University Industry
Demonstration Partnership

New Metrics for Science Production and Impact: Institute for Research on Innovation & Science (IRIS)

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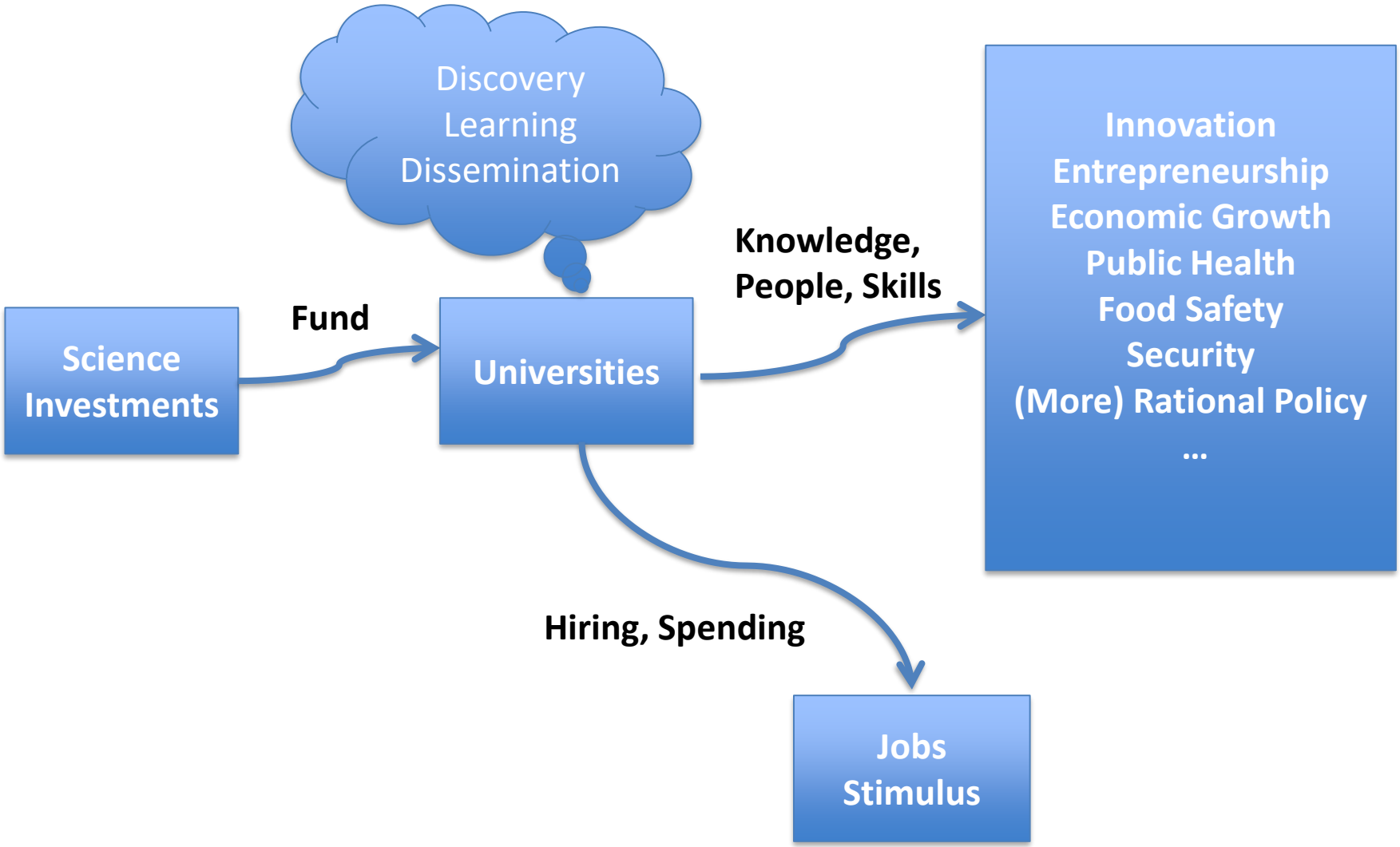
In 2015, our society invested U.S. $214 in academic research for every man, woman, and child in the country

- We make those investments to develop human knowledge and to improve quality of life and well being.
- How do we understand, explain and improve those effects?

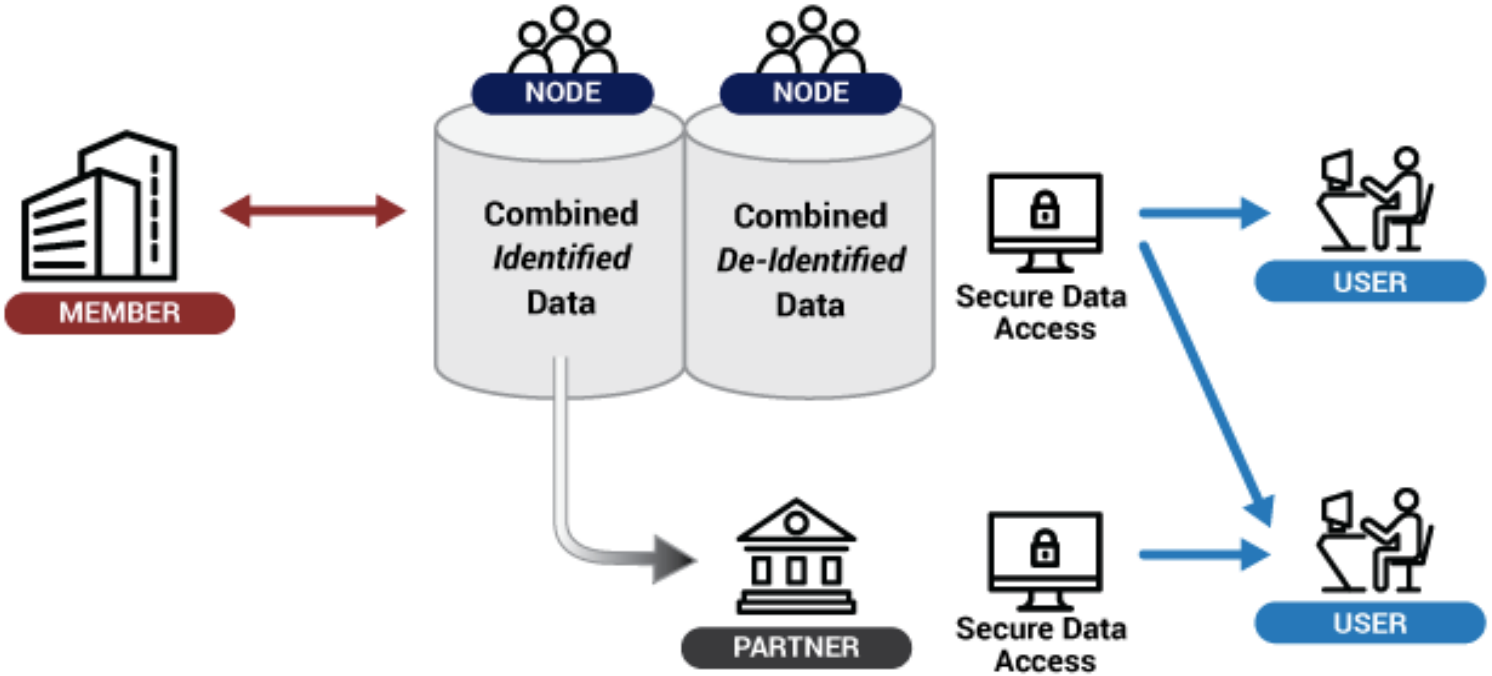
Framework


Discovery
Learning
Dissemination
Science Investments
Fund
Universities
Knowledge, People, Skills
Innovation
Entrepreneurship
Economic Growth
Public Health
Food Safety
Security
(More) Rational Policy
…
Hiring, Spending
Jobs Stimulus

MEMBERS: Universities contribute data, support infrastructure and receive campus-specific and aggregate reports

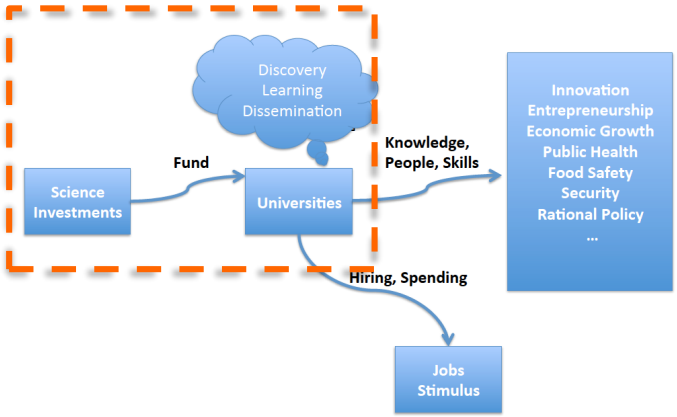
NODES: Approved nodes materially improve data, develop products, and expand user communities

USERS: Approved users securely access de-identified aggregate datasets



PARTNERS: Approved partners receive data from IRIS which they improve and make accessible throught their own secure systems

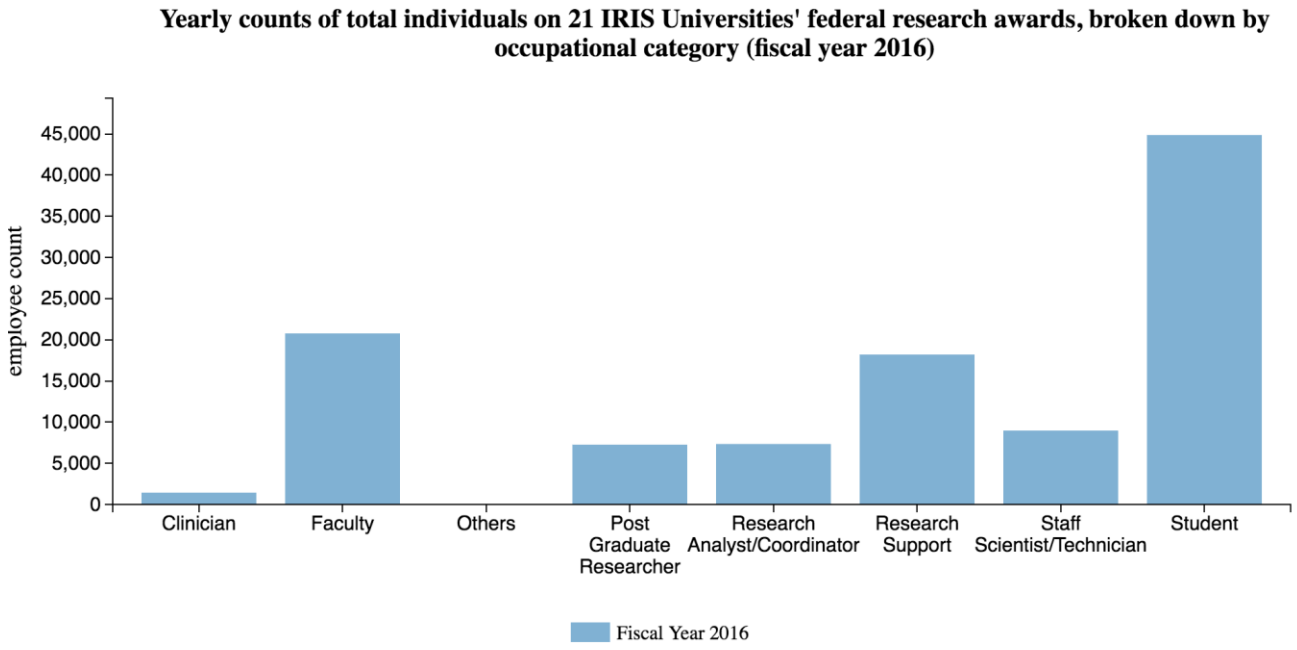
Growing National Research Data Infrastructure



Universities are SOURCES of ideas and trained people

Federal funding allows work to be done on campus, that work trains people and discovers things. It also creates complex and dynamic collaboration networks that are idiosyncratic to particular campuses

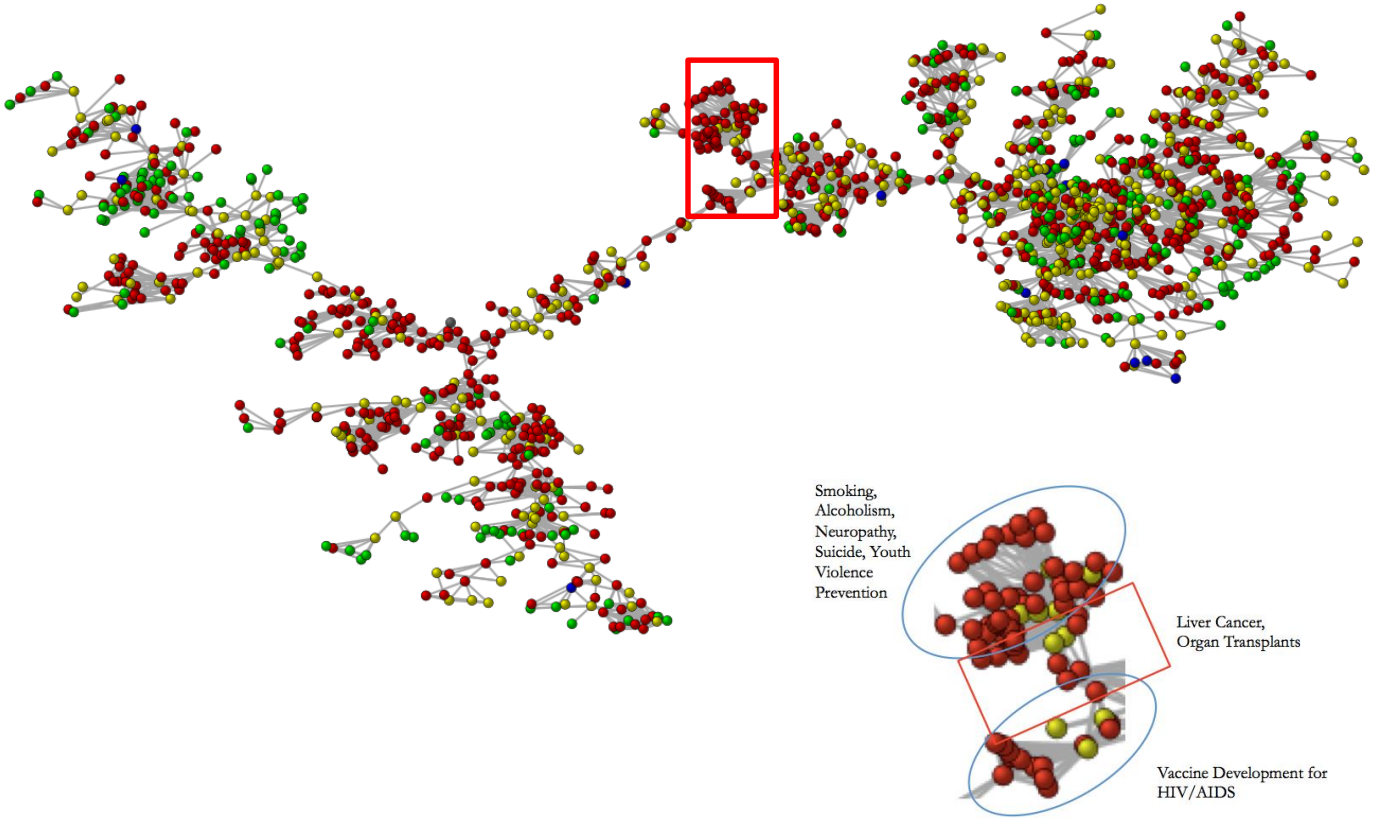
Who does federal research funding support?

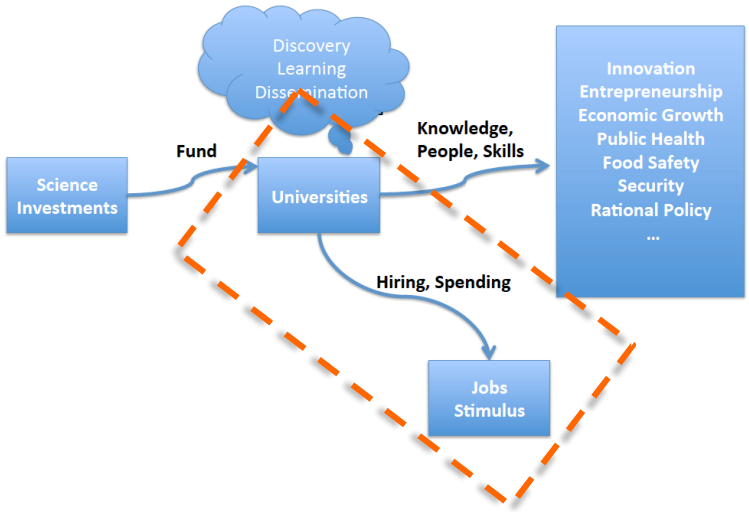


At 21 IRIS members

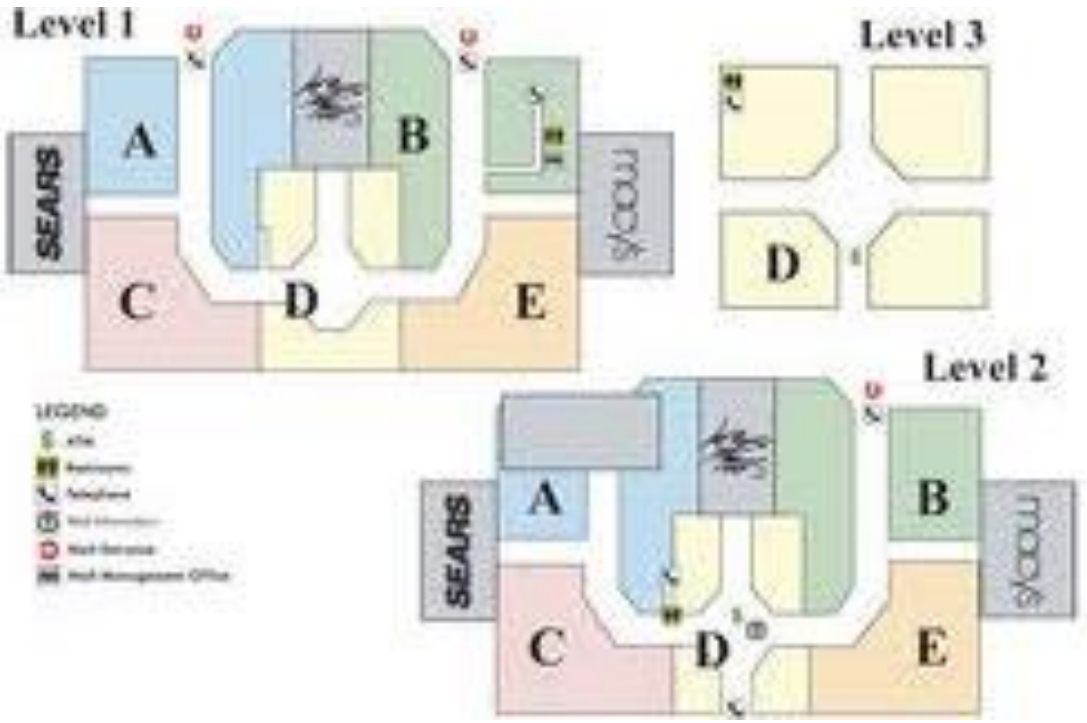
- 108,835 people
- 41% students

Collaboration network on one campus based on federally funded projects





Universities are ANCHORS that increase the resilience of regions and markets


Level 1
SEARS
A
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Level 3
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Level 2
SEARS
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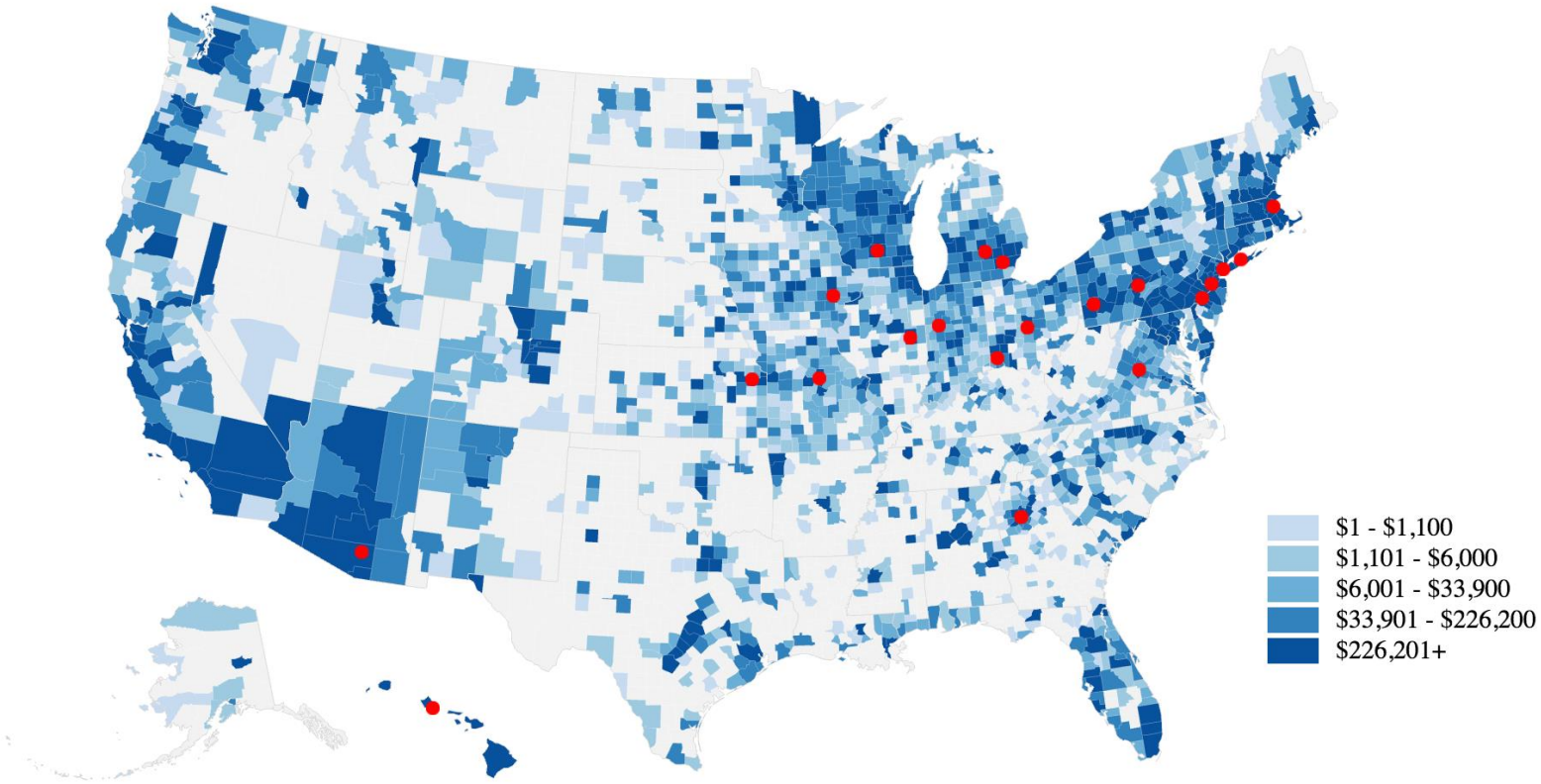
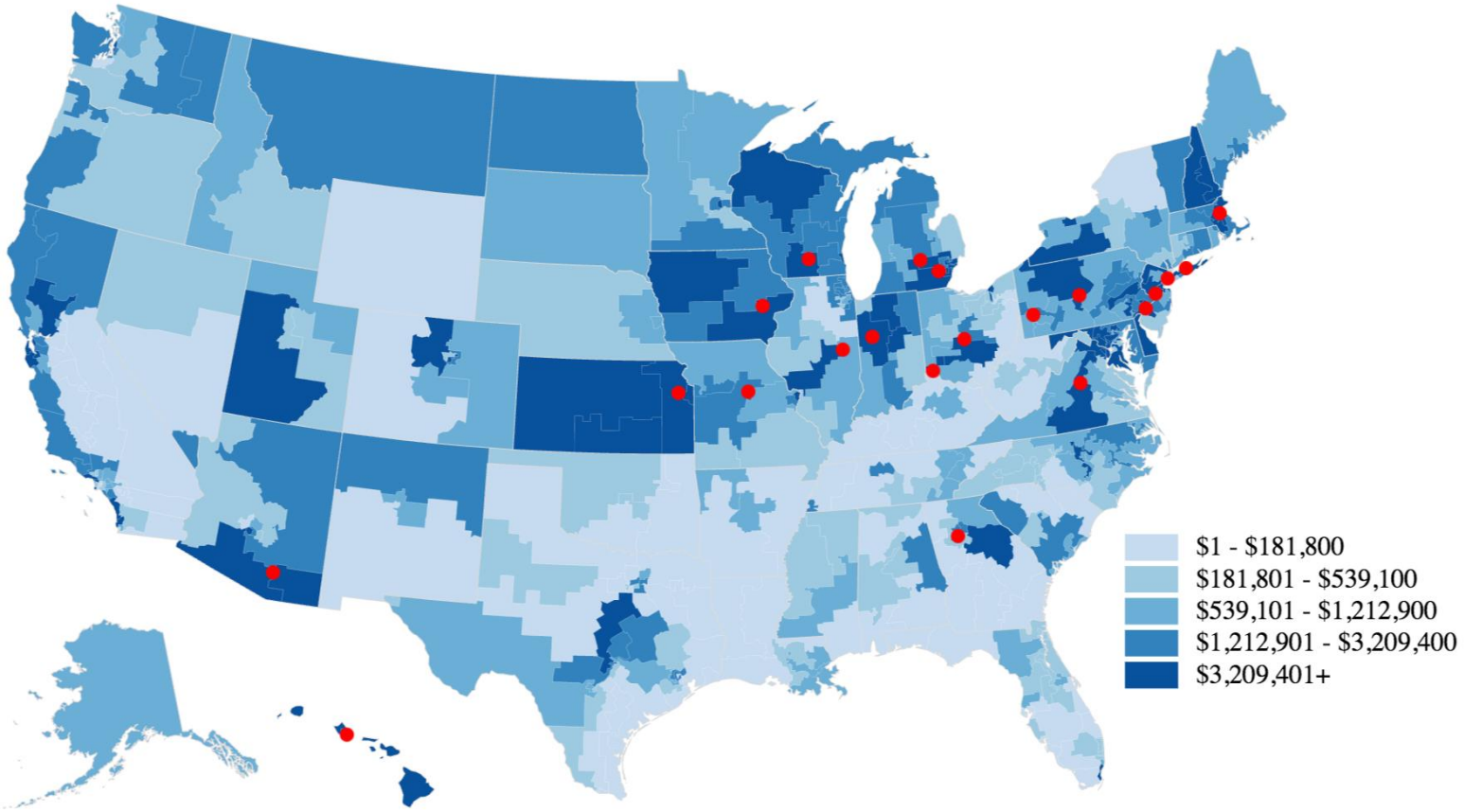
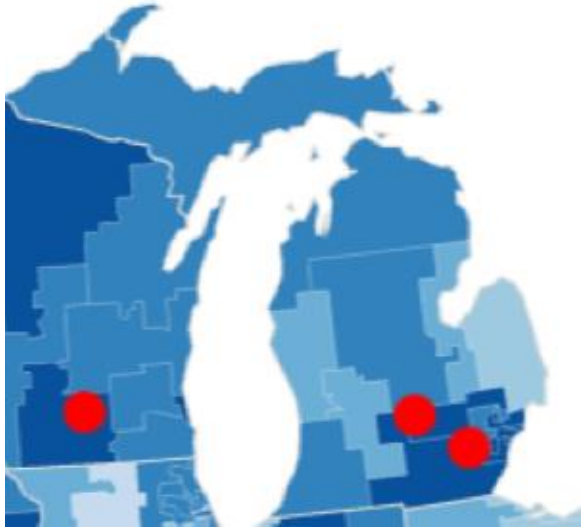
$2.2 Billion direct cost vendor spending to 1778 US Counties



And 435 Congressional Districts





UM and MSU together bought $145 million of goods and services from businesses in the state using federal research funds in 2016 alone

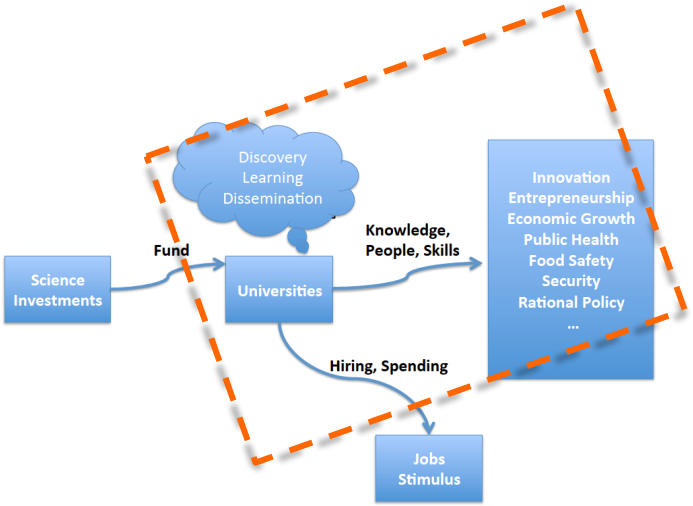
Vendor spending has important ripple effects

Over the last 15 years, vendor spending on research grants from a single university has helped support roughly:

- 221,000 manufacturing jobs in about 2400 establishments
- 195,000 professional, scientific and technical service jobs in about 2100 establishments
- 111,000 merchant wholesale jobs in about 2000 establishments
- 641,000 healthcare jobs in about 1000 establishments

This single university has purchased goods and services to support research from more than 11,000 businesses around the country.

In 2016, 47% of vendor spending stayed in the state where the university is located.



The movement of people and discoveries back and forth between universities and other organizations makes them HUBS.

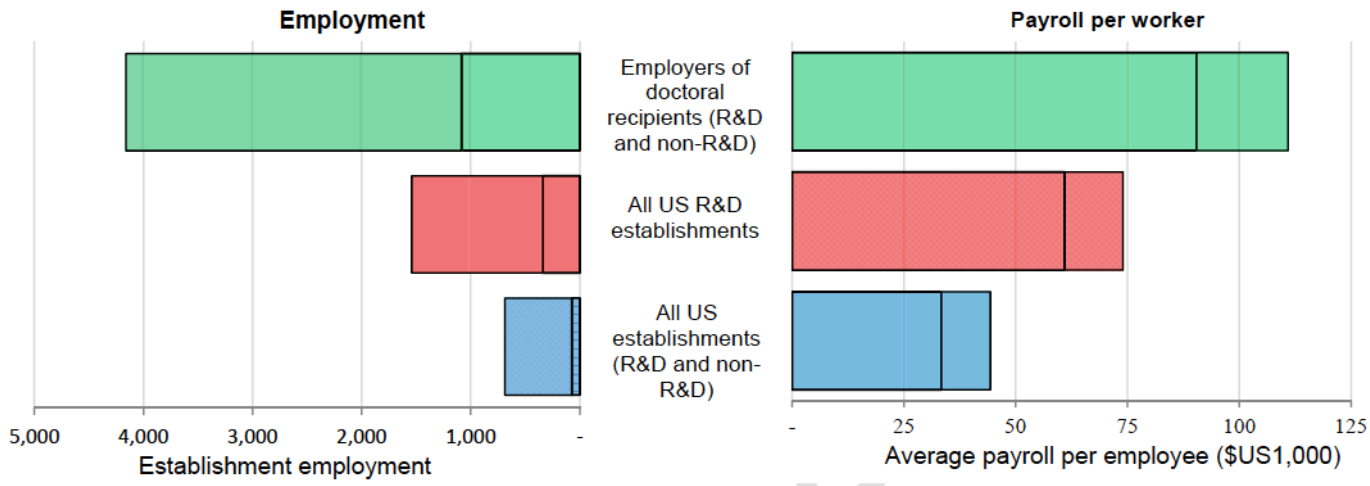
Figuratively, universities are one hop from everywhere in society

Ph.D. Placements by Sector & Location for 9 B1G

Table 1. Postgraduation employment of UMETRICS doctoral recipients who were paid by research grants and left the university between 2009 and 2011. The national workforce distribution is calculated from all employment in all establishments covered by the Census's LBD between 2010 and 2012.

	Doctoral recipients placed in sector (%)				
	Industry		Academia	Government	All
Locale and small	R&D firms	Non-R&D firms			
Placed within sector	17.0	21.7	57.1	4.1	100.0
National sample (*M*)	10.8	75.0	10.7	3.5	100.0
Of those in sector, percent placed:					
Within 50 miles	10.1	23.5	8.9	18.2	12.7
Within state	16.6	36.0	18.0	25.8	22.0

Figure 1. UMETRICS Doctoral Recipients are placed at establishments that are larger and have higher payrolls per worker



Most over represented industries

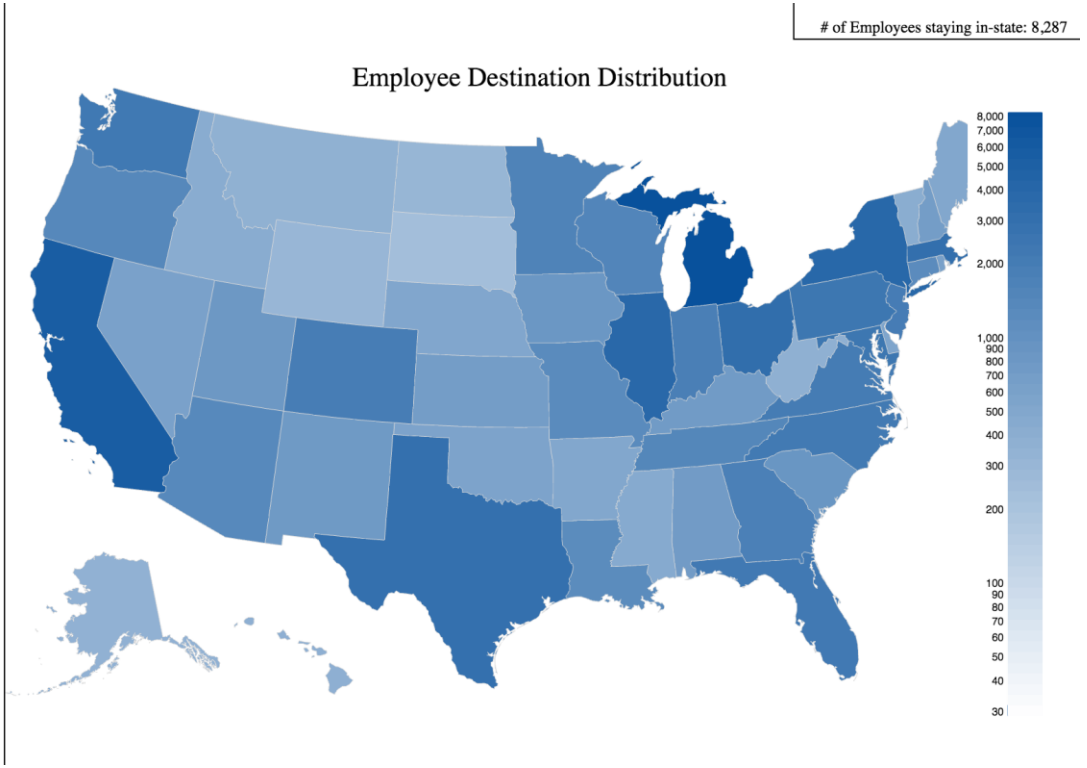
Industry Description (4 digit NAICS codes)	All U.S. Employers	Doctoral Recipients	Difference
Electrical and Electronic Goods Merchant Wholesalers	0.44%	6.67%	6.22%
Computer Systems Design and Related Services	1.32%	6.19%	4.87%
Architectural, Engineering, and Related Services	1.16%	5.95%	4.79%
Semiconductor and Other Electronic Component Manufacturing	0.26%	4.05%	3.79%
Pharmaceutical and Medicine Manufacturing	0.21%	3.33%	3.12%
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	0.36%	3.33%	2.98%
Management of Companies and Enterprises	2.71%	5.00%	2.29%
Basic Chemical Manufacturing	0.14%	2.38%	2.24%
Aerospace Product and Parts Manufacturing	0.32%	2.38%	2.06%
Other Information Services	0.16%	2.02%	1.86%

40,340 research employees left University X and took jobs in other US organizations between 2005-2014

They are employed in all 50 states. 1 in 5 stayed in the state where University X is located.

Top employee destinations by state with employee count

1. Michigan (8,287)
2. California (4,425)
3. New York (2,567)
4. Illinois (2,489)
5. Ohio (1,880)
6. Massachusetts (1,743)
7. Texas (1,658)
8. Pennsylvania (1,180)
9. Maryland (1,177)
10. Washington (1,059)
11. District of Columbia (1,057)
12. Florida (1,045)
13. North Carolina (981)
14. Virginia (890)
15. New Jersey (870)



Five years after leaving, graduate students . . .

Still to come . . .

- Scientific productivity (publications, patents)
- Start-ups and entrepreneurship
- Service to federal government
- More extensive student data
- Non-federal spending
- More universities (60 in negotiation, goal of 150)
- . . .

- Public funding helps universities be better sources, anchors, and hubs.
- Combining research, teaching, and public service on campus keeps our society poised to respond to new and unexpected problems
- Research universities are our society's insurance against an unpredictable future
- IRIS is a platform to better understand, explain, and improve the public value of academic research investments

Want to learn more?

- Visit iris.isr.umich.edu
- Call 734-615-0015
- Email IRIS-info@umich.edu
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- Thank you!