

Elsevier Research Intelligence

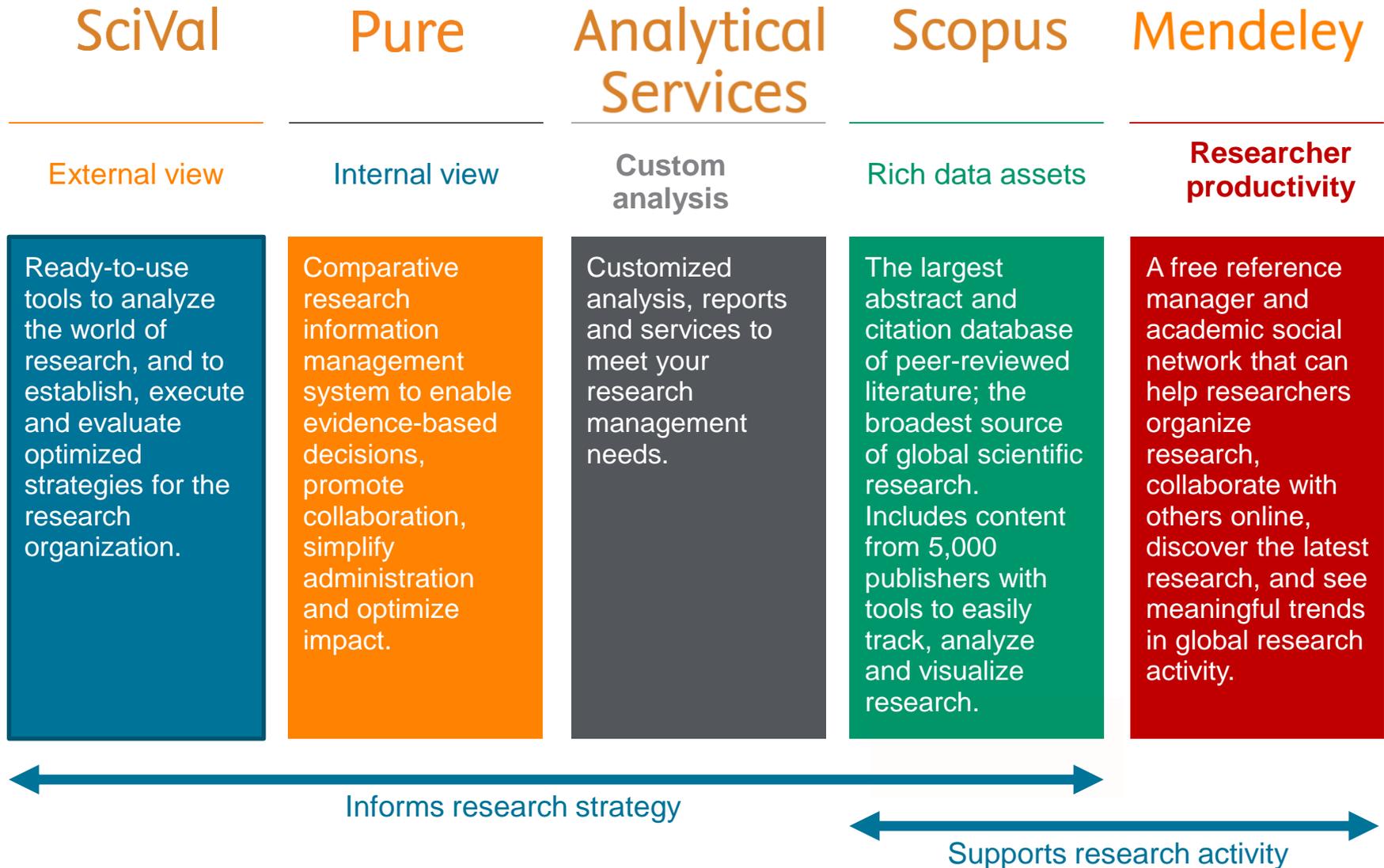
# Discovering the Future of Research Metrics at Elsevier

Ann Gabriel, Vice President  
Elsevier Global Academic & Research Relations

## Outline

- Elsevier and Analytics
- New Metrics
- Analyzing Knowledge Economies:  
Council of State Governments partnership
- Future Research

# Elsevier Research Intelligence



# Elsevier is increasingly the partner of choice for global research leaders

## National research assessment and benchmarking reports

- US NSF Science & Engineering Indicators
- Research Performance in South-East Asia
- UK REF, UK BIS reports
- ERA (Australia)
- FCT (Portugal)
- VQR (Italy)



## Global University Rankings

- Times Higher World University Rankings
- Maclean's
- QS rankings
- US News rankings (Arab Region)



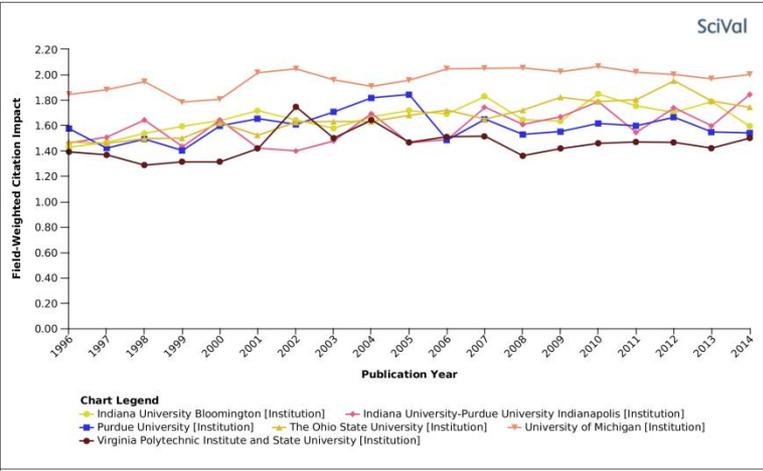
## ProBono initiatives and reports (selected examples)

- US Council of State Governments
- NIH Best reports (including Cornell)
- Illinois Science and Technology Road Map
- Sustainability Science (24 September)
- World Bank
- Royal Society
- Science Europe
- EuroStemCell, Kyoto University
- European Commission, FENS, HBP,
- Kavli Foundation, RIKEN BSI



# SciVal Basics: Benchmarking, Collaboration, Competencies

## CITATION IMPACT



## COLLABORATION

### Institutions collaborating with The Ohio State University

North America United States All sectors reset filter

700 collaborating Institutions 11,484 co-authored publications

Institution	Co-authored publications	Co-authors at The Ohio State University	Co-authors at the other Institution	Field-Weight
Harvard University	1,198	955	1,276	3.88
University of Wisconsin	1,018	570	727	4.23
Johns Hopkins University	834	567	565	4.30
Massachusetts Institute of Technology	814	378	467	3.70
University of Michigan	805	650	802	3.05

## COMPETENCIES

### Virginia Polytechnic Institute and State University

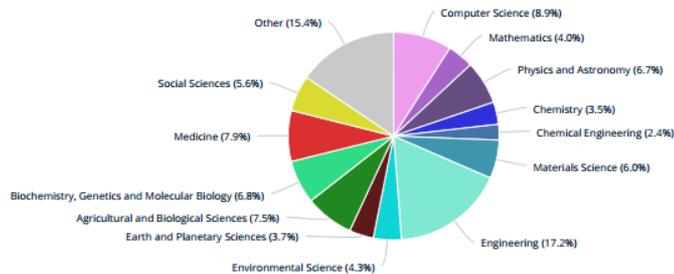
338th (QS) · 251-300 (THE) · 201-300 (ARWU) | United States | More details on this Institution

Source: Scopus data up to 16 Oct 2015 2012 to 2014 no filter selected

#### Overall research performance

Publications	Citations	Authors	Field-Weighted Citation Impact	Citations per Publication
12,061	51,336	7,329	1.46	4.3

View list of publications



## LEADING AUTHORS

### University of Michigan

30th (QS) · 21st (THE) · 22nd (ARWU) | United States | More details on this Institution

Source: Scopus data up to 16 Oct 2015 2012 to 2014 no filter selected

## Authors

Top 100 authors, by number of publications at the University of Michigan over the period 2012 to 2014.

Note that some authors may no longer be affiliated with the University of Michigan.

Name	Publications	Most recent publication	Citations	h-index
1. Neal, Homer A.	346	2014	8,544	83
2. Qian, Jianming	345	2014	8,544	63
3. Zhou, Bing	344	2014	8,492	60
4. Ferretti, Claudio	267	2014	7,182	58
5. Diehl, Edward B.	265	2014	7,179	43

# Developing Metrics in Scival and Mendeley: Societal-economic Impact, Awarded Grants, Patents, Readership



# Awarded grants

The screenshot displays the SciVal 'Awarded grants' dashboard. The top navigation bar includes 'Home', 'Overview', 'Benchmarking', 'Collaboration', 'Trends', and 'My SciVal'. The sidebar on the left allows for filtering by 'Institutions and Groups', 'Researchers and Groups', 'Publication Sets', 'Countries and Groups', and 'Research Areas'. The main content area is divided into two sections:

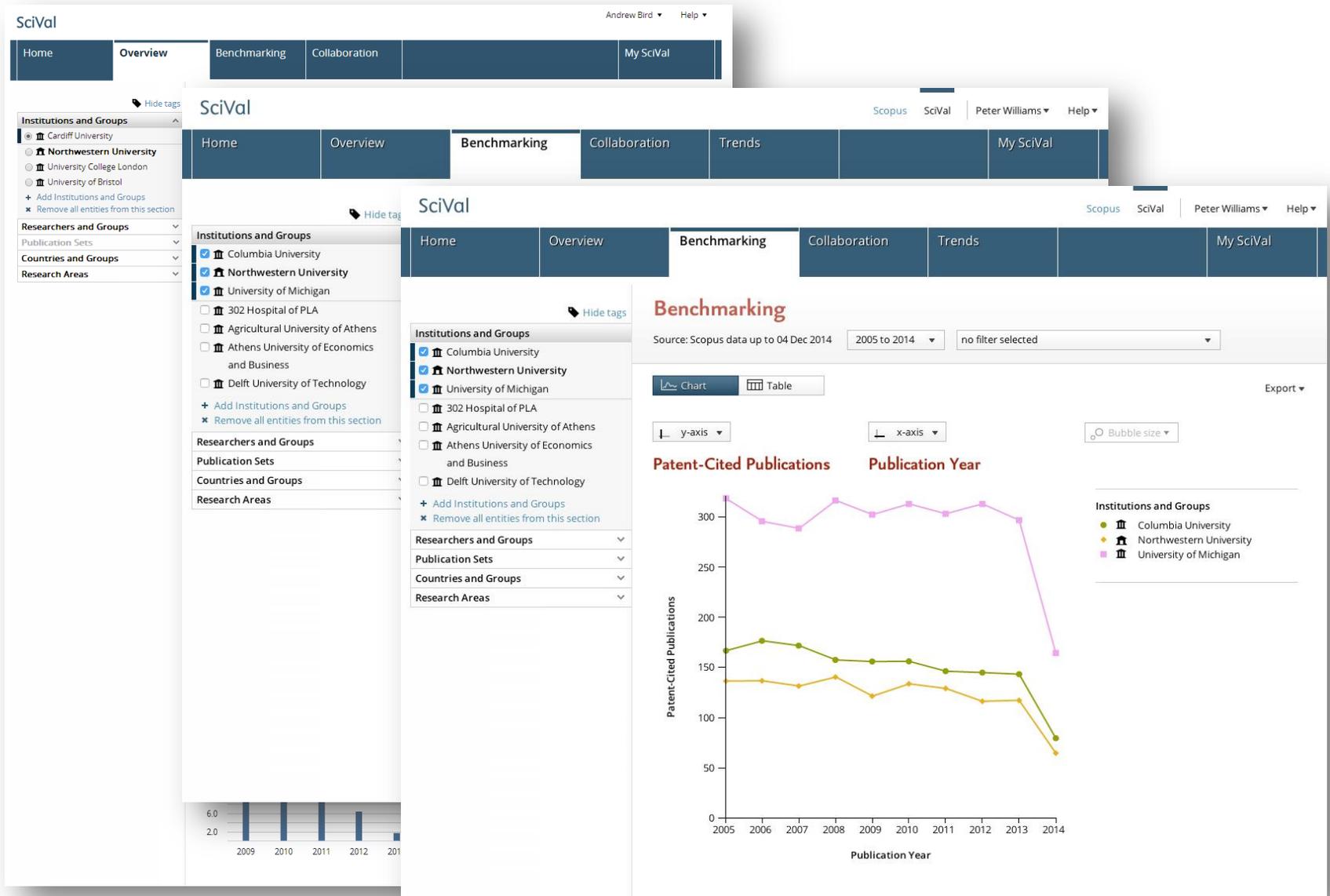
- Awards Volume (number):** A bar chart showing the number of awards for 2010 and 2011. The y-axis ranges from 0 to 700.
- Awards Volume (amount USD):** A line chart showing the amount of awards in USD from 2005 to 2014. The y-axis ranges from 0 to 750M. The legend indicates three institutions: Columbia University (green), Northwestern University (yellow), and University of Michigan (pink).

Year	Awards Volume (number)
2010	~650
2011	~600

Year	Columbia University (USD)	Northwestern University (USD)	University of Michigan (USD)
2005	~350M	~250M	~450M
2006	~400M	~280M	~480M
2007	~420M	~300M	~500M
2008	~420M	~320M	~520M
2009	~420M	~340M	~550M
2010	~450M	~360M	~580M
2011	~480M	~380M	~600M
2012	~500M	~400M	~620M
2013	~520M	~420M	~650M
2014	~400M	~300M	~500M

- Initial launch with selection of funding bodies of research intensive countries
- Can be filtered by subject area

# Societal-economic Impact - Patent Article Citations



# Elsevier acquires Newsflo: capturing the impact of publications beyond citations

- **Newsflo** helps researchers and academic institutions to measure the wider impact of their work by tracking and analyzing media coverage of their publications and findings
- Acquired by Elsevier in January 2015

**newsflo**  
bespoke media monitoring

HOME  
Home

FOR UNIVERSITIES  
For Universities

FOR CHARITIES & NGOS  
For Charities & NGOs

FOR BUSINESSES  
For Businesses

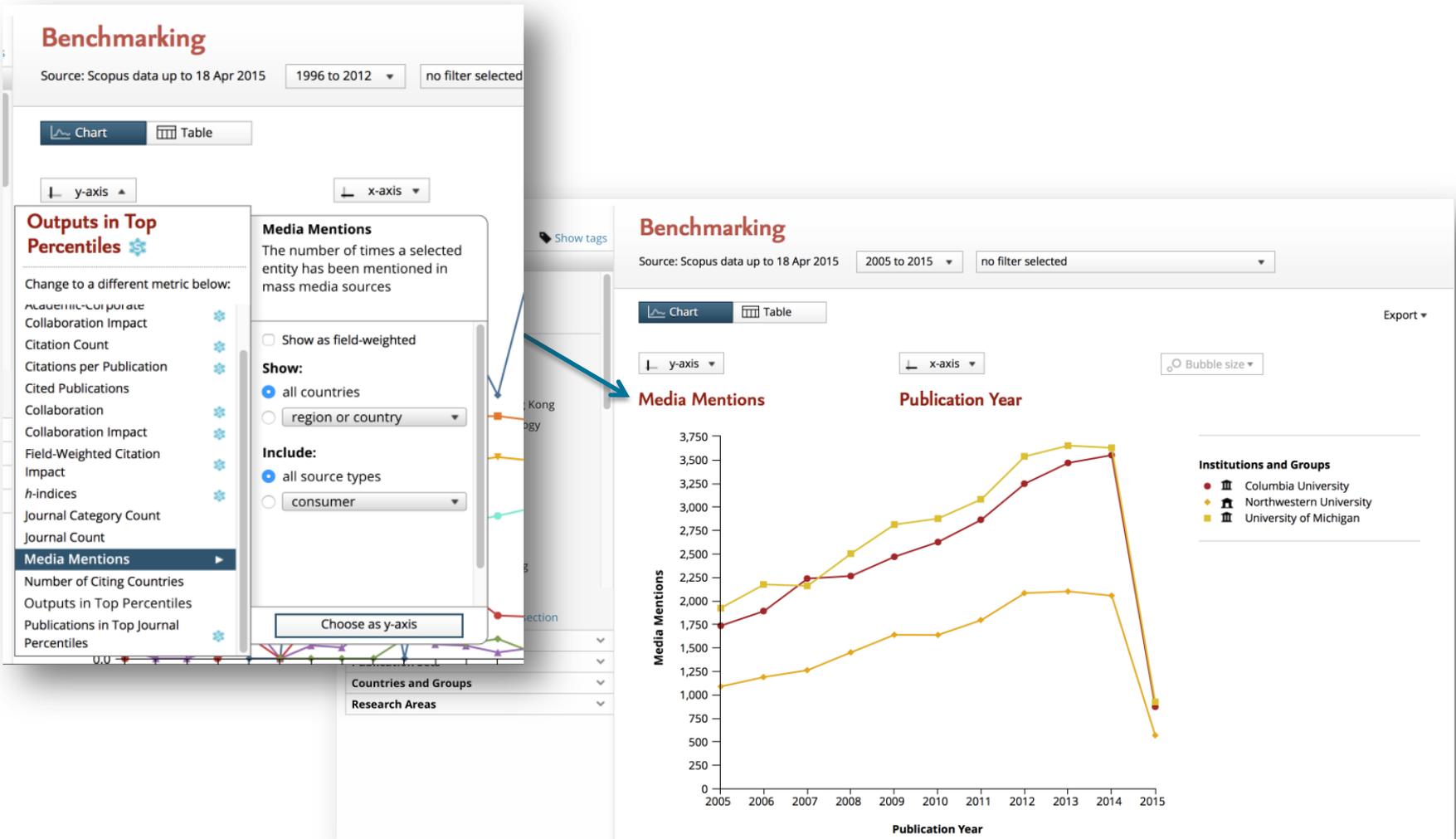
CONTACT  
Contact



## Monitoring made easy

Media monitoring shouldn't be a chore. With newsflo, it's easy to keep track of coverage at all levels of your institution. We offer tailored solutions to ensure that our software perfectly meets your needs, with a wide range of innovative features to make life easier.

# Societal Economic Impact – Mass Media Mentions



# Mendeley Readership Statistics: discovering new insights into the demographics of your audiences

The screenshot displays the Mendeley user interface. At the top, the Mendeley logo is on the left, and navigation links like 'Welcome back', 'My Account', and 'Upgrade' are on the right. Below the logo, there are tabs for 'Dashboard', 'My Library', 'Papers', 'Groups', and 'People'. A search bar is located on the right side of the navigation area. The main content area shows a paper titled 'Cloud Computing' by Shivaji P Mirashe, N V Kalyankar. The paper is categorized under 'Computer and Information Science' and 'Miscellaneous Papers'. There are buttons for 'Save reference to library' and 'Share'. The 'Overview' section provides details about the paper, including its source (Communications of the ACM), volume, issue, publisher, and page count. It also lists the ISSN, ISBN, DOI, PubMed ID, and arXiv ID. A section for 'Readership Statistics' shows that 10,509 readers are on Mendeley, with a breakdown by discipline (98% Computer and Information Science, 1% Engineering, 1% Business Administration), academic status (26% Student (Master), 21% Student (Bachelor), 13% Ph.D. Student), and country (1% United States, 1% Brazil, 0% United Kingdom). The 'Abstract' section begins with the text: 'Computing as you know it is about to change, your applications and documents are going to move from the desktop into the cloud. I'm talking about cloud computing, where applications and files are hosted on a "cloud" consisting of thousands of computers and servers, all linked together and accessible via the Internet. With cloud

**MENDELEY**

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## Cloud Computing

by Shivaji P Mirashe, N V Kalyankar

[Computer and Information Science](#) > [Miscellaneous Papers](#)

[Save reference to library](#) [Share](#) [f](#) [t](#) [e](#) [m](#)

### Overview

Communications of the ACM (2010)  
Volume: 51, Issue: 7, Publisher: ACM, Pages: 9

ISSN: 03621340  
ISBN: 1-58113-199-2  
DOI: 10.1145/358438.349303  
PubMed: 22988693  
arXiv: 1003.4074

Available from [arxiv.org](#)

or

### Readership Statistics

**10509** Readers on Mendeley

by Discipline

- 98% **Computer and Information Science**
- 1% **Engineering**
- 1% **Business Administration**

by Academic Status

- 26% Student (Master)
- 21% Student (Bachelor)
- 13% Ph.D. Student

by Country

- 1% United States
- 1% Brazil
- 0% United Kingdom

### Abstract

Computing as you know it is about to change, your applications and documents are going to move from the desktop into the cloud. I'm talking about cloud computing, where applications and files are hosted on a "cloud" consisting of thousands of computers and servers, all linked together and accessible via the Internet. With cloud

### Tags

# Analyzing America's Knowledge Economy

Elsevier Analytical Services and the Council of State Governments partnered on this report to examine the comparative research strengths of US states.



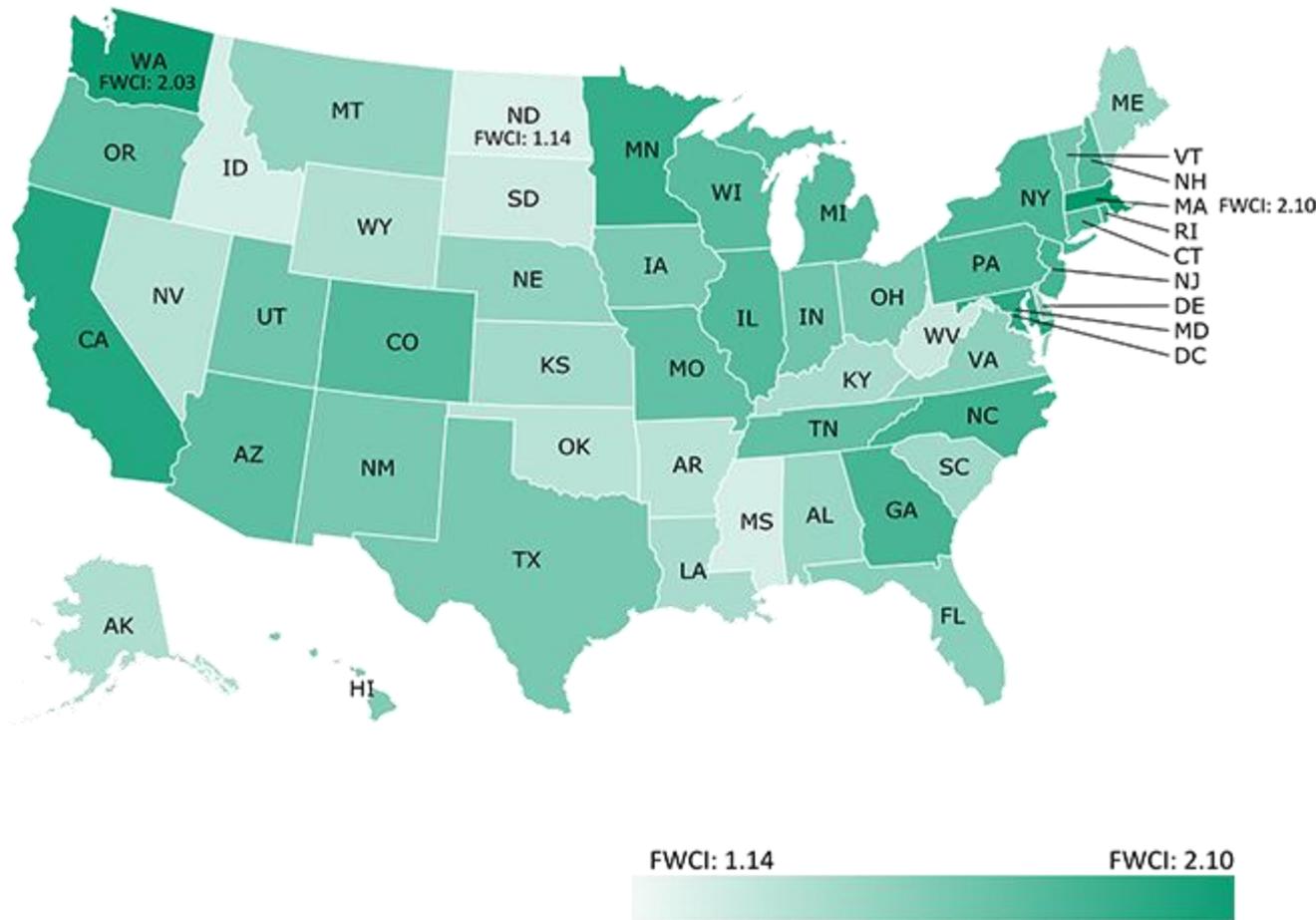
The report, launched in April of this year, outlines a process by which states can identify and showcase their strengths and provides case studies for North Carolina, New York, and Arkansas as examples of the type of information is available for all states.

## AMERICA'S KNOWLEDGE ECONOMY | A STATE-BY-STATE REVIEW

To generate this report, [Elsevier's Analytical Services](#) identified and aggregated research performance data from 2004-2013 for all institutions in each state.

The report draws on a variety of data sources including [Scopus](#), usage metrics from [ScienceDirect](#), R&D expenditure and related data from the [National Science Foundation's Center for Science and Engineering Statistics](#), and patent information from the [US Patent and Trademark Office](#) and the [LexisNexis patent database](#).

# Core Findings



- The production of research is not balanced in the US, but many states produce highly-cited research.
- The combined absolute number of research publications of the top five states (California, New York, Massachusetts, Texas, and Maryland) comprises more than 50% of the total US output.
- The US as a whole produces research that is cited over 49% more than the world average.

Figure 1: The map shows the field-weighted citation impact (FWCI) of research by US states, 2004-2013. The world average is set to 1.0, and states with darker colors produced research that received relatively more citations. On the whole, research from all states received relatively more citations than the world average, with that from Massachusetts and Washington receiving more than twice as many citations than the world average (hence their FWCI being greater than 2).

# America's Knowledge Economy: State-by-State Reviews: Indiana

## 2.23 PUBLICATIONS

PER 1,000 RESIDENTS, 2013

U.S. Average: 1.70 publications per 1,000 residents

## FIELD-WEIGHTED CITATION IMPACT, 2004–13

**1.62** Cited 62% more than global average

### COMPARATIVE ADVANTAGE IN RESEARCH

**ENERGY** Ranked 8<sup>th</sup> among all states in terms of research impact and cited 30% more than the U.S. average.

**ILLINOIS** | TOP COLLABORATING STATE, 2004–13

8,434 collaborations (6.5% of all of Indiana's publications)

### RESEARCH FROM CORPORATE SECTOR, 2004–13

**7.2%** of Indiana's total research output is from its corporate sector, the 6<sup>th</sup> highest rate among all states.

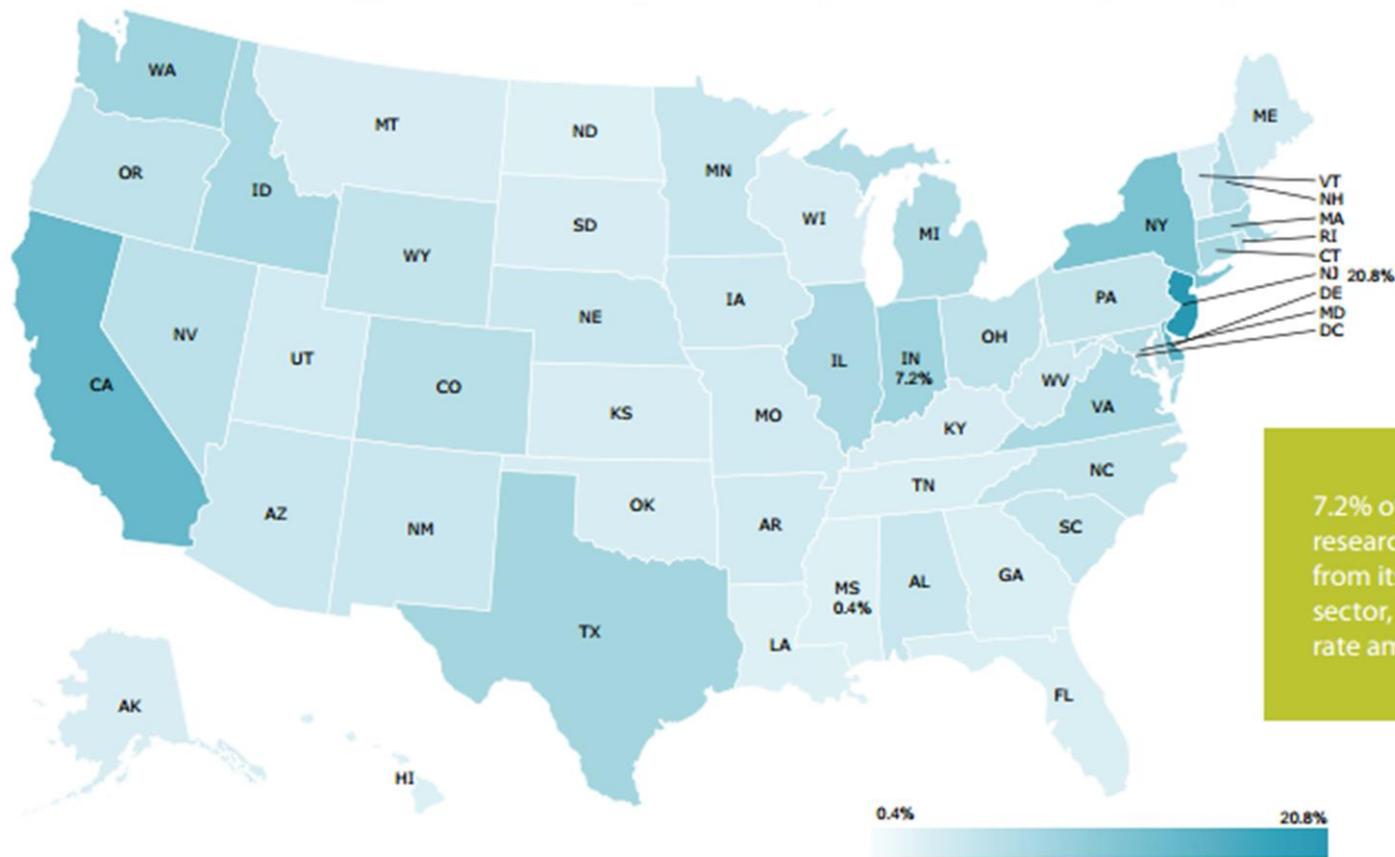
### RESEARCH STRENGTH IN CHEMICAL ENGINEERING

**8<sup>th</sup> among all states in terms of relative impact of research in chemical engineering, cited 9% more than the U.S. average.**



# America's Knowledge Economy: State-by-State Reviews: Indiana

Percentage of total state output from corporate institutions (2004–13)

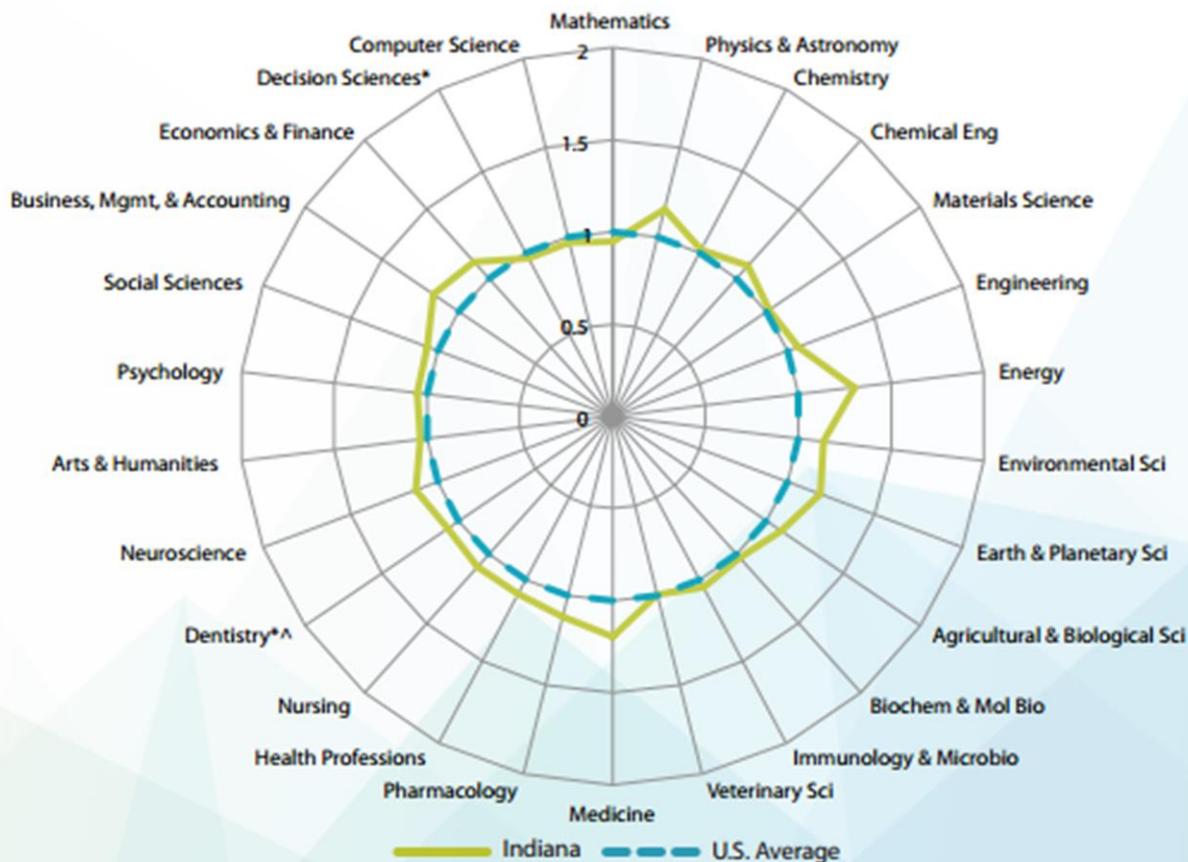


7.2% of Indiana's total research output is from its corporate sector, the 6<sup>th</sup> highest rate among all states.

Source: Scopus®

# America's Knowledge Economy: State-by-State Reviews: Indiana

Impact Across Research Fields, 2004-13



Indiana's research in energy is cited 30% more than the U.S. average.

\* and ^ indicate the state did not produce more than 100 publications in that research field for 2004 or 2013, respectively.  
 Source: Scopus®

# America's Knowledge Economy: State-by-State Reviews: California

**2.39 PUBLICATIONS**

**PER 1,000 RESIDENTS, 2013**

U.S. Average: 1.70 publications per 1,000 residents

**FIELD-WEIGHTED CITATION  
IMPACT, 2004–13**

**1.94** Cited 94% more than  
global average

**MOST IMPACTFUL RESEARCH FIELD**

**COMPUTER SCIENCE**

**Ranked 2<sup>nd</sup> among all states in terms of research impact**  
and cited 33% more than the U.S. average.

**MASSACHUSETTS**

**TOP COLLABORATING  
STATE, 2004–13**

53,148 collaborations (6.4% of all of California's publications)

**CRITICAL MASS OF RESEARCH AND INNOVATION, 2004–13**

**California researchers and inventors account for 17% of all  
U.S. research publications and 25.1% of all U.S. patents granted.**

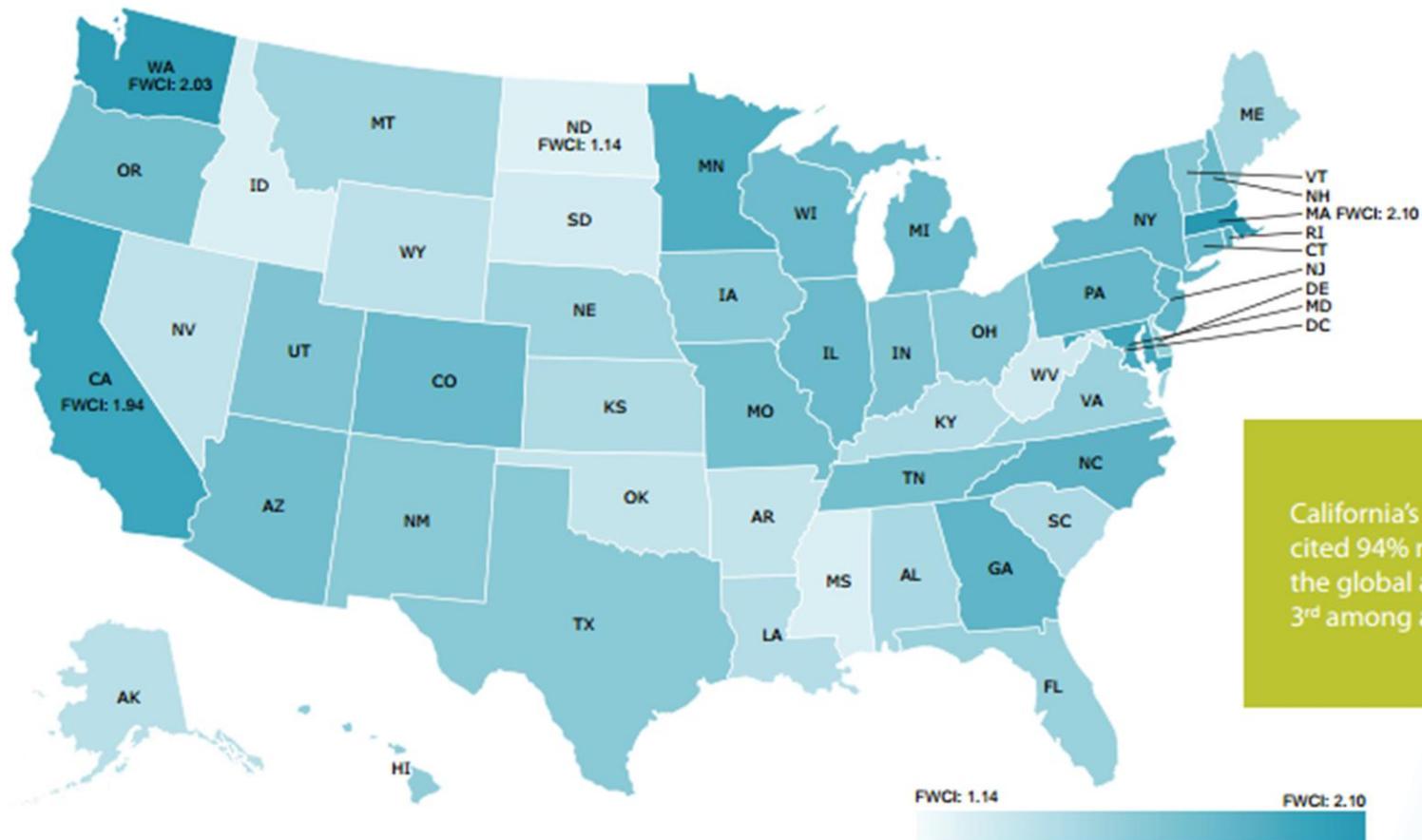
**RESEARCH STRENGTHS IN PHYSICAL SCIENCES AND ENGINEERING, 2004–13**

**1<sup>st</sup> among all states in relative impact of research in chemistry, materials science,  
and engineering 2<sup>nd</sup> among all states in relative impact of research in mathematics  
and chemical engineering.**



# America's Knowledge Economy: State-by-State Reviews: California

Field-weighted citation impact (FWCI) for U.S. States (2004–13)

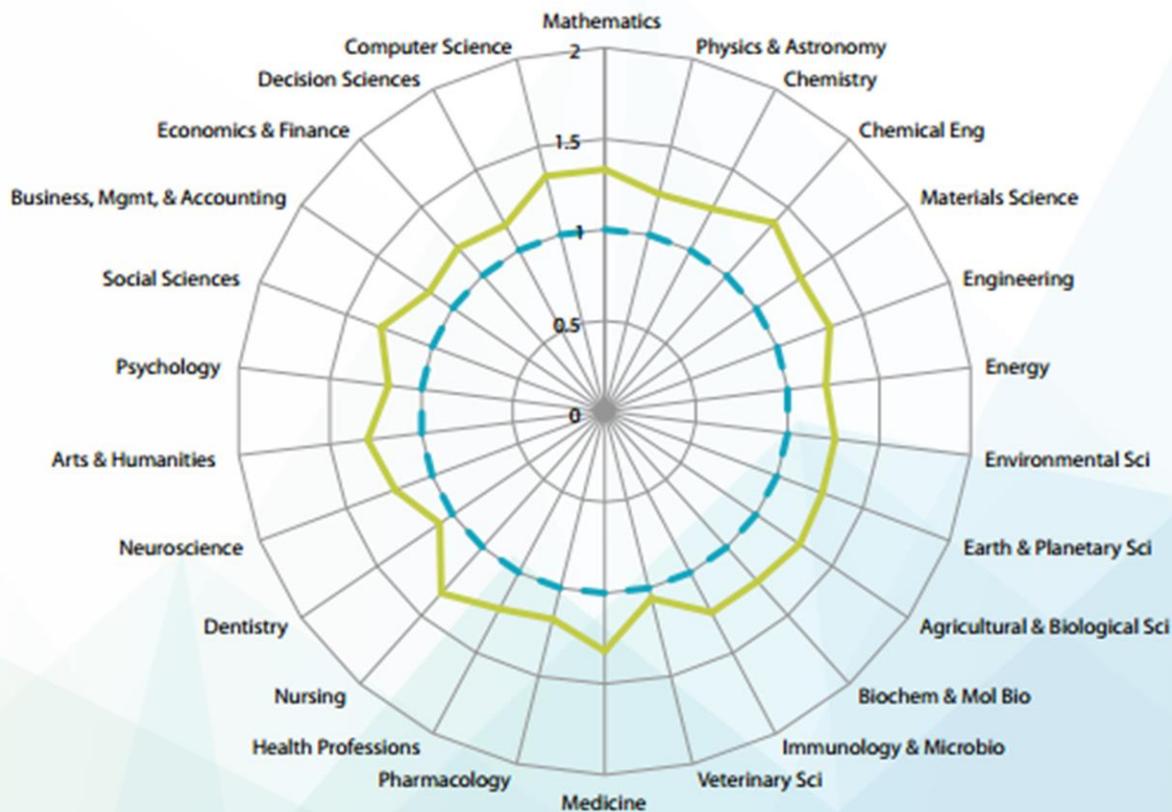


California's research is cited 94% more than the global average, 3<sup>rd</sup> among all states

Source: Scopus®

# America's Knowledge Economy: State-by-State Reviews: California

Impact Across Research Fields, 2004–13



The field-weighted citation impact of California's research is above the U.S. average in all areas

Source: Scopus®

— California — U.S. Average

# America's Knowledge Economy: State-by-State Reviews: Ohio, Michigan, Virginia

## 2.28 PUBLICATIONS

PER 1,000 RESIDENTS, 2013  
U.S. Average: 1.70 publications per 1,000 residents

## FIELD-WEIGHTED CITATION IMPACT, 2004-2013

**1.55** Cited 55% more than global average

### COMPARATIVE ADVANTAGE IN RESEARCH

**MEDICINE** Cited **19% more** than the U.S. average.



### MICHIGAN | TOP COLLABORATING STATE, 2004-2013

11,576 collaborations from 2004-2013 (5.0% of all of Ohio's publications)

### RESEARCH FROM MEDICAL SECTOR, 2004-2013

**16.2%** of Ohio's total research output is from its medical sector, the 2<sup>nd</sup> highest rate among all states.

### RELATIVE VOLUME IN MATERIALS SCIENCE 2004-2013

**4<sup>TH</sup> AMONG ALL STATES** Ohio produces **33% more** publications in materials science than its total research volume would suggest.

## 2.43 PUBLICATIONS

PER 1,000 RESIDENTS, 2013  
U.S. Average: 1.70 publications per 1,000 residents

## FIELD-WEIGHTED CITATION IMPACT, 2004-2013

**1.70** Cited 70% more than global average

### MOST IMPACTFUL RESEARCH FIELD

**ENERGY** Ranked **6<sup>th</sup>** among all states in terms of research impact and cited **37% more** than the U.S. average.



### CALIFORNIA | TOP COLLABORATING STATE, 2004-2013

23,795 collaborations (11.4% of all of Michigan's publications)

## 4<sup>TH</sup> AMONG ALL STATES

Growth in publications per capita, 2004-2013

### RESEARCH FROM MEDICAL SECTOR, 2004-2013

**7.3%** of Michigan's total research output is from its medical sector, the 6<sup>th</sup> highest rate among all states.

## 2.34 PUBLICATIONS

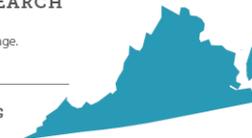
PER 1,000 RESIDENTS, 2013  
U.S. Average: 1.70 publications per 1,000 residents

## FIELD-WEIGHTED CITATION IMPACT, 2004-2013

**1.48** Cited 48% more than global average

### COMPARATIVE ADVANTAGE IN RESEARCH

**MEDICINE** Cited **11% more** than the U.S. average.



### MARYLAND | TOP COLLABORATING STATE, 2004-2013

15,244 collaborations from 2004-2013 (8.7% of all of Virginia's publications)

### RESEARCH FROM MEDICAL SECTOR, 2004-2013

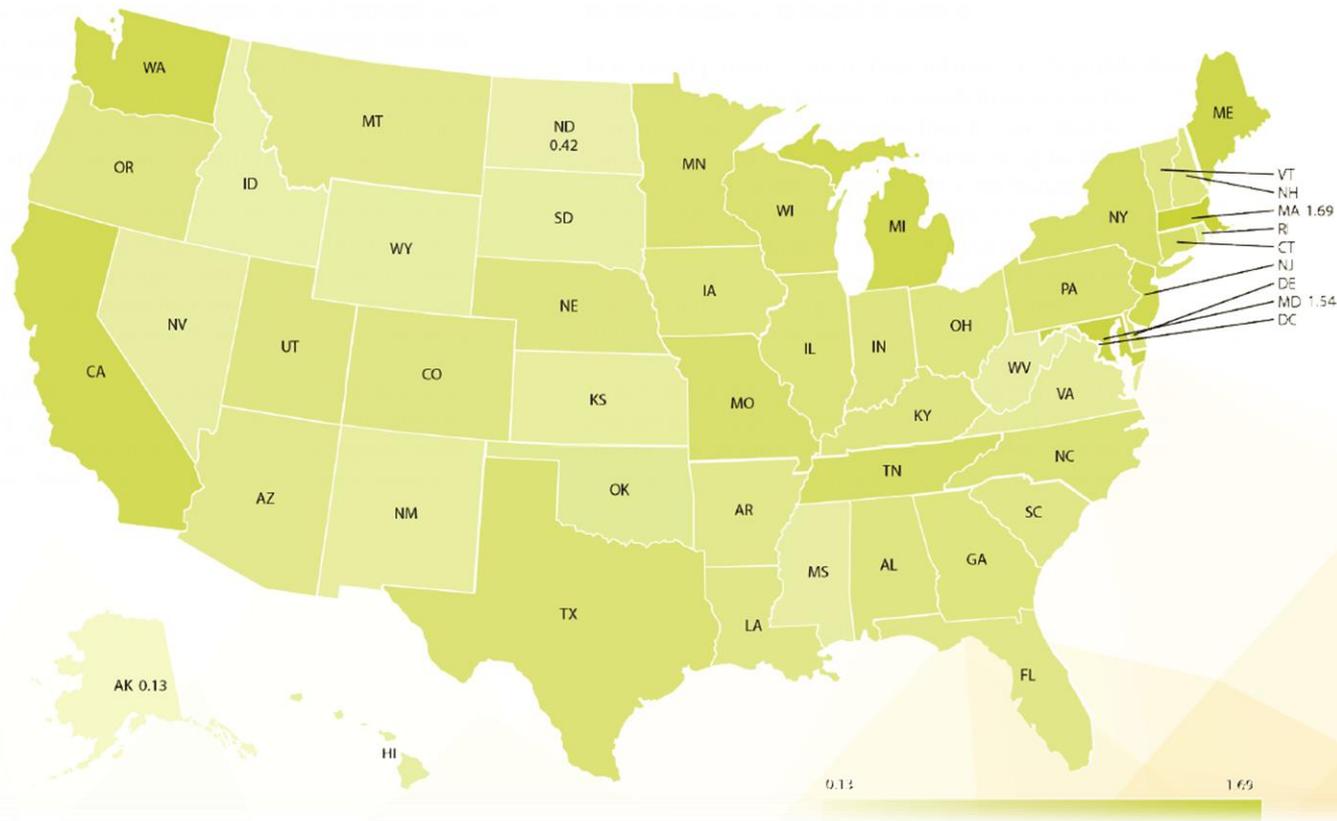
**16.7%** of Virginia's total research output is from its government sector, the 5<sup>th</sup> highest rate among all states.

### RESEARCH FROM CORPORATE SECTOR, 2004-2013

**6.3%** of Virginia's total research output is from its corporate sector, the 10<sup>th</sup> highest rate among all states.

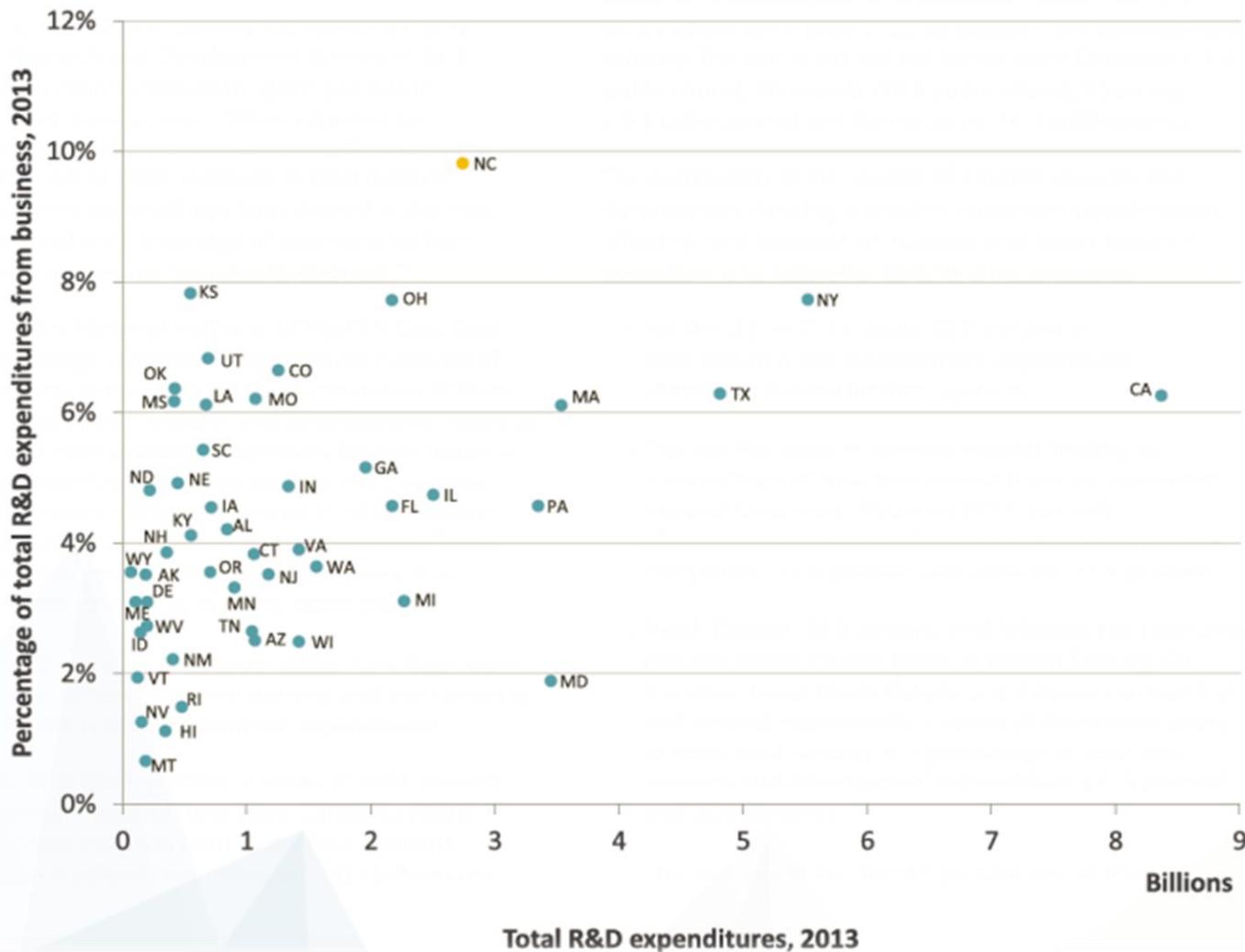
# Patent Citations: Analyzing the commercialization of research

**Figure 4.5**—Ratio of National Patent Citation Share to National Publication Share across all States, 2004–2012.  
 Source: LexisNexis® patent database and Scopus®



# Business involvement in R&D

**Figure 3.2**— Percentage of Total Research and Development Expenditures from Business Versus Total Research and Development Expenditures Across All States, 2013. Source: NSF Higher Education Research and Development Survey



# Collaboration Metrics in *Sustainability Science in a Global Landscape*



## The Panelists

- Luisa Massarani, PhD, science journalist; researcher at the Museum of Life in Rio de Janeiro; Regional Coordinator for Latin America and the Caribbean, SciDev.Net
- Robert Lee Hotz, Science Writer, The Wall Street Journal (Moderator)
- Takako Izumi, PhD, Associate Professor at the International Research Institute of Disaster Science, Tohoku University, Japan
- Romain Murenzi, PhD, Executive Director, The World Academy of Sciences (TWAS)
- Alexander Zehnder, PhD, Scientific Director, Water Resources, Alberta Innovates – Energy and Environment Solutions (AI-EES), Edmonton, Canada; Founder and Director, Triple Z Ltd; Visiting Professor, Nanyang Technological University, Singapore
- Richard Horton, FRCP, FMedSci, Editor-in-Chief, The Lancet

# Sustainability Science: Key Findings

The good news:

- Research on sustainability has grown almost twice as fast as research overall each year between 2009 and 2013: **7.6%** compared to an annual growth rate for all published research of 3.9%).
- Sustainability research also receives **30% more** citations than an average research paper

What we need to work on:

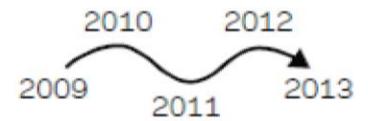
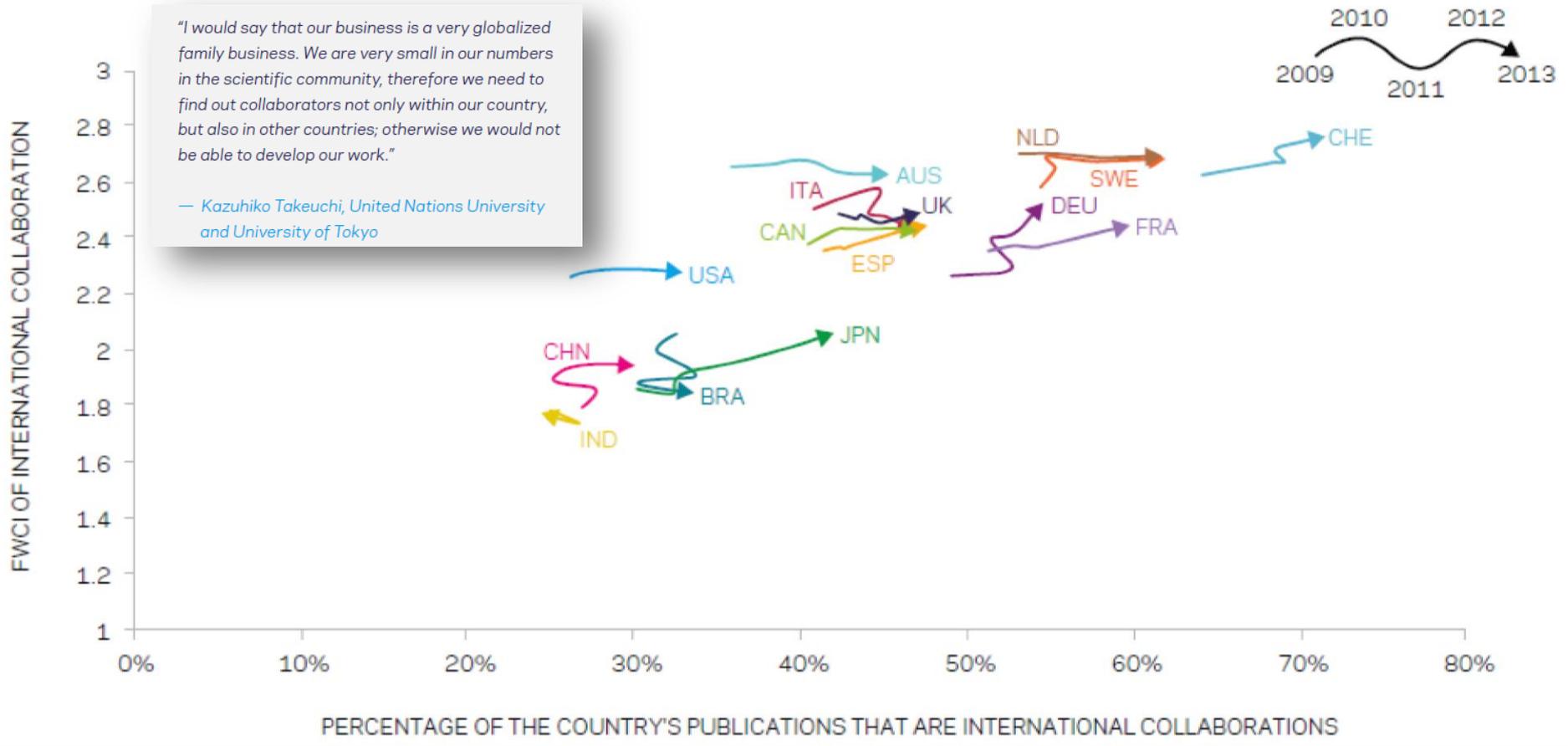
- Despite the strong interest in and reception of sustainability science, **the level of interdisciplinary research is below world average**
- Low-income countries contribute **no more than 2%** of the research output in sustainability science compared to 76% contributed by high-income countries.



# Sustainability Science: internationally collaborative

"I would say that our business is a very globalized family business. We are very small in our numbers in the scientific community, therefore we need to find out collaborators not only within our country, but also in other countries; otherwise we would not be able to develop our work."

— Kazuhiko Takeuchi, United Nations University and University of Tokyo



# Analytics on gender in research and publishing

*Elsevier is committed to applying our high quality data sources and technical and bibliometric expertise to provide an evidence-based examination of the outputs, quality, and impact of research through a gender lens as well as an understanding of where women fit in the structure of science and research.*

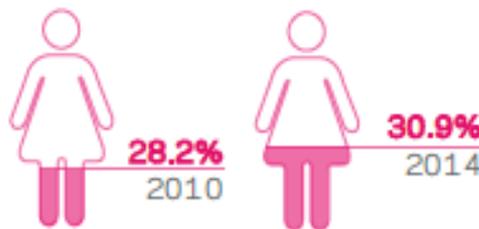
- **Gender in the German Research Arena:** Elsevier Analytics Report pilots gender methodology matching Facebook to Scopus in past 5 years with 85% accuracy. Presentation at European Gender Summit: Nov 6-7<sup>th</sup>
- **Global Gender report 2016** Analytics committed to developing a comprehensive gender in research analytics study and produce a publicly available report next year.

## MAPPING GENDER

A case study of the German research arena

### Distribution of female researchers

The number and proportion of female researchers in Germany is increasing.

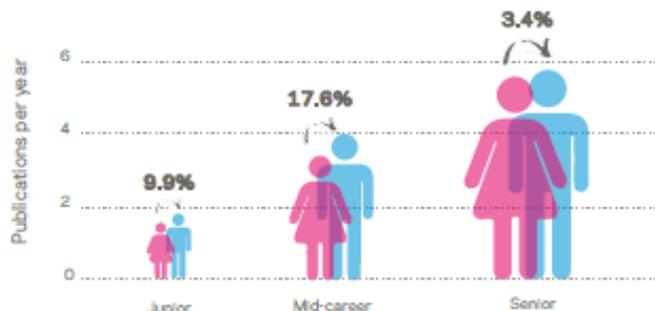


In general, Agriculture, Medicine, and Health related subject areas have the highest share of female researchers.

Subject areas in the Natural Sciences and Engineering have the lowest shares.

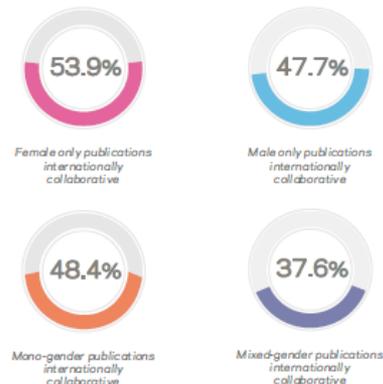
### Research productivity

The differences between publication productivity and citation impact between female and male researchers in Germany are smaller for more senior researchers.



### International collaboration

For Germany, female-only publications are the most internationally collaborative. Mixed-gender publications are more interdisciplinary but less internationally collaborative than mono-gender publications.



Elsevier Research Intelligence

**Thank You**

[www.elsevier.com/research-intelligence](http://www.elsevier.com/research-intelligence)

