STAR METRICS:

Science and Technology for America's Reinvestment:
Measuring the EffecTs of Research on Innovation, Competitiveness and Science

An Update

Administration Interest

- **Investment in Science**
  - American Recovery and Reinvestment Act
  - The National Academy of Sciences Speech, April 2
- **Openness and transparency**
  - data.gov; open.gov; etc.
- **Evidence based policy**
  - Joint memo on "Science and Technology Priorities for the FY2012 Budget" : **Science of Science Policy** (is the only program listed by name – also in 2011)
- **Accountability**
  - ARRA Reporting Guidelines
  - Putting Performance First: Replacing PART with a new performance improvement and analysis framework

Administration Interest

Agencies, in cooperation with OSTP and OMB, should develop and sustain datasets to better document Federal science, technology, and innovation investments and to make these data open to the public in accessible, useful formats. Agencies should develop and regularly update their data sharing policies for research performers and create incentives for sharing data publicly in interoperable formats to ensure maximum value, consistent with privacy, national security, and confidentiality concerns.

Agencies should develop outcome-oriented goals for their science, technology, and innovation activities, establish timelines for evaluating the performance of these activities, and target investments toward high-performing programs in their budget submissions. Agencies should support the development and use of "science of science policy" tools that can improve management of their R&D portfolios and better assess the impact of their science, technology, and innovation investments.

FY12 Orszag-Holdren Memo, July 21 2010; reiterates August 4, 2009 memo;
Science of Science Policy is only program mentioned by name

What is STAR METRICS?

1. Data Infrastructure to capture impact of science investments.
2. Collaborative identification of data and data sources
3. Explicit integration of domain and social scientists in development of metrics

Basic Approach

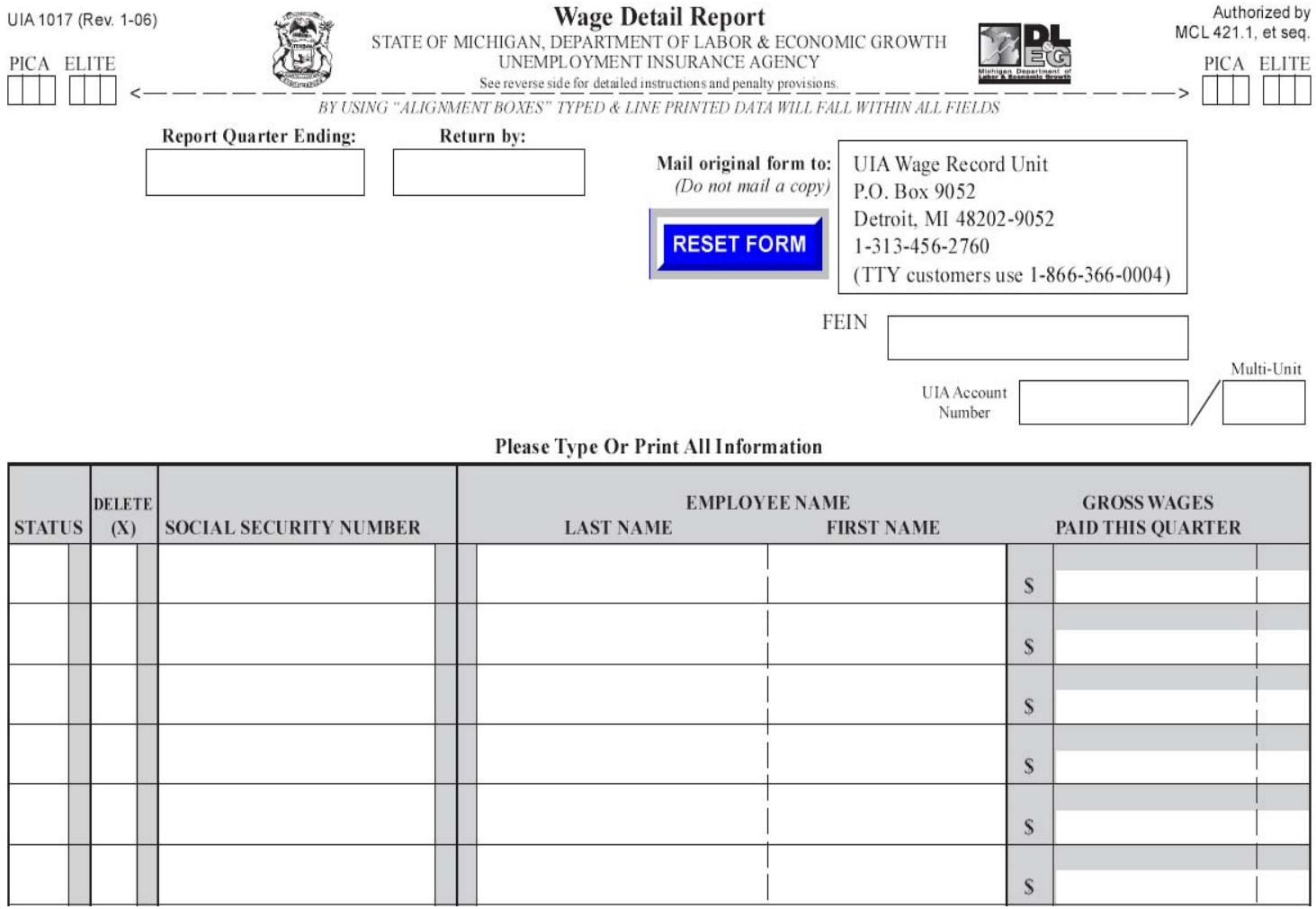
Creating the Frame

- Start with basic unit of analysis
  - Science is done by scientists. Need to identify universe of individuals funded by federal agencies (PI, co-PI, RAs, graduate students etc.)
- Capture Inputs using existing data

Measuring outcomes

- Scientific
- Social
- Economic
- Workforce

Based on Existing Record Reporting



UIA 1017 (Rev. 1-06)

PICA ELITE

Wage Detail Report

STATE OF MICHIGAN, DEPARTMENT OF LABOR & ECONOMIC GROWTH
UNEMPLOYMENT INSURANCE AGENCY
See reverse side for detailed instructions and penalty provisions.

Authorized by MCL 421.1, et seq.

PICA ELITE

BY USING "ALIGNMENT BOXES" TYPED & LINE PRINTED DATA WILL FALL WITHIN ALL FIELDS

Report Quarter Ending:

Return by:

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UIA Wage Record Unit
P.O. Box 9052
Detroit, MI 48202-9052
1-313-456-2760
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STATUS	DELETE (X)	SOCIAL SECURITY NUMBER	EMPLOYEE NAME LAST NAME	EMPLOYEE NAME FIRST NAME	GROSS WAGES PAID THIS QUARTER
					$
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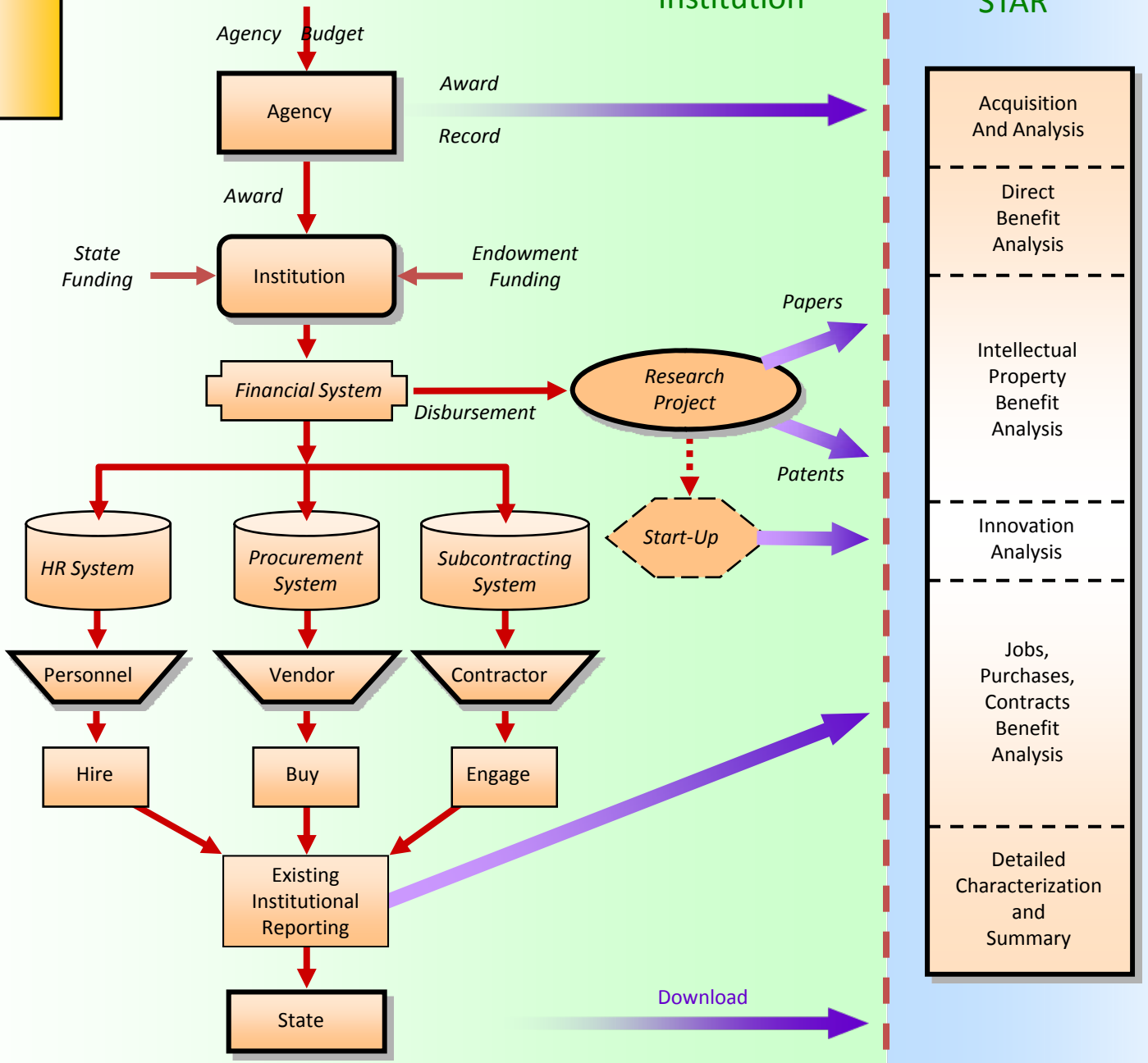
STAR Pilot Project



Phase I
Creating the Frame (and measuring jobs)

Phase I: What is requested

14 administrative data elements from awards, grants, HR or finance systems are provided to STAR Metrics on a quarterly basis…

- Award data
- Payroll Staff Information
- Non-Payroll Charges
- Sub-awards
- Indirect Cost Rate Proposal

…will yield these Quarterly pre-calculated reports…

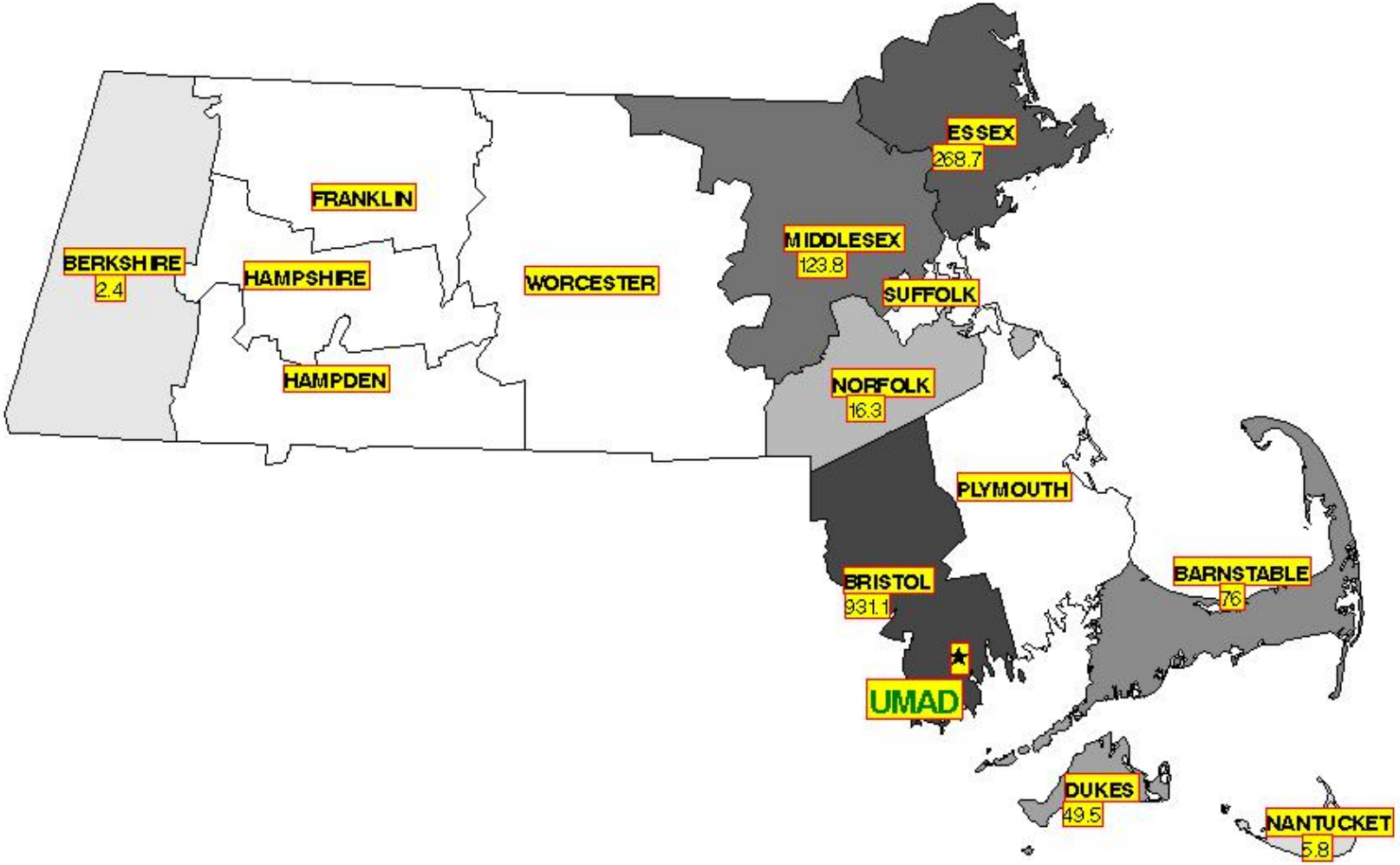
- **Stimulus FTE Jobs** (ARRA) – with and without Overhead Job calculations
- **FTE Jobs and Positions** – All awards (with and without Overhead)
- **FTE Sub-awards** – All awards (with and without Overhead)
- **Vendor FTE's (Jobs)** – All awards
- **Overhead Jobs** (calculated from Indirect Costs)

Star Metrics Phase 1 – 14 Requested Data Elements

Description	Element ID	Item	Data Source	Unit of Analysis	Purpose
Information on Scientists and Awards	**1**	De-identified Employee ID #	University	Individual	Job Metrics
	2	Federal Award ID #		Award	
	3	University Award ID #		Award	
	4	Overhead charged		Award	
	5	Occupational Classification		Individual	
	6	Proportion of time allocated to award		Individual	
	7	FTE status		Individual	
Information on Overhead	**8**	Proportion of overhead associated with salaries (from overhead cost proposal)	University	University	Job Metrics
Payments to vendors	**2**	Federal Award ID #	University	Award	Secondary Economic Impact
	9	University Award ID #		Award	
	10	Duns #		Vendor	
	11	Amount of Contract		Vendor	
Subcontracts and subawards	**2**	Federal Award ID #	University	Award	Secondary Economic Impact
	12	University Award ID #		Award	
	13	Duns #		Subcontractor	
	14	Amount of Contract		Subcontractor	

Local Economic Impact

for UNIVERSITY OF MASSACHUSETTS DARTMOUTH
Total Jobs (SIMULATED DATA)



Source: STAR Metrics - Jobs

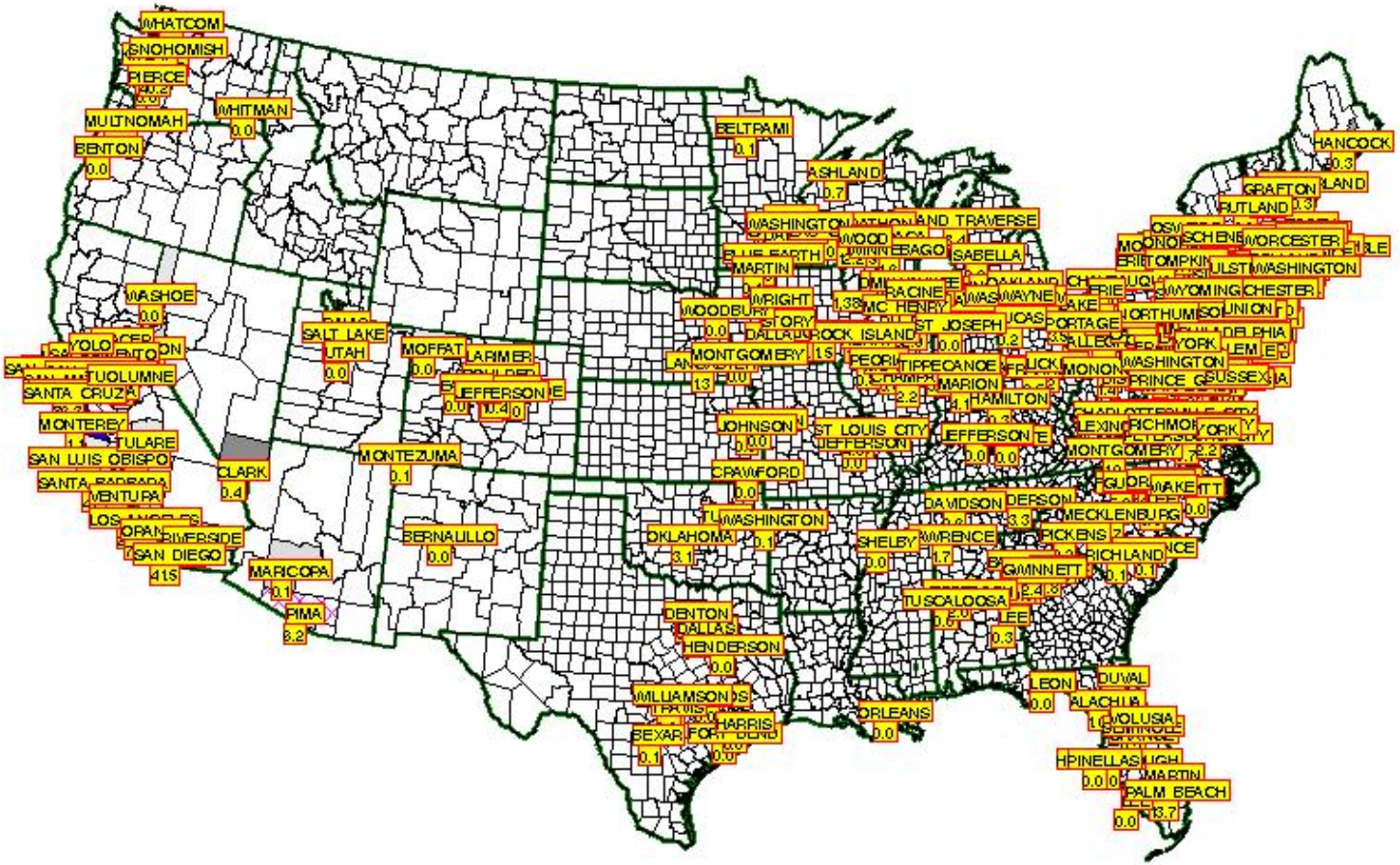
Local Economic Impact
for UNIVERSITY OF MASSACHUSETTS DARTMOUTH
Total Jobs (SIMULATED DATA)

County Name	County Code	Sub-Awards & Vendor Jobs	Award FTEs, Sub-Award & Vendor Jobs	Total Jobs
BARNSTABLE	1	76	76	76
BERKSHIRE	3	2.4	2.4	2.4
BRISTOL	5	100.7	861.4	931.1
DUKES	7	49.5	49.5	49.5
ESSEX	9	268.7	268.7	268.7
MIDDLESEX	17	123.8	123.8	123.8
NANTUCKET	19	5.8	5.8	5.8
NORFOLK	21	16.3	16.3	16.3
		643	1,404	1,474

Source: STAR Metrics - Jobs

Initial Jobs Impact of Science Expenditures

for 5 universities
Total Jobs

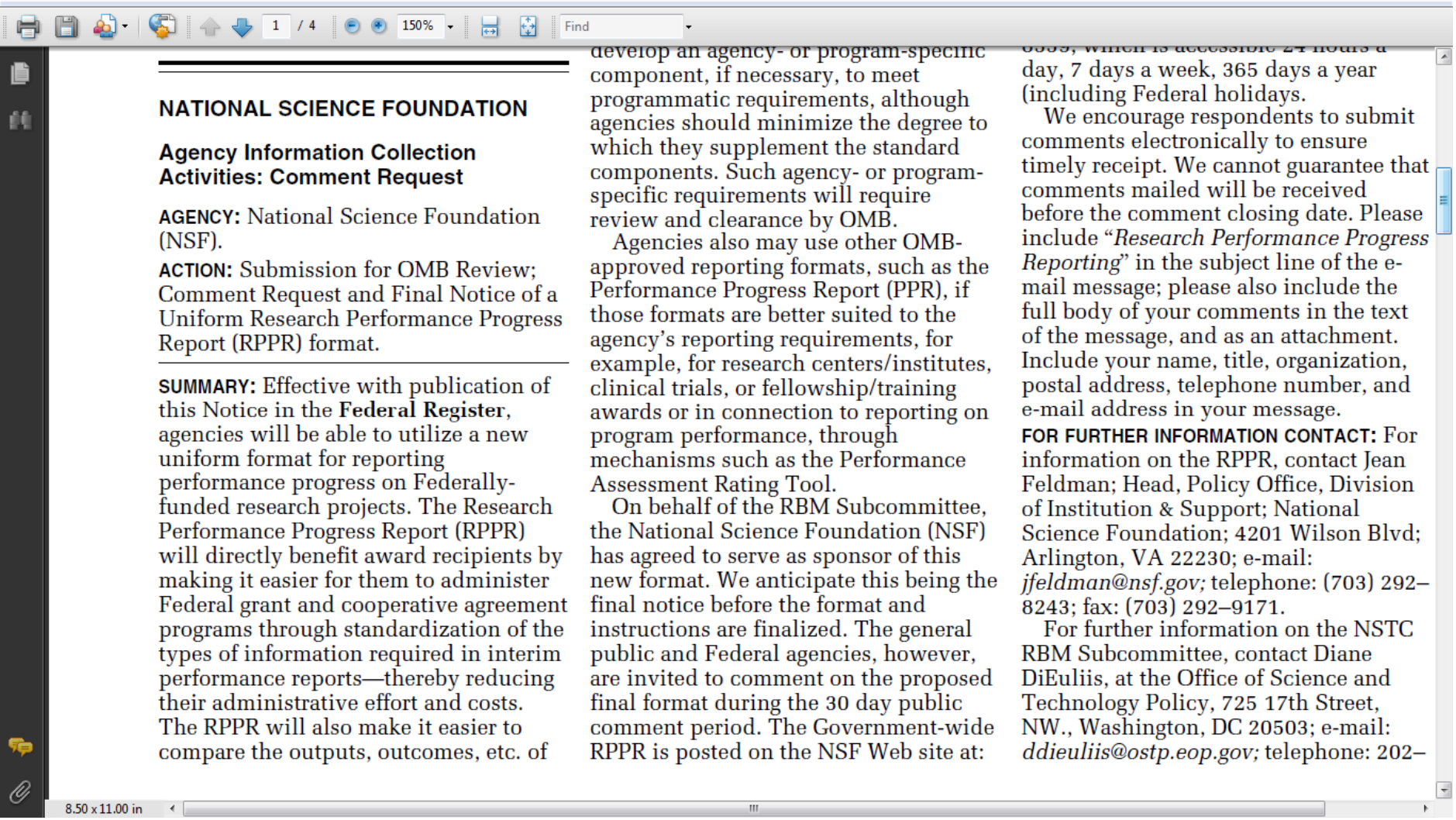


Source: STAR Metrics - Jobs Q3 2009 - Q2 2010 (fuzz factor applied)
Note: Map excludes Alaska, Hawaii, and Puerto Rico.

Phase II

- Goal: Begin to collect data from disconnected sources across agencies, universities and scientists to capture relationship between discovery and impact
  - knowledge (e.g. publication, citations…)
  - economic (patents, spin off companies…)
  - workforce (employment, student mobility…)
  - social (e.g. health, environment, energy…)
- Key Issues
  - Engagement of academic community
  - Name disambiguation
  - Burden reduction

Capturing Scientific Outcomes



NATIONAL SCIENCE FOUNDATION

Agency Information Collection Activities: Comment Request

AGENCY: National Science Foundation (NSF).

ACTION: Submission for OMB Review; Comment Request and Final Notice of a Uniform Research Performance Progress Report (RPPR) format.

SUMMARY: Effective with publication of this Notice in the **Federal Register**, agencies will be able to utilize a new uniform format for reporting performance progress on Federally-funded research projects. The Research Performance Progress Report (RPPR) will directly benefit award recipients by making it easier for them to administer Federal grant and cooperative agreement programs through standardization of the types of information required in interim performance reports—thereby reducing their administrative effort and costs. The RPPR will also make it easier to compare the outputs, outcomes, etc. of

develop an agency- or program-specific component, if necessary, to meet programmatic requirements, although agencies should minimize the degree to which they supplement the standard components. Such agency- or program-specific requirements will require review and clearance by OMB.

Agencies also may use other OMB-approved reporting formats, such as the Performance Progress Report (PPR), if those formats are better suited to the agency's reporting requirements, for example, for research centers/institutes, clinical trials, or fellowship/training awards or in connection to reporting on program performance, through mechanisms such as the Performance Assessment Rating Tool.

On behalf of the RBM Subcommittee, the National Science Foundation (NSF) has agreed to serve as sponsor of this new format. We anticipate this being the final notice before the format and instructions are finalized. The general public and Federal agencies, however, are invited to comment on the proposed final format during the 30 day public comment period. The Government-wide RPPR is posted on the NSF Web site at:

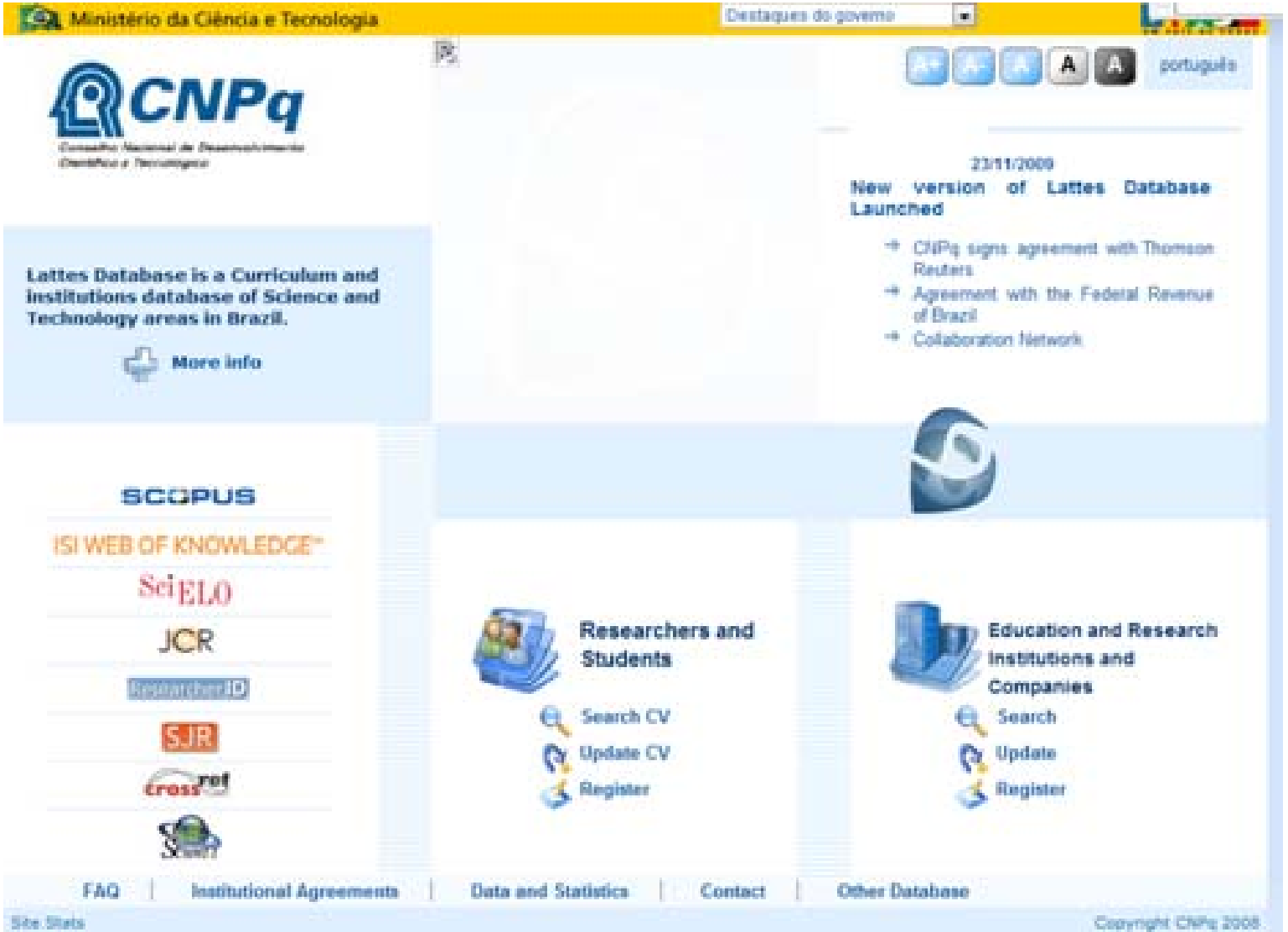
[illegible] which is accessible 24 hours a day, 7 days a week, 365 days a year (including Federal holidays.

We encourage respondents to submit comments electronically to ensure timely receipt. We cannot guarantee that comments mailed will be received before the comment closing date. Please include "*Research Performance Progress Reporting*" in the subject line of the e-mail message; please also include the full body of your comments in the text of the message, and as an attachment. Include your name, title, organization, postal address, telephone number, and e-mail address in your message.

FOR FURTHER INFORMATION CONTACT: For information on the RPPR, contact Jean Feldman; Head, Policy Office, Division of Institution & Support; National Science Foundation; 4201 Wilson Blvd; Arlington, VA 22230; e-mail: *jfeldman@nsf.gov;* telephone: (703) 292–8243; fax: (703) 292–9171.

For further information on the NSTC RBM Subcommittee, contact Diane DiEuliis, at the Office of Science and Technology Policy, 725 17th Street, NW., Washington, DC 20503; e-mail: *ddieuliis@ostp.eop.gov;* telephone: 202–

The Brazilian Experience



Principal Investigator/Program Director (Last, First, Middle)

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Michael Conlon	Interim Director of Biomedical Informatics, University of Florida
eRA COMMONS USER NAME MCONLON	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Bucknell University, Lewisburg, PA	B.A.	1975	Mathematics
Bucknell University, Lewisburg, PA	B.A.	1975	Economics
University of Florida, Gainesville, FL	M.Stat	1979	Statistics
University of Florida, Gainesville, FL	Ph.D.	1982	Statistics

A. Positions and Honors

Positions and Employment

2008- Interim Director, Biomedical Informatics, College of Medicine, University of Florida.
2008- Associate University CIO, IT Architecture
2008- Associate Director, Clinical and Translational Science Institute, University of Florida.
2008- Interim Director, Clinical and Translational Informatics Program, University of Florida
2008- Research Associate Professor, Department of Epidemiology and Health Policy Research, University of Florida
2005-08 PeopleSoft Implementation Officer, University of Florida
2002- Director of Data Infrastructure, University of Florida
2002-03 Co-founder and Chief Technology Officer, MarCon Global Data Solutions, Incorporated
1997-02 Assistant Vice President for Health Affairs, Academic Information Systems and Support and Chief Information Officer, University of Florida Health Science Center
1993-07 Director of Information Resources and Technology Programs, College of Liberal Arts and Sciences, University of Florida
1992-08 Research Associate Professor. Department of Statistics, University of Florida
1982-83 Asst. Dir. of Acad. Computing. Ctr for Instr. and Research Computing Activities, Univ. of Florida
1980-83 Director, Statistical Consulting Center, Center for Instructional and Research Computing Activities

Other Experience

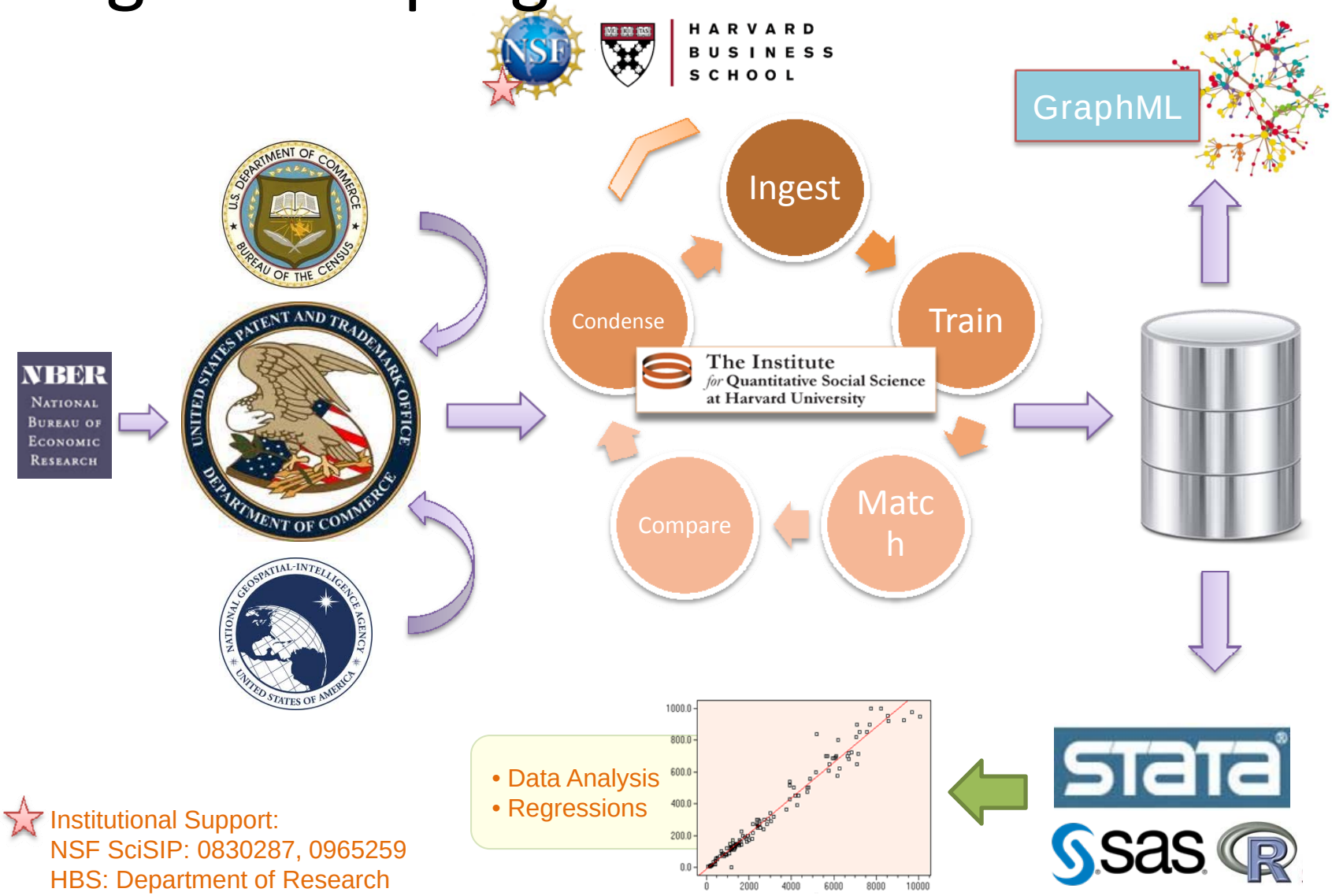
2009- Member, InCommon working group on Research Administration
2008- Chair, Health Science Center Information Architecture Committee
2008- Member, Health Science Center Information System Advisory Council
2008-09 Chair, University Planning Group on Computational Biology
2007-08 Member, Health Science Center Information Architecture Committee
2004- Member, Educause Working Group on Identity Management
2003- Chair, Information Technology Advisory Committee on UF Active Directory
2003-05 Editor, *AmStat OnLine*, American Statistical Association
2002- Member, Information Technology Advisory Committee, Data Infrastructure and Administrative Computing
2002-03 Chair, University Directory Services Committee
2001-03 Member, Microsoft national Higher Education Advisory Group

PHS 398/2590 (Rev. 09/04) Page ___ Biographical Sketch Format Page

"Facebook for Scientists"

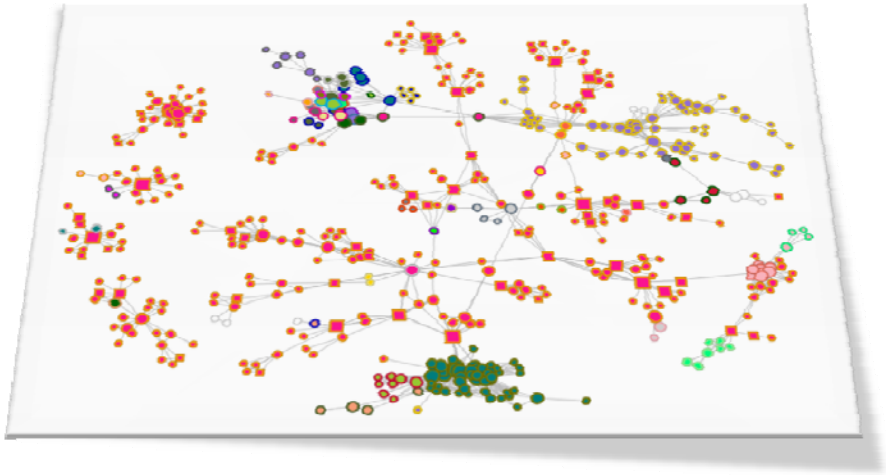
- Information in VIVO can be used to create
  - Biosketches
  - Vitas
  - Annual reports
  - Department and research group web sites
- Information can be used to populate profiles in collaborative tools – portals, wikis, …

Capturing Economic Outcomes: e.g.Developing Patent Database



Institutional Support:
NSF SciSIP: 0830287, 0965259
HBS: Department of Research

Visual Exploration - Overview



Top Assignees - (501 inventors)

WISCONSIN ALUMNI RESEARCH FOUNDATION	(274)
PROMEGA CORPORATION	(58)
THIRD WAVE TECHNOLOGIES INC	(51)
TOMOTHERAPY INCORPORATED	(8)
ERAGEN BIOSCIENCES INC	(8)
STANDARD IMAGING INC	(7)
ACTUANT CORPORATION	(6)
FIRESITE LLC	(5)
JOHNSONDIVERSEY INC	(5)
RENOVAR INC	(4)

Primary Class - (471 patents)

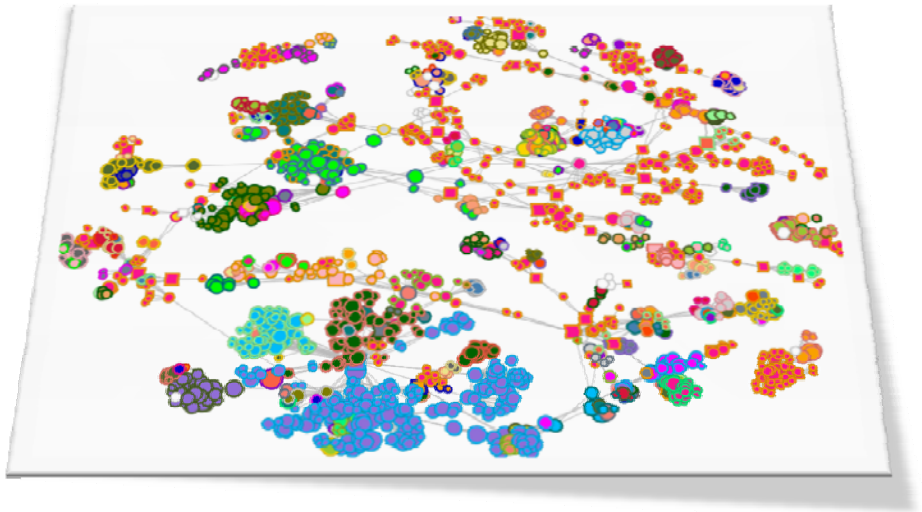
435 (147)	CHEMISTRY MOLECULAR BIOLOGY AND MICROBIOLOGY
514 (51)	DRUG BIO AFFECTING AND BODY TREATING COMPOSITIONS
D7 (20)	EQUIPMENT FOR PREPARING OR SERVING FOOD OR DRINK NOT ELSEWHERE SPECIFIED
324 (17)	ELECTRICITY MEASURING AND TESTING
250 (13)	RADIANT ENERGY
378 (13)	X RAY OR GAMMA RAY SYSTEMS OR DEVICES
600 (11)	SURGERY
382 (8)	IMAGE ANALYSIS
372 (8)	COHERENT LIGHT GENERATORS
536 (8)	ORGANIC COMPOUNDS PART OF THE CLASS 532 570 SERIES

Top Assignees - (1822 inventors)

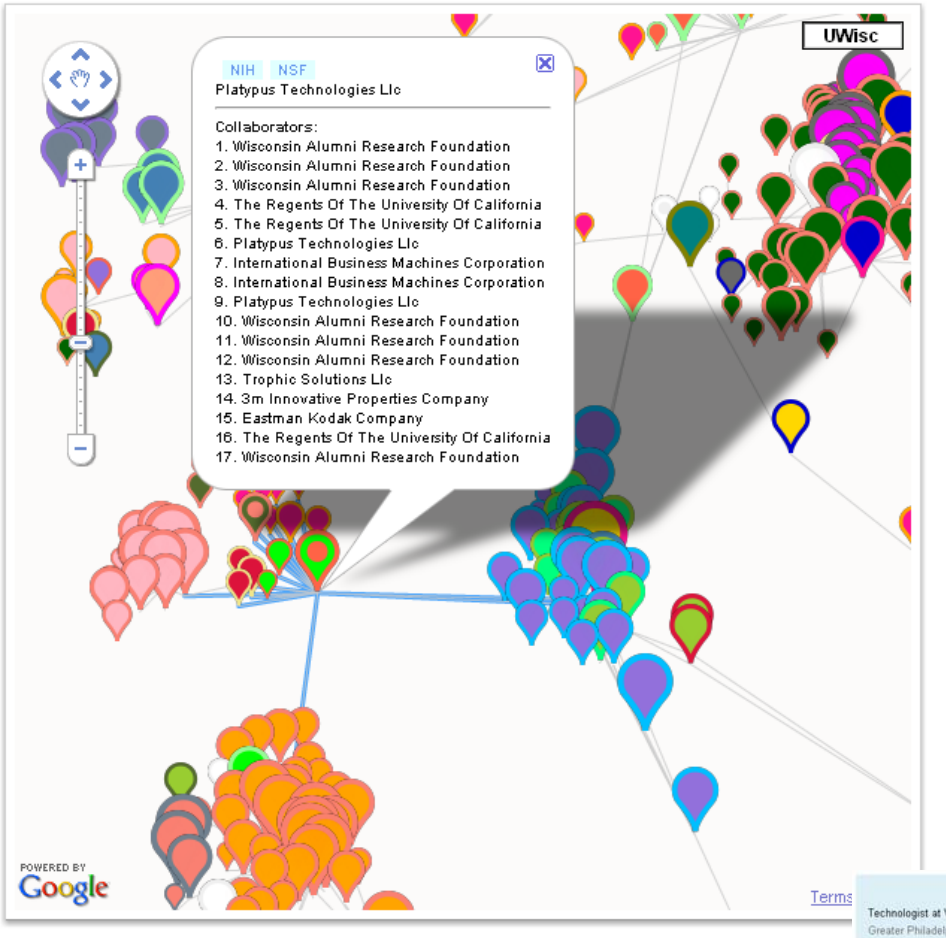
WISCONSIN ALUMNI RESEARCH FOUNDATION	(391)
INTERNATIONAL BUSINESS MACHINES CORPORATION	(223)
GENERAL ELECTRIC COMPANY	(72)
EMC CORPORATION	(59)
SUN MICROSYSTEMS INC	(54)
THIRD WAVE TECHNOLOGIES INC	(53)
PIONEER HIBRED INTERNATIONAL INC	(46)
PFIZER INC	(39)
EASTMAN KODAK COMPANY	(39)
PHARMACIA CORPORATION	(36)
ELAN PHARMACEUTICALS INC	(34)

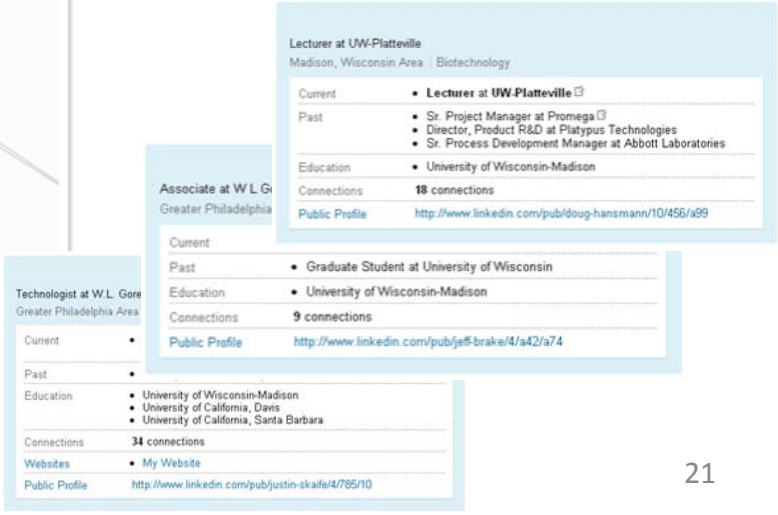
Primary Class - (2847 patents)

514 (386)	DRUG BIO AFFECTING AND BODY TREATING COMPOSITIONS
435 (258)	CHEMISTRY MOLECULAR BIOLOGY AND MICROBIOLC
378 (208)	X RAY OR GAMMA RAY SYSTEMS OR DEVICES
800 (164)	MULTICELLULAR LIVING ORGANISMS AND UNMODIFIE PARTS THEREOF AND RELATED PROCESSES
347 (109)	INCREMENTAL PRINTING OF SYMBOLIC INFORMATIOI
530 (93)	CHEMISTRY NATURAL RESINS OR DERIVATIVES PEPTIDES OR PROTEINS LIGNINS OR REACTION PRODUCTS THEREOF
711 (87)	ELECTRICAL COMPUTERS AND DIGITAL PROCESSIN SYSTEMS MEMORY
709 (77)	ELECTRICAL COMPUTERS AND DIGITAL PROCESSIN SYSTEMS MULTICOMPUTER DATA TRANSFERRING
375 (74)	PULSE OR DIGITAL COMMUNICATIONS
424 (70)	DRUG BIO AFFECTING AND BODY TREATING COMPOSITIONS



Visual Exploration - Drill Down





http://140.247.116.250/StarMetrics/default.php

Current Status

- NIH, NSF and OSTP MOU signed
- Partnership with Federal Demonstration Partnership, and engagement with AAU, APLU, COGR
- Over 100 academic institutions at various degrees of participation
- European Union engagement and emulation

STAR METRICS

A Federal Collaboration with Research Institutions

Science and Technology for America's Reinvestment
Measuring the EffecTs of Research on Innovation, Competitiveness and Science

Log On

HOW TO GET STARTED

Get started by visiting the **Participation Guide**. There you will find:

1. About STAR METRICS
2. Getting Started
3. Employment Calculations

IMPORTANT LINKS

Download these important documents.

Participation Agreement (**doc**)
This agreement must be signed in order to participate. See the **Resources** page for instructions on sending this document.

Participation Guide (**pdf** | **doc**)

Data Dictionary (**pdf** | **xls**)

Technical Specifications (**pdf** | **doc**)

CONTACT

Contact us at:
starmetrics@nih.gov

WHAT IS STAR METRICS?

STAR METRICS - Science and Technology for America's Reinvestment: Measuring the Effect of Research on Innovation, Competitiveness and Science, is a multi-agency venture led by the National Institutes of Health, the National Science Foundation (NSF) and the White House Office of Science and Technology Policy (OSTP).

The STAR METRICS project is a partnership between science agencies and research institutions to document the outcomes of science investments to the public. The benefits of STAR METRICS are that a common empirical infrastructure will be available to all recipients of federal funding and science agencies to quickly respond to State, Congressional and OMB requests. It is critical that this effort takes a bottom up approach that is domain specific, generalizable and replicable.

> "It is essential to document with solid evidence the returns our Nation is obtaining from its investment in research and development. STAR METRICS is an important element of doing just that."
>
> - John P. Holdren
> Assistant to the President for Science and Technology and
> Director of the White House Office of Science and Technology Policy
> June 1, 2010.

See **Press Release** (**pdf**) May 28, 2010.

Participants may join Phase I at any time however they must be engaged in Phase I to participate in Phase II. For more information about how to join STAR METRICS, please go to the Participation Guide. A brief description of the two phases of the STAR METRICS project is as follows:

- **Phase I:** Develop uniform, auditable and standardized measures of the impact of science spending (ARRA and non-ARRA) on job creation, using data from research institutions' existing database records. No personally identifiable information (PII) is collected in Phase I.
- **Phase II:** Develop measures of the impact of federal science investment on scientific knowledge (using metrics such as publications and citations), social outcomes (e.g. health outcomes measures and environmental impact factors), workforce outcomes (e.g. student mobility and employment), and economic growth (e.g. tracing patents, new company start-ups and other measures). Phase II will require the collection of PII.

Next Steps:
Details

Stakeholder (institutional representatives) meeting October 22, 2010 at National Press Club

- Invitation letter from Dr. Holdren went to VPs for Research to institutions participating in Phase I

Goal: Get feedback from attendees on

- Which data elements should be used to measure impact?
- What are appropriate criteria for including data elements?
- What elements should be added as the project evolves over the long term?

For more information

- Contact
- Julia Lane (jlane@nsf.gov)
- Stefano Bertuzzi (stefano.bertuzzi@nih.gov)
- Diane DiEuliis (Diane_DiEuliis@ostp.eop.gov)