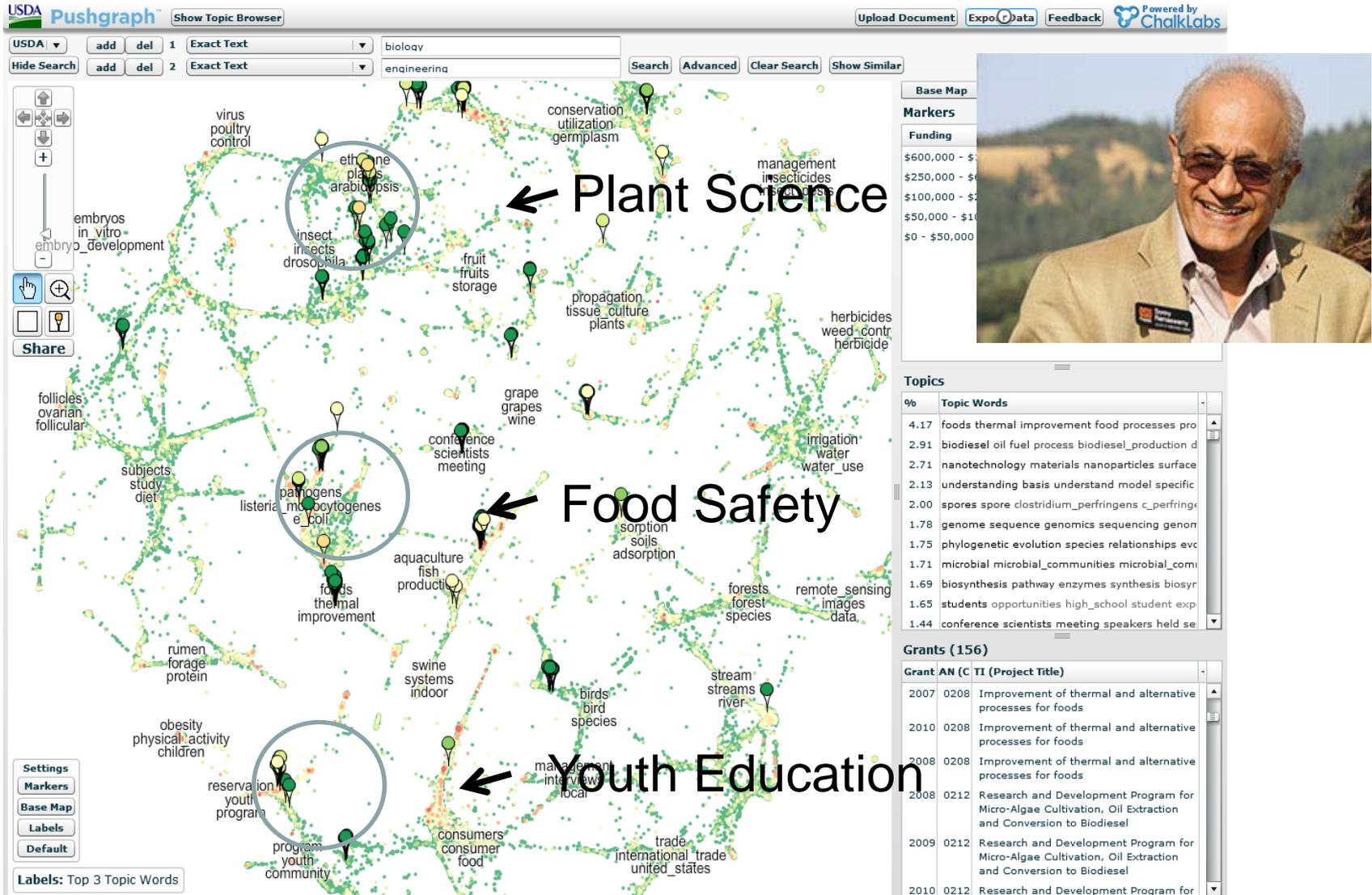
Competitive food safety projects (red green clusters)

Clear lines (purple) of capacity-funded Capacity food safety projects



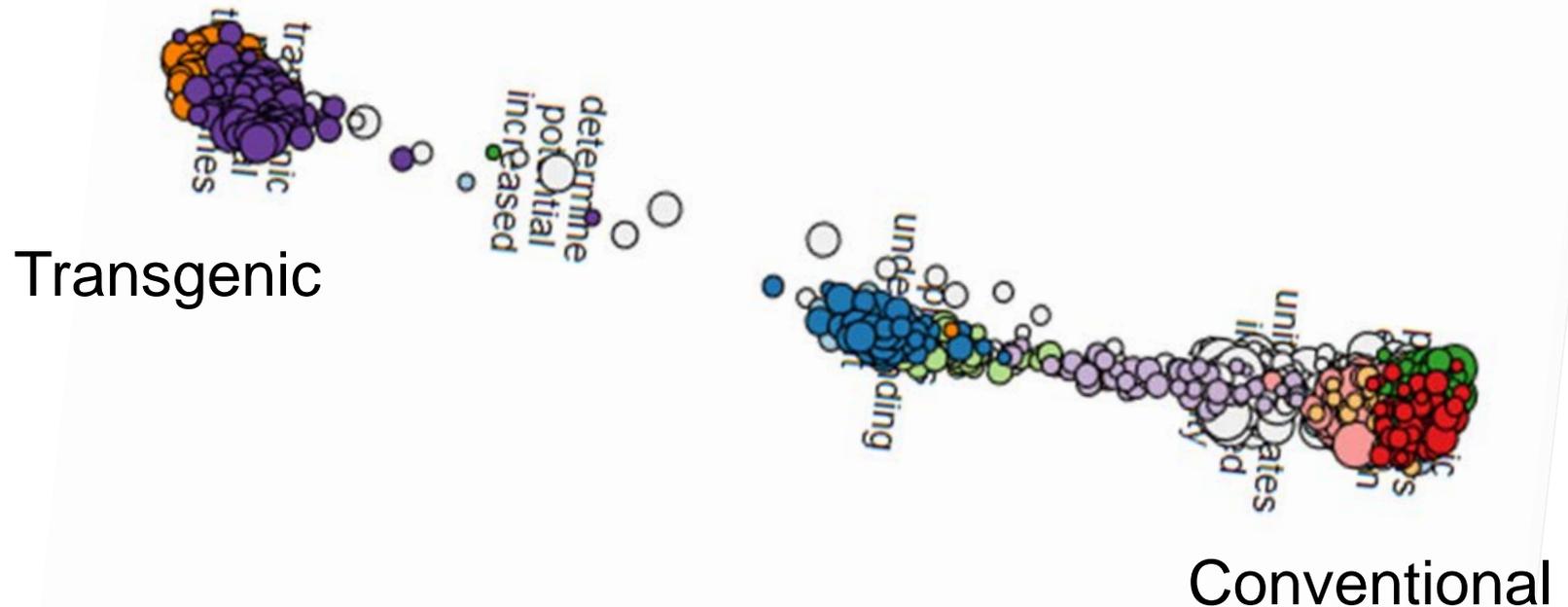


Characteristics: Convergence in science



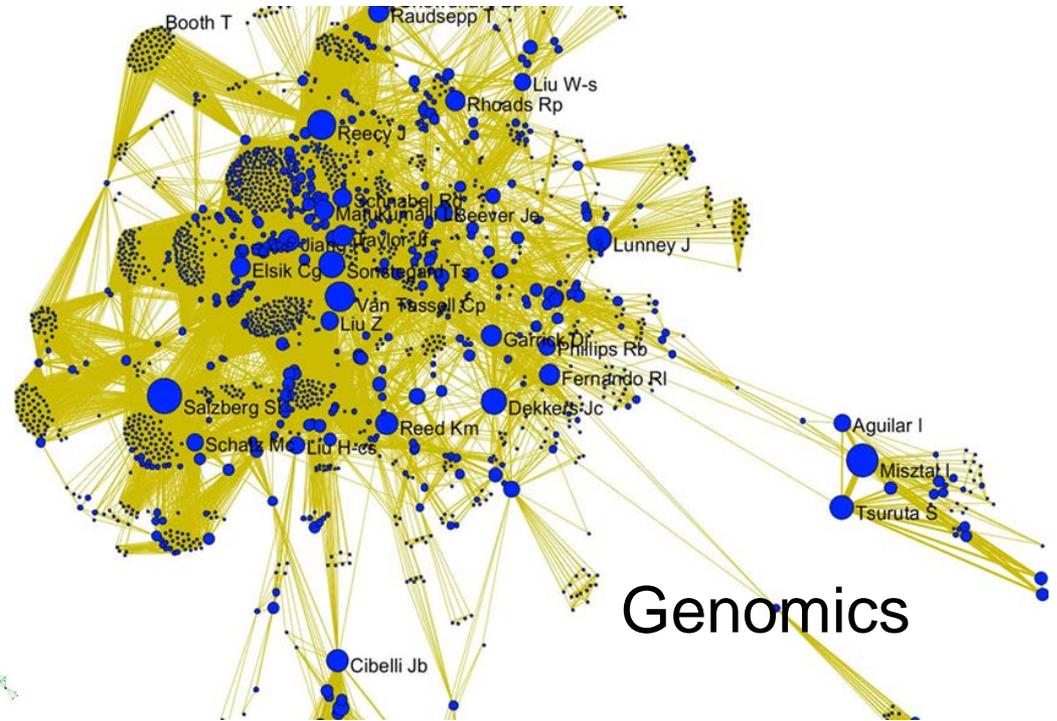
Understanding Science: “Plant Breeding”

- ad hoc modeling

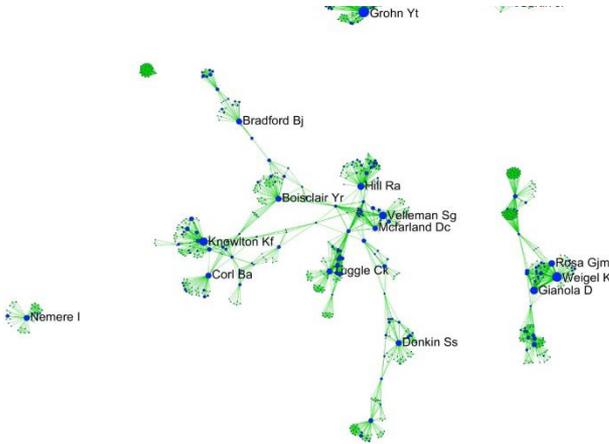


People Conducting NIFA Science

Who are the bridges
or blockers, brokers or
chokers?



Genomics



Growth & Nutrition

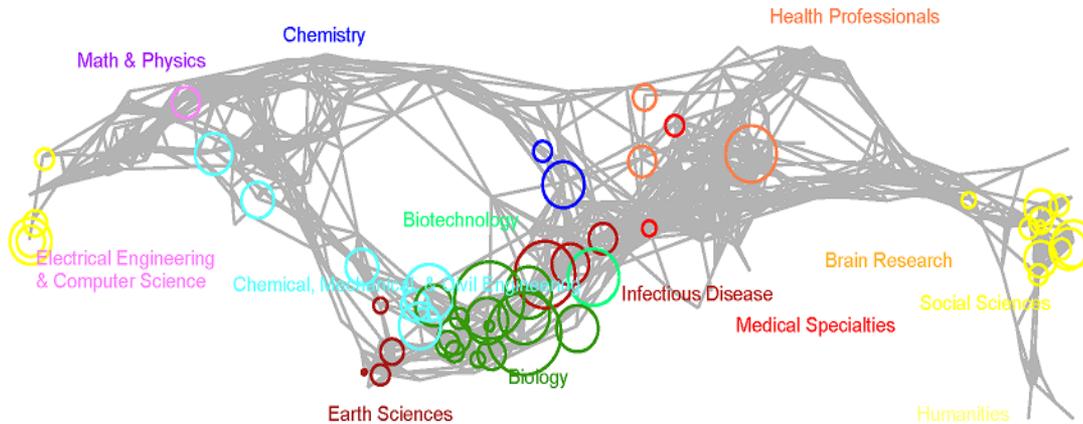


United States
Department of
Agriculture

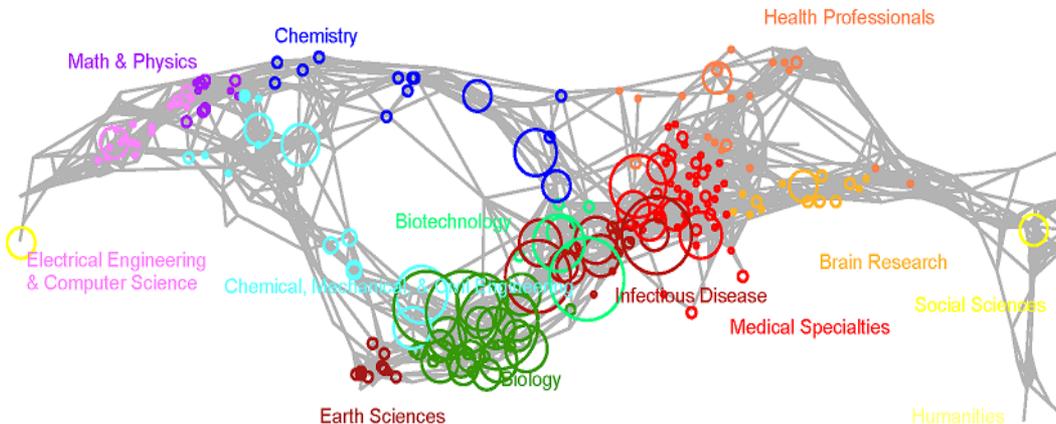
National Institute
of Food
and Agriculture

INVESTING IN SCIENCE | SECURING OUR FUTURE | WWW.NIFA.USDA.GOV

People Managing NIFA's Science



Areas of science supported by NIFA's Institute of Food Production and Sustainability



Scientific expertise of National Program Leaders in NIFA's Institute of Food Production and Sustainability



Saving Time and Resources: Identifying Reviewers, Panel Composition, Duplicative Research

Pushgraph™ | CRIS

https://usda.pushgraph.com/section/accountability/concept

Apps Gmail Google Calendar NIFA Intranet T & A NIFA Reporting Por... AFUCU AERC Projects Capital One CC CHASE CC Music Google Beta Employee Personal ... TCM Turner Classic ... Other bookmarks

Maps CRIS CRIS Concepts US Map

Engineering next generation tools for longitudinal monitoring of pollinator populations and promoting bee colony health

CRIS Legend Markers EPP all Legend Markers Settings Base Map Labels Reset

EPP all Concepts 10 Results [Export](#)

%	Concept	Concept Words
11.8	7	process biomass agricultural energy evaluate conversion determine feedstock biofuels pi
10.5	2	project program area priority sustainable sustainability technology waste developing prod
10.3	1	proposed united_states project objective low_cost economic create propose approach bi
10.2	5	tools improve crop agricultural_systems field plant techniques soil water_use managem
10.0	4	design develop data control based model effects including needed evaluate work integrat
10.0	6	engineering based processes products goal performance applications high materials lor
9.7	9	develop production development objectives generation technologies conditions system ct

Primary Investigators 549 Results [Export](#)

#Awd	Primary Investigator
8	Yang, P. Y.
7	Hansen, C. L.
7	Kastner, J. R.
7	Shupe, T. F.
6	King, B. A.
6	West, T. P.

CRIS Data CRIS Financial EPP all 852 Results - \$107,456,000 [Export](#)

Title	PI	Performing Institution
Soil Steam Disinfestation	Weissman, J.	Precision Combustion, Inc.
NRI: An Integrated Machine Vision-based Control	Burks, T. F.	UNIVERSITY OF FLORIDA
New generation of green, high efficient agricultura	Vacca, A.	PURDUE UNIVERSITY
Targeted Irrigation Management (TIM) and Initial S	Groeneveld, D.	HydroBio
Development of wireless sensor for studying fligh	Rao, S. U.	OREGON STATE UNIVERSITY
Development of Environmentally Friendly and Eco	Ngo, H. L.	Agricultural Research Service

Help Desk / Customer Support

Privacy Policy Section 508 FOIA

1:44 PM 5/7/2015



Communications: One-stop shop for NIFA Impacts



NIFA IMPACTS

share your SCIENCE!

Partner with NIFA to highlight your discoveries and accomplishments!

FOLLOW @USDA_NIFA & TWEET YOUR STORIES USING #NIFAIMPACTS

E-MAIL IMPACTSTORIES @NIFA.USDA.GOV

OR CALL THE IMPACTS COORDINATOR: 202-720-6133

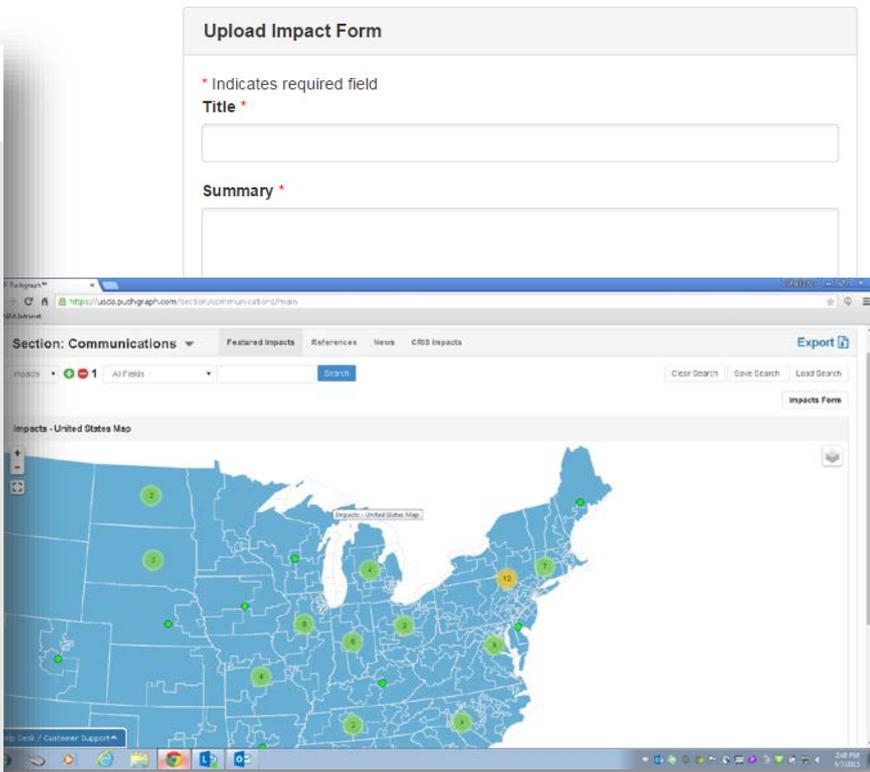
ILLUSTRATE
to the American people how research, education, and extension are improving lives.

REPORT
to Congress that NIFA-funded projects are making a difference.

INFORM
state and local governments about the ways their partnership betters their communities.

COMMUNICATE
to partners and stakeholders the opportunities available to educate the next generation.

ENABLE
USDA *Leadership* to make sound decisions regarding mission priorities.



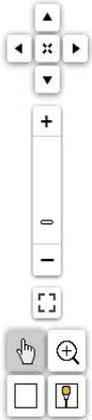


NIFA's Knowledge Discovery Tools: Applied to USDA and Federal Science

- Throughout NIFA: program planning, management, reporting, analysis and communications
- Throughout REE/USDA: Understand and improve relationships among REE science
 - Areas of science, people, places, funding mechanisms
- Throughout Federal Government: Understand and improve relationships among USDA agencies within the Federal science landscape



Science Map of Food Safety: USDA's National Institute of Food and Agriculture and Agricultural Research Service

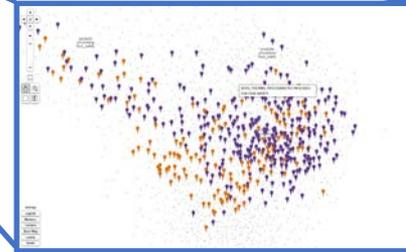
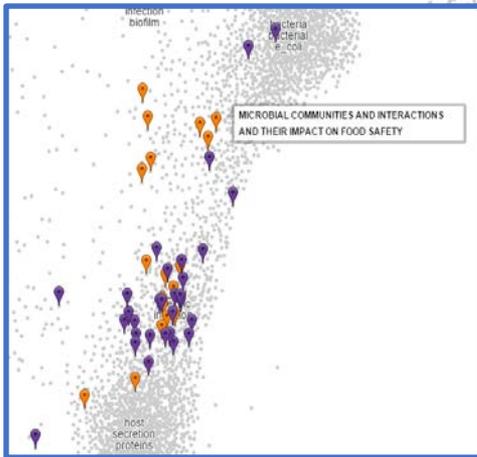


Food safety education

Example: Enhancing food safety education by incorporating simulation-based learning (NIFA)

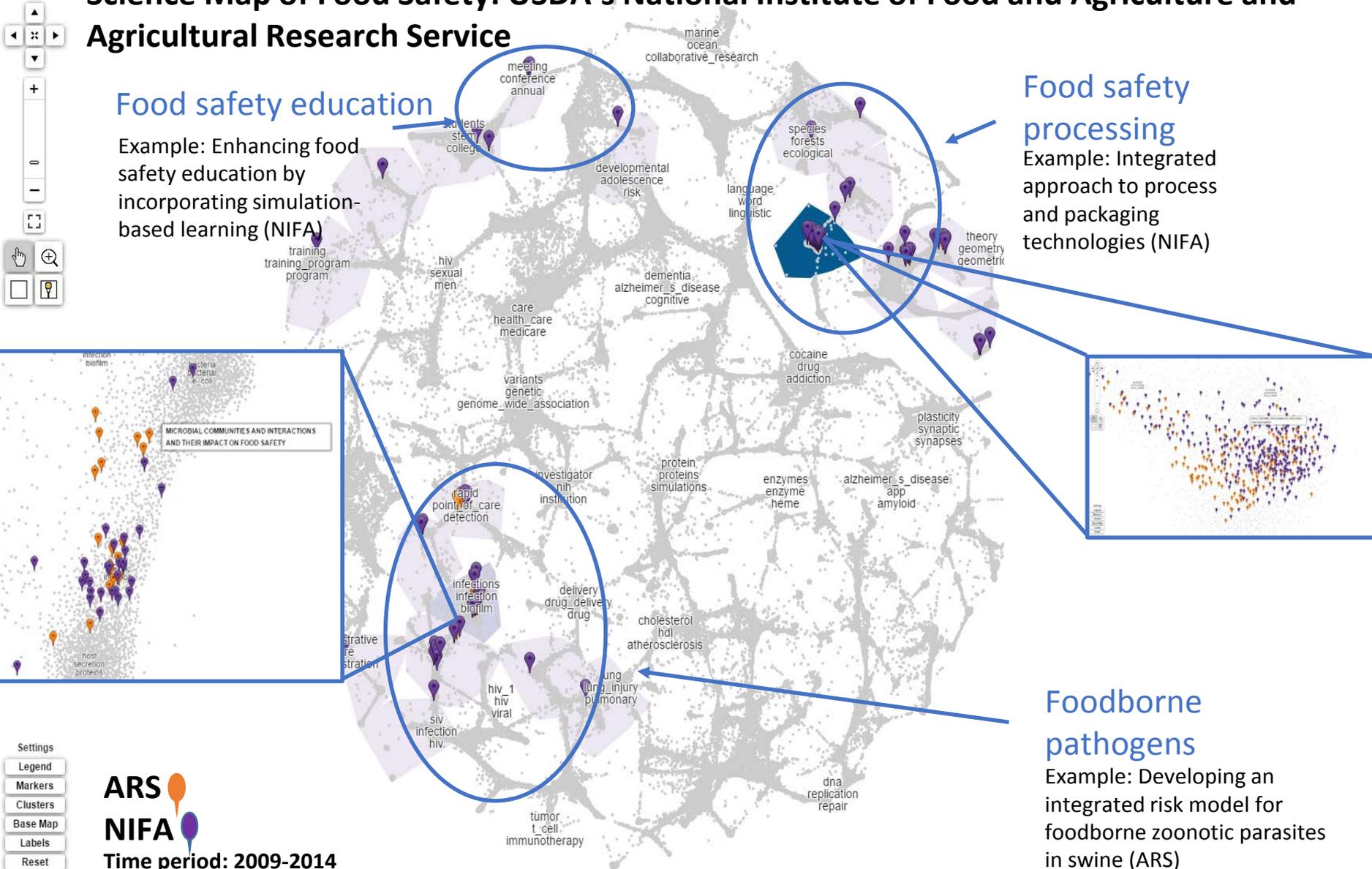
Food safety processing

Example: Integrated approach to process and packaging technologies (NIFA)



- Settings
- Legend
- Markers
- Clusters
- Base Map
- Labels
- Reset

ARS
NIFA
Time period: 2009-2014

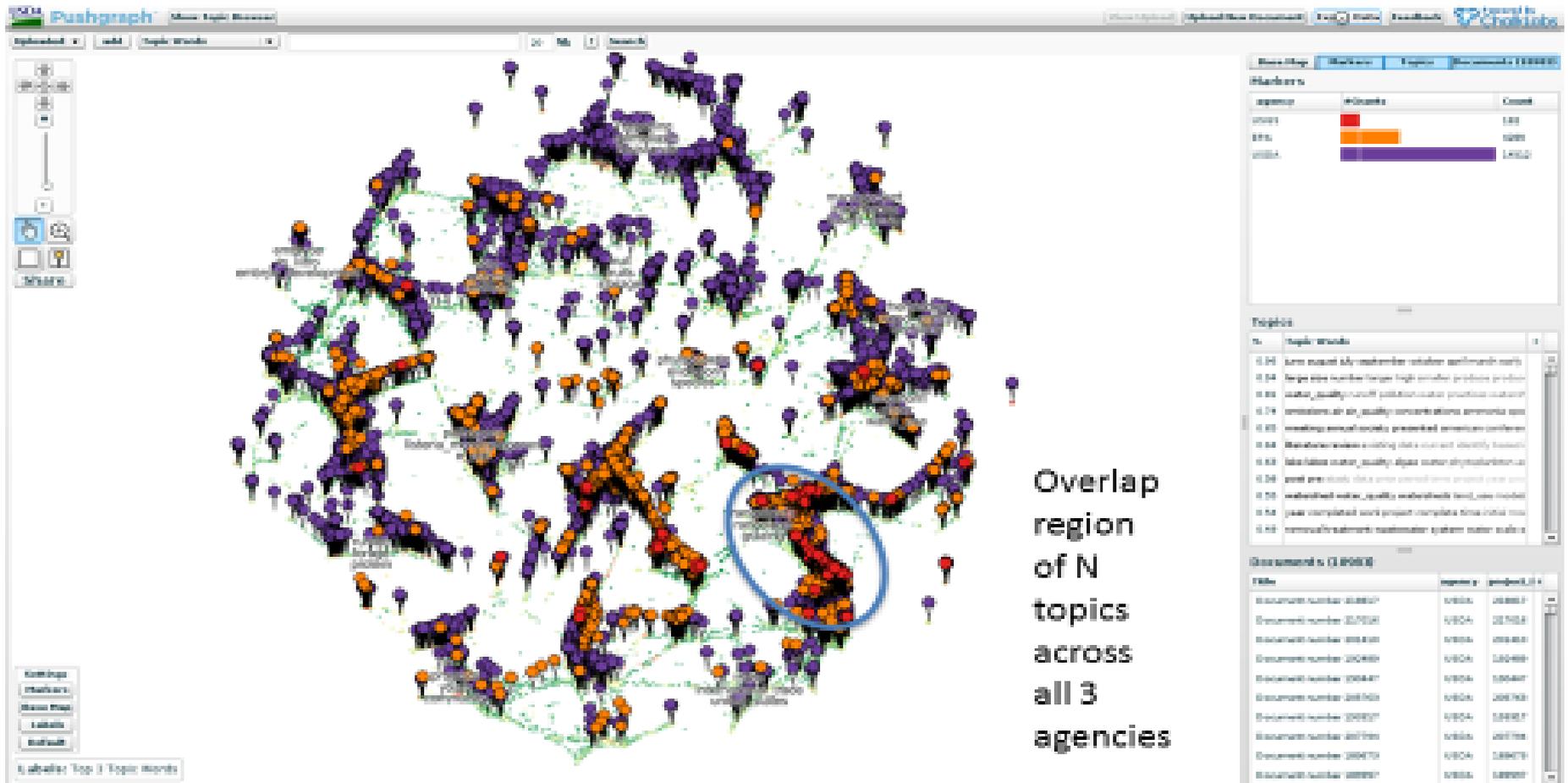


Foodborne pathogens

Example: Developing an integrated risk model for foodborne zoonotic parasites in swine (ARS)



USDA, EPA, and USGS Projects Inferenced Against NIFA Projects



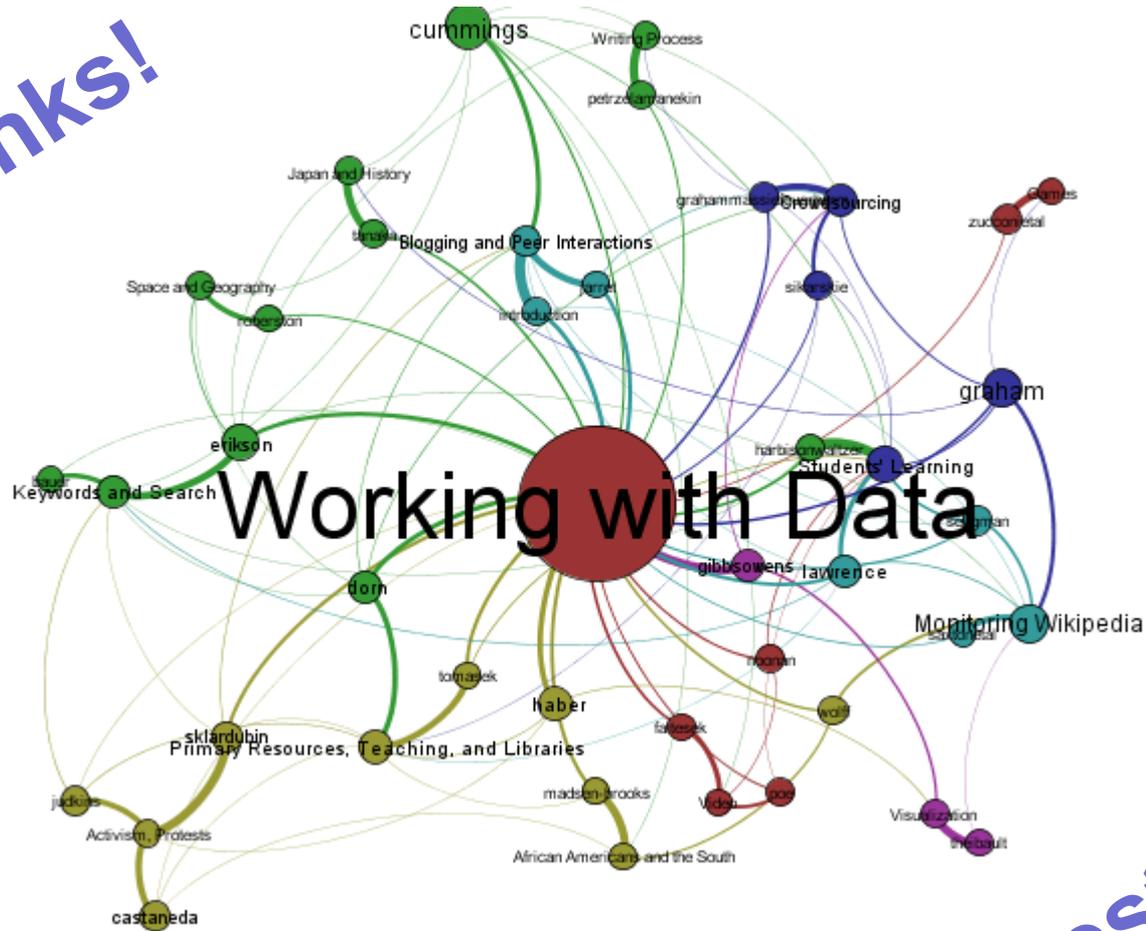


NIFA is Using Tools

- Inform scientific program planning and management
- Improve efficiency of work
- Enhance communications with stakeholders and convey impacts
- Most importantly, provide
 - **Access** to our data (internally, public next)
 - **Answers** to questions
 - **Analysis** of science portfolios



Thanks!



Questions?



United States
Department of
Agriculture

National Institute
of Food
and Agriculture

INVESTING IN SCIENCE | SECURING OUR FUTURE | WWW.NIFA.USDA.GOV