

# STAR METRICS

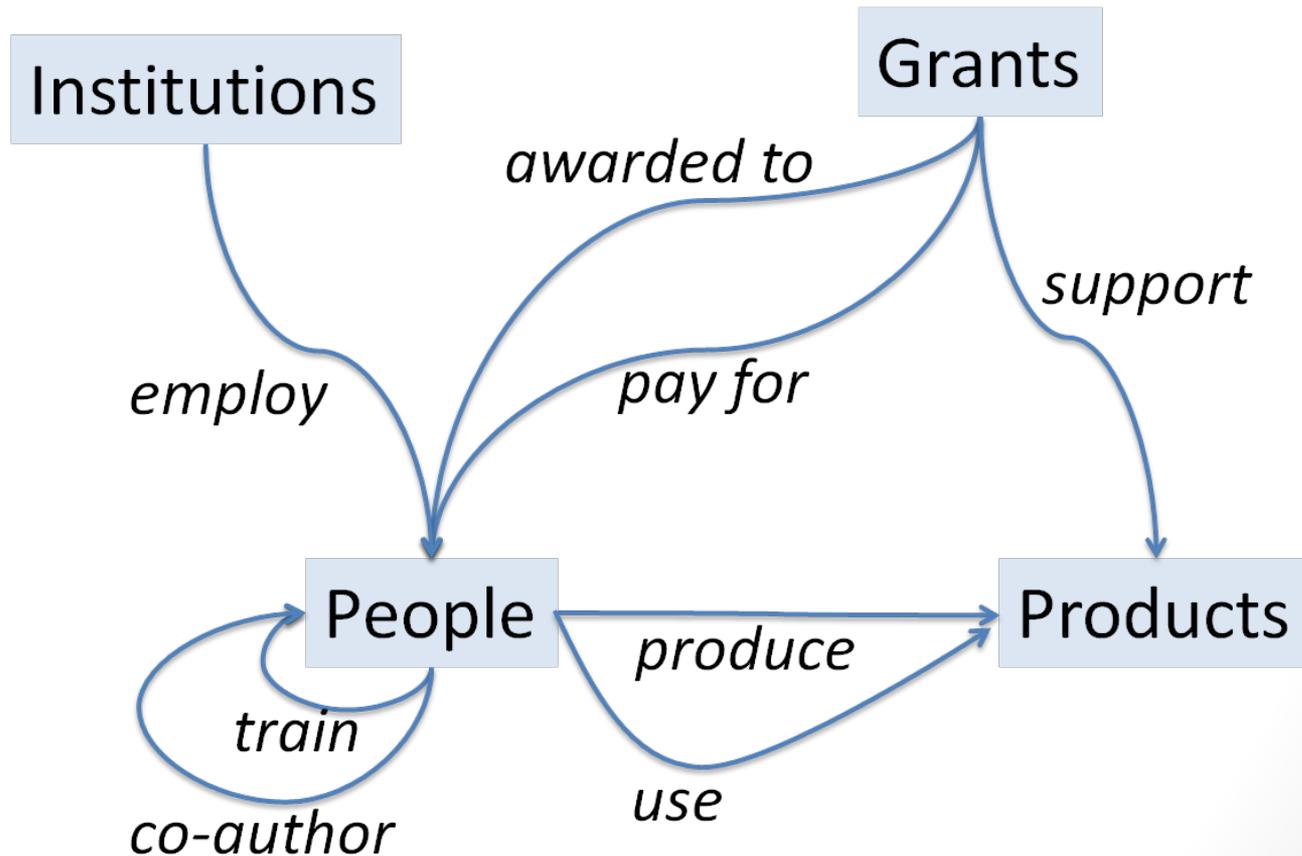
Julia Lane

# Overview

- Why measurement is hard to do
- Designing a better system: the nascent approach in the US – using nanotech as example
  - Workforce Information
  - Investment information
  - (Some) initial output information
- Application: COV module

# Why good measurement is hard to do

# Complex conceptual framework

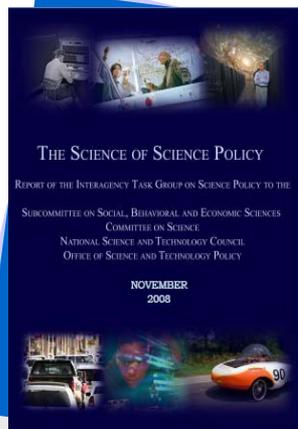


# And the data don't exist

The ITG undertook a literature review to determine the state of the science to date. A questionnaire was also circulated to Federal agencies to ascertain what methods are currently in use for programmatic investment decision making, as well as to ask what tools and resources are needed by Federal agencies that are currently unavailable. The ITG found that:

- There is a well developed body of social science knowledge that could be readily applied to the study of science and innovation.
- Although many Federal agencies have their own communities of practice, the collection and analysis of data about the science and scientific communities they support is heterogeneous and unsystematic.
- Agencies are using very different models, data and tools to understand their investments in science and technology.
- The data infrastructure is inadequate for decision-making.

THE SCIENCE OF SCIENCE POLICY: A FEDERAL RESEARCH ROADMAP



# The Nascent System in the U.S.

# Brief Background: Evolution

- 2006: Science of Science Policy established – NSTC interagency group plus NSF SciSIP program
- 2008: Roadmap finds “data inadequate for decision-making” across all science agencies
- 2009: ARRA reporting requirements demonstrated uneven capacity across agencies; STAR pilot
- 2010: STAR METRICS established
- 2012: 6 federal agencies, 85 research institutions (~40% of NSF/NIH extramural research portfolios)

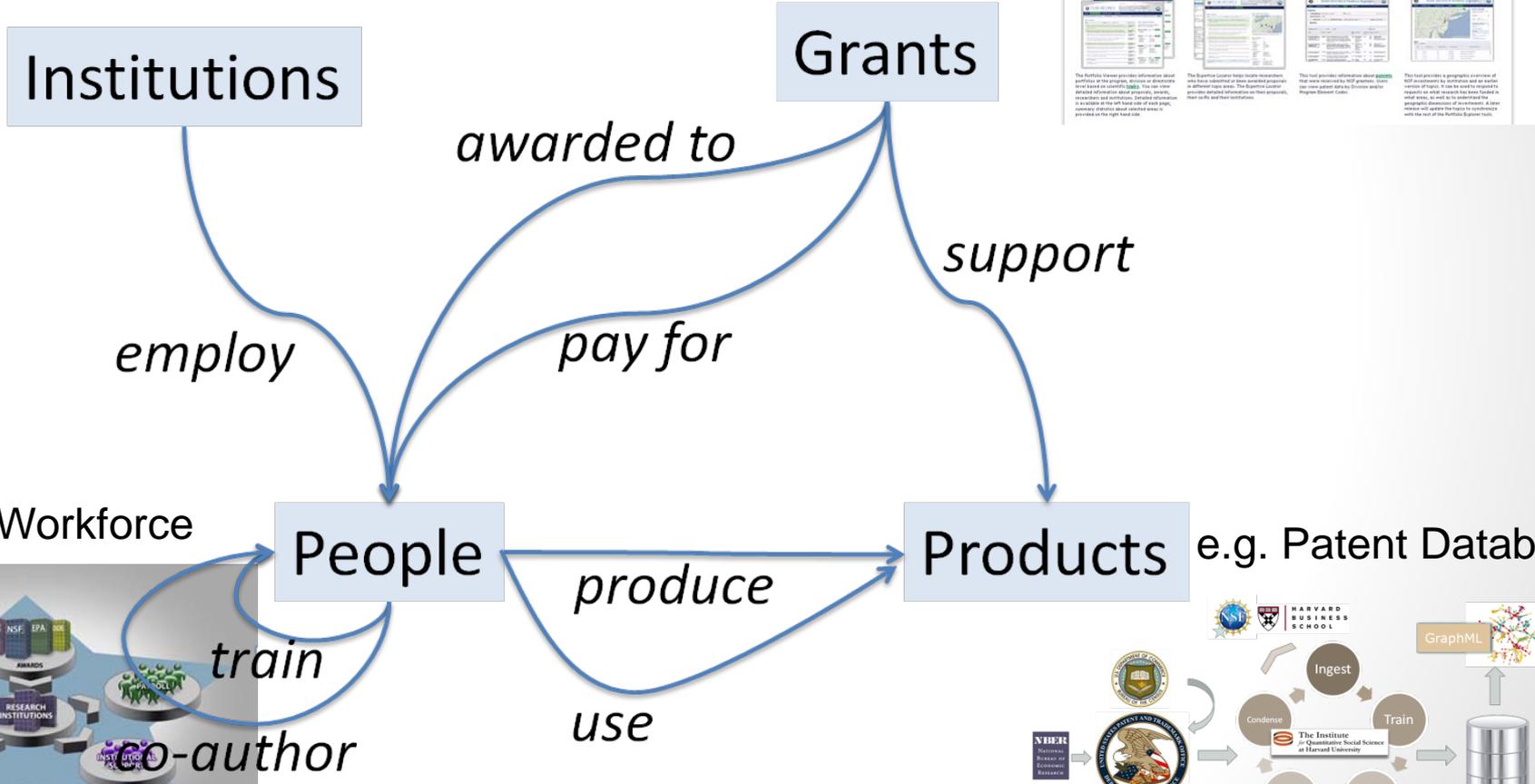
# Brief Background:

## Interagency collaboration

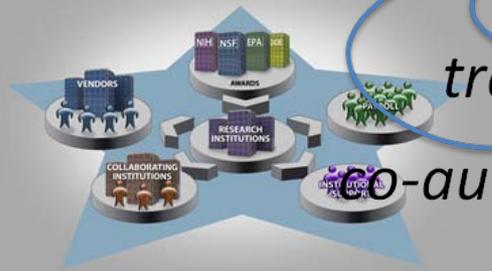
- Provide a better empirical basis for science policy by:
  - providing an open and automated data infrastructure that can be used by federal agencies, research institutions, and researchers,
  - documenting federal investments in science, and
  - analyzing the resulting relationship between inputs, outputs, and outcomes.

Approach: automatically capture data about the conduct of science – inputs, outputs and the connections between the two

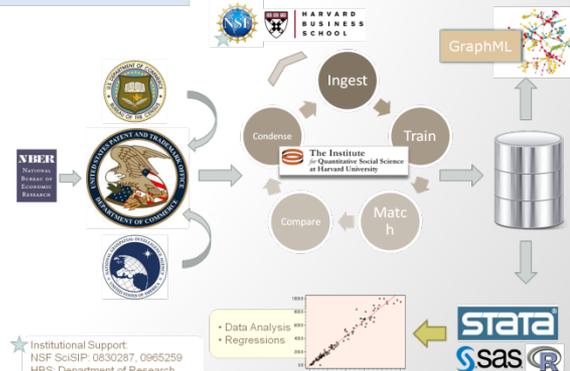
## Portfolio Explorer



Scientific Workforce



e.g. Patent Database

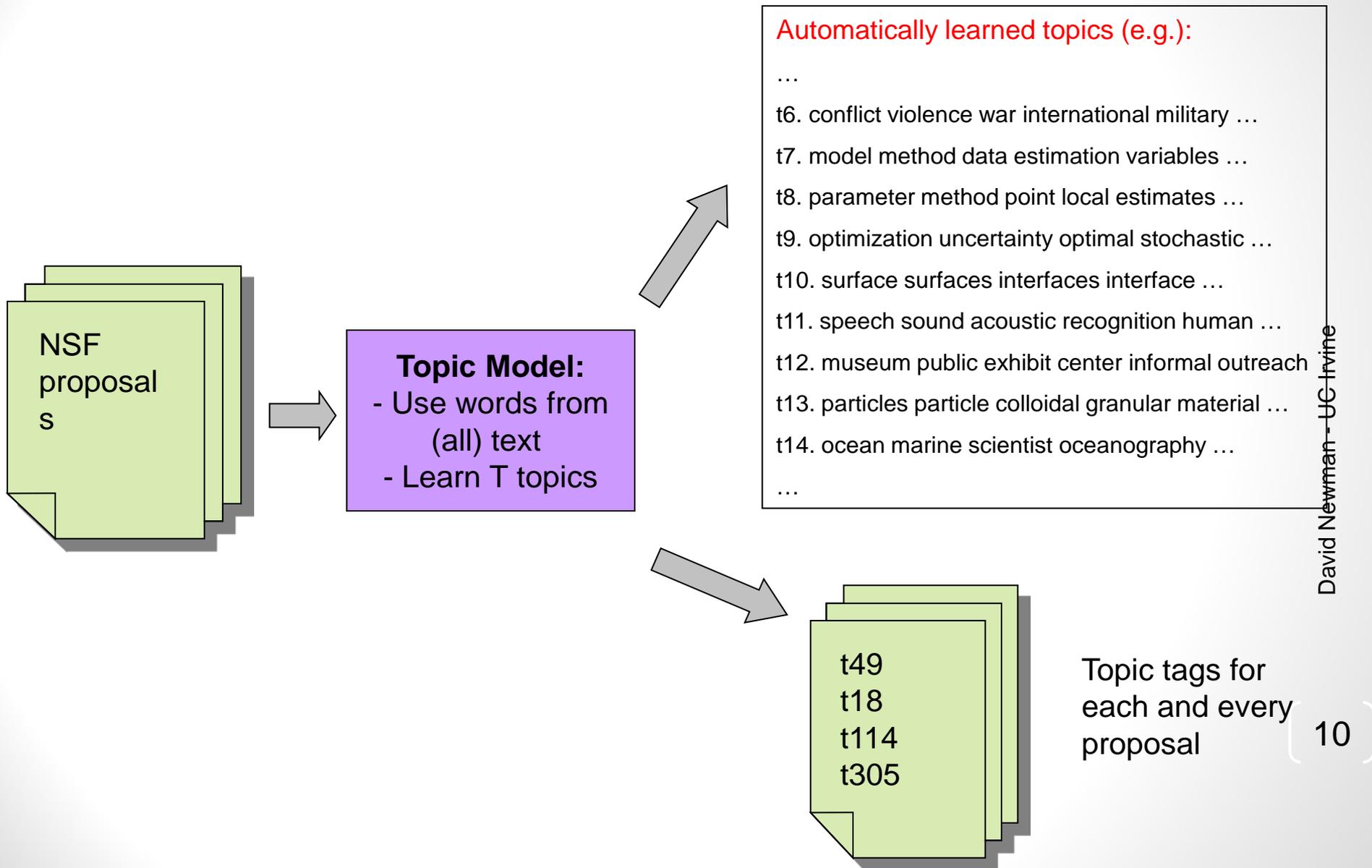


Source: Ian Foster University of Chicago

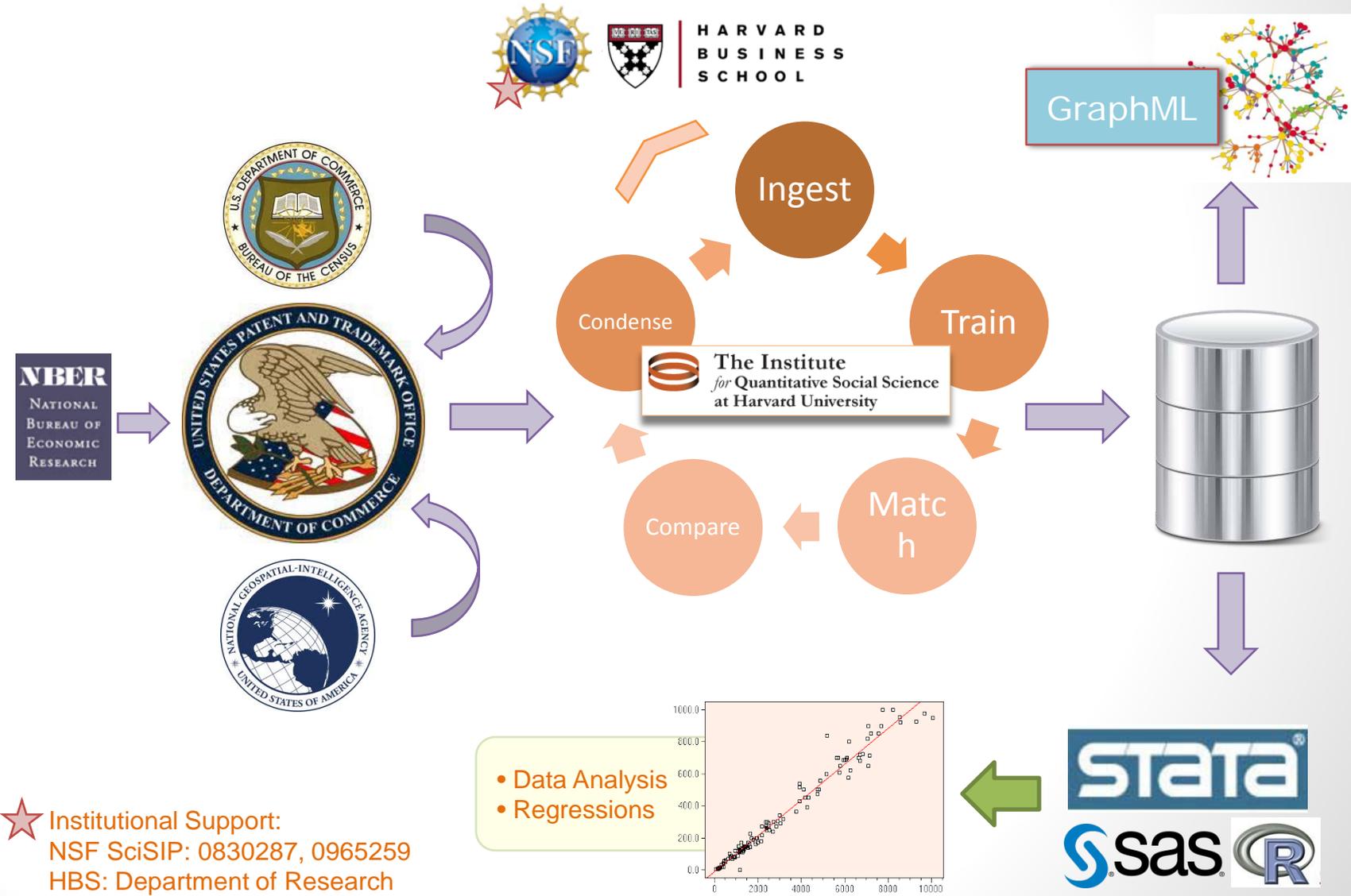


Institutional Support  
NSF SciIP: 0830287, 0965259  
HBS: Department of Research

# Automated capture of scientific topics

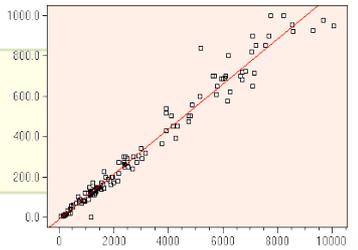


# Automated capture of economic outcomes

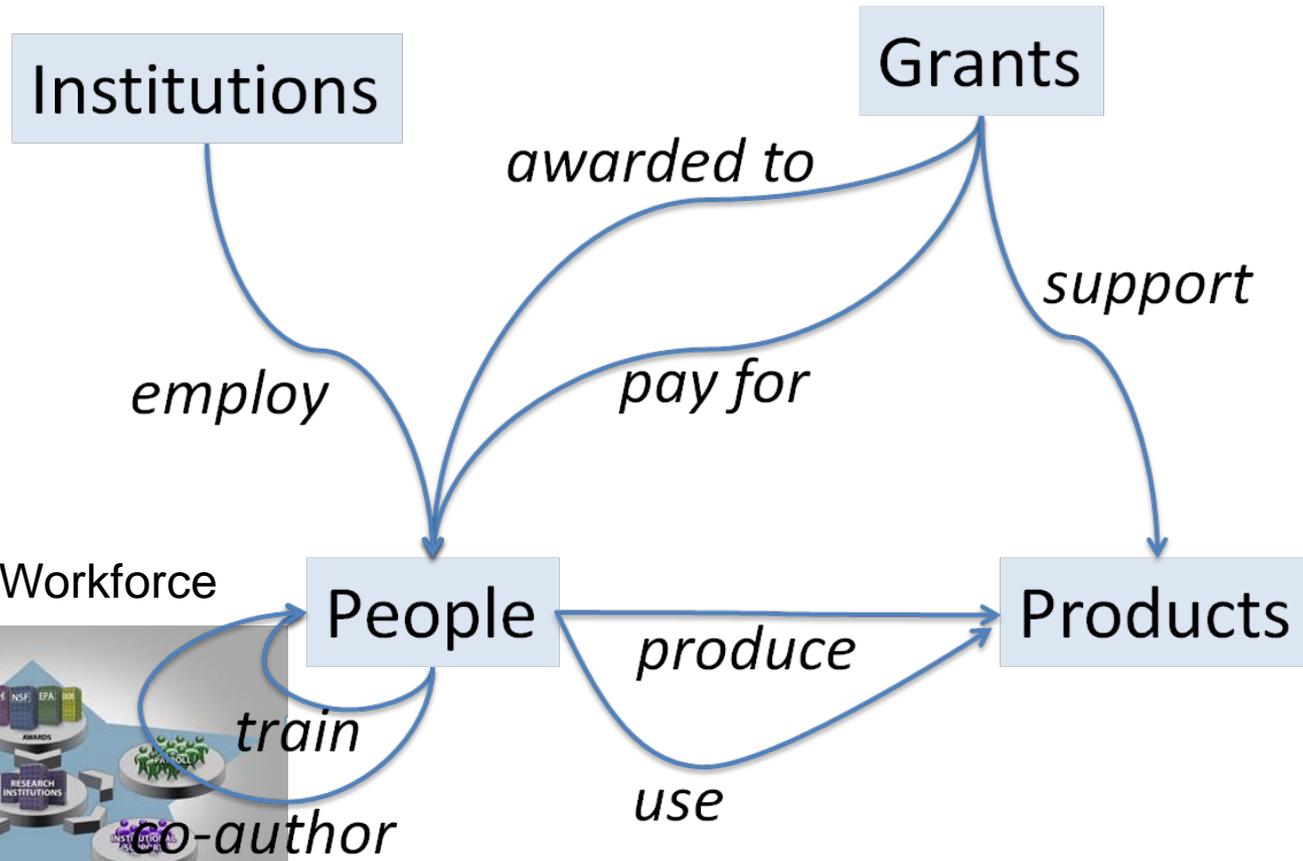


★ Institutional Support:  
 NSF SciSIP: 0830287, 0965259  
 HBS: Department of Research

- Data Analysis
- Regressions



Approach: automatically capture data about the conduct of science – inputs, outputs and the connections between the two



Source: Ian Foster University of Chicago



# Example for selected institutions and NSF grants

## Nano Tech Science Topics

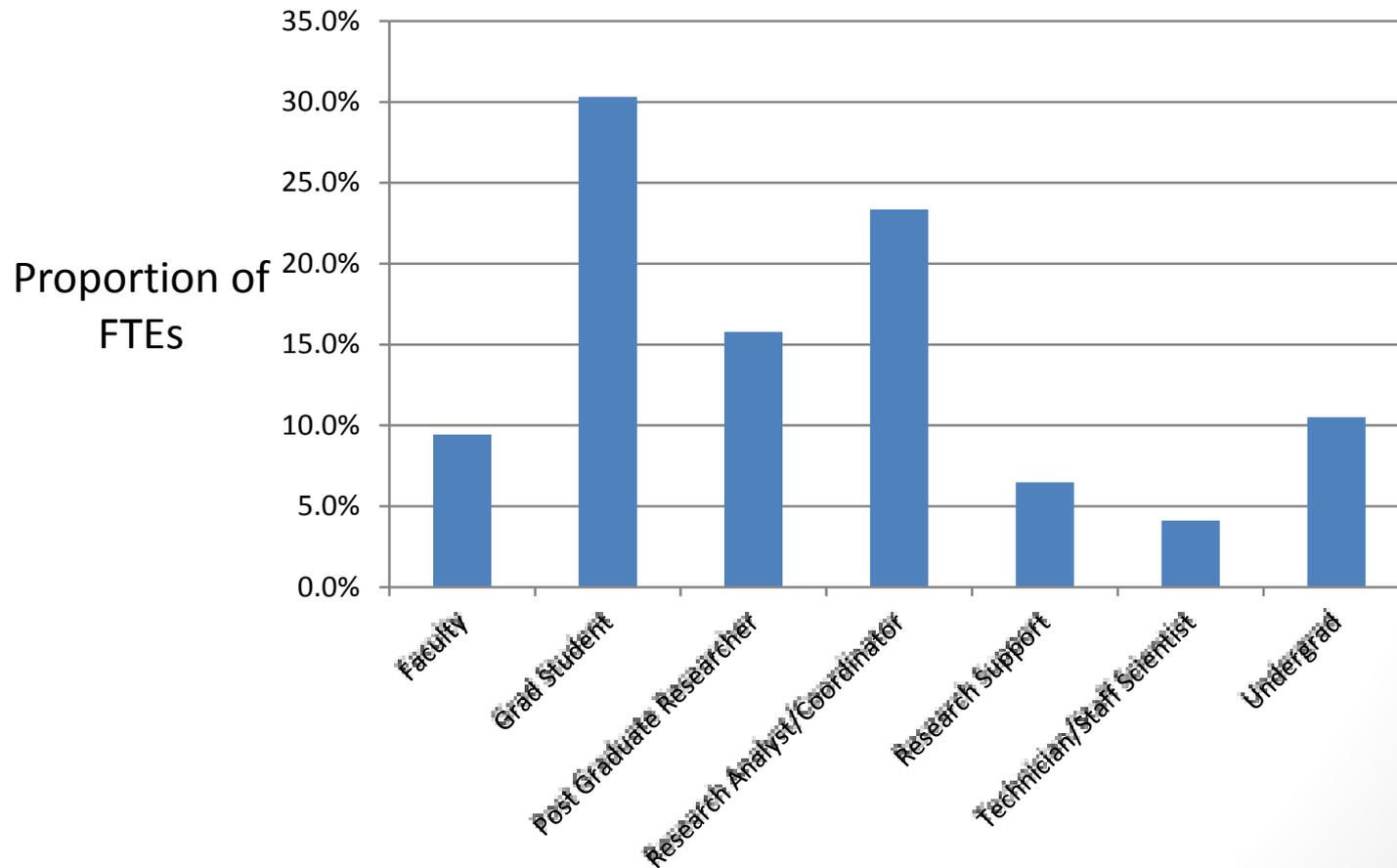
Values

nanoparticle polymer solvent polymerization monomer gel particle surfactant NPs solution ...	Individuals	276
	Number of Awards	57
environment environmental degradation contaminant pollutant concentration pollution toxicity nanomaterial EPA ...	Individuals	152
	Number of Awards	19
CNT nanowire nanotechnology nanostructure nanotube graphene carbon_nanotube nanoscale nanomaterial nano ...	Individuals	126
	Number of Awards	32
composite fiber polymer dispersion nanocomposite nanofiber matrix resin clay fabric ...	Individuals	20
	Number of Awards	5

( 13 )

# Information About Individuals Tells Us About Future Supply

**Distribution of Employment on Nanotech awards**

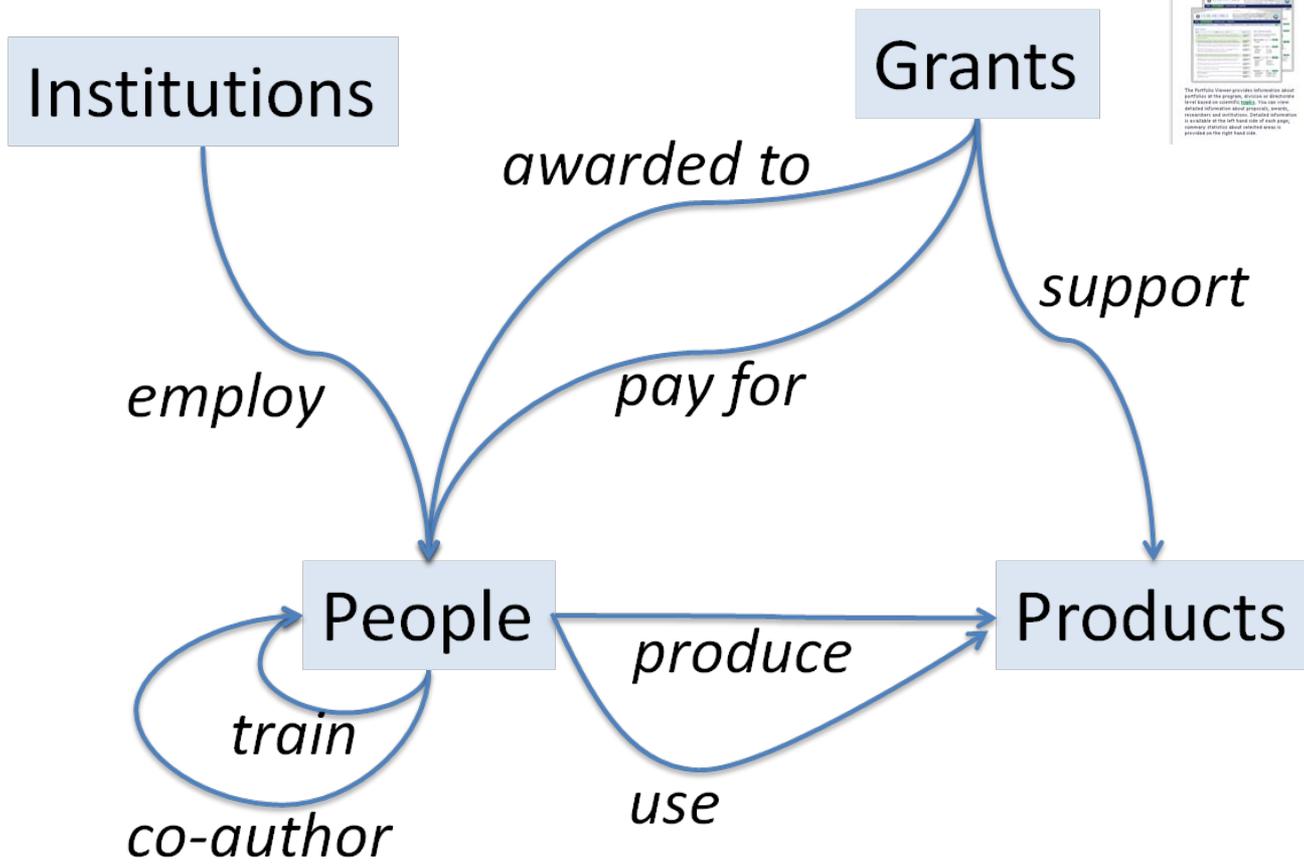


# Where did Nanotech award expenditures get spent?

## DISTRIBUTION OF SUB-AWARD AND VENDOR JOBS BY INDUSTRY:

Rolling 12 months thru 9/2011

Industry	Subawards/ Subcontracts Vendors		Grand Total
Accommodation and Food Services	0.0%	2.7%	0.1%
Arts, Entertainment, and Recreation	0.0%	0.1%	0.0%
Construction	1.3%	0.0%	1.3%
Educational Services	93.6%	0.9%	88.9%
Information	0.0%	0.5%	0.0%
Manufacturing	0.0%	25.7%	1.3%
Other Services (except Public Administration)	0.0%	2.9%	0.1%
Professional, Scientific, and Technical Services	5.1%	42.9%	7.0%
Retail Trade	0.0%	1.6%	0.1%
Transportation and Warehousing	0.0%	0.1%	0.0%
Wholesale Trade	0.0%	22.6%	1.1%
<b>Grand Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>



Source: Ian Foster University of Chicago

# Information about grants tells us about portfolio using different lenses

- Divisions
- Programs
- Researchers
- Institutions
- Time
- Geography



# STAR METRICS Portfolio Explorer

Limited Distribution  
ALPHA-version

[Home](#)[Portfolio](#)[Expertise](#)[Patents](#)[Maps](#)[About](#)[Feedback](#)

## Welcome

This site provides four tools that provide different views of scientific portfolios. The tools are provided by the [STAR METRICS](#) program; an interagency collaboration to provide a stronger empirical basis for science policy decisions.

### Portfolio Viewer



The Portfolio Viewer provides information about portfolios at the program, division or directorate level based on scientific [topics](#). You can view detailed information about proposals, awards, researchers and institutions. Detailed information is available at the left hand side of each page; summary statistics about selected areas is provided on the right hand side.

### Expertise Locator



The Expertise Locator helps locate researchers who have submitted or been awarded proposals in different topic areas. The Expertise Locator provides detailed information on their proposals, their co-PIs and their institutions.

### Patent Viewer



This tool provides information about [patents](#) that were received by NSF grantees. Users can view patent data by Division and/or Program Element Codes.

### Map Viewer



This tool provides a geographic overview of NSF investments by institution and an earlier version of topics. It can be used to respond to requests on what research has been funded in what areas, as well as to understand the geographic dimensions of investments. A later release will update the topics to synchronize with the rest of the Portfolio Explorer tools.

## Send Us Feedback

We would love to hear from you! Please email us at [PEfeedback@nsf.gov](mailto:PEfeedback@nsf.gov) with any questions or feedback. If you have a problem to report, please include the url of the page you were on together with a description of what happened.

**Topic Data** Clear Selection

Show  entries Keyword Filter:  Export as CSV

Inclusion\*:

Select	Topic	Awarded	Awarded Amt.
<input checked="" type="checkbox"/>	<b>t324: Carbon Nanomaterials</b> - graphene graphite carbon graphene_sheet sheet GNR nanoribbon electronic substrate graphene_layer SiC graphene_film graphene_based graphitic single_layer device flake monolayer exfoliation layer ...	56	\$17.15M
<input checked="" type="checkbox"/>	<b>t1: Mechanics of Materials</b> - dislocation grain grain_size deformation grain_boundary microstructure grain_boundaries metal twin texture slip orientation nanocrystalline plasticity mechanism polycrystalline strain plastic_deformation microstructural strain_rate ...	45	\$11.64M
<input checked="" type="checkbox"/>	<b>t574: Plasmons</b> - plasmonic metal surface_plasmon plasmon enhancement near_field optical resonance metallic dielectric coupling light wavelength nanostructure spp mode excitation structure surface gold ...	41	\$12.44M
<input checked="" type="checkbox"/>	<b>t444: Quantum Dots</b> - quantum_dot exciton carrier semiconductor QDs dot optical electron electron_hole hole energy quantum quantum_well structure emission transition nanostructure phonon confinement coupling ...	36	\$9.97M
<input checked="" type="checkbox"/>	<b>t772: Lithography Processing</b> - lithography fabrication patterning patterned pattern substrate fabricated mask fabricate etching structure array resist process nanofabrication photoresist layer feature nanoscale photolithography ...	36	\$16.93M
<input checked="" type="checkbox"/>	<b>t370: Nanotechnology</b> - nanotechnology nano nanoscale nanoscience nanomaterial nanoscale_science NUE device nanomanufacturing nanostructure micro nanodevice nanoelectronic nanosystem nanofabrication nanoscience_nanotechnology fabrication nano_scale education Nanotech ...	34	\$6.31M
<input type="checkbox"/>	<b>t789: Waveguides</b> - waveguide optical photonic photonic_crystal device wavelength light modulator structure optic integrated mode silicon loss refractive_index nanophotonic index fabrication modulation photonic_device	34	\$8.68M

**Researcher Summary**

The below reflects a summary of the Topics you select/ed on the left. Click the triangle controls for expanded summaries or click the 'Explore' button to analyze your selection deeper.

**Researchers (433)** Explore

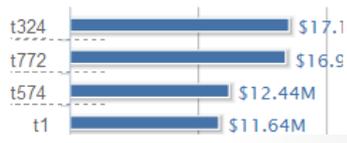
**Awarded (248)**

Total Funding: \$74.44M

**Funding by Division (top 8)**



**Funding by Topic (top 8)**





**t1: Mechanics of Materials** - dislocation grain grain\_size deformation grain\_boundary microstructure grain\_boundaries metal twin texture slip orientation nanocrystalline plasticity mechanism polycrystalline strain plastic\_deformation microstructural strain\_rate ... 45 \$11.64M

PGE Code (Total:12)	Division	Awarded	Awarded Amt.
p1771:METAL & METALLIC NANOSTRUCTURE	DMR	23	\$5.24M
p1630:MECHANICS OF MATERIALS	CMMI	9	\$2.73M
p1574:GEOPHYSICS	EAR	2	\$0.57M
p1572:TECTONICS	EAR	2	\$0.45M
p1467:MATERIALS PROCESSING AND MANFG	CMMI	2	\$0.70M
p1594:HIST BLACK COLLEGES AND UNIV	HRD	1	\$0.20M

Co-occurring Topics: t1:Mechanics of Materials, t867:Metals, t724:Fracture Mechanics, t192:Molecular Modeling, t710:Mechanics of Materials, t1000:Mechanics of Materials

**t574: Plasmons** - plasmonic metal surface\_plasmon plasmon enhancement near\_field optical resonance metallic dielectric coupling light wavelength nanostructure spp mode excitation structure surface gold ... 41 \$12.44M

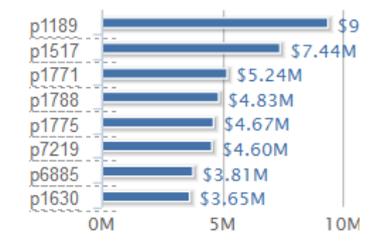
PGE Code (Total:19)	Division	Awarded	Awarded Amt.
p1517:ELECT, PHOTONICS, & MAG DEVICE	ECCS	6	\$1.92M
p6885:MACROMOLEC/SUPRAMOLEC/NANO	CHE	5	\$1.46M
p7607:ENERGY,POWER,ADAPTIVE SYS	ECCS	4	\$1.30M
p1775:ELECTRONIC/PHOTONIC MATERIALS	DMR	4	\$1.01M
p6880:CHEMICAL MEASUREMENT & IMAGING	CHE	3	\$0.94M
p7909:BIOSENSING	CBET	3	\$0.79M

Co-occurring Topics: t574:Plasmons, t835:Biosensors, t789:Wavguides, t39:Metamaterials, t772:Lithography Processing, t250:Instrumentation

### Funding by Topic (top 8)



### Funding by PGE Codes (top 8)



### Funding over Time



**Researchers**

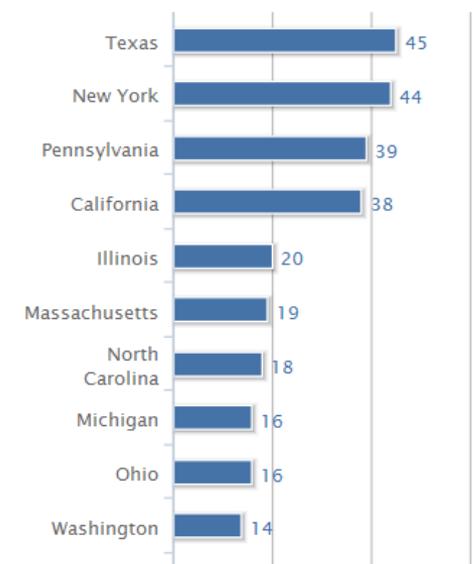
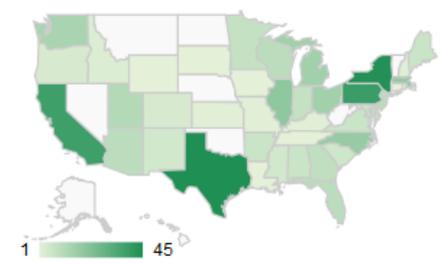
Show  entries

Keyword Filter:

Export as CSV

Name	Institution	Department	Count*	IDs**	Details
Tony F Heinz	American Physical Society	Education	4	<a href="#">1106210</a> , <a href="#">1124894</a> , <a href="#">1106172</a> , <a href="#">1106225</a>	▶
Rodney S Ruoff	University of Texas at Austin	Mechanical Engineering	3	<a href="#">1130261</a> , <a href="#">0969106</a> , <a href="#">1006350</a>	▶
James C Hone	Columbia University	Mechanical Engineering	3	<a href="#">1124894</a> , <a href="#">1138237</a> , <a href="#">1122594</a>	▶
Donald K Roper	University of Arkansas	Chemical Engineering	3	<a href="#">1138248</a> , <a href="#">1006927</a> , <a href="#">1134222</a>	▶
Teri W Odom	Northwestern University	Chemistry	3	<a href="#">1006380</a> , <a href="#">1058501</a> , <a href="#">1069180</a>	▶
Eui-Hyeok Yang	Stevens Institute of Technology	Mechanical Engineering	3	<a href="#">1040007</a> , <a href="#">1104870</a> , <a href="#">1138244</a>	▶
Stefan Strauf	Stevens Institute of Technology	Physics and Engineering Physics	3	<a href="#">1040007</a> , <a href="#">1104870</a> , <a href="#">1053537</a>	▶
Jan M Yarrison-Rice	Miami University Oxford Campus	Department of Physics	2	<a href="#">1100489</a> , <a href="#">1105121</a>	▶
Gregory J Salamo	University of Arkansas	Department of Physics	2	<a href="#">1138248</a> , <a href="#">1008107</a>	▶
Myung S Jhon	Carnegie-Mellon University	Chemical Engineering	2	<a href="#">1020137</a> , <a href="#">1123627</a>	▶
Pallab K Bhattacharya	University of Michigan Ann Arbor	Electrical Engineering & Computer Sci.	2	<a href="#">1120923</a> , <a href="#">0968346</a>	▶
Howard E Jackson	University of Cincinnati Main Campus	Department of Physics	2	<a href="#">1100489</a> , <a href="#">1105362</a>	▶
Thomas R Bieler	Michigan State University	Chemical Engineering and Materials Sci.	2	<a href="#">1006656</a> , <a href="#">1108211</a>	▶
Leigh M Smith	University of Cincinnati Main Campus	Department of Physics, ML-11	2	<a href="#">1100489</a> , <a href="#">1105362</a>	▶
Naomi J Halas	William Marsh Rice University	Electrical & Computer Engineering	2	<a href="#">0959343</a> , <a href="#">1040478</a>	▶
Ronald S Besser	Stevens Institute of Technology	Chemical Engineering and Materials Sci.	2	<a href="#">1040007</a> , <a href="#">1138244</a>	▶

**Researchers by State**



Name	Institution	Department	Count*	IDs**	Details
John W Morris	University of California-Berkeley	Material Science and Engineering	1	<a href="#">1105081</a>	▶
Ronald O Scattergood	North Carolina State University	Materials Science & Engineering	1	<a href="#">1005677</a>	▶
William W Gerberich	University of Minnesota-Twin Cities	Chemical Engr & Materials Science	1	<a href="#">0946337</a>	▼

**William W Gerberich:**

[wgerb@umn.edu](mailto:wgerb@umn.edu)  
6126258548

Chemical Engr & Materials Science  
University of Minnesota-Twin Cities

Total: 8  
Awarded: 8 (\$5.27M)  
Date First: 5/1/1984  
Date Last: 6/1/2010

Patents: 4

**Awarded**

**Grant: 1000415**

Status: Awarded \$205,368 on 2010/07/01

Title: Collaborative Research: Hierarchically Structured Polycrystalline Hollow Gold Nanoparticles- A Model System for Integrated Experimental and Multiscale Computational Nanomechanics

NSF Division: Division of Civil, Mechanical, and Manufacturing Innovation (CMMI)

Program Element: Biomechanics and Mechanobiology (BMMB) (7479)

Topics: t192: Molecular Modeling, t805: Nanomaterials, t1: Mechanics of Materials, t790: NSF/Minorities

Co-PIs  
◦ Traian Dumitrica

**Grant: 0946337**

Status: Awarded \$264,439 on 2009/12/15

Title: EAGER: Oxide Film Effects on Dislocation Nucleation -- Implications to Structure/Property Relations

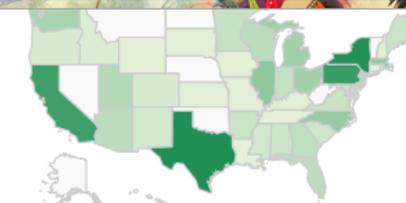
NSF Division: Metals (DMR)

Program Element: Metals and Metallic Nanostructure (1771)

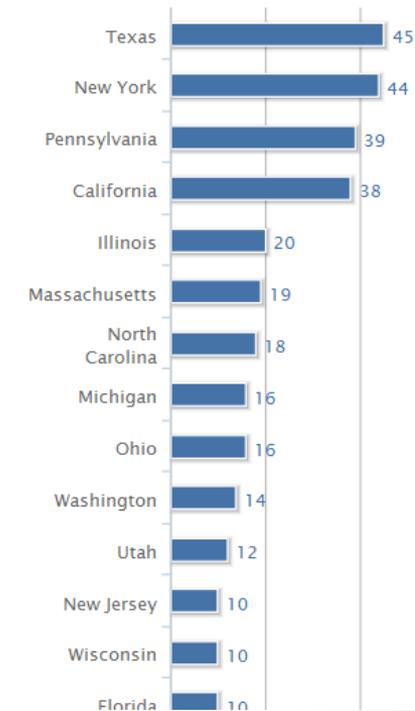
Topics: t1: Mechanics of Materials, t402: Mechanics of Materials, t176: Thin Films, t636: Metal Oxides

Co-PIs  
◦ Christopher Leighton

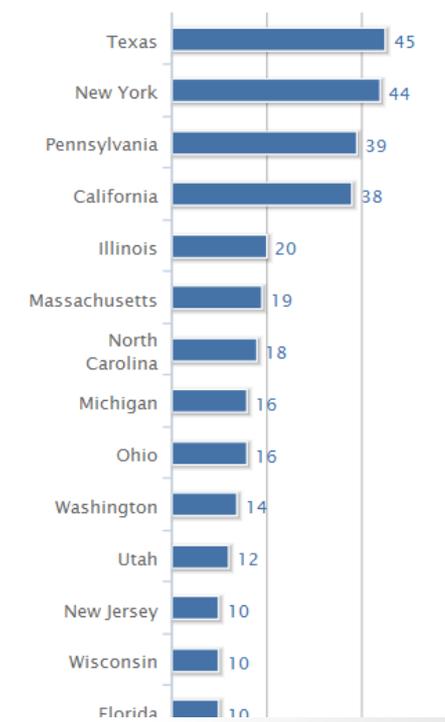
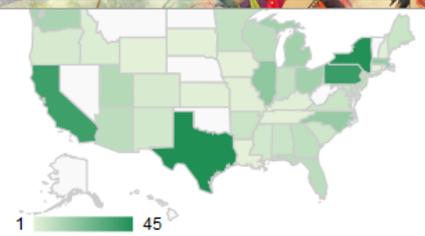
Tsu-Wei Chou	University of Delaware	Mechanical Engineering	1	<a href="#">1138182</a>	▶
Roberto D Merlin	University of Michigan Ann Arbor	Department of Physics	1	<a href="#">1120923</a>	▶
Scott E Johnson	University of Maine	Earth Sciences	1	<a href="#">1118786</a>	▶



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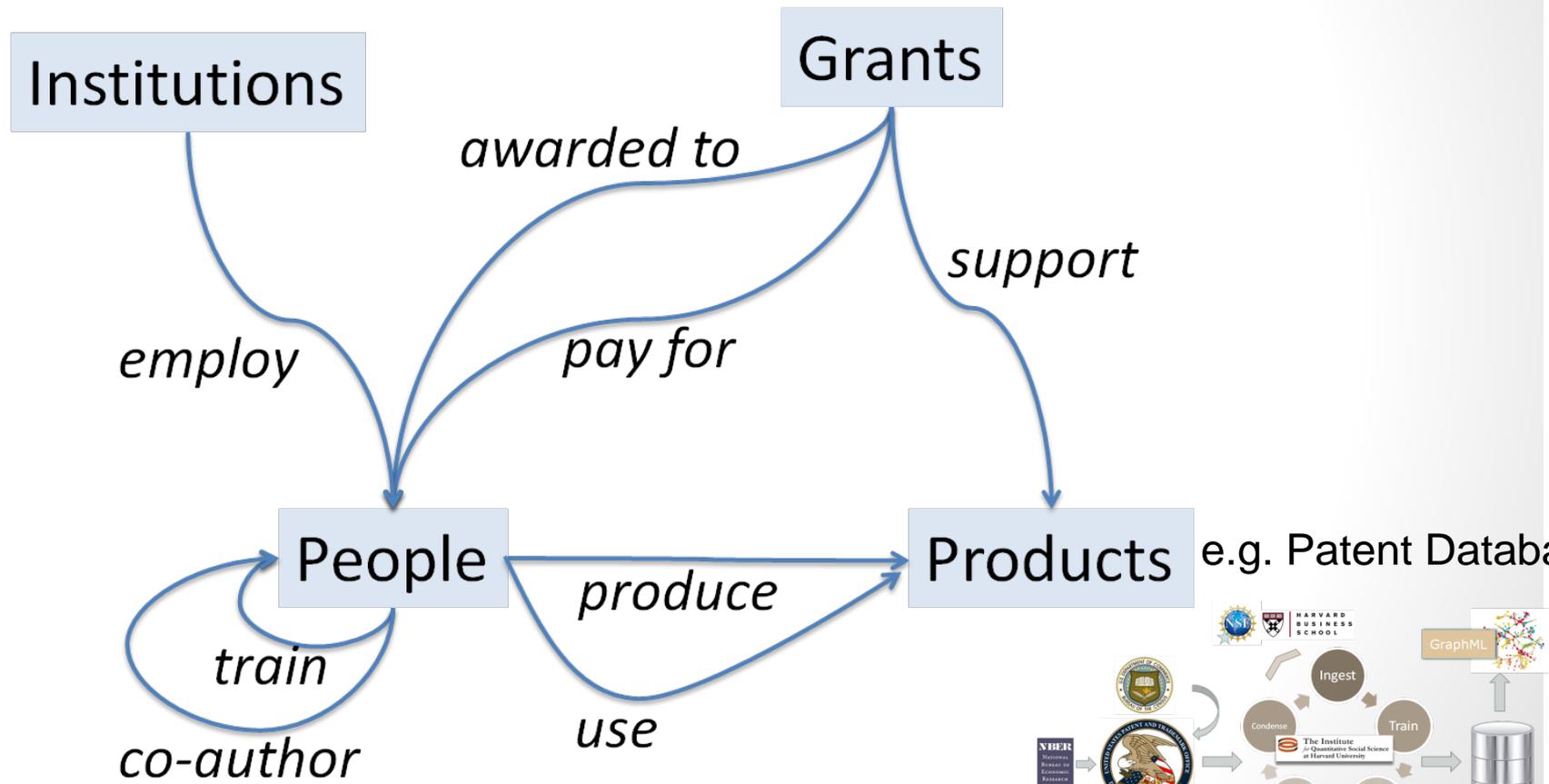


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<div style="text-align: right;"> <ul style="list-style-type: none"> <li>◦ Timothy P Lodge</li> <li>◦ David L Davidson</li> </ul> </div> <hr/> <p><b>Grant: <a href="#">8400015</a></b></p> <p><b>Status:</b> Awarded \$425,900 on 1984/06/01</p> <p><b>Title:</b> Electron Channeling Studies of Three-Dimensional Strain Gradients at Fracture Surfaces and Near Crack Tips (Materials Research)</p> <p><b>NSF Division:</b> Electronic Materials (DMR)</p> <p><b>Program Element:</b> Metals, Ceramics, And Electronic Materials (1715)</p> <p><b>Topics:</b> t0: Not Machine Readable</p> <p><b>Patents:</b></p> <table border="1"> <thead> <tr> <th>ID</th> <th>Title</th> <th>Application Year</th> <th>Grant Year</th> <th>Assignee</th> </tr> </thead> <tbody> <tr> <td><a href="#">5260141</a></td> <td></td> <td>1991</td> <td>1993</td> <td>UNIVERSITY OF MINNESOTA THE REGENTS OF</td> </tr> <tr> <td><a href="#">5344551</a></td> <td></td> <td>1993</td> <td>1994</td> <td>UNIVERSITY OF MINNESOTA THE REGENTS OF</td> </tr> <tr> <td><a href="#">5696327</a></td> <td></td> <td>1994</td> <td>1997</td> <td>UNIVERSITY OF MINNESOTA THE REGENTS OF</td> </tr> <tr> <td><a href="#">6924004</a></td> <td>Apparatus and method for synthesizing films and coatings by focused particle beam deposition</td> <td>2001</td> <td>2005</td> <td>REGENTS OF THE UNIVERSITY OF MINNESOTA</td> </tr> </tbody> </table>						ID	Title	Application Year	Grant Year	Assignee	<a href="#">5260141</a>		1991	1993	UNIVERSITY OF MINNESOTA THE REGENTS OF	<a href="#">5344551</a>		1993	1994	UNIVERSITY OF MINNESOTA THE REGENTS OF	<a href="#">5696327</a>		1994	1997	UNIVERSITY OF MINNESOTA THE REGENTS OF	<a href="#">6924004</a>	Apparatus and method for synthesizing films and coatings by focused particle beam deposition	2001	2005	REGENTS OF THE UNIVERSITY OF MINNESOTA
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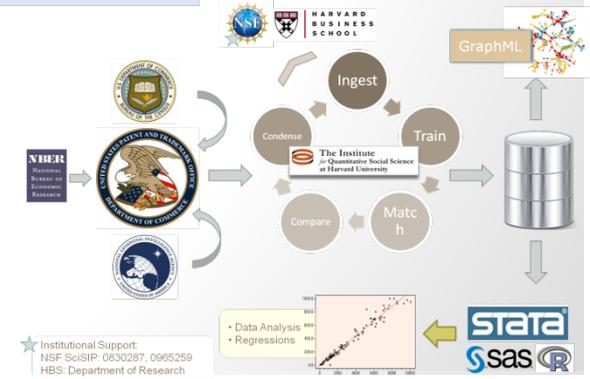


PATENTS

Approach: automatically capture data about the conduct of science – inputs, outputs and the connections between the two

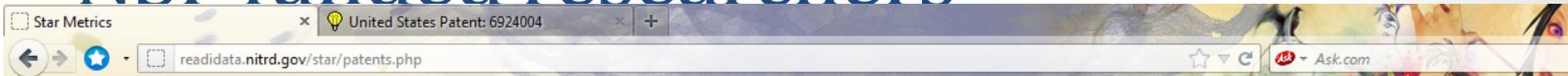


Source: Ian Foster University of Chicago



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

# What patents have been granted to NSF funded researchers



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## Select one or more NSF Divisions and/or Program Element Codes

The patents displayed are associated with funded NSF PI's. Patents were linked to researchers/inventors by means of fuzzy string matching (PI name weighted by location) within the USPTO-derived database, and is subject to error based on those parameters. Initial patents displayed are NOT necessarily a function of NSF grants.

**Instructions:** Select an NSF Division below. Optionally, limit your results by one or more Program Element Codes. Click "View Classes" to proceed.

**Note:** choosing more than one Division or changing the time span to 10 years will significantly slow things down. For best results, use one Division at a time.

### NSF Divisions

Show 50 entries

Keyword Filter:

Select Divisions

#### Office of the Director

- Office of Cyberinfrastructure (OCI)
- Office of the General Counsel (OGC)
- Office of Integrative Activities (OIA)
- Office of International Science and Engineering (OISE)
- Office of Diversity and Inclusion (ODI) (ODI)
- Office of Legislative & Public Affairs (OLPA)
- Office of Polar Programs (OPP)

#### National Science Board

- Office of the Assistant Director (NSB)

#### Office of the Inspector General

- Office of the Assistant Director (OIG)

#### Directorate for Biological Sciences

- Division of Molecular & Cellular Biosciences (MCB)

### Filter

The data on the left and on the screens that follow are limited by the Filter criteria below.

#### Time

Last 5 years

#### Prg. Element Code(s)

- Include All
- Limit to PGEs:   
(separate with commas)

View Classes



# STAR METRICS Portfolio Explorer

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 Divisions: (1 of 53) CMMI  
 PGE Codes: All

Timing: Last 5 years

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[Classes](#)

Filter

Include patents for selected Classes. Use the Summary sidebar to explore your selection.

**Classes**
[Clear Selection](#)

Show 50 entries

Keyword Filter:

Select	USPTO Class ID	Patent Class Description	Patents by NSF PIs
<input type="checkbox"/>	c257	ACTIVE SOLID-STATE DEVICES (E.G., TRANSISTORS, SOLID-STATE DIODES)	114
<input type="checkbox"/>	c73	MEASURING AND TESTING	91
<input type="checkbox"/>	c438	SEMICONDUCTOR DEVICE MANUFACTURING: PROCESS	86
<input type="checkbox"/>	c428	STOCK MATERIAL OR MISCELLANEOUS ARTICLES	78
<input type="checkbox"/>	c250	RADIANT ENERGY	65
<input type="checkbox"/>	c385	OPTICAL WAVEGUIDES	60
<input type="checkbox"/>	c435	CHEMISTRY: MOLECULAR BIOLOGY AND MICROBIOLOGY	52
<input type="checkbox"/>	c977	NANOTECHNOLOGY	44
<input type="checkbox"/>	c356	OPTICS: MEASURING AND TESTING	43
<input type="checkbox"/>	c359	OPTICAL: SYSTEMS AND ELEMENTS	43
<input type="checkbox"/>	c423	CHEMISTRY OF INORGANIC COMPOUNDS	42
<input type="checkbox"/>	c324	ELECTRICITY: MEASURING AND TESTING	40
<input type="checkbox"/>	c427	COATING PROCESSES	36

## Patents Summary

The below reflects a summary of the Classes you select/ed on the left. Click the 'Explore' button to analyze your selection deeper.

Patents ()

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# Drilling down into details

Star Metrics United States Patent: 6924004 readidata.nitrd.gov/star/patents.php

## STAR METRICS Portfolio Explorer

ALPHA-version distribution NSF

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Select Divisions: (1 of 53) CMMI Timing: Last 5 years [Change Selection](#)  
 Classes 1 of 267 Filter c977: NANOTECHNOLOGY [Change Selection](#)

Patents Viewer

Patents

Show 50 entries Keyword Filter:  [Export as CSV](#)

Patent (uspto)	Title	Patent Classes	Appl. Year	Grant Year	Inventors	Assignee	Details
<a href="#">7611562</a>	Triangular nanoframes and method of making same	c75: SPECIALIZED METALLURGICAL PROCESSES, COMPOSITIONS FOR USE THEREIN, CONSOLIDATED METAL POWDER COMPOSITIONS, AND LOOSE METAL PARTICULATE MIXTURES c977: NANOTECHNOLOGY	2007	2009	<ul style="list-style-type: none"> <li>CHAD A MIRKIN</li> <li>GABRIELLA METRAUX</li> <li>YUNWEI CAO</li> <li>RONGCHAO JIN</li> </ul>	NORTHWESTERN UNIVERSITY	<a href="#">▶</a>
<a href="#">7563482</a>	Templated monolayer polymerization and replication	c427: COATING PROCESSES c977: NANOTECHNOLOGY	2007	2009	<ul style="list-style-type: none"> <li>JOSEPH M JACOBSON</li> <li>DAVID W MOSLEY</li> </ul>	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	<a href="#">▶</a>
<a href="#">7238425</a>	Telescoped multiwall nanotube and manufacture thereof	c428: STOCK MATERIAL OR MISCELLANEOUS ARTICLES c977: NANOTECHNOLOGY	2005	2007	<ul style="list-style-type: none"> <li>JOHN P CUMINGS</li> <li>ALEX K ZETTL</li> <li>STEVEN G LOUIE</li> <li>MARVIN L COHEN</li> </ul>	THE REGENTS OF THE UNIVERSITY OF CALIFORNIA	<a href="#">▶</a>
<a href="#">7637960</a>	Short and thin silicon cantilever with tip	c850: SCANNING-PROBE TECHNIQUES OR	2006	2009	<ul style="list-style-type: none"> <li>CHENGZHI CAI</li> </ul>	UNIVERSITY OF	<a href="#">▶</a>

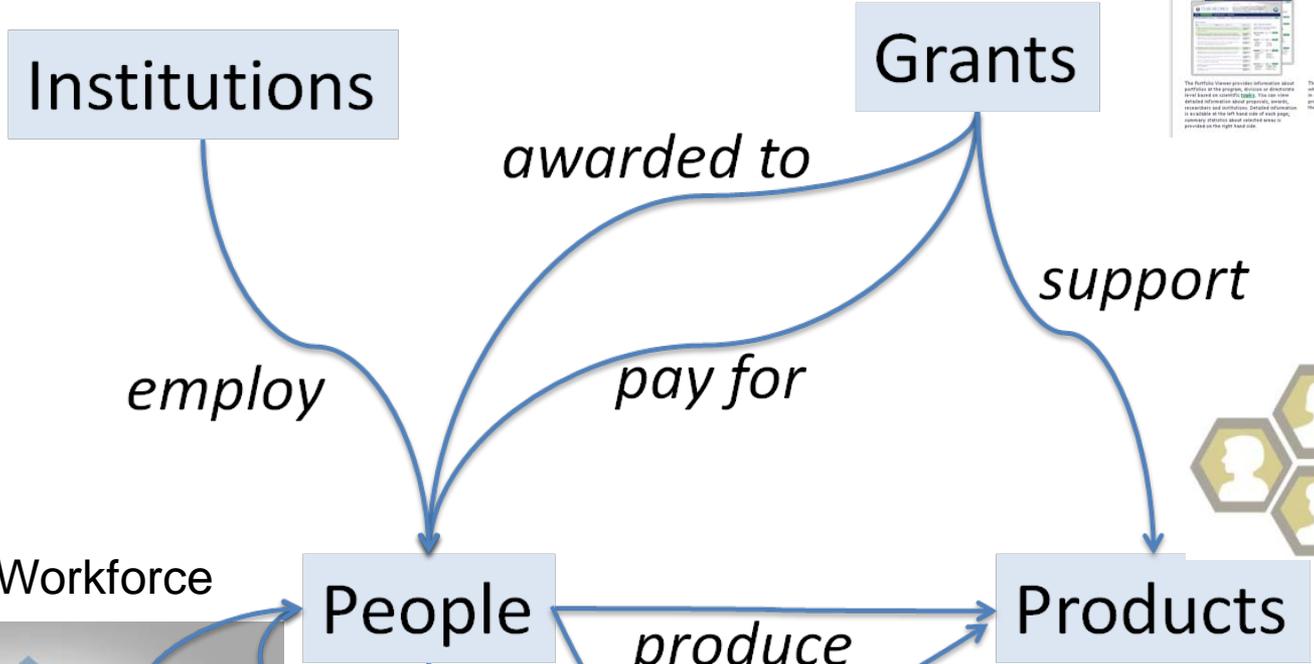


# Basic Approach

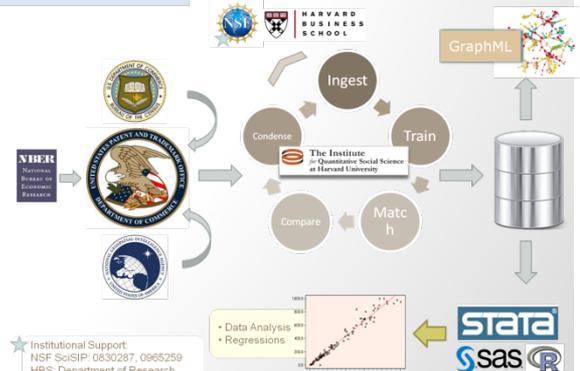
- **Focus:** Build coherent data infrastructure (not shiny tools) leverage existing systems – and minimize manual input
- **Unit of Analysis:** Individual - Senior personnel
- **Incentives:** Create value for all stakeholders to ensure capture of right measures and data quality

Approach: automatically capture data about the conduct of science – inputs, outputs and the connections between the two

## Portfolio Explorer



Scientific Workforce



Source: Ian Foster University of Chicago



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



# Application: COV module

# Ultimate Goals

- Fully fledged academic field
- Fully fledged analytical tool set in government
  - Science policy in same analytical tier as tax policy
- Common empirical infrastructure available to all universities and science agencies to quickly respond to State, Congressional and OMB requests
- Common scientific infrastructure for researchers to develop and study science policy

# Thank you

- Comments and questions?