Guest Speaker Presentation Thursday Afternoon June 2015

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Institute for Research on Innovation and Science (IRIS)

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American Institutes for Research
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University of Melbourne

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University of Michigan
Executive Director, IRIS
Key ideas

• Demonstrate value for money invested in research
• Document the value of education
• Insure permanent, independent, statistical evidence
Overview

- Background
- What has been achieved
- Immediate Next Steps
- The future
Overview

• Background
• What has been achieved
• Immediate Next Steps
• The future
In 2012, our society invested $209 in academic research for every man, woman, and child in the US

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

Universities spend a lot on research, but we know too little about what those investments produce.

We have trouble

- explaining and justifying what we do
- modifying and improving our processes
- documenting the full public value of our work

Existing data and models are insufficient.
One answer

Treat R&D funding like a straightforward investment, prioritize the *really* important stuff.

Prioritizing Grants

Even with a smaller budget, we can increase our investments in transformative science and basic research by simply setting priorities and better managing the resources available.

While the scientific mind seeks to understand all aspects of the world around us, some research topics are simply more likely to contribute to truly meaningful discoveries or knowledge.

Letter dated March 12, 2013, Senator Tom Coburn to Subra Suresh, NSF Director
Competing Budgetary Priorities

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"I think you should be more explicit here in step two."
A conceptual framework

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Our Response

- Establish a university-led institute to provide independent scientific evidence on the social and economic impact of research.
- Return timely, research-informed products to universities.
Overview

• Background
• **What has been achieved**
• Immediate Next Steps
• The future
What has been achieved
UMETRICS + CENSUS

UMETRICS

• is a CIC initiative to create independent statistical evidence about the value of university research
• provides valuable information for outreach to Federal, State, and Local constituents
• integrates university administrative data with restricted U.S. Census Bureau data product
What has been produced

- Michigan: state legislature/regents
- OSU: Boehner’s office
- Purdue: state and federal delegations
UMETRICS currently provides

Independent statistical evidence about national, regional & local economic impact

$1.949 Billion in Direct Cost Vendor Purchases from 9 CIC Universities, Q3 2012-Q4 2014
UMETRICS currently provides independent statistical evidence about academic workforce composition.

75,375 employees by type, 9 CIC Universities, Q3 2012-Q4 2014

- Faculty: 12,499
- Staff: 20,144
- Post-Doc: 6,974
- Grad: 17,646
- Undergrad: 18,112
UMETRICS Currently provides

Independent statistical evidence about academic research collaborations

Networks provide insights into conditions of training and their relationship to career outcomes

Links to academic outputs (publications, patents, grant information) inform innovation
Research outputs from this approach
Census Links

➢ Census data contains information on (essentially) the population of organizations that employ people and the population of people who are employed in the US
➢ Preliminary findings rigorously screened to protect privacy
➢ More Census work remains to be done to validate
➢ No burden on universities – work all done at Census

Work done by Nikolas Zolas, Catherine Buffington, Nathan Goldschlag & Julia Lane
Linking UMETRICS to CENSUS data to generate new indicators

UMETRICS DATA
University data on Federal awards:
Employee, vendor, subaward transactions

CENSUS DATA
Secure data on people and businesses:
Employment records, business dynamics & characteristics

UMETRICS DATA

Employee Name/DOB

Organization Name/Location

CENSUS DATA

JOB PLACEMENTS
Where research employees get their next jobs

START-UP ACTIVITY
What types of businesses research employees found

VENDOR CHARACTERISTICS
What types of businesses supply research

Analyze by: Occupational category | Funding agency | Research area | Years since leaving university

PRELIMINARY RESULTS Please do not cite or use without permission
Where do research employees get their next jobs?

### 2010 Cohort 2-digit NAICS

<table>
<thead>
<tr>
<th>NAICS</th>
<th>NAICS Description</th>
<th>LBD</th>
<th>All Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Forestry, Fishing, Hunting, and Agriculture Support</td>
<td>1.12%</td>
<td>0.77%</td>
</tr>
<tr>
<td>21</td>
<td>Mining</td>
<td>0.59%</td>
<td>0.36%</td>
</tr>
<tr>
<td>22</td>
<td>Utilities</td>
<td>0.72%</td>
<td>0.32%</td>
</tr>
<tr>
<td>23</td>
<td>Construction</td>
<td>4.64%</td>
<td>2.63%</td>
</tr>
</tbody>
</table>

### 2010 Cohort 3-digit NAICS (Manufacturing)

<table>
<thead>
<tr>
<th>NAICS</th>
<th>NAICS Description</th>
<th>LBD</th>
<th>All Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>330</td>
<td>Primary Metal Manufacturing</td>
<td>0.00%</td>
<td>0.01%</td>
</tr>
<tr>
<td>331</td>
<td>Primary Metal Manufacturing</td>
<td>0.33%</td>
<td>0.28%</td>
</tr>
<tr>
<td>332</td>
<td>Fabricated Metal Product Manufacturing</td>
<td>1.18%</td>
<td>1.01%</td>
</tr>
<tr>
<td>333</td>
<td>Machinery Manufacturing</td>
<td>0.85%</td>
<td>1.38%</td>
</tr>
</tbody>
</table>

### 2010 Cohort 4-digit NAICS (Computer & Electronics Manufacturing)

<table>
<thead>
<tr>
<th>NAICS</th>
<th>NAICS Description</th>
<th>LBD</th>
<th>All Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>3341</td>
<td>Computer and Peripheral Equipment Manufacturing</td>
<td>0.06%</td>
<td>0.26%</td>
</tr>
<tr>
<td>3342</td>
<td>Communications Equipment Manufacturing</td>
<td>0.10%</td>
<td>0.17%</td>
</tr>
<tr>
<td>3343</td>
<td>Audio and Video Equipment Manufacturing</td>
<td>0.01%</td>
<td>0.02%</td>
</tr>
<tr>
<td>3344</td>
<td>Semiconductor and Other Electronic Component Manufacturing</td>
<td>0.25%</td>
<td>0.54%</td>
</tr>
<tr>
<td>3345</td>
<td>Navigational, Measuring, Electromedical, and Control Instruments Manufacturing</td>
<td>0.34%</td>
<td>0.74%</td>
</tr>
<tr>
<td>3346</td>
<td>Manufacturing and Reproducing Magnetic and Optical Media</td>
<td>0.01%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Over three years (2010 – 2012) just over 59% get jobs in industry, just under 33% get jobs in academia.

PRELIMINARY RESULTS Please do not cite or use without permission
How many are entrepreneurs?

PRELIMINARY RESULTS Please do not cite or use without permission
Business Dynamics for the Companies They Found

**PRELIMINARY RESULTS** Please do not cite or use without permission

1700-2200 new firms employing 3000-4000 people **per year** (2005-2012)
Vendor Activity by Industry

- At a single university we find a focus on
  - Semiconductors and electronics
  - Engineering services
  - Research services

<table>
<thead>
<tr>
<th>NAICS</th>
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<th>Univ X</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>331</td>
<td>Primary Metal Manufacturing</td>
<td>0.20%</td>
<td>0.36%</td>
</tr>
<tr>
<td>332</td>
<td>Fabricated Metal Product Manufacturing</td>
<td>9.68%</td>
<td>1.68%</td>
</tr>
<tr>
<td>333</td>
<td>Machinery Manufacturing</td>
<td>4.67%</td>
<td>0.92%</td>
</tr>
<tr>
<td>334</td>
<td>Computer and Electronic Product Manufacturing</td>
<td>17.63%</td>
<td>0.62%</td>
</tr>
<tr>
<td>335</td>
<td>Electrical Equipment, Appliance, and Component Manufacturing</td>
<td>2.01%</td>
<td>0.25%</td>
</tr>
<tr>
<td>336</td>
<td>Transportation Equipment Manufacturing</td>
<td>0.47%</td>
<td>0.64%</td>
</tr>
<tr>
<td>337</td>
<td>Furniture and Related Product Manufacturing</td>
<td>0.53%</td>
<td>0.39%</td>
</tr>
<tr>
<td>339</td>
<td>Miscellaneous Manufacturing</td>
<td>1.63%</td>
<td>0.58%</td>
</tr>
<tr>
<td>541</td>
<td>Professional, Scientific, and Technical Services</td>
<td>17.32%</td>
<td>8.27%</td>
</tr>
<tr>
<td>5411</td>
<td>Legal Services</td>
<td>0.36%</td>
<td>1.44%</td>
</tr>
<tr>
<td>5412</td>
<td>Accounting, Tax Preparation, Bookkeeping, and Payroll Services</td>
<td>0.28%</td>
<td>0.50%</td>
</tr>
<tr>
<td>5413</td>
<td>Architectural, Engineering, and Related Services</td>
<td>7.55%</td>
<td>1.25%</td>
</tr>
<tr>
<td>5414</td>
<td>Specialized Design Services</td>
<td>0.07%</td>
<td>0.22%</td>
</tr>
<tr>
<td>5415</td>
<td>Computer Systems Design and Related Services</td>
<td>2.93%</td>
<td>2.23%</td>
</tr>
<tr>
<td>5416</td>
<td>Management, Scientific, and Technical Consulting Services</td>
<td>1.23%</td>
<td>1.10%</td>
</tr>
<tr>
<td>5417</td>
<td>Scientific Research and Development Services</td>
<td>4.60%</td>
<td>0.29%</td>
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NAICS | NAICS Description | Univ X | US  |
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<td>0.29%</td>
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PRELIMINARY RESULTS Please do not cite or use without permission
Top Vendor Industries – Detail

- How do these industries compare to the average?
- Mostly older, with more receipts and payroll, and higher average wages

<table>
<thead>
<tr>
<th>NAICS</th>
<th>Share of Young Firms</th>
<th>Age</th>
<th>Employment</th>
<th>Payroll</th>
<th>Receipts</th>
<th>Average Wage</th>
<th>Employment Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Manufacturing</td>
<td>-20.56%</td>
<td>26.83%</td>
<td>120.66%</td>
<td>254.06%</td>
<td>416.06%</td>
<td>45.32%</td>
<td>126.67%</td>
</tr>
<tr>
<td>Fabricated Metal Product</td>
<td>-52.06%</td>
<td>49.30%</td>
<td>48.96%</td>
<td>82.10%</td>
<td>81.33%</td>
<td>15.25%</td>
<td>108.08%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery Manufacturing</td>
<td>-51.24%</td>
<td>55.73%</td>
<td>80.40%</td>
<td>156.90%</td>
<td>160.11%</td>
<td>34.46%</td>
<td>161.60%</td>
</tr>
<tr>
<td>Computer and Electronic Product Manufacturing</td>
<td>-27.57%</td>
<td>27.02%</td>
<td>102.16%</td>
<td>227.21%</td>
<td>202.75%</td>
<td>51.79%</td>
<td>28.19%</td>
</tr>
<tr>
<td>Miscellaneous Manufacturing</td>
<td>-28.11%</td>
<td>23.76%</td>
<td>3.71%</td>
<td>23.17%</td>
<td>24.39%</td>
<td>0.90%</td>
<td>10.38%</td>
</tr>
<tr>
<td>Merchant Wholesalers, Durable</td>
<td>-25.05%</td>
<td>17.04%</td>
<td>-23.66%</td>
<td>11.12%</td>
<td>196.09%</td>
<td>35.27%</td>
<td>-26.38%</td>
</tr>
<tr>
<td>Goods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merchant Wholesalers, Nondurable</td>
<td>-12.29%</td>
<td>10.42%</td>
<td>-10.13%</td>
<td>16.95%</td>
<td>493.91%</td>
<td>23.75%</td>
<td>-25.37%</td>
</tr>
<tr>
<td>Goods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional, Scientific, and</td>
<td>9.58%</td>
<td>-14.28%</td>
<td>-48.76%</td>
<td>-16.26%</td>
<td>-37.42%</td>
<td>45.81%</td>
<td>-29.26%</td>
</tr>
<tr>
<td>Technical Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PRELIMINARY RESULTS Please do not cite or use without permission
Overview

• Background
• What has been achieved
• Immediate Next Steps
• The future
The Institute for Research on Innovation & Science (IRIS) is a new, IRB-approved platform to make UMETRICS a trusted and permanent national data resource for the academic community. It is member-driven, created by and for universities. IRIS’s core data facility is located at the University of Michigan’s Institute for Social Research.
Member universities contribute data, support infrastructure and receive campus-specific and aggregate products

Approved Nodes materially improve data, develop products, and expand user communities

Approved Users securely access de-identified, aggregate datasets

Approved Partners receive data from IRIS which they improve and make accessible through their own secure systems
UMETRICS participants:

Goal: National Coverage in 3-5 Years
- >150 institutions
- All 50 states
- >90% R&D Spending

Seed Funding for IRIS infrastructure:
Overview

• Background
• What has been achieved
• Immediate Next Steps
• The future
Future Possibilities

New work with existing data

1. National workforce (particularly post-doc) composition
2. Network of subcontract relationships across campuses allows e.g. analysis of initial and sustaining effects of multi-institution investments (e.g. STCs, EERCs, CTSA, infrastructure commitments)
3. National distribution of vendor spending by county/congressional district

Additional research through Census Research Data Center Network
Future Possibilities

Future Possibilities with linkages include

1. Economic outcomes (e.g. placement rates, earnings/career trajectories, startups/firm productivity & growth) by agency, topic, mechanism.

2. Scientific outcomes (e.g. dissertation/publication/patenting outcomes) through partnership with libraries (ARL and SHARE)

3. Undergraduate engagement in research, educational, and career outcomes

Additional research through Census Research Data Center Network
Key ideas

• Demonstrate value for money invested in research
• Document the value of educational evidence
• Insure permanent, independent, statistical evidence
• IRIS is open to “early adopting” member institutions through September 1, 2015
• Early adopters will help finalize governance structure
• IRIS will reopen to new members when national governance is in place
• Contact Jason Owen-Smith (jdos@umich.edu) with questions about becoming an “early adopter”
Questions & Reactions?

Julia.lane@nyu.edu
jdos@umich.edu

Thank You