

Elsevier Research Intelligence

Research Data and Analysis: Focus on Economic Development Metrics

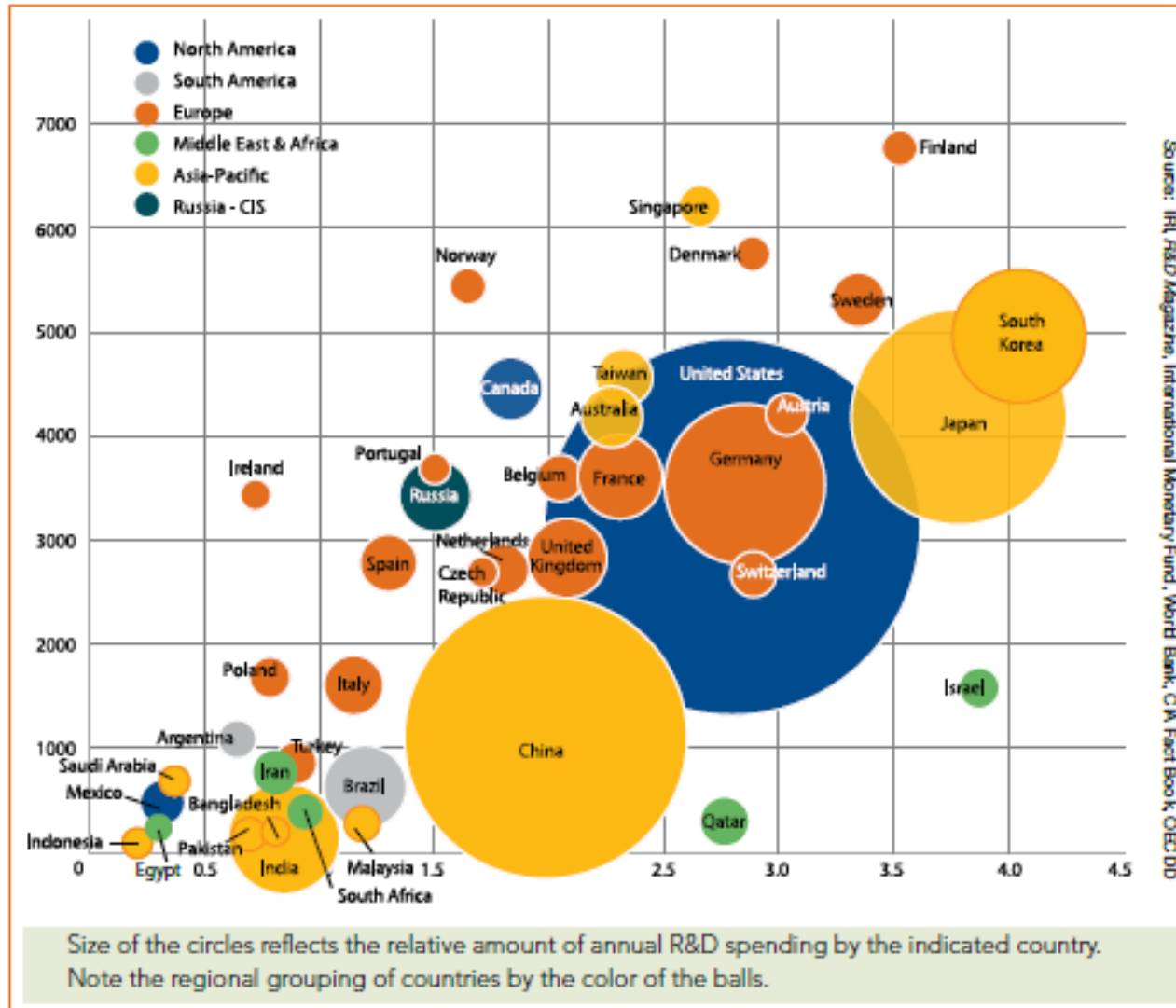
University-Industry Demonstration Partnership
6 October 2016

Daniel Calto
Director of Solution Services
Research Intelligence, Elsevier

Grand Challenges Are Multidisciplinary and Global



2015 Global R&D Expenditures

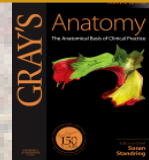


- The world as a whole spent over \$1.88T in R&D in 2015
- In 2015 South Korea spent \$74B, 4.0% of its GDP, on R&D. It now spends more than any EU country except Germany, with a much smaller population
- India's investments in R&D were the sixth-highest globally. Three years ago they were the tenth-highest spender.
- US R&D spending in 2015 was up 2.3% over the prior year to \$497B, while China's spending rose 7.7% to \$372B

Elsevier – A Unique Vantage Point on the Global World of Research

Elsevier – From publisher to solution provider

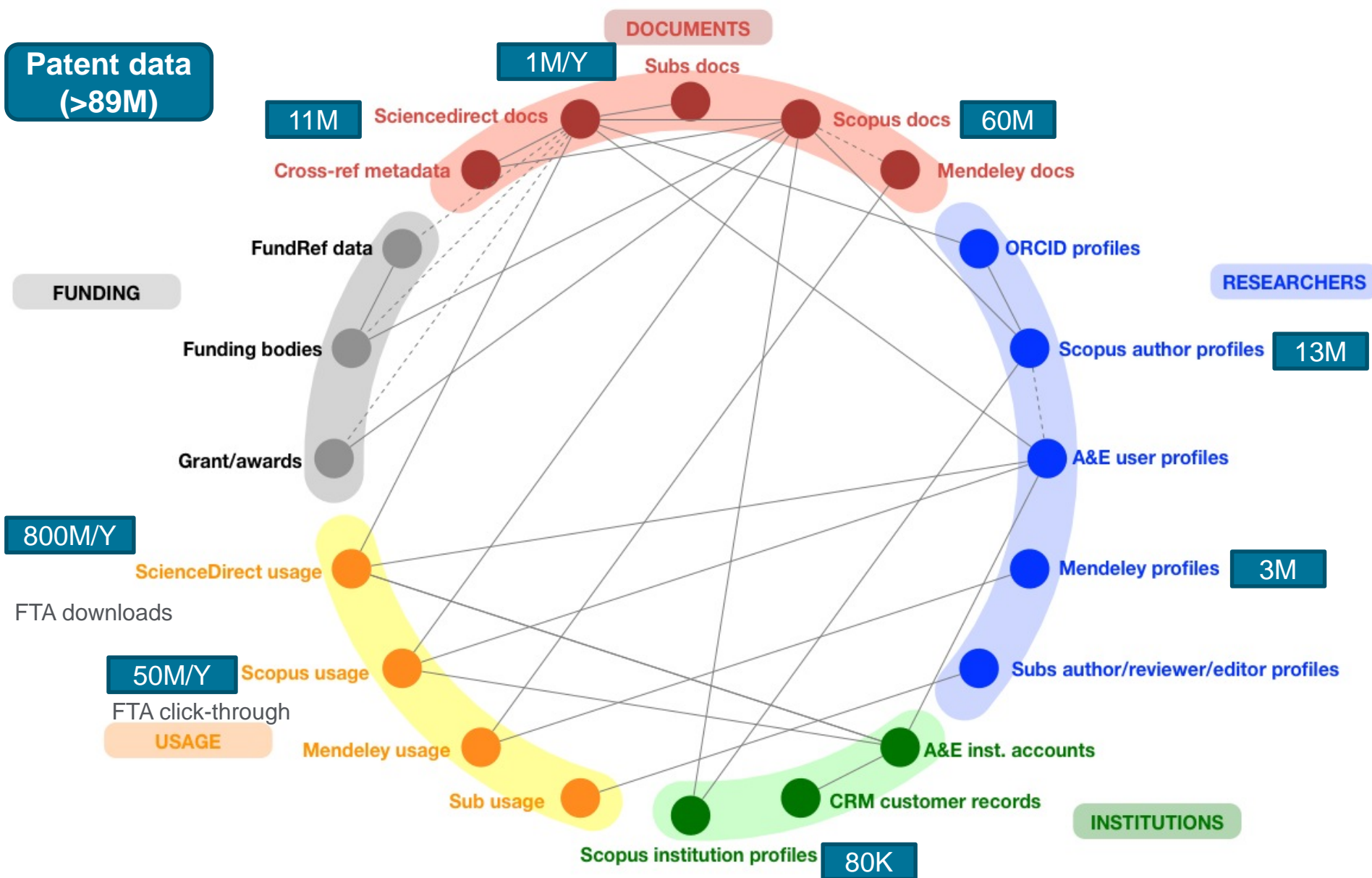
- Serving 30 million+ scientists, students, health and information professionals in 180+ countries
- 2,500 E-journals, 2,000 E-books published each year, dozens of research databases
- RELX (Reed Elsevier), the largest digital company in Europe



Each year

- 1.2 million manuscripts submitted to 2,500+ Elsevier journals
- 300,000+ articles published
- 800 million digital article downloads delivered
- 22,000+ journals, >2 million articles per year tracked by Scopus (>60M articles in total)
- Terabytes of data in Elsevier Research Intelligence suite

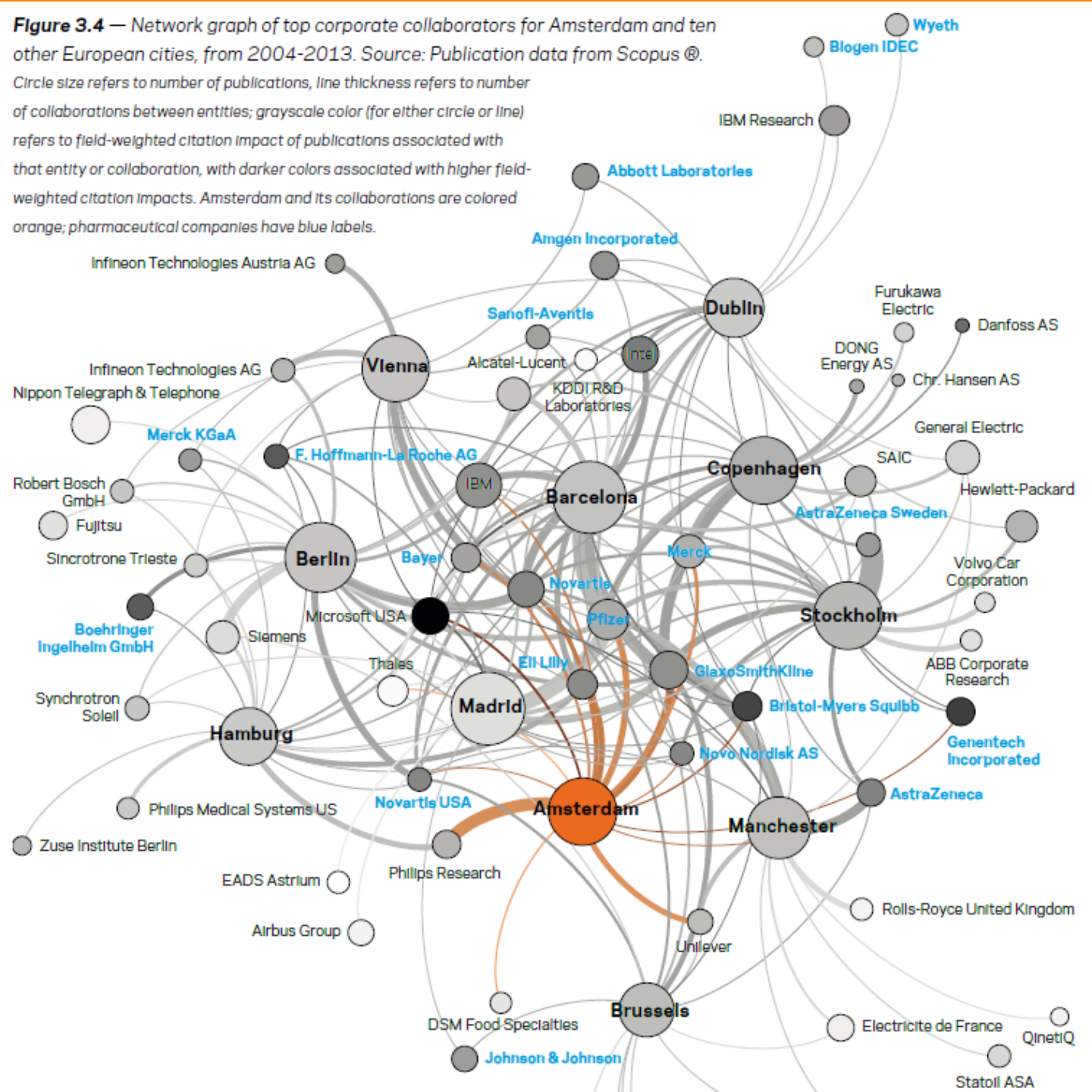
What Data Do We Bring to the Table?



Amsterdam as Knowledge Hub vs. 10 Comparator Cities

- All pubs from Amsterdam and 10 other metro-area universities co-authored with industry
- Initial analysis showed Amsterdam has comparative advantage vs. peers in biomedical research in terms of overall field-weighted citation impact
- Research Q: How are Amsterdam and peer cities connected to major life sciences and other firms?

Figure 3.4 — Network graph of top corporate collaborators for Amsterdam and ten other European cities, from 2004-2013. Source: Publication data from Scopus ®. Circle size refers to number of publications, line thickness refers to number of collaborations between entities; grayscale color (for either circle or line) refers to field-weighted citation impact of publications associated with that entity or collaboration, with darker colors associated with higher field-weighted citation impacts. Amsterdam and its collaborations are colored orange; pharmaceutical companies have blue labels.



Evaluating UK Research Performance: BIS Report



See: <https://www.gov.uk/government/publications/performance-of-the-uk-research-base-international-comparison-2013>



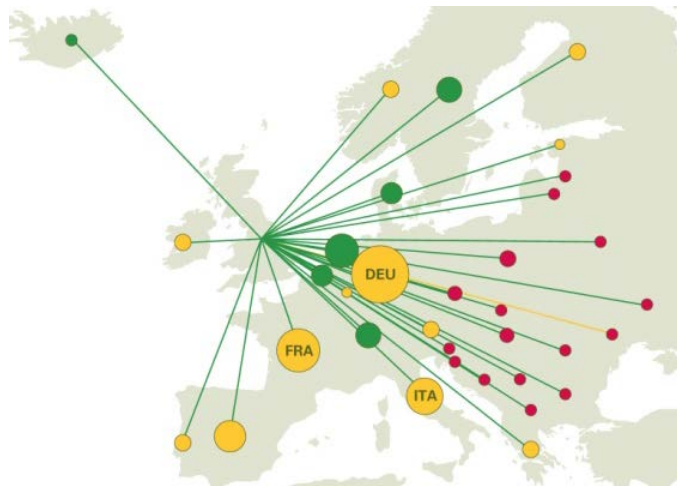
BIS Report: Quantitative Inputs

Data

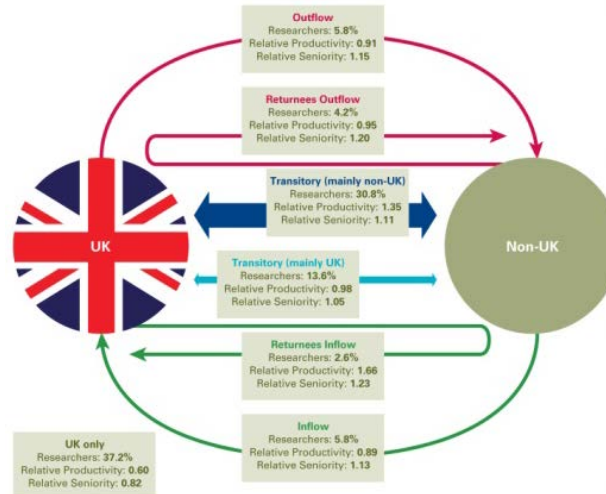
- Scopus
 - ScienceDirect usage
 - OECD
 - HESA
 - WIPO
 - AUTM
 - HEFCE
- 112 database tables, 2.3 Gigabytes
 - 20MM+ articles, 200MM+ citations, 3B downloads
 - 45MM indicator values
 - Largest indicator: 6MM+ values

Analyses

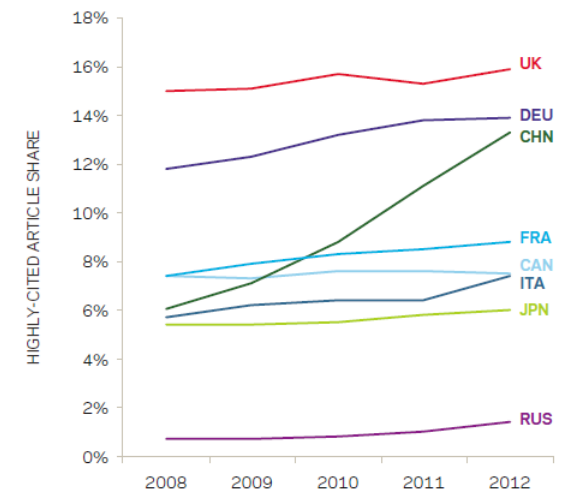
Collaboration networks



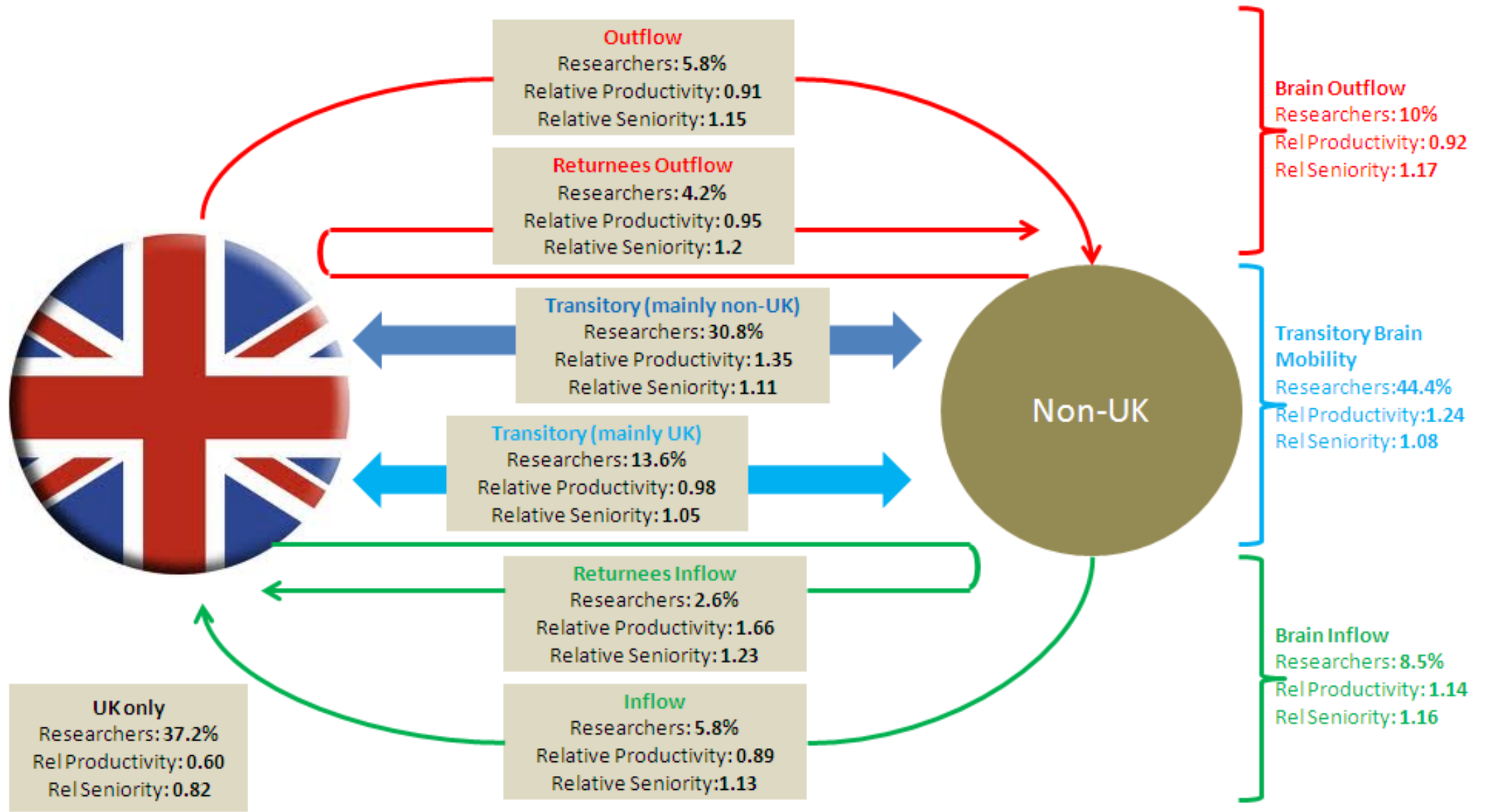
Brain Circulation



Highly-Cited Articles (ex. US)



Monitoring brain circulation—UK map



Returnee Researcher = 2 or more years abroad
 Transitory Researcher = 2 or more years abroad

City Portal – Comparative Analysis of Top 50 Global Research Cities

ERI Analytics City Data Portal ^{Cities}

- 1. City Overview
 - Boston
 - Overview
 - Top institutions
 - Top collaborating cities
 - City to City Connections
 - City to Corporate Connections
- 2. Research Performance
- 3. Research Collaboration
- 4. Innovation
- 5. Human Capital
- 6. Demographics & Area
- 7. GDP & Productivity

Boston

Research Performance
Publications per 100 persons, 2014
1.1813

Human Capital
Active researchers 2010-2014
360,186

Collaboration with other cities 2010-2014

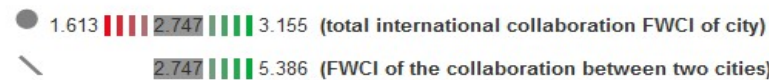


Demographics
Population 2014
3,684,250

Innovation
Country patent application share 2008 (%)
5.08

GDP & Productivity
GDP per capita 2013 (\$)
84,732

[show city definition](#)



Color is determined by the Field-Weighted Citation Impact, scaling from red (lowest FWCI) to green (highest FWCI).
The mid point (grey) is determined by the currently selected overview city's FWCI value.

Traditional Impact Metrics – Citation and Publication Metrics

Harvard University

2nd (QS) · 6th (THE) · 1st (ARWU) | United States | [More details on this Institution](#)

[View data sources](#) | 2011 to 2015 | no subject area filter selected | [ASJC](#)

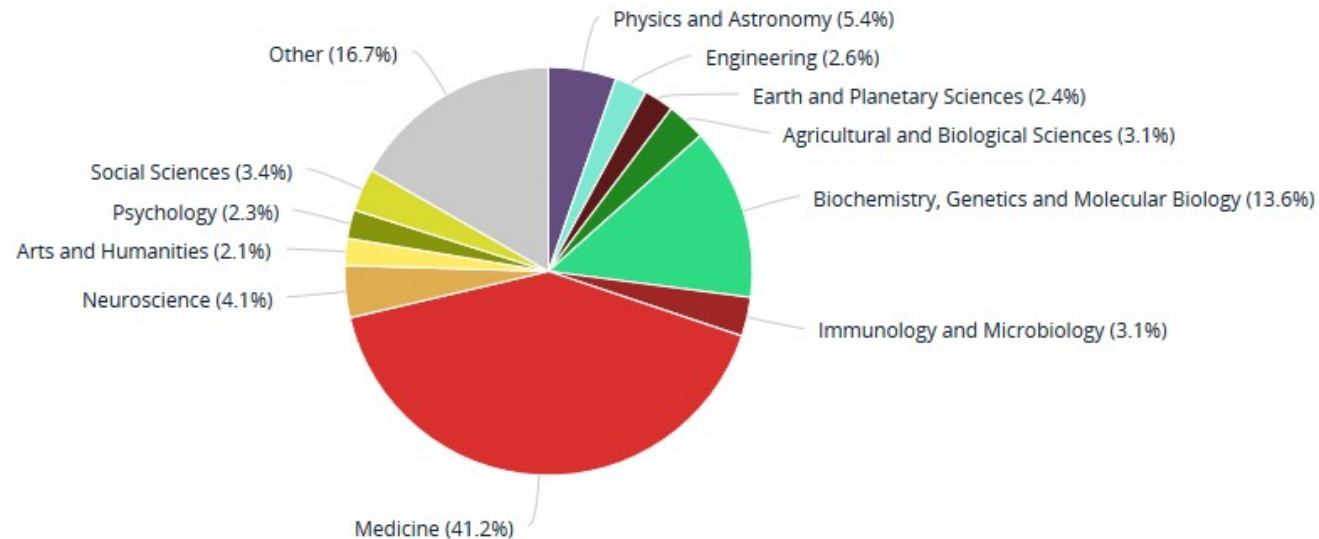
- Summary
- Collaboration
- Published
- Viewed
- Cited
- Economic Impact
- Authors
- Competencies

Overall research performance

[Download page as PDF](#) | [Export](#)

Publications	Citations	Authors	Field-Weighted Citation Impact	Citations per Publication
130,916 ▲	2,070,452	71,119 ▲	2.39	15.8

[View list of publications](#)



Institutional Collaboration Patterns: Harvard Global Co-Authorship Network

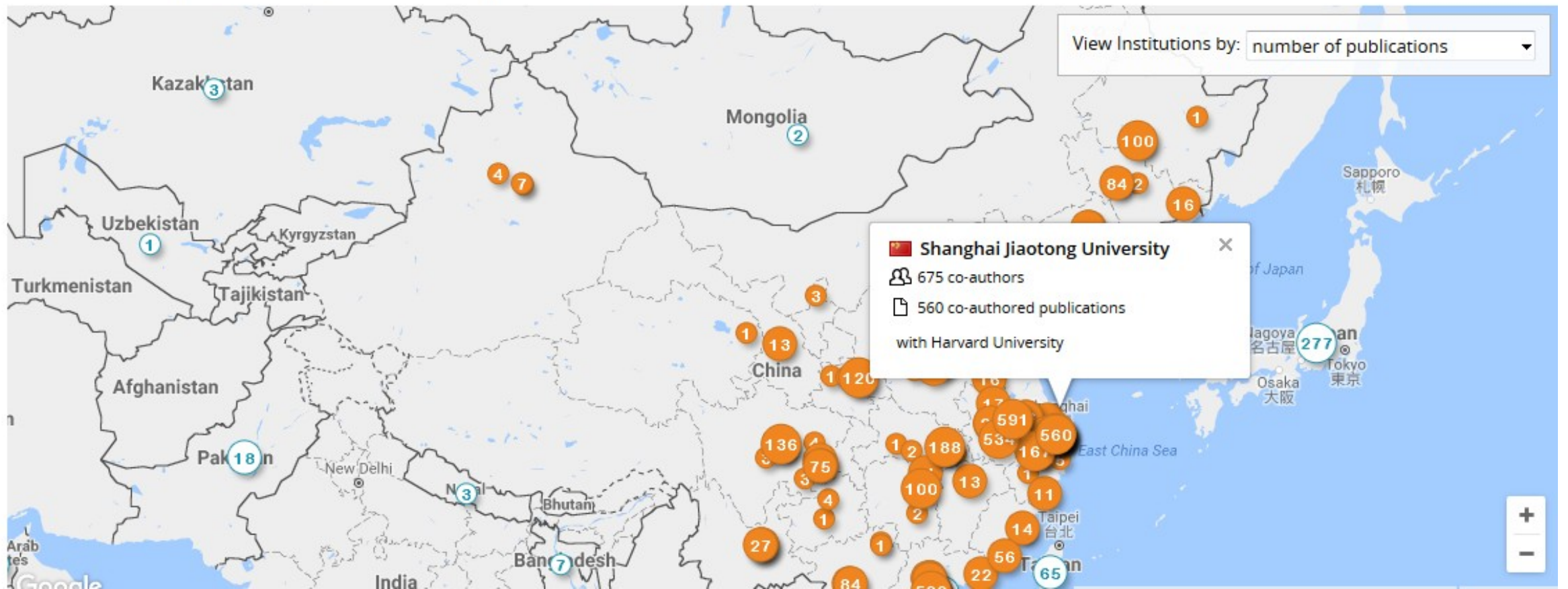
Map Table
Export ▾ Shortcuts ▾

Institutions collaborating with Harvard University

Asia Pacific ▾
China ▾
All sectors ▾

← Filter for more (regional) detail or filter by field at the top of the page

🏠 339 collaborating Institutions
📄 5,171 co-authored publications



Institutional Collaboration Patterns: Harvard Global Co-Authorship Network

Collaboration with Shanghai Jiaotong University

Year range: 2011 to 2015

Export ▾ Shortcuts ▾



- Overview**
- Current co-authors
- Potential co-authors

Harvard University

865 ▲

co-authors with Shanghai Jiaotong University

2.39

Field-Weighted Citation Impact

Co-authored

560 ▲

publications

6.41

Field-Weighted Citation Impact

Shanghai Jiaotong University

675 ▲

co-authors with Harvard University

1.12

Field-Weighted Citation Impact

Authors	71,119 ▲	-	48,844 ▲
Scholarly Output	130,916 ▲	-	57,093 ▲
Views count (from Scopus)	2,095,086	41,577	777,491
Field-Weighted Views Impact	1.32	8.01	1.01
Citation Count	2,070,452	21,642	338,170

Show all

Co-authored publications by Subject Area

- Pie chart
- Bar chart

Custom Research Areas--Usage Data – Heat Map of Abstract Downloads by Originating Institution

SciVal Scopus SciVal Dan

Home Overview Benchmarking Collaboration Trends My S

Hide tags

- Institutions and Groups
- Researchers and Groups
- Publication Sets
- Countries and Groups
- Research Areas**
 - Cardiomyopathy**
 - + Add Research Areas
 - * Remove all entities from this section

Cardiomyopathy

Source: Scopus data up to 21 Sep 2015 2010 to >2015 no filter selected

Summary **Institutions** Countries Authors Journals Keyphrases

Top Institutions

Map Table Chart

Top 100 Institutions in this Research Area, by Scholarly Output

Worldwide All sectors ← Filter for more (regional) detail

Size: Outputs in Top Percentiles total value Color: Views Count total value

Economic Impact and Collaboration Metrics – University-Industry Co-Authorship

Institutions collaborating with Harvard University

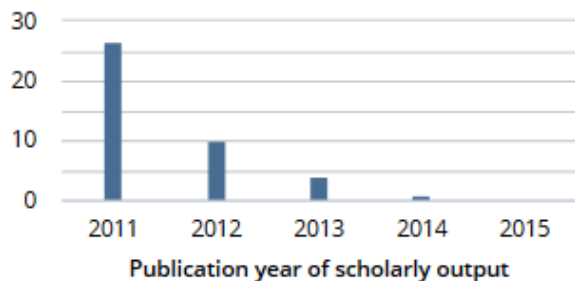
Worldwide | [reset filter](#)

272 collaborating Institutions 4,925 co-authored publications

Institution	Co-authored publications	Co-authors at Harvard University	Co-authors at the other Institution	Field-Weighted C...	Field-Weighted View...
GlaxoSmithKline	284	649	492	8.80	3.36
Novartis USA	283	887	491	5.73	2.10
Pfizer	281	632	510	7.08	2.42
RAND	272	214	164	2.59	1.45
Novartis	237	618	514	7.17	3.01
Merck	230	607	413	5.92	2.66
New England Research Institutes	192	195	82	3.52	1.33
Eli Lilly	176	352	223	7.90	2.79
Genentech Incorporated	172	405	207	13.23	5.00
AstraZeneca	137	224	220	7.00	2.68
Amgen Incorporated	125	322	189	8.24	3.04
Microsoft USA	125	177	122	2.85	0.88

Economic Impact Metrics--Patent Citations per 1000 publications by Institution

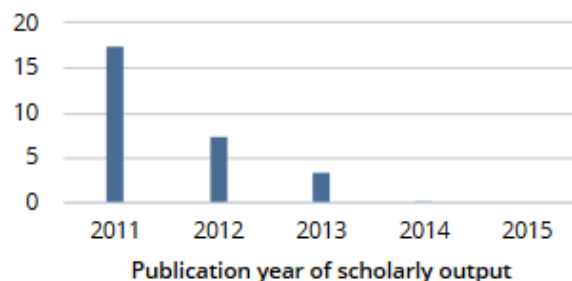
Patent-Citations per Scholarly Output



8.4

average patent-citations received per 1,000 scholarly outputs published by National Taiwan University

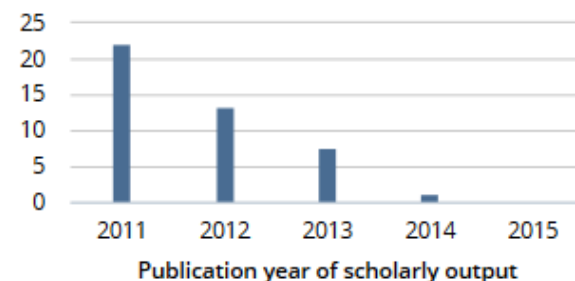
Patent-Citations per Scholarly Output



5.2

average patent-citations received per 1,000 scholarly outputs published by Tsinghua University

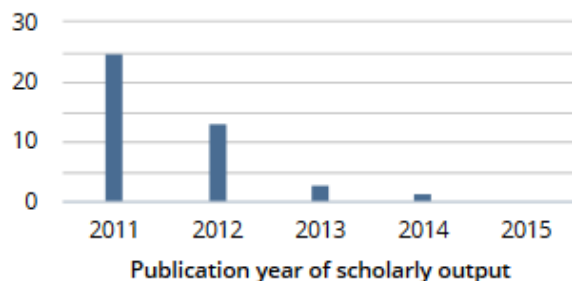
Patent-Citations per Scholarly Output



8.5

average patent-citations received per 1,000 scholarly outputs published by Nanyang Technological University

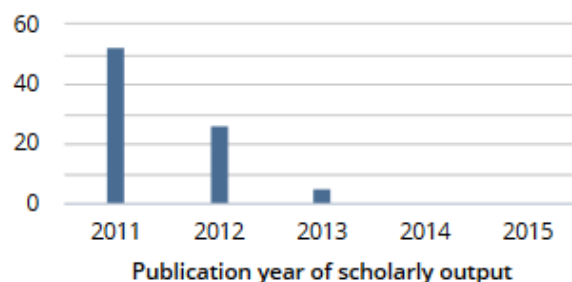
Patent-Citations per Scholarly Output



8.5

average patent-citations received per 1,000 scholarly outputs published by the University of Tokyo

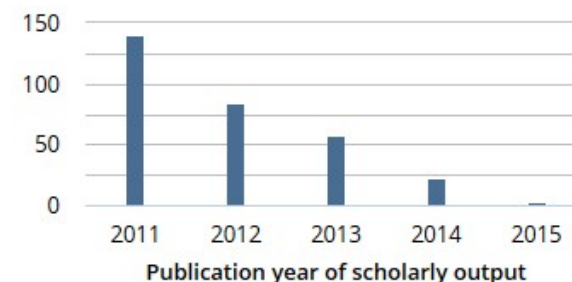
Patent-Citations per Scholarly Output



16.7

average patent-citations received per 1,000 scholarly outputs published by the Korea Advanced Institute of Science and Technology

Patent-Citations per Scholarly Output



59.1

average patent-citations received per 1,000 scholarly outputs published by Harvard University

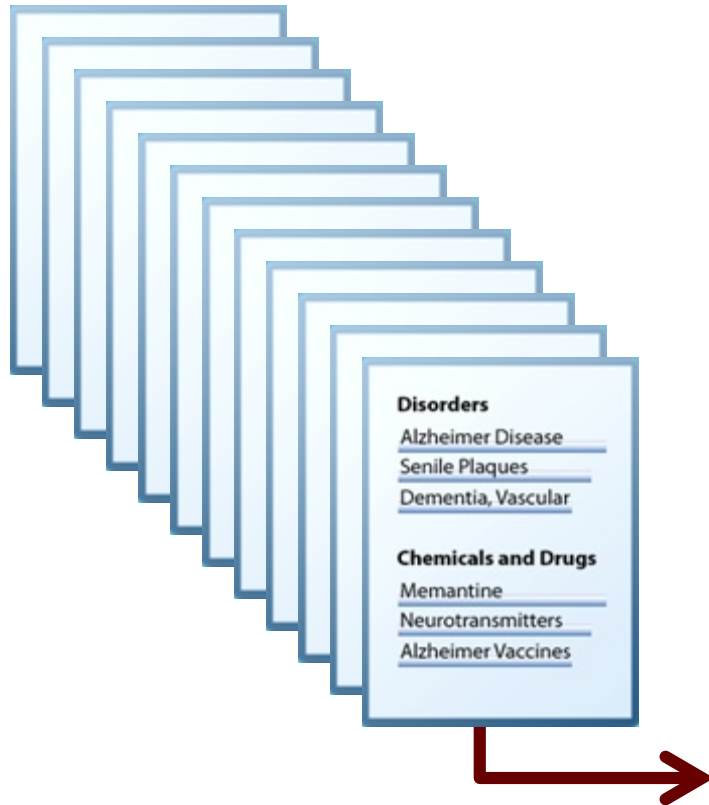
[Learn more about this metric >](#)

Economic Impact Metrics – Patent-Cited Publications

The screenshot displays the SciVal 'Benchmarking' interface. The main chart, titled 'Patent-Cited Publications', shows data from 2005 to 2014. The y-axis represents the number of Patent-Cited Publications (0 to 300), and the x-axis represents the Publication Year. Three institutions are compared: Columbia University (green line), Northwestern University (yellow line), and University of Michigan (pink line). The University of Michigan consistently has the highest number of patent-cited publications, peaking in 2008 and 2010. Columbia University and Northwestern University show similar trends, with a notable decline in 2014.

Publication Year	Columbia University	Northwestern University	University of Michigan
2005	165	135	315
2006	175	135	295
2007	170	130	285
2008	155	140	315
2009	155	120	300
2010	155	135	315
2011	145	130	300
2012	145	115	315
2013	140	115	295
2014	75	65	165

Semantic and NLP Technology--Elsevier Fingerprint Engine



Using advanced semantic technologies and natural language processing, we can generate a researcher's unique Fingerprint by aggregating the Fingerprints of each of their publication abstracts

Profile Ruffin, Mack T

All of the publications and grants associated with this researcher have been analyzed to create a unique fingerprint. Blue lines signify expertise demonstrated within grants - with the length indicating the prevalence or significance of a topic.

Based on:

Combined Profile **Publications** Grants

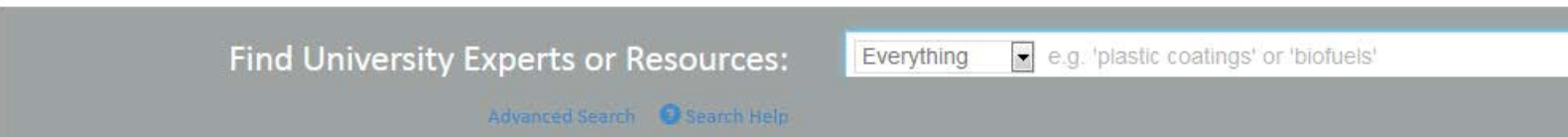
Disorders

- [Uterine Cervical Neoplasms](#)
- [Colorectal Neoplasms](#)
- [Cervical Intraepithelial Neoplasia](#)
- [Papillomavirus Infections](#)
- [Neoplasms](#)
- [Prostatic Neoplasms](#)
- [Breast Neoplasms](#)
- [Tumor Virus Infections](#)
- [Uterine Cervical Dysplasia](#)
- [Uterine Cervical Diseases](#)
- [Colonic Neoplasms](#)
- [Adenoma](#)
- [Colonic Polyps](#)

Case-Control Studies

- [Medical Audit](#)
- [Mammography](#)
- [Routine Diagnostic Tests](#)
- [Clinical Protocols](#)
- [Vaccination](#)
- [Occult Blood](#)
- [Needle Biopsy](#)
- [Sigmoidoscopy](#)
- [Fat-Restricted Diet](#)
- [Education](#)
- [Community-Based Participator...](#)
- [Double-Blind Method](#)
- [High Pressure Liquid Chromatography](#)

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Find a Resource or Faculty Expert

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Take the Next Step and Connect

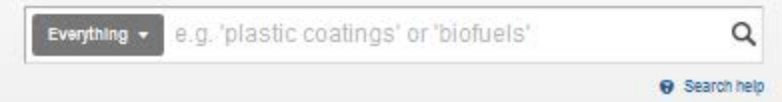
You've found the one—or ten, or twenty—experts that can help you. Now you need to connect. We've made that easy. Use one simple form to contact all of your



University Expertise Portal

A way for businesses to connect to the expert resources available at Michigan's universities.

The MCRN University Expertise Portal enables you to search through topics of research and expertise at Michigan's universities and create a request to our business engagement offices to connect you to the on-campus resources your business needs.



About

Collaborators



<http://influent.utsystem.edu>

<https://mcrn.pure.elsevier.com/>

Hagop M Kantarjian

Cancer Center Support Grant (CCSG) Programs - Leukemia

Overview Fingerprint **Network** Projects (3) Research Output (1858) Similar Experts (99)

Network

Visualization Map Experts Research Units

- Experts
- External persons
- Research Units
- External research units
- Show counts on lines

Years
2012 to 2016

Collaboration minimum
10

Force Circle

Home

View Score

Overview

Find

Leu

Ant