



About the social relevance of research indicators

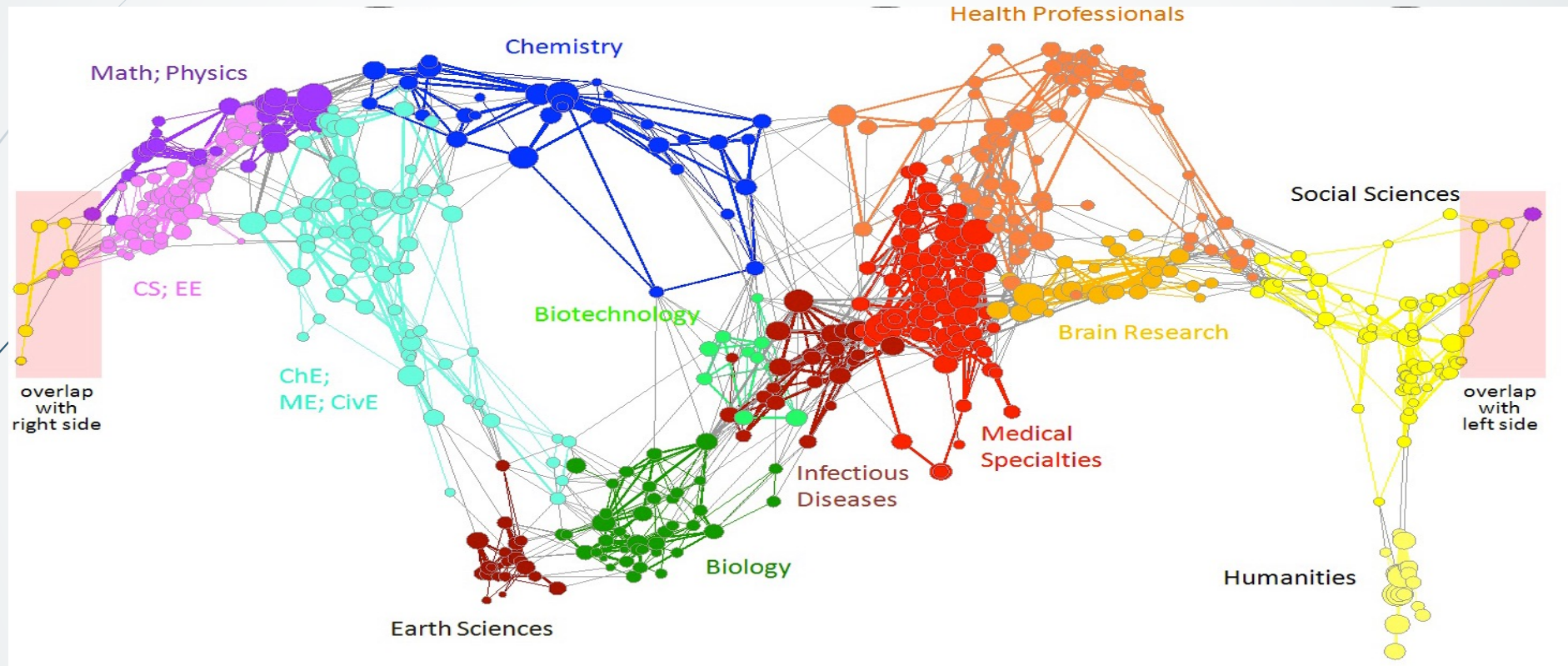
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Data Archiving and Networked Services

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Zweites Forum Bibliometrie, 1. – 2. Juli 2021, virtuell an der Universitätsbibliothek der Technischen Universität München

Journeys



Klavans, Richard and Kevin W. Boyack. 2007. *Maps of Science: Forecasting Large Trends in Science*. Courtesy of Richard Klavans, SciTech Strategies, Inc. In "3rd Iteration (2007): The Power of Forecasts," *Places & Spaces: Mapping Science*, edited by Katy Börner and Julie M. Davis. <http://scimaps.org>.

Overview

Journeys

After WWII Science and Technology Indicator systems

60s/70s Citation Indexing

80s Bibliometrics as profession

90s WWW

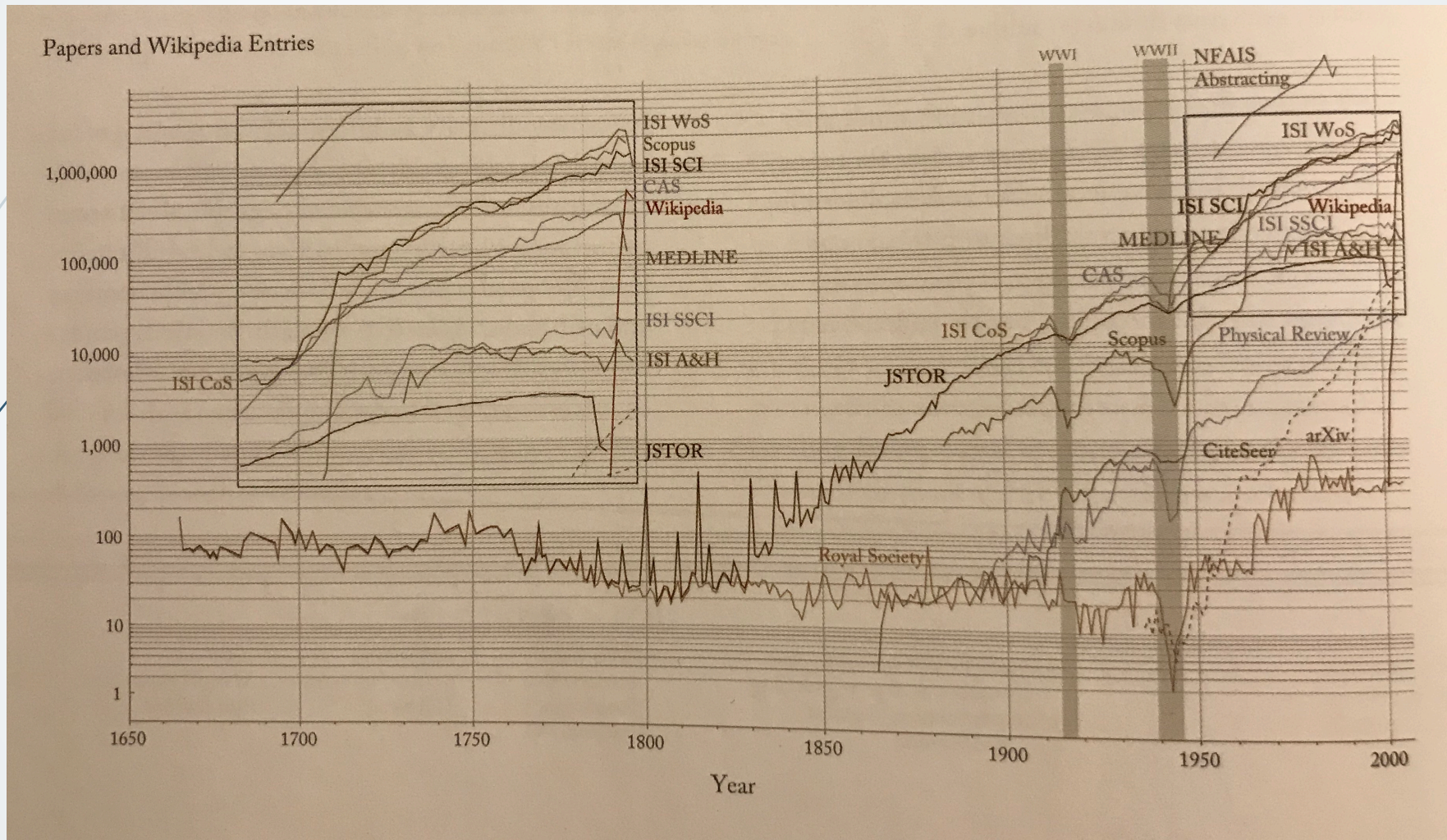
2000s Crisis of bibliometrics

2010s New technology, new players

2020s Open Science, Responsible
Innovation/Science and Metrics

Conclusions

Journeys



Photocopy: Borner, K. (2010). Atlas of science: Visualizing what we know. Cambridge, Mass: MIT Press.

Science and Technology Indicators

National Science Board
SCIENCE & ENGINEERING INDICATORS 2018

2018 REPORT DIGEST **DATA** FIGURES TOPICS STATE INDICATORS NATIONAL SCIENCE BOARD

Newer information is available !

Select "VIEW" to see the table. PDF and Excel are available for download.

- Chapter 1. **Elementary and Secondary Mathematics and Science Education**
- Chapter 2. **Higher Education in Science and Engineering**
- Chapter 3. **Science and Engineering Labor Force**
- Chapter 4. **Research and Development: U.S. Trends and International Comparisons**
- Chapter 5. **Academic Research and Development**

Download Chapter 5 Tables: [PDF \(.zip\)](#) | [Excel \(.zip\)](#) ← GO TO CHAPTER 5

TABLE	TITLE	VIEW	PDF	EXCEL
5-1	R&D expenditures at universities and colleges, by field: FY 2016			
5-2	Higher education R&D expenditures, by source, character of work, and institution type: FYs 2012-16			
5-3	Higher education R&D expenditures, by Carnegie classification, institution type, and type of cost: FY 2016			
5-4	Top six federal agencies' shares of federally funded academic R&D expenditures: FYs 2007-16			
5-5	Federal funding of academic S&E R&D, by agency and field: FY 2016			
5-6	Growth of academic R&D expenditures, by field: FYs 1997-2016			

<https://www.nsf.gov/statistics/2018/nsb20181/data/tables>

<https://web.archive.org/save/https://www.nsf.gov/statistics/2018/nsb20181/data/tables>

Citation Indexing

Unique Advantages of Citation Indexes

The ISI® databases differ from traditional indexing and abstracting services in several other ways as well. From the outset, the Science Citation Index® (SCI®), Social Sciences Citation Index® (SSCI®), and Arts & Humanities Citation Index® (A&HCI®) have been multidisciplinary. They cover virtually all disciplines whereas traditional services are limited to a single field or discipline. In this latter respect, VINITI abstracting in Moscow has also been multi-disciplinary. But it still does not produce a single unified index.

The advantages of a multidisciplinary index can be exemplified by the work of the Nobel Prize chemist Harold C. Urey. His now classic paper, published in Science³ in 1962, "Lifelike forms in meteorites" described the chemical compounds contained in meteorites that were essential to the formation of life. The first slide is a reproduction of an advertisement for the 1966 Science Citation Index which demonstrates its multi-disciplinary coverage in biology, cosmology, chemistry, earth sciences, geochemistry, and so on.

E. Garfield (1997) Concept of Citation Indexing: A Unique and Innovative Tool for Navigating the Research Literature. Speech presented at Far Eastern State University Vladivostok - September 4, 1997

<http://www.garfield.library.upenn.edu/papers/vladivostok.html>

HOW TO DO A SEARCH

Starting point for most searches in the **SCI** is a specific work. □ For example: suppose you are interested in the subject of Urey's article: "Lifelike Forms in Meteorites."

Lifelike Forms in Meteorites

Are fossils present in carbonaceous meteorites? The evidence is suggestive but as yet inconclusive.

Harold C. Urey

At a meeting held 1 May 1962 at the New York Academy of Sciences, a group of workers was presented dealing with the 1700 particles per milligram claimed by the Fordham group in contradiction to reports

mentioning my early skepticism in regard to the whole matter and my suggestion that additional experiment hydrocarbons extracted from meteorites be made by spectroscopic methods, to supplement the mass spectrographic analyses. In New York October 1961, Nagy had shown chemical and mineralogical data pointing to the possibility that there

H. C. Urey, *Science* 137, 623-628 (1962)

In the **SCI**, this subject is identified by the specific citation:

UREY HC-----62-SCIENCE----- 137 623

To find where a specific paper, book, thesis or technical note, etc. has been cited in a current journal article, look in the **Citation Index section** of the **SCI** under the specific citation.

CITED AUTHOR	CITING AUTHOR	CITED PUBLICATION	CITING PUBLICATION	VOL	PAGE
UREY HC	J. CHEM. PHYS.	35	1962	38	1962
MILLER G	J. CHEM. PHYS.	45	1966	42	1966
MILLER G	J. CHEM. PHYS.	45	1966	28	1966
MILLER G	J. CHEM. PHYS.	45	1966	52	1966
MILLER G	J. CHEM. PHYS.	45	1966	79	1966
MILLER G	NATURE	205	1965	1200	1965
MILLER G	NATURE	205	1965	1200	1965
MILLER G	NATURE	205	1965	1200	1965
MILLER G	NATURE	205	1965	1200	1965

CITATION INDEX SECTION

Any article cited during the period indexed is listed alphabetically under the first author's name. Each cited work by that author is arranged chronologically and indicated by a dashed line. ■ Beneath the cited item, you will find the list of current citing articles. In this instance, the 1962 article by H. C. Urey in *Science* 137, 623 was cited, in 1965, by G. Mueller, *Nature* 205, 1200. ■ Each citing item, other than journal articles, is characterized by a code indicating whether it is a review article, letter, correction, book review, meeting proceedings, editorial, etc. In this example "L" is the code for "letter."

To find the articles and other items published by a specific organization, look in the **Corporate Index** under the organization's name.

U. LOND. BEIR. COLL. REYNOLDS PARK	J. CHEM. SOC.	45	1966	1412
BAGAR Y	J. CHEM. SOC.	45	1966	1543
U. LOND. BEIR. COLL. GEORG. SEZ. LAB. LONDO.	J. CHEM. SOC.	45	1966	649
U. LOND. BEIR. COLL.	NATURE	205	1965	573
MILLER G	NATURE	205	1965	1200
MILLER G	NATURE	205	1965	1200
U. LOND. BEIR. COLL. DEP. CHEM. LONDON	J. CHEM. SOC.	45	1966	772
PERKINS R	J. CHEM. SOC.	45	1966	858

CORPORATE INDEX SECTION

To find the full titles, co-authors and bibliographic data for the citing works or works attributed to an organization, look in the **Source Index** under the first author's name.

MUELLER GW	KAD. CORP. NY	45	P	28	JAN 19
MUELLER GW	INT. BUS. MACH.	45	P	28	JAN 12
MUELLER GW	INT. BUS. MACH.	45	P	28	JAN 12
MUELLER GW	INT. BUS. MACH.	45	P	28	JAN 12
MUELLER GW	INT. BUS. MACH.	45	P	28	JAN 12
MUELLER GW	INT. BUS. MACH.	45	P	28	JAN 12
MUELLER GW	INT. BUS. MACH.	45	P	28	JAN 12
MUELLER GW	INT. BUS. MACH.	45	P	28	JAN 12
MUELLER GW	INT. BUS. MACH.	45	P	28	JAN 12

SOURCE INDEX WITH TITLES

All the current articles published in the period indexed are listed alphabetically by author. ■ The full title, as in the Mueller article above, is given. ■ All co-authors, journal, page, volume, year and the number of references it cites are given. Each item is coded, e.g. "C" for "correction," "B" for "book review," "L" for "letter," "M" for "meeting," etc. ■ The **SCI Source Index** is essentially a calendar year *author index* covering all the journal items processed by the closing date for the current year. ■ All journal issues available for any given year are included in the latest **SCI Annual**. ■ The **SCI Source Index** can also be used independently of the *Citation Index*. ■ While the *Citation Index* is a *subject index*, the *Source Index* is the comprehensive *author index* of science. All co-authors are cross-referenced.

CORPORATE INDEX SECTION

Under each organization you will find the citations for all items attributed to that organization which were published during the period indexed. ■ In this example, the 1965 article by Mueller is listed under *University of London, Birkbeck College*, with other articles attributed to that institution.

FIGURE #1 : HOW TO SEARCH

Bibliometrics as profession

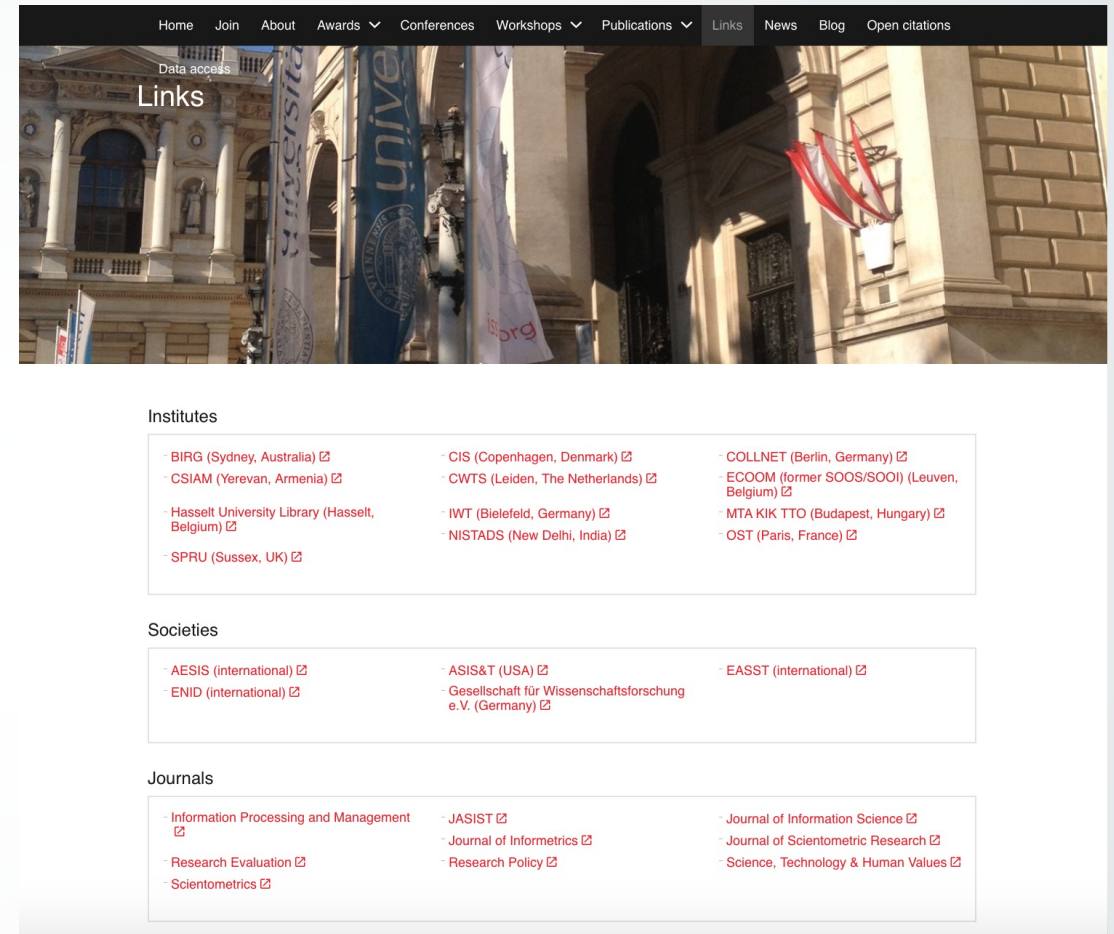
1978 Journal *Scientometrics*

Since 1984 Derek de Solla Price
Memorial Medal

1993 The International Society for
Scientometrics and Informetrics (ISSI)

CWTS B.V.

European Research Infrastructure for
Science, technology and Innovation
policy Studies (RISIS) (2014-2022)



The screenshot shows the 'Links' page of the ISSI website. The page features a navigation menu at the top with links for Home, Join, About, Awards, Conferences, Workshops, Publications, Links, News, Blog, and Open citations. Below the navigation is a large banner image of a building facade with the text 'Data access' and 'Links'. The main content is organized into three sections: Institutes, Societies, and Journals, each containing a list of affiliated organizations with external links.

Institutes

- BIRG (Sydney, Australia) [↗](#)
- CSIAM (Yerevan, Armenia) [↗](#)
- Hasselt University Library (Hasselt, Belgium) [↗](#)
- SPRU (Sussex, UK) [↗](#)
- CIS (Copenhagen, Denmark) [↗](#)
- CWTS (Leiden, The Netherlands) [↗](#)
- IWT (Bielefeld, Germany) [↗](#)
- NISTADS (New Delhi, India) [↗](#)
- COLLNET (Berlin, Germany) [↗](#)
- ECOOM (former SOOS/SOOL) (Leuven, Belgium) [↗](#)
- MTA KIK TTO (Budapest, Hungary) [↗](#)
- OST (Paris, France) [↗](#)

Societies

- AESIS (international) [↗](#)
- ENID (international) [↗](#)
- ASIS&T (USA) [↗](#)
- Gesellschaft für Wissenschaftsforschung e.V. (Germany) [↗](#)
- EASST (international) [↗](#)

Journals

- Information Processing and Management [↗](#)
- Research Evaluation [↗](#)
- Scientometrics [↗](#)
- JASIST [↗](#)
- Journal of Informetrics [↗](#)
- Research Policy [↗](#)
- Journal of Information Science [↗](#)
- Journal of Scientometric Research [↗](#)
- Science, Technology & Human Values [↗](#)

'Crisis' of bibliometrics

"Before 2000, there was the Science Citation Index on CD-ROM from the Institute for Scientific Information (ISI), used by experts for specialist analyses. In 2002, Thomson Reuters launched an integrated web platform, making the Web of Science database widely accessible. Competing citation indices were created: Elsevier's Scopus (released in 2004) and Google Scholar (beta version released in 2004). Web-based tools to easily compare institutional research productivity and impact were introduced, such as InCites (using the Web of Science) and SciVal (using Scopus), as well as software to analyse individual citation profiles using Google Scholar (Publish or Perish, released in 2007).

In 2005, Jorge Hirsch, a physicist at the University of California, San Diego, proposed the *h*-index, popularizing citation counting for individual researchers. Interest in the journal impact factor grew steadily after 1995 (see 'Impact-factor obsession').

Lately, metrics related to social usage and online comment have gained momentum — F1000Prime was established in 2002, Mendeley in 2008, and Altmetric.com (supported by Macmillan Science and Education, which owns Nature Publishing Group) in 2011.

As scientometricians, social scientists and research administrators, we have watched with increasing alarm the pervasive misapplication of indicators to the evaluation of scientific performance. The following are just a few of numerous examples. Across the world, universities have become obsessed with their position in global rankings (such as the Shanghai Ranking and Times Higher Education's list), even when such lists are based on what are, in our view, inaccurate data and arbitrary indicators."

Hicks, D., Wouters, P., Waltman, L. *et al.* Bibliometrics: The Leiden Manifesto for research metrics. *Nature* **520**, 429–431 (2015). <https://doi.org/10.1038/520429a>

And the response: Leiden Manifesto

LEIDEN MANIFESTO FOR RESEARCH METRICS

[Home](#) [Video version](#) [Translations](#) [Blog](#)

We would like to thank the volunteers who translated the Leiden Manifesto into 25 languages: Chinese, Spanish, French, Brazilian Portuguese, Persian, Catalan, German, Korean, traditional Chinese, Basque, Russian, Japanese, Finnish, Swedish, Slovak, Serbian, Danish, Czech, Indonesian, Italian, Galician, Estonian, Lithuanian, Turkish and Bulgarian.

关于科研指标的莱顿宣言

translated by Jian Wang
Leiden University

leiden_manifesto_chinese.pdf
Download File 

El manifiesto de Leiden sobre indicadores de investigación

translated by Ismael Rafols & Jordi Molas Gallart

manifiesto_cast.pdf
Download File 

<http://www.leidenmanifesto.org>

- ▶ Quantitative evaluation should support qualitative expert assessment
- ▶ Measure performance against the research missions of the institution, group or researcher.
- ▶ Protect excellence in locally relevant research.
- ▶ Keep data collection and analytical processes open, transparent and simple.
- ▶ Allow those evaluated to verify data and analysis.
- ▶ Account for variation by field in publication and citation practices.
- ▶ Base assessment of individual researchers on a qualitative judgement of their portfolio.
- ▶ Avoid misplaced concreteness and false precision.
- ▶ Recognize the systemic effects of assessment and indicators.
- ▶ Scrutinize indicators regularly and update them.

Automatisation and Internet/WWW

Lost or Found? Discovering Data Needed for Research

Gregory, K., Groth, P., Scharnhorst, A. & Wyatt, S., 30 Apr 2020, In: Harvard Data Science Review.
Research output: Contribution to journal/periodical > Article > Scientific > peer-review

 Open Access  File

 Research Practice  Typology  Evidence  Interaction

SIOR: An Egalitarian Scientific Agora

Oliver, E., Scharnhorst, A., Cabré, J. & Ionescu, V., 2020, In: Qualitative Inquiry. 26, 8-9, p. 955-961 7 p.
Research output: Contribution to journal/periodical > Article > Scientific > peer-review

 Open Access  File

 Social Effects  Citizen  Peer Review  Open Access  Research Results

208

Downloads
(Pure)



91

70

Downloads
(Pure)



21

<https://pure.know.nl/portal/en/persons/andrea-scharnhorst/publications/>

New technology, new players

[WHY DIMENSIONS](#)[ABOUT DIMENSIONS](#)[WORKING TOGETHER](#)[RESOURCES](#)[CONTACT US](#)

Free data access for scientometric research projects

- Free access to Dimensions data for noncommercial scientometric research projects.
- Support provided via email.
- Opportunities to collaborate with Digital Science on both scientometric studies and projects that improve Dimensions data for all.
- Special consideration for International Society for Scientometrics and Informetrics members.

[APPLY FOR FREE DATA ACCESS](#)

Open Science, responsible innovation/science/metrics

The future of digital infrastructure for research and education is being built.

Who's in control?

SPARC*

Data and data analytics are playing an increasingly central role at higher education institutions, and the academic community is at a critical juncture. The growing trend of publisher acquisition of critical infrastructure has underscored a pressing need to understand the changing landscape and develop actions that institutions can—individually and collectively—take to maintain and regain control of data infrastructure. These actions will determine who ultimately controls the research and education process and whether we meaningfully address inequities created by legacy players or simply recreate them in new ways.

Claudio Aspesi
CWTS Friday Webinar | 22.01.2021 |
Data Analytics applied to academic institutions:
why inaction is not an option?

<https://infrastructure.sparcopen.org/2020-update>

SPARC*

Who We Are

What We Do

Why It Matters

Become a Member

Who We Are

Sharing knowledge is a fundamental human right. SPARC is a global advocacy organization working to make research and education open and equitable by design—for everyone.

Conclusions – Take-away

- Without indicators one cannot possibly manage and steer academia.
- Sciences/Academia and the society in which it is embedded are complex systems.
 - Relative autonomy of the science system, different laws of subsystems of society (Luhmann)
 - Anticipatory systems (Leydesdorff)
 - Multiple actors in and along the boundaries of those subsystems with partly conflicting interests
 - Meaning: there is always more than one dimension, always layers
- Research indicators
 - Been used for understanding and/or managing
 - Theory: How? (Methods) Why? (Impact of Impact measures)
 - Practice: the link to the 'How?' is necessary; the link to the 'Why?' would be beneficial
 - Costs versus benefits – not all what can be measured is worth to be measured
 - Input versus Output: Performance measures make only sense when the boundary condition under which performance is delivered is taken into account!
 - Use your common sense: do indicators deliver more insights or are they an excuse for cutting resources?

Further readings

Topics	Literatur
Science maps	Borner, K. (2010). Atlas of science: Visualizing what we know. Cambridge, Mass: MIT Press. Borner, K. (2015). Atlas of knowledge: Anyone can map. Cambridge, Mass: MIT Press.
Indicators, Indexing, history	Godin, B. (2009). The value of science: changing conceptions of scientific productivity, 1869 to circa 1970. <i>Social Science Information</i> , 48, 4, 547-586. Wouters, Paul. 1999. "The Citation Culture." PhD diss., University of Amsterdam. http://garfield.library.upenn.edu/wouters/wouters.pdf Garfield, E. (1962-93). <i>Essays of an information scientist</i> . Vol1-15. Philadelphia, Pa. : ISI Press – OpenAccess http://www.garfield.library.upenn.edu/essays.html
Matthew effect of science	M. Bonitz, E. Bruckner, A. Scharnhorst: Characteristics and Impact of the Matthew Effect for Countries. <i>Scientometrics</i> 40 (3) (1997) 407–422.
Bibliometrics as profession	Introduction texts on bibliometrics (Wolfgang Glänzel's group) https://www.ecoom.be/en/research/bibliometrics
Crisis of bibliometrics	Hicks, D., Wouters, P., Waltman, L. <i>et al.</i> Bibliometrics: The Leiden Manifesto for research metrics. <i>Nature</i> 520 , 429–431 (2015). https://doi.org/10.1038/520429a
Open Science and responsible innovation/science/metrics	Aspesi, C., & Brand, A. (2020). In pursuit of open science, open access is not enough. <i>Science</i> , 368(6491), 574–577. https://doi.org/10.1126/science.aba3763 https://infrastructure.sparcopen.org Ludo Waltman, Sybille Hinze, Andrea Scharnhorst, Jesper Wiborg Schneider, Theresa Velden (2018) Exploration of reproducibility issues in scientometric research Part 1: Direct reproducibility. Preprint: https://arxiv.org/abs/1804.05024 Theresa Velden, Sybille Hinze, Andrea Scharnhorst, Jesper Wiborg Schneider, Ludo Waltman (2018) Exploration of Reproducibility Issues in Scientometric Research Part 2: Conceptual Reproducibility. Preprint: https://arxiv.org/abs/1804.05026
Science system as a complex system	Scharnhorst, Andrea, Katy Börner, and Peter Besselaar (Eds.) (2012). <i>Models of Science Dynamics</i> . Berlin, Heidelberg: Springer Berlin Heidelberg. doi:10.1007/978-3-642-23068-4. Leydesdorff, Loet (2021) <i>The Evolutionary Dynamics of Discursive Knowledge</i> . Springer OpenAccess

