

Usage Data and Metrics for Scholarly Publications

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Preface

'When I use a word,' Humpty Dumpty said, in a rather scornful tone, 'it means just what I choose it to mean, neither more nor less.'

'The question is,' said Alice, 'whether you *can* make words mean so many different things.'

'The question is,' said Humpty Dumpty, 'which is to be master - that's all.'

Lewis Carroll *Through The Looking Glass*



Agenda

- Why ?
- Basics / Data
- Metrics
- Some Examples



Motivation

- Assessment and evaluation of research
 - Appointment decisions
 - Funding decisions
 - Monitoring trends
 - Prioritize activities and attention
- Metrics as a research policy issue

Rankings are here to stay, and it is therefore worth the time and effort to get them right.

(Alan Gilbert, President University of Manchester)

From: D Butler (2007) Academics strike back at spurious rankings, *Nature* 447, pp 514-515



Motivation

- Metrics as a licensing issue:
consortia and publishers want to
investigate value for money issues

We not only need to measure things in new ways but we also need to measure new things.
(Sherrie Schmidt, Arizona State University)

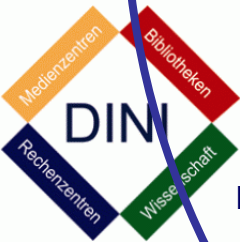
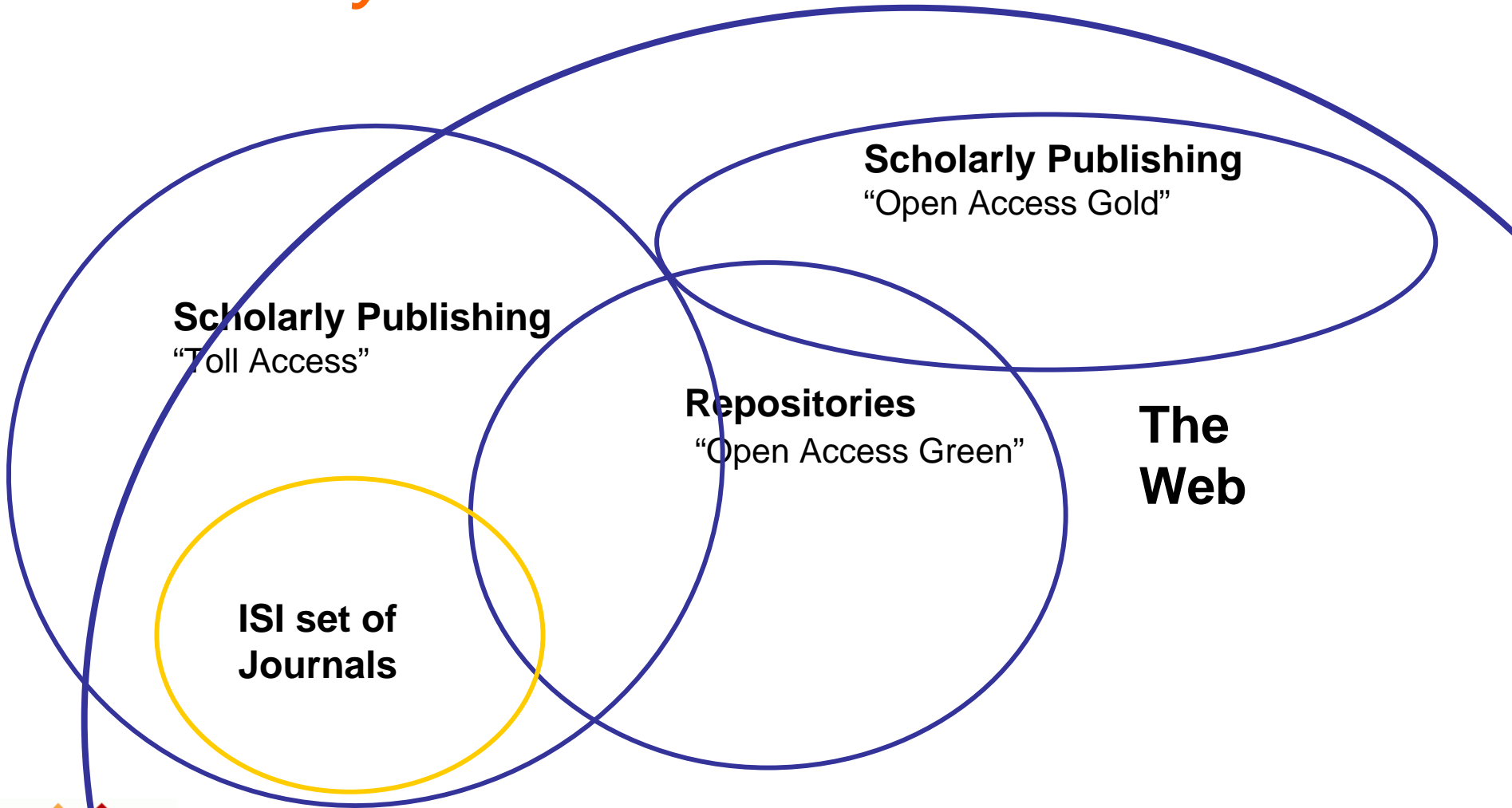


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Scholarly “Publications”



What do we count?

- Publications are the quantifiable output of the research process
- Electronic publications as a limited but rather well defined sub-field of research output
- Beyond “publications” (primary data, learning objects, etc.)



What do we count?

- Practical definition of meaningful items
- Identification of meaningful items
 - Checksums
 - Persistent identifiers
 - Heuristics
 - Distributed heterogeneous publication network



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How do we count?

- Which indicators describe the performance of publications?
(citation, usage, „endorsement“, post-publication peer-review ...)
- Which performance?
- Quantitative vs. qualitative analysis



What's out there?

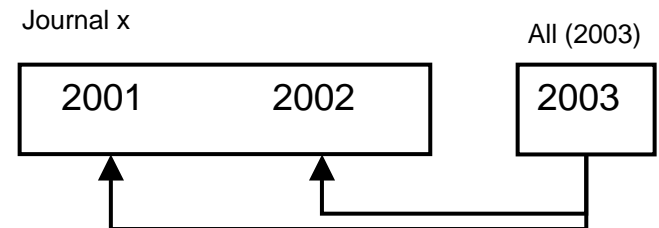
- 1960 Journal Impact Factor
- 1976 Pinski and Narin: weighted influence (PageRank)
- 1995- Leiden Group (CWTS), especially, discusses inaccuracies for specific journals, suggests modifications of the IF, as well as new measures (summary in Glanzel, Moed 2002)
- 2004 Pudovkin & Garfield's r_nIF, Vinkler's SIC, Sombatsompop & Markpin's CHAL-IF
- Late 2004 Appearance of Google Scholar and Elsevier's Scopus
- 2005 Van Leeuwen & Moed on uncitedness and distribution affects on IF, Sombatsompop & Markpin's IF Point Average, Rousseau's median and percentile IFs, Hirsch's h-index, Vaidya's v-index (m-index), Egghe's fractional relative IFs
- 2006 Egghe's g-index, Bollen, Rodriguez & Van de Sompel's y-index
- 2007 Bergstrom's Eigenfactor, Barendse's strike rate index, Potential IF for Spanish journals, UKSG's Usage factor
- 2008 Stringer, Sales-Pardo & Nunes Amaral's multi-class AUC static for ranking journals, Markpin...Sombatsompop's ACIF, Harzing & van der Wal's Publish or Perish scheme (combining 3 measures), Falagas et al.'s SJR, Zitt & Small's audience factor, Index Copernicus Value (ICV) for journals



Journal Impact Factor

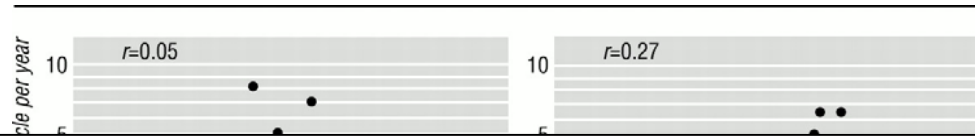
Citations in Current Year to Journal X's
Contents in the Previous Two Years

Number of Citable Items* in Journal X in the
Previous Two Years



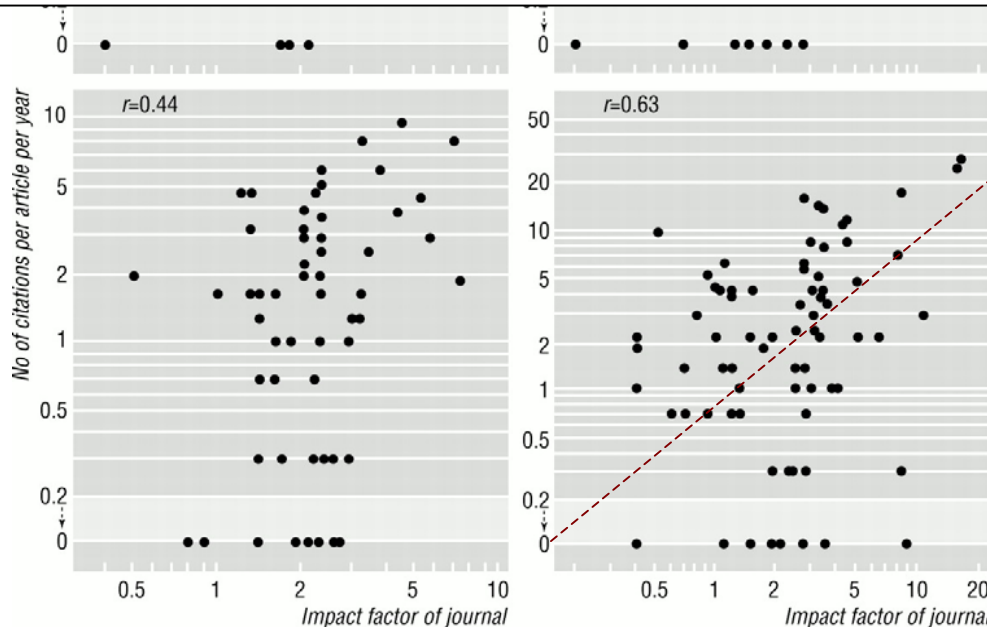
* Citable items = Articles and Reviews, but not such items as editorials, letters to the editor, news items, meeting abstracts, corrections, etc.

Correlation between Article Citation Rate and Journal Impact Factor



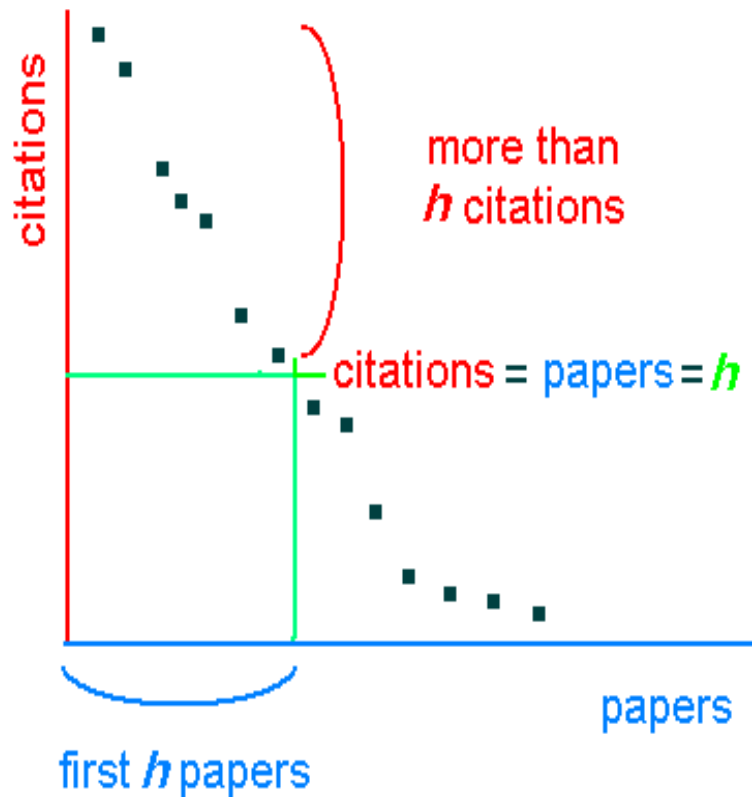
We never predicted that people would turn this into an evaluation tool for giving out grants and funding.
(Eugene Garfield)

From: Richard Monastersky (2005) *The Number That's Devouring Science* *The Chronicle of Higher Education*



From: P.O. Seglen (1997) *Why the impact factor of journals should not be used for evaluating research* *BMJ* 314

H-Index



Paper	Citations	
	Scientist A	Scientist B
1	<u>51</u>	6
2	<u>34</u>	5
3	<u>29</u>	4
4	<u>22</u>	4
5	3	3
6	1	3
7	0	2
8		2
9		1
<u>10</u>		0
<u>11</u>		0
h	4	4



From: Wikipedia

From: Lutz Bornmann (2006) H Index

Usage Factor

Total **usage** over period 'x' of articles
published during period 'y'

Total articles published during period 'y'

- usage should be total downloads, as specified in COUNTER JR1
- specified usage period should be one calendar year
- need to account for journals not covered by ISI

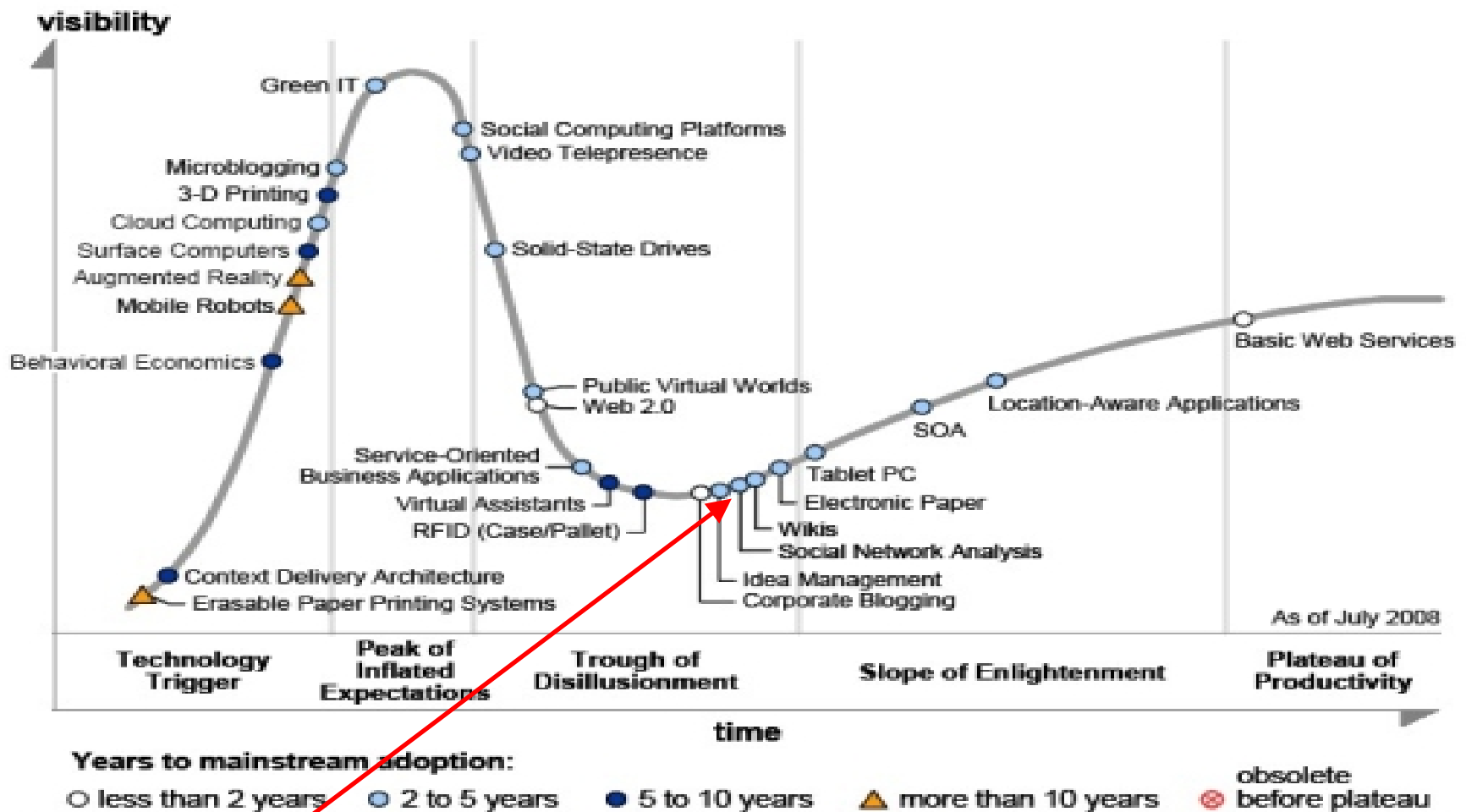


Open Access and Metrics

- Possibility to collect and process quantitative data on electronic publications
 - Usage
 - Citations { become open access as well !
- Possibility to construct new indicators to measure different aspects of research impact
- Possibility to enhance and complement existing metrics



Figure 1. Hype Cycle for Emerging Technologies, 2008

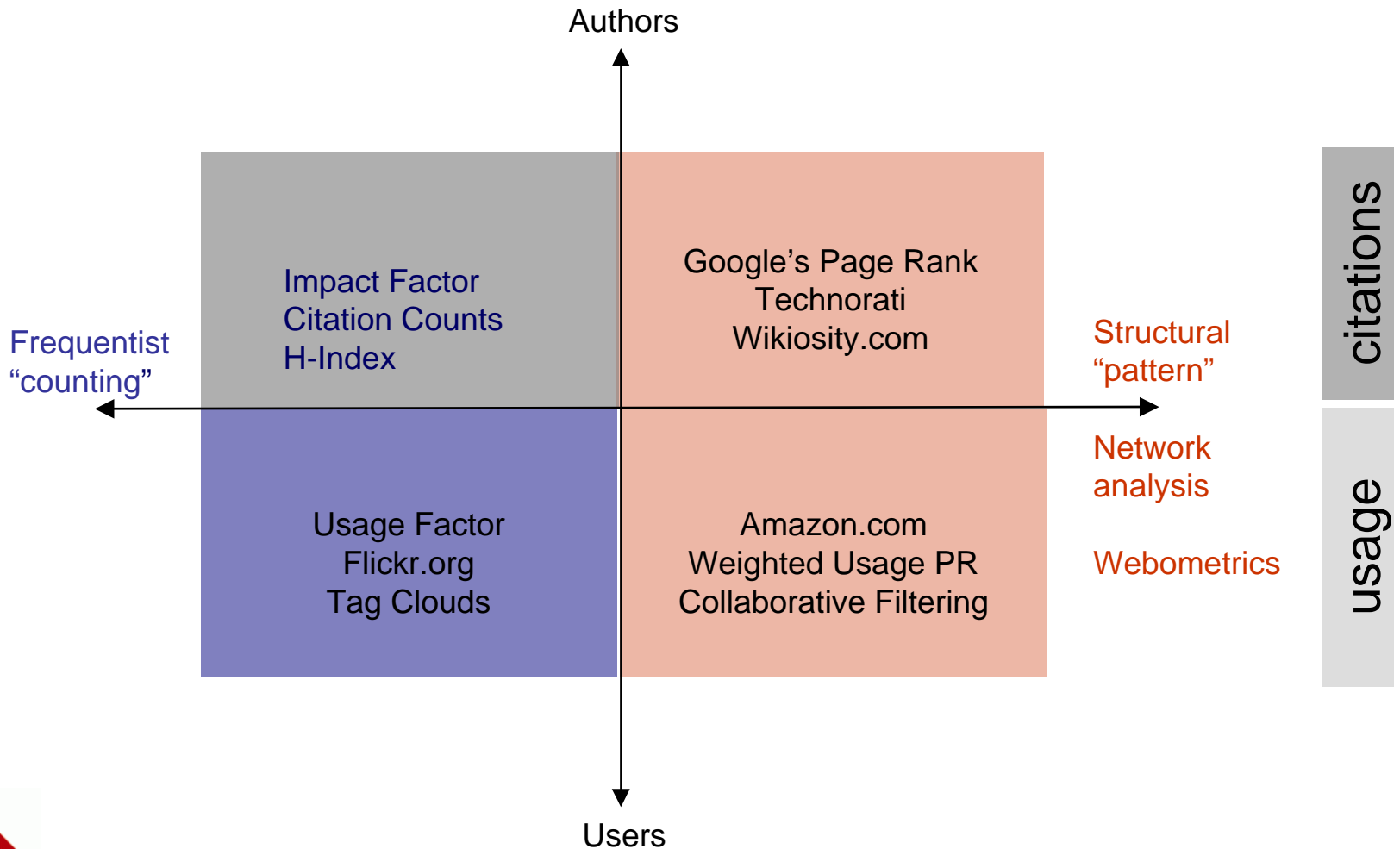


network analysis



$$PR_i = \frac{1-d}{N} + d \sum_{\forall j \in \{(j,i)\}} \frac{PR_j}{C_j}$$

A Taxonomy of Metrics



Based on: Bollen, Johan and Van de Sompel, Herbert (2005) A framework for assessing the impact of units of scholarly communication based on OAI-PMH harvesting of usage information. *OAI4*, Geneva

What do these metrics tell and Which is best?

- Wrong question
- Different measures attempt to answer different questions, emphasize different aspects and nuances
- Resist the demand for single-number metrics that are all-revealing
- Qualities of quality: Use, prestige, utility, influence, significance, popularity etc.



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Some Examples

- LANL (bX, MESUR)
- University of Southampton (Citebase, IRS, EPStats ...)
- UKSG (Usage Factor)
- COUNTER, PIRUS
- DINI (OA Statistics / OA Network)
 - U Göttingen, U Stuttgart, Humboldt U Berlin, U Saarbrücken
- DRIVER
- RePEc
- SSRN



PIRUS (Publisher and IR Usage Statistics)

- Develop COUNTER-compliant usage reports at the individual article level
- Requirements
 - DOIs as PI
 - SUSHI as protocol for exchanging data
- Report für the JISC to be published within the next few days



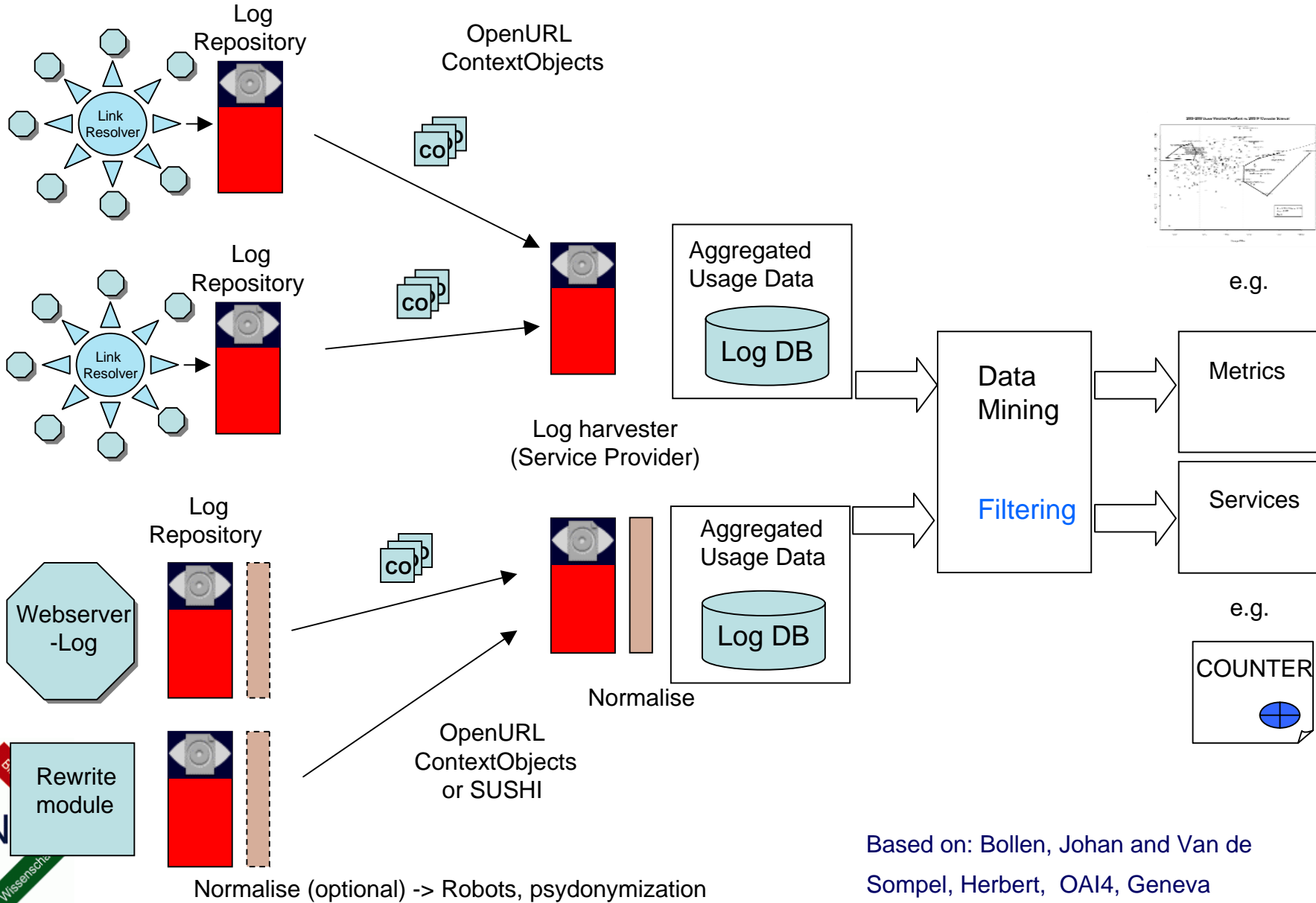
DINI - Infrastructure for Collecting Usage Data

- Produce valid and reliable document usage statistics based various established „standards“
- Network of DINI-certified repositories
- DINI recommendations / DRIVER guidelines

OA-S-Fieldname	Description	COUNTER	LogEc	IFABC
Document-Identifier	non-ambiguous label identifying the full text	needed	needed	needed
File Format	File format of server reply (e.g. HTML or PDF)	needed	needed	needed
Service Type	nature of server reply (e.g. full text, abstract)	needed	needed	-
Time of Request	Time of request processing to the second	needed	needed	needed
IP	IP-Adress of user (Client)	needed	needed	IF Session-Identifier is not available: needed
Session-Identifier	server generated non-ambiguous session/visit label	optional	-	IF IP is not available: needed
User Agent	User-Agent-String of the requesting client	needed	needed	IF Session-ID is not available: needed
HTTP Status Code	Server-Status-Code of the HTTP-Requests	needed	needed	needed
Bytes sent	server reply size	-	-	IF File Format is not HTML: needed



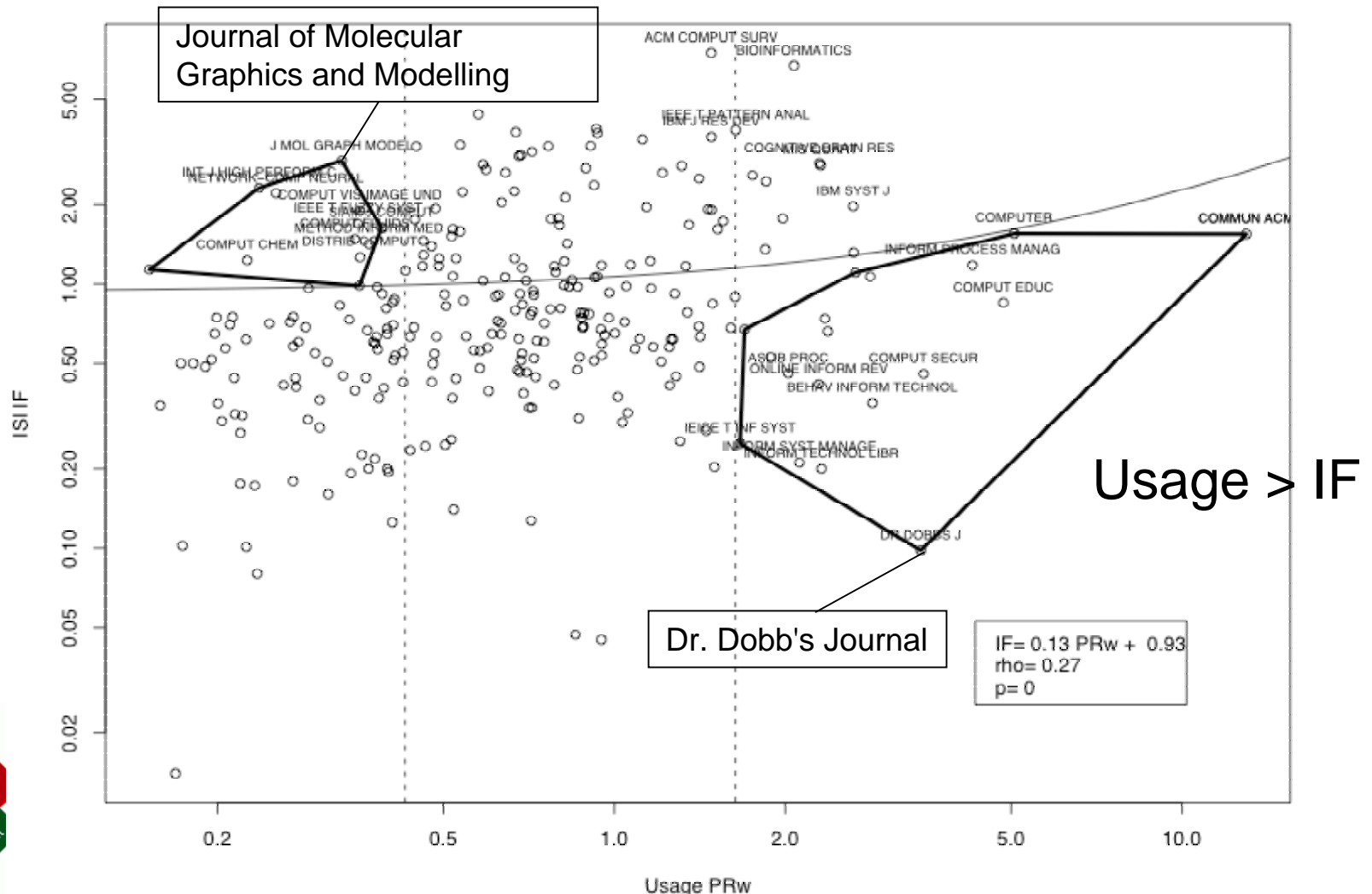
DINI - Infrastructure for Collecting Usage Data



Based on: Bollen, Johan and Van de Sompel, Herbert, OAI4, Geneva

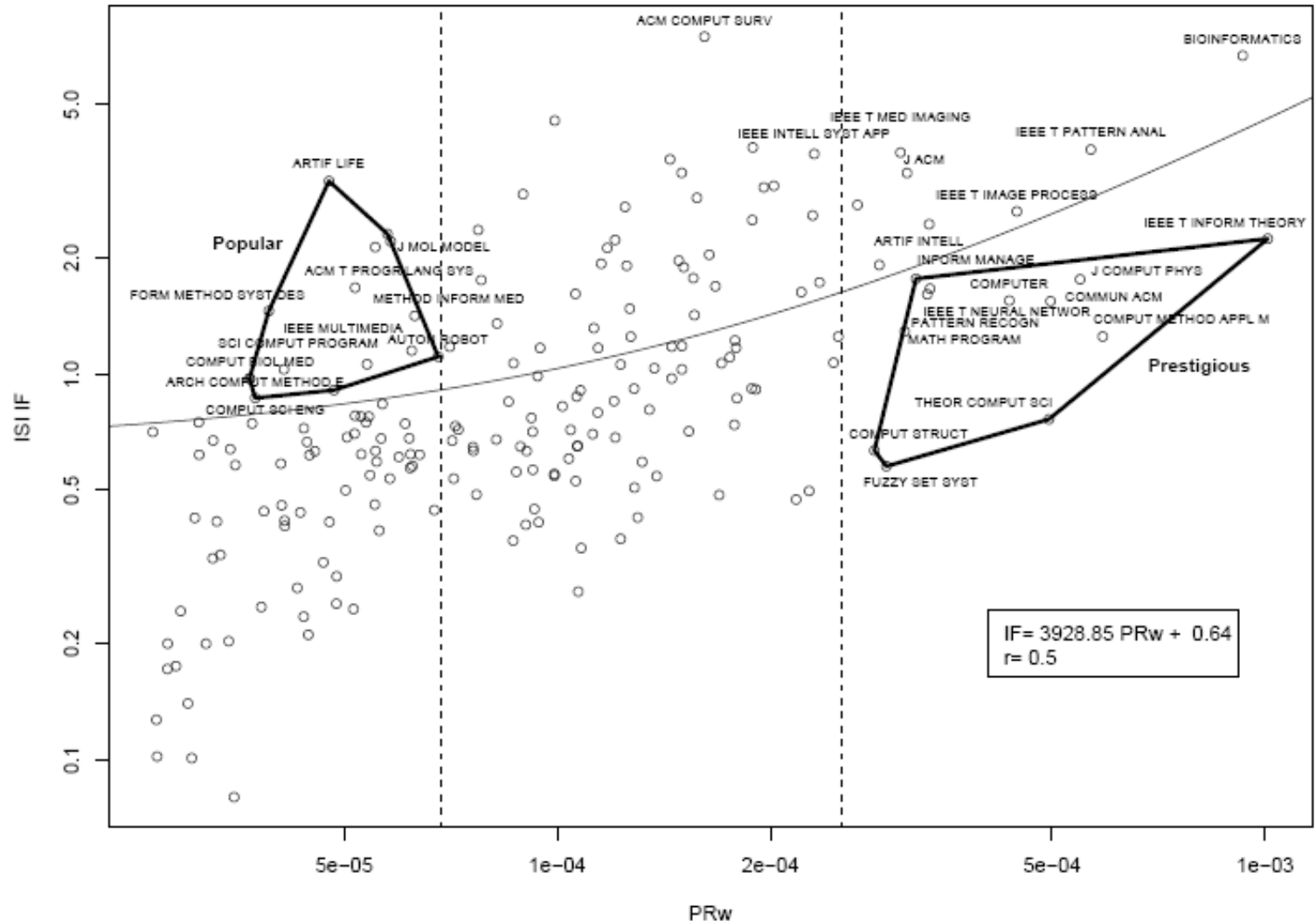
bX - Comparison of Journal Usage PageRank and Journal Impact Factor

2003–2005 Usage Weighted PageRank vs. 2003 IF (Computer Science)

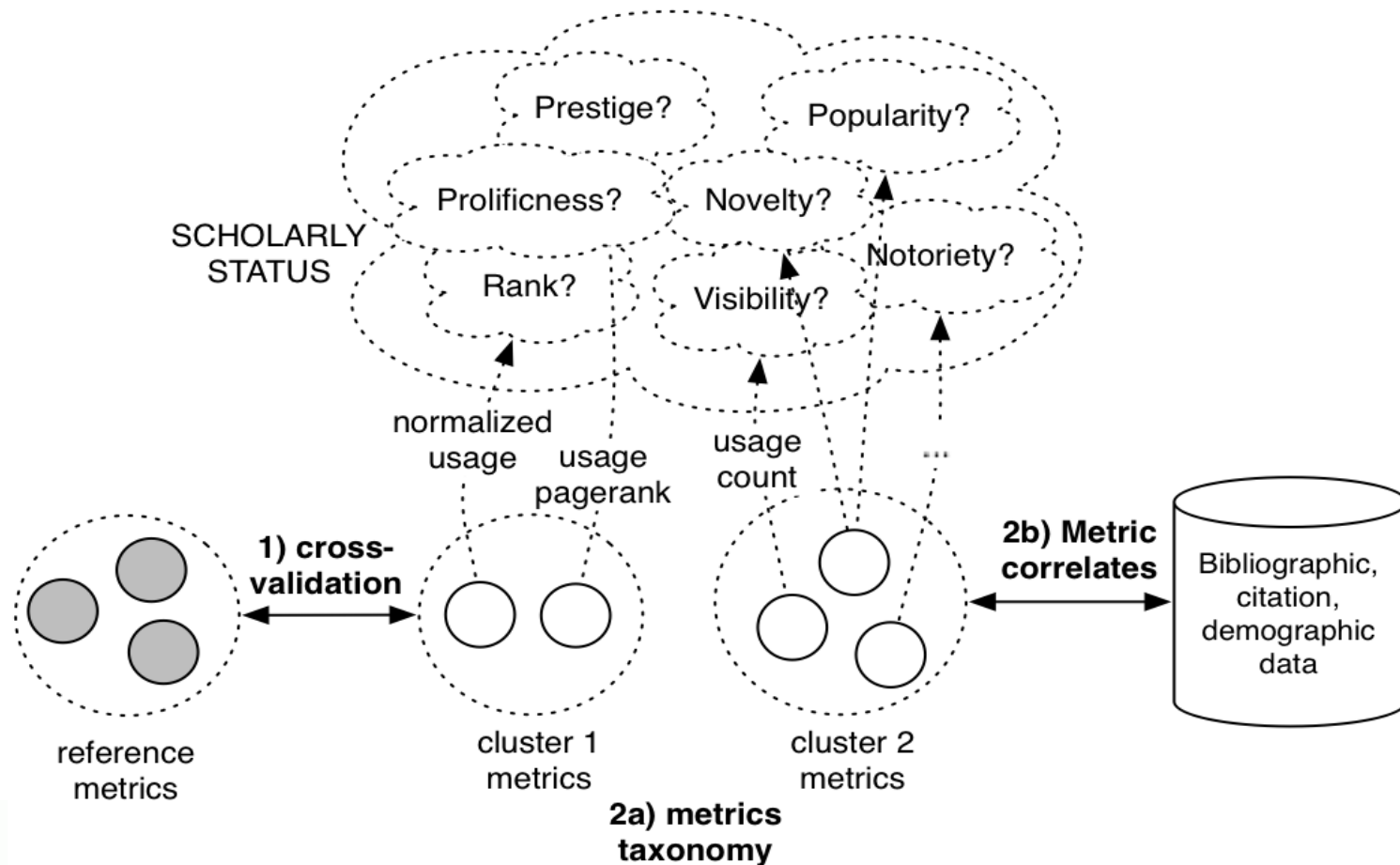


Comparison of Weighted Citation PageRank and Journal Impact Factor

From: Johan Bollen, Marko A. Rodriguez, and Herbert Van de Sompel (2006) Journal Status



MESUR – Towards a taxonomy of metrics describing aspects of quality



Conclusion

- Scholarly evaluation will evolve as scholarly communication does
- Open Access opens up the possibilities on data and metrics
- In assessment of research quantitative and qualitative methods are complementary



Conclusion

- Infrastructure for collecting and aggregating usage data conceptually available, has to be deployed and implemented in practice on a larger scale (DINI/DFG, PIRUS/COUNTER ...)
- Investigating metrics for different needs and purposes (MESUR ...)
- Co-operation and standardization are needed



Conclusion

Acting like

Humpty Dumpty

collectively

and in a responsible way



Further information

- Scholze, F (2007) Measuring research impact in an open access environment. <http://elib.uni-stuttgart.de/opus/volltexte/2007/3234/>
- Merk, C and Windisch, NK (2008) JISC usage statistics review: final report. <http://www.jisc.ac.uk/whatwedo/programmes/digitalrepositories2007/usagestatisticsreview.aspx>
- DRIVER Guidelines 2.0. Guidelines for content providers: exposing textual resources with OAI-PMH (annex 8, p131). http://www.driver-support.eu/documents/DRIVER_Guidelines_v2_Final_2008-11-13.pdf

