Linked Administrative Data for Research and Reporting: IRIS & UMETRICS

Jason Owen-Smith
IRIS/University of Michigan
jdos@umich.edu
Iris.isr.umich.edu
Data to understand, explain and improve the public value of academic research
Background

- Recession & Stimulus
- Federal STAR METRICS (Level 1) Program (2010-16)
- CIC/UMETRICS Pilot Project (2013-14)
- Institute for Research on Innovation and Science (IRIS)
  - Founded 01/01/2015
  - Core facility at University of Michigan
  - 3 years seed funding for infrastructure from Sloan & Kauffman
  - 35 member MOUs (~1/3% federal R&D)
  - 40 more campuses in some stage of negotiation
  - Final goal = 150 (93% federal R&D)
- Student Data Pilot Project

PI Team: Julia Lane (NYU), Jason Owen-Smith (Michigan), Bruce Weinberg (Ohio State), Ron Jarmin (U.S. Census)
Investments → Universities → Discovery, Learning, Dissemination → Support, Knowledge, People, Skills → Innovation, Entrepreneurship, Economic Growth, Public Health, Food Safety, Security → (More) Rational Policy, Jobs, Stimulus
Currently

- 35 universities
- ~1/3 Federal R&D spending
- ~30% doctorate grants
- Goal: 150 universities
- 3 research data releases
- >120 researchers from 30 institutions using data
1. University transaction data – Restricted
2. US Census outcome data – Restricted
3. Federal grant data – Public
4. US Patent Office data – Public
5. Publication data – Public & Restricted
6. Dissertation data – Public & Restricted

Long term, comprehensive data about academic researchers

IRIS 2019 Data Release

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universities</td>
<td>31</td>
</tr>
<tr>
<td>Awards (All)</td>
<td>392,125</td>
</tr>
<tr>
<td>Awards (Fed)</td>
<td>215,628 (55%)</td>
</tr>
<tr>
<td>Employees</td>
<td>643,463</td>
</tr>
<tr>
<td>Faculty</td>
<td>66,687</td>
</tr>
<tr>
<td>P-Docs</td>
<td>66,687</td>
</tr>
<tr>
<td>Grads</td>
<td>141,630</td>
</tr>
<tr>
<td>Ugrads</td>
<td>169,682</td>
</tr>
<tr>
<td>Total Direct Costs</td>
<td>$83.5 bn</td>
</tr>
<tr>
<td>Vendor Expenditures</td>
<td>$48.7 bn</td>
</tr>
<tr>
<td>Subaward Payments</td>
<td>$12.6 bn</td>
</tr>
</tbody>
</table>

120 Researchers from 30 Institutions using data
A people and team centric view of science and its impact.
Investments allow 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.

Universities are SOURCES of ideas and trained people.
How are federal R&D funds spent?

**Hiring people**

Federal grants paid some salary to:
- 133,699 people
- 18.6% faculty members
- 18.1% undergraduate students
- 19.1% graduate students
- 6.7% post docs

Federal grants paid nearly as many undergraduates as faculty.

Nearly 44% of people employed on grants are students or trainees.

Less than 1 in 5 are faculty.

Figures are based on IRIS-UMETRICS data for 26 universities in FY 2017.
How are federal R&D funds spent?

Hiring people

**NIH** grants paid some salary to
- 55,318 people on 26 campuses
- 24.4% faculty members
- 9.7% undergraduate students
- 14.6% graduate students
- 10.0% post docs

34.3% of people employed on grants are students or trainees

Fewer than 1 in 4 are faculty

NIH funded teams are particularly staff intensive relative to those funded by other agencies

Figures are based on IRIS-UMETRICS data for **26 universities** in FY 2017
NIH Supported Careers, K awards at 10 universities
Universities are ANCHORS that increase the resilience of regions and markets.
How are federal R&D funds spent?

Vendor Purchases

Federal grants from all agencies (including NIH) purchased $3.07 billion in goods and services in FY 2017

Direct cost purchases supported businesses in 435 congressional districts

Figures are based on IRIS-UMETRICS data for 26 universities in FY 2017
How are R&D funds spent?

Vendor Purchases

This university’s research activities have supported

• 2360 business that have employed more than 400,000 people in professional scientific and technical services

• Subcontracts to 713 other research performers

• 2130 businesses that have employed more than 117,000 people in professional and commercial equipment suppliers

• 2540 businesses that have employed more than 261,000 people in navigational, measurement, electromedical and control instrument manufacturing

Figures are based on IRIS-UMETRICS data for a single (anonymized) university, all (federal and non-federal) research funds linked to U.S. Census Bureau Data for FY 2017. Census DRB # CDBRB-FY18-148
Bringing it together: Stories of impact

Treadmill training helps babies with Down syndrome walk months earlier

AHN AHRB—Starting infants with Down syndrome on treadmill training for just minutes a day can help them walk as much as a month earlier than those who don’t, according to a new study from the University of Michigan (U-M).

The study also suggests that treadmill training is an effective way to help babies with Down syndrome learn to walk.

Sam Carlin has built 50 pediatric treadmills for U-M researchers so they can study the mobility patterns of infants with Down syndrome.

"Walking is a critical factor in helping infants with Down syndrome learn to walk," said Ulrich, professor of movement science and health psychology. "Once an infant can walk, we see improvements in their cognitive, social, emotional and physical development because they can explore their environment and learn.

The results suggest that starting treadmill training earlier than they normally are able to start on their own can make a difference in the overall development of children with Down syndrome."

The treadmill studies were conducted at the University of Michigan's Center for Human Development and Learning. The goal of the study was to determine if treadmill training could help infants with Down syndrome learn to walk.

The study was supported by the National Institutes of Health and the National Science Foundation.

From the "Journal of Child Development and Learning" (vol. 2, no. 1) and the "Journal of Motor Learning and Development" (vol. 3, no. 2). Copyright © 2009 by the American Psychological Association of Pediatric Treadmills.

Pedicatric Treadmills

Designed for children with developmental disabilities (such as Down Syndrome or Cerebral Palsy)

U-M Professor Dale Ulrich determined that just a few minutes of daily treadmill training can help accelerate the walking habits of children with Down syndrome. Photo: U-M School of Kinesiology
The movement of people and discoveries back and forth between universities and other organizations makes them HUBS.

Universities are, metaphorically, one hop from everywhere.
People paid on sponsored projects got jobs in all fifty states after leaving their institutions.

53.2% got jobs in their university’s home states.

Earnings and employment data derived from tax and unemployment insurance information maintained by the U.S. Census Bureau.

Figures are based on IRIS-UMETRICS data. All (federal and non-federal) R&D funds linked to US Census Bureau data for 26 universities. Census DRB # CBDRB-FY18-411.
Career outcomes for Ph.D. Students taking jobs in industry from 9 Big 10 Universities

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

Zolas et al. 2015
Career Outcomes for Trainees

Three years after leaving their universities,

• 36% of graduate students had jobs in academia making an average salary of $58,830

• 64% of graduate students had jobs in the private sector making an average salary of $97,050

Earnings and employment data derived from tax and unemployment insurance information maintained by the U.S. Census Bureau

Figures are based on IRIS-UMETRICS data. All (federal and non-federal) research funds linked to US Census Bureau data for 18 universities. Census DRB # CBDRB-FY18-411
Want more?

Iris.isr.umich.edu
@IRIS_UMETRICS
jdos@umich.edu