

# **New developments in bibliometrics and research assessment**

**Henk F. Moed**

**Elsevier, Amsterdam, The Netherlands**

**Lecture at ESSS, Berlin, 10 Sept. 2013**

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**1 Bibliometric assessment of research**

**2 Creating and combining large datasets**

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**USA**

**Main collaborators**

**UK**

**China**

**Germany**

**Canada**

# Brazil

## Main collaborators

Argentina

USA

Portugal

France

Chile

# Malaysia

## Main collaborators

**Thailand**

**India**

**Singapore**

**Iran**

**UK**

# Romania

## Main collaborators

France

Hungary

Germany

Italy

Bulgaria

# South Africa

## Main collaborators

**UK**

**China**

**USA**

**Nigeria**

**Australia**

**Netherlands**

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# **Potentialities and limitations of citation-based indicators**

**Henk F. Moed**

**A talk at the ISSI panel "The wondrous world of  
bibliometric indicators"**

**Vienna, 17 July 2013**

## Manuscript peer review is essential

- The citations we analyze are contained in **peer reviewed** research articles
- Manuscript peer review primarily aims to ban articles that do not meet a set of **minimum quality criteria**

**Citations can be conceived as manifestations of intellectual influence.....**

**....But.....**

- Citations measure **multiple** aspects, not just one
- The nature of the influence may **vary** from one influential paper to another.

## What is measured by citations and references? - 1

| <b>Principal author(s)</b>           | <b>References conceived as</b>  | <b>Citations measure</b>                                 |
|--------------------------------------|---|--|
| <b>Garfield<br/>Salton</b>           | <b>Descriptors of document content</b>  |  |
| <b>Garfield</b>                      | <b>Manifestations of scholarly information flows</b>                                      | <b>Utility (quantity of information use)</b>             |
| <b>Small<br/>Garfield</b>            | <b>Elements in a symbol making process</b>  | <b>Highly cited items as concept symbols</b>             |
| <b>Merton</b>                        | <b>Registrations of intellectual property and peer recognition of the knowledge claim</b> | <b>Intellectual influence</b>                            |
| <b>Cole &amp; Cole<br/>Zuckerman</b> |   | <b>Socially defined quality</b>                          |
| <b>Gilbert</b>                       | <b>Persuasion tools</b>   | <b>Authoritativeness</b>                                 |
| <b>Zuckerman</b>                     | <b>Referencing motives and their consequences are analytically distinct</b>               | <b>Citations are proxies of more direct measurements</b> |

**Random** errors or 'individual vagaries' cancel out in analyses of large datasets.....

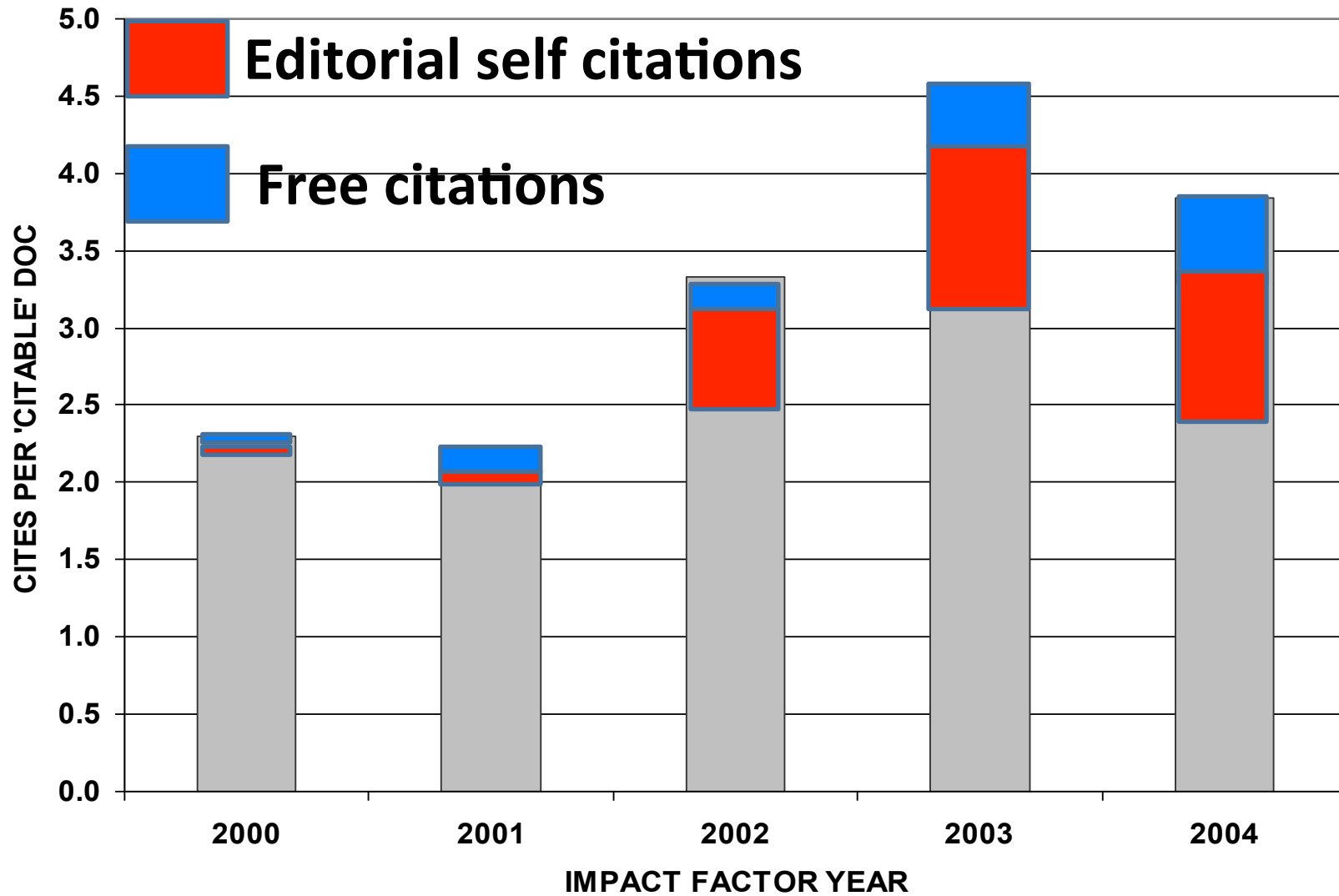
.....**but**.....

- An **individual** article's reference list does **not** give a full account of all influences
- **Systematic** biases remain

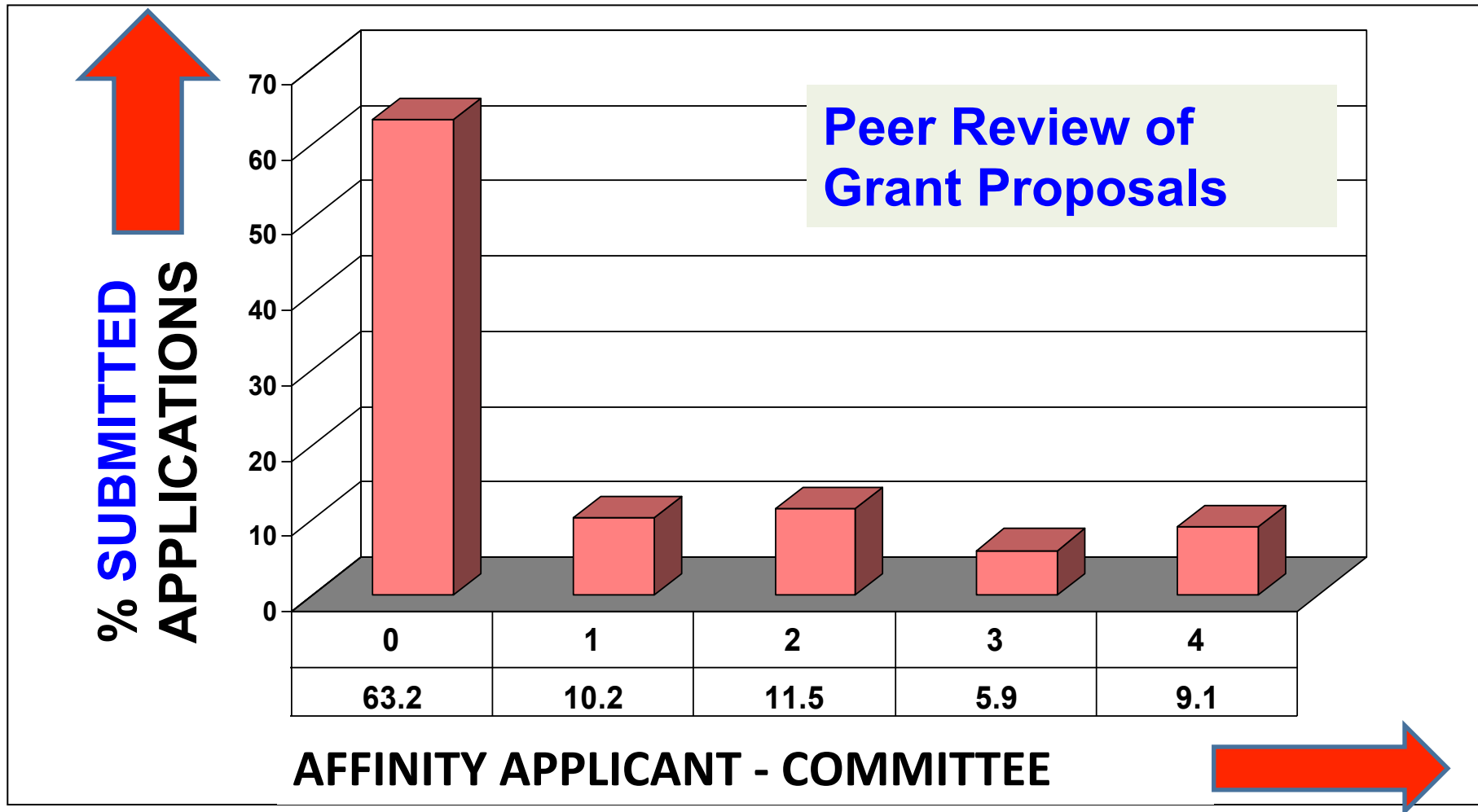
## Citation analysis requires a permanent quest for biases

- It needs to include **expert knowledge** about the units of assessment
- But **Peer Review** has its biases too

# Decomposition of the IF of a Gerontology journal

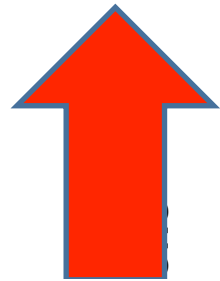


**For 15 % of SUBMITTED applications an applicant is a member of the evaluating Committee (Affinity=3, 4)**

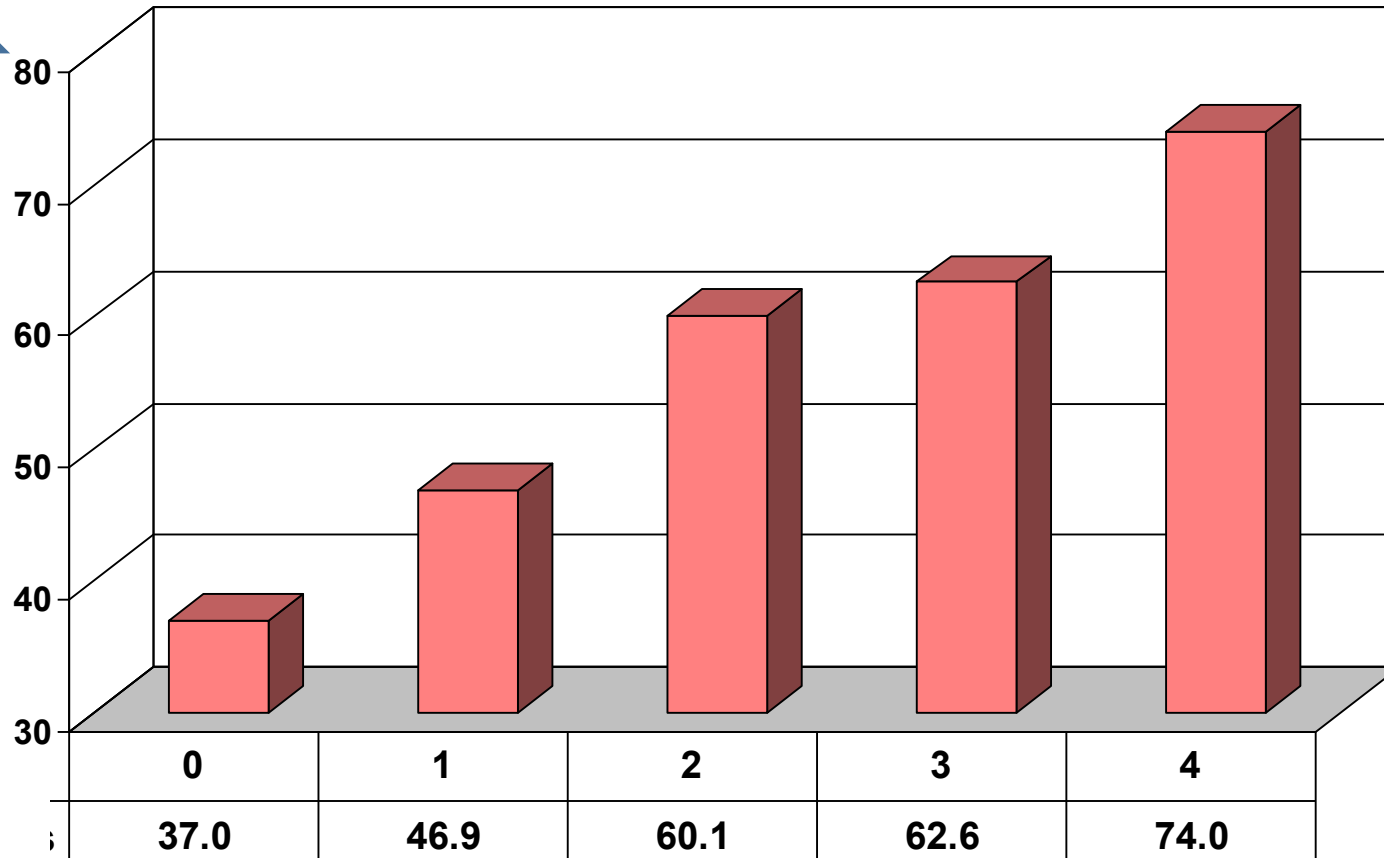




# Probability to be granted increases with increasing affinity applicants-Committee



**% GRANTED APPLICATIONS**



**AFFINITY APPLICANT - COMMITTEE**



**Logistic regression analysis:  
Affinity Applicant-Committee has a significant effect  
upon the probability to be granted**

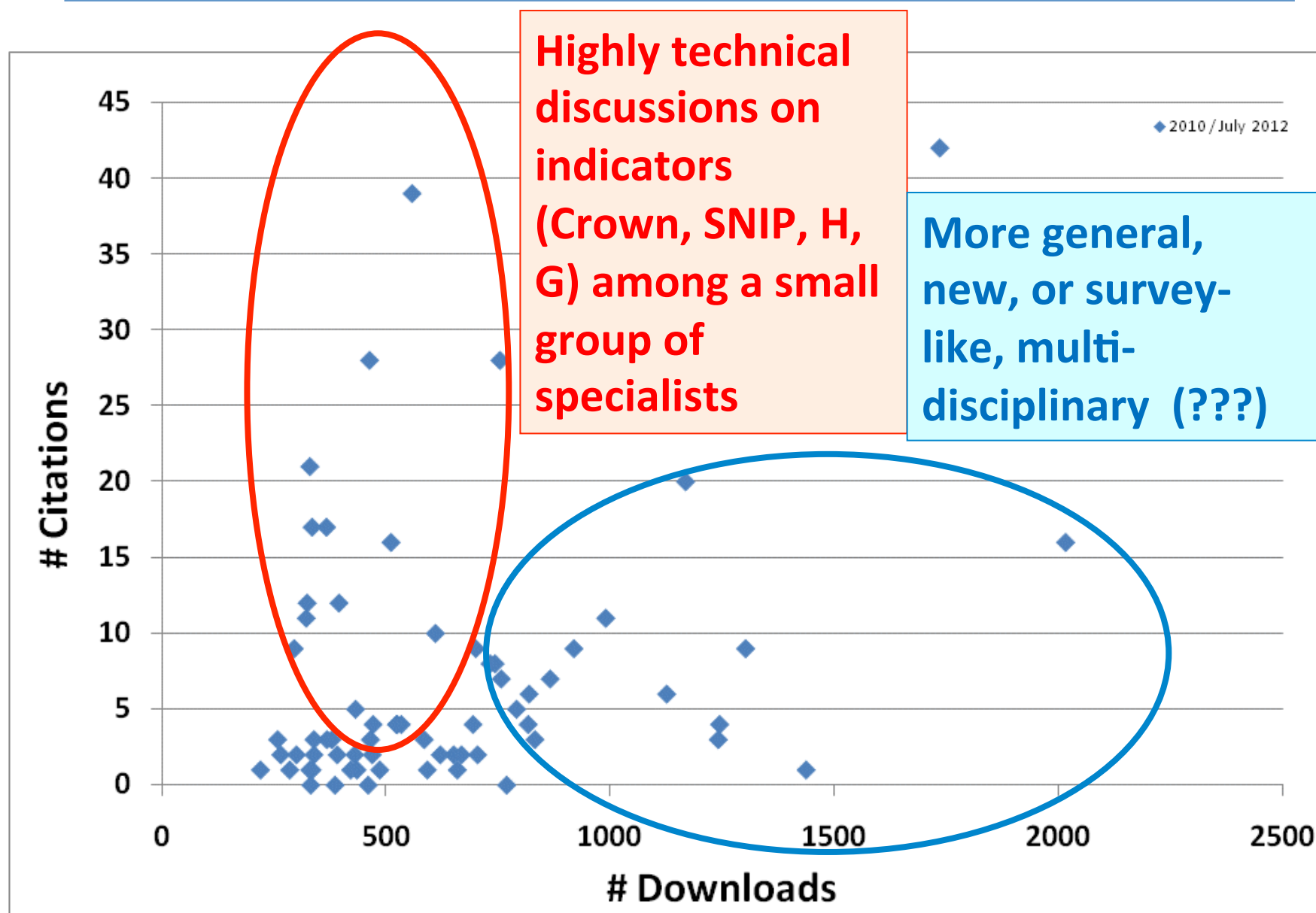
MAXIMUM-LIKELIHOOD ANALYSIS-OF-VARIANCE TABLE (N=2,499)

| Source                              | DF       | Chi-Square    | Prob             |
|-------------------------------------|----------|---------------|------------------|
| INTERCEPT                           | 1        | 18.47         | 0.0000           |
| <u>CITATION IMPACT APPLICANT</u>    | <u>3</u> | <u>26.97</u>  | <u>0.0000 **</u> |
| Rel transdisc impact applicant      | 1        | 0.29          | 0.5926           |
| <u>AFFINITY APPLICANT-COMMITTEE</u> | <u>2</u> | <u>112.50</u> | <u>0.0000 **</u> |
| Sum requested                       | 1        | 45.47         | 0.0000 **        |
| Institution applicant               | 4        | 25.94         | 0.0000 **        |
| LIKELIHOOD RATIO                    | 199      | 230.23        | 0.0638           |

## Citations and full text downloads measure distinct aspects

- **Short term** download counts reflect browsing through newly published journal issues
- Citations tend to result from an author's **reflection** upon what he/she has downloaded and read.....
- But there is more.....

Downloads vs. citations for JOI 2010 articles, measured during 18 months



**Altmetrics deserves to be further explored....**

**....but....**

- It is essential to keep distinguishing between **scientific-scholarly** and **societal** impact.
- Social media mentions should **not** be used to measure the contribution to **scientific** progress

## On promoting societal impact

- Societal value can **not** be assessed in a **politically neutral** manner
- Stimulate in teaching/training research students to study **scientifically relevant** aspects of societal issues

**A framework is needed to  
characterize and position  
bibliometric indicators and products**

# **The Multi-Dimensional Research Assessment Matrix**

**Expert Group on the Assessment of  
University-Based Research (AUBR, 2010)**



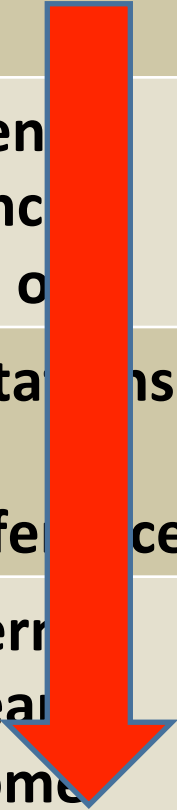
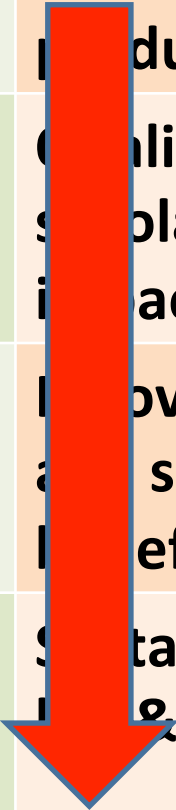
## Multi-dimensional Research Assessment Matrix (Part)

| Unit of assessment | Purpose                          | Output dimensions             | Bibliometric indicators | Other indicators             |
|--------------------|----------------------------------|-------------------------------|-------------------------|------------------------------|
| Individual         | Allocate resources               | Research productivity         | Publications            | Peer review                  |
| Research group     | Improve performance              | Quality, scholarly impact     | Journal citation impact | Patents, licences, spin offs |
| Department         | Increase multi-discipl. research | Innovation and social benefit | Actual citation impact  | Invitations for conferences  |
| Institution        | Increase regional engagement     | Sustainability & Scale        | Internat. co-authorship | External research income     |
| Research field     | Promotion, hiring                | Research infrastruct.         | citation 'prestige'     | PhD completion rates         |

# Multi-dimensional Research Assessment Matrix (Part)

| Unit of assessment | Purpose                          | Output dimensions          | Bibliometric indicators | Other indicators               |
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| Individual         | Allocate resources               | Research products          | Publications            | Peer review                    |
| Research group     | Improve performance              | Quality, scholarly impact  |                         | enrichment of research         |
| Department         | Increase multi-discipl. research | Innovation, social benefit |                         | collaborations, conferences    |
| Institution        | Increase regional engagement     | Sustainability & Soc       |                         | error rates, research outcomes |
| Research field     | Promotion, hiring                | Research infrastruct.      | 'prestige'              | completion rates               |

Read column-wise



## Multi-dimensional Research Assessment Matrix (Part)

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## **Base notions**

**The choice of indicators depends upon:**

- **What unit is to be assessed**
- **Why is the assessment done?**
- **Which aspect is being assessed?**

**Indicators that are appropriate in one type of assessment may be inappropriate in another**

# **Author Level Bibliometrics**

**Henk F. Moed**

**A talk at a Special Session on Author Level  
Bibliometrics at ISSI2013**

**Vienna, 17 July 2013**

## **A base problem**

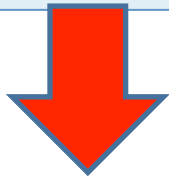
- **How to assess the performance of an individual by analyzing products that are the result of teamwork?**
- **Most research articles are the result of collaboration within or between teams**

# CASE 1

**Meta level :  
Policy issue**



**Policy measure**



**Bibliometric  
operationali-  
zation**

**More and more individual  
researchers have to be objectively  
evaluated for promotion and hiring**



**Use easily available metrics**



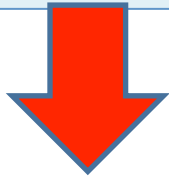
**Count total publications or #  
articles in journals with the highest  
impact factors in the field**

## CASE 2

**Meta level :  
Policy issue**



**Policy measure**



**Bibliometric  
operationali-  
zation**

**Research community is not  
sufficiently oriented toward  
international networks**



**Stimulate publication in good  
international journals**



**Count # articles in first impact  
quartile of journals in subject field**

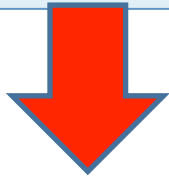


## CASE 3

**Meta level :  
Policy issue**



**Policy measure**



**Bibliometric  
operationali-  
zation**

**Professors are legally bound to do  
research but many of them don't**



**Allow only research active  
professors to decide on  
recruitment of new research staff**



**Select only professors with  $\geq 3$   
publications in 7 years in  
recruitment committees**

## Base notions

- A set of “**meta**” assumptions is required that determine which assessment methodology is to be used
- Bibliometrics can **help** formulating and testing such assumptions
- Bibliometric researchers should explain better what “**correlations**” mean

## Wider issues

- **Change** an assessment methodology every 5-10 years
- What is an **acceptable** “error rate” in the assessment process?
- Wrong in **individual cases** ⇔ beneficiary for the **system as a whole**
- What is a **fair** assessment process?

# Contents

**1**

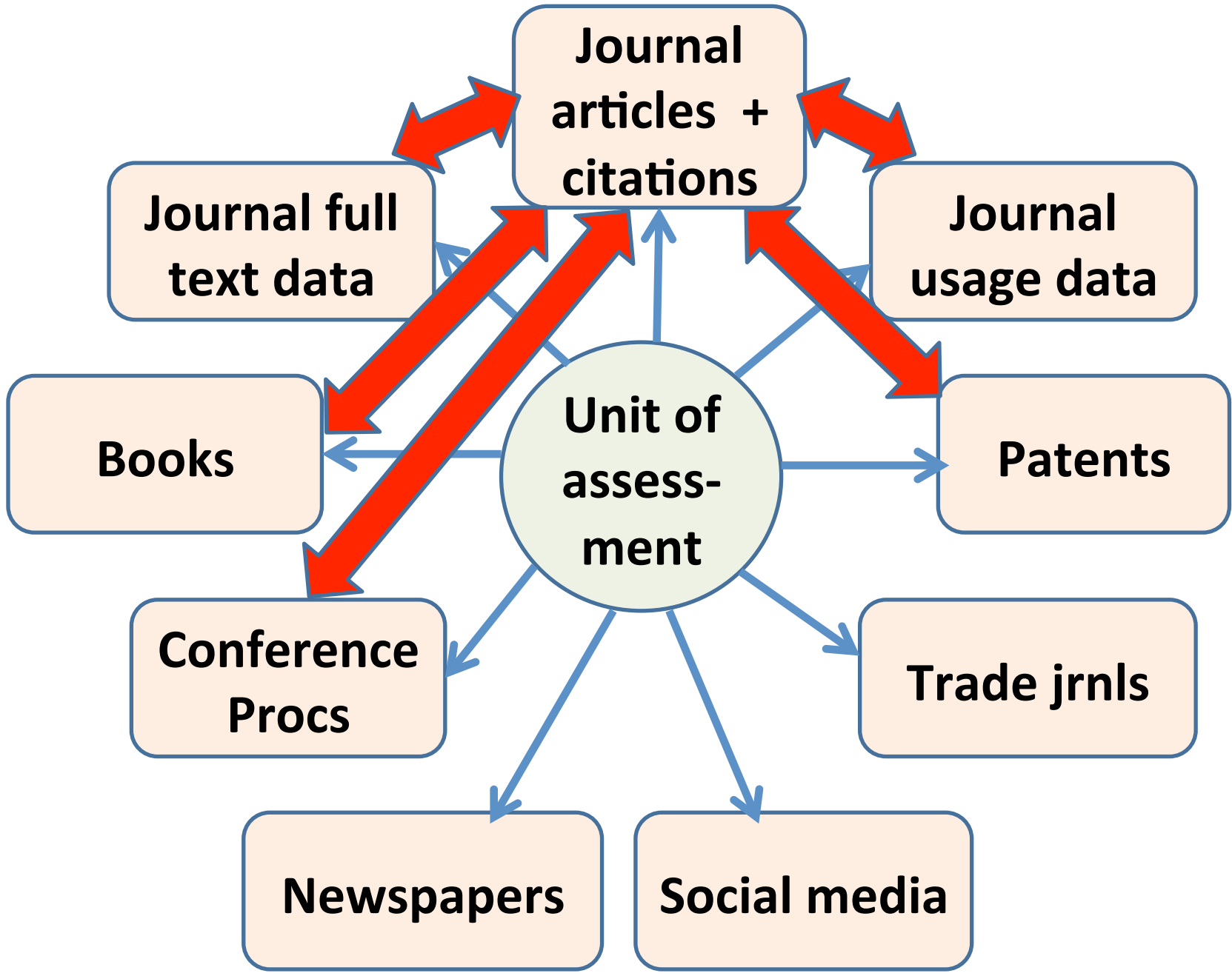
**Bibliometric assessment of research**

**2**

**Creating and combining large datasets**

**3**

**Conclusions**



## What types of impact do the data sets indicate?

| Data set                   | Type of impact          | Quality control |
|----------------------------|-------------------------|-----------------|
| journal articles           | Scientific              | Peer review     |
| Patents                    | Technological           | Pat. examiners  |
| Books                      | Scholarly; Educational  | Book publishers |
| Conf. Procs.               | Scientific              | Program chairs  |
| Newspapers                 | Cultural; Enlightenment | Journalists     |
| Trade journals             | Technological?          | ?               |
| Usage/ full text downloads | Scientific; societal?   | ?               |
| Social media               | ?                       | ?               |

**Thank you for your  
attention!**

**Elsevier Bibliometric Research Program:**

**[www.ebrp.elsevier.com](http://www.ebrp.elsevier.com)**