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EDITORIAL

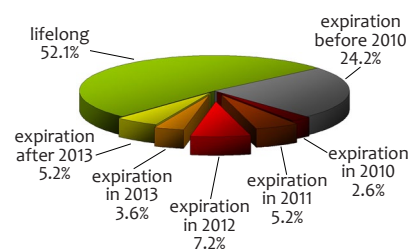
The end of the year has come again. So soon – but with a lot of good memories of conferences, seminars and workshops. The ISSI members could close a very strong year: our humble newsletter alone announced no less than 9 professional events to participate in – a few of them (those indicated by white numbers on black background) are still due in 2013: ① 17th STI Conference in Montreal, Canada, ② 6th Gilberto Sotolongo Aguilar Seminar in Havana, Cuba, ③ Metrics 2012 Conference in Baltimore, USA, ④ CoLIS 8 Conference in Copenhagen, Denmark, ⑤ Scientometrics 2012 Conference in Regensburg, Germany, ⑥ 17th Nordic Workshop on Bibliometrics & Research Policy in Helsinki, Finland, ⑦ Workshop on Bibliometrics for the Social Sciences and Humanities in Helsinki, Finland, ⑧ 14th ISSI Conference in Vienna, Austria, ⑨ 18th STI Conference in Berlin, Germany.

Meanwhile at the ISSI we kept on growing in 2012 as well. The 12 new members brought us the representation of 2 new countries, Armenia and Malaysia, too. With these two new additions ISSI has members from 49 countries all over the world now.

Last but not least, expiring memberships must be mentioned here at this time of the year. If you happen to belong to that 7.2% whose membership expires in 2012, please don't forget to renew your membership in time. For more info about the procedure, please visit the ISSI website: <http://www.issi-society.info/join.html>.

Balázs Schlemmer

ISSI MEMBERSHIPS



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THE EUGENE GARFIELD DOCTORAL DISSERTATION SCHOLARSHIP

Since 2005 Eugene Garfield has, with the help of ISSI, awarded a scholarship to support doctoral students. Recipients of this award were:

- ▶ 2005 Kayvan Kousha (Iran)
- ▶ 2007 Sonia Vasconcelos (Brazil)
- ▶ 2009 Vincent Larivière (Canada)
- ▶ 2011 Stefanie Haustein (Germany)

Because of the high quality of the candidates in 2011 the committee moreover decided to confer this year two honourable mentions namely to Raf Guns (Belgium) and Björn Hammarfelt (Sweden).

- ▶ 2013 you?

If you are interested, please read carefully the following call for nominations.

CALL FOR NOMINATIONS

1. NATURE OF THE AWARD

The scholarship will consist of an award of \$3,000 (donated by the Eugene Garfield Foundation) to cover any research related expenses (including traveling) of the grant recipient, contingent upon the recipient's attending ISSI 2013, the next ISSI biennial conference. This conference will be held in Vienna, Austria, from July 15 till July 19, 2013.

2. PURPOSE OF THE AWARD

The purpose of this scholarship is to foster research in bibliometrics, scientometrics, informetrics and webmetrics by encouraging and assisting doctoral students in the field with their dissertation research.

3. ELIGIBILITY

3.1 The scholarship recipient must meet the following qualifications:

- (a) Be an active doctoral candidate pursuing research using bibliometric, scientometric, informetric or webmetric methodology in a degree-granting institution;

- (b) Have a doctoral dissertation proposal accepted by the institution.

3.2 The applicant need not be a member of ISSI to be considered for this scholarship.

Clarification: an active doctoral student is someone who has not yet obtained the doctoral degree at the moment he/she receives the award.

4. ADMINISTRATION

The award is sponsored by the Eugene Garfield Foundation with the cooperation of the Chemical Heritage Foundation, and is administered by the Board of the International Society for Scientometrics and Informetrics (ISSI).

5. NOMINATIONS

Submission should include the following:

- (a) The doctoral research proposal, including a description of the research, methodology, and significance, 10 pages or less in length, double-spaced, and in English;
- (b) A copy of the paper submitted for presentation at the ISSI Conference;
- (c) A cover letter from the dissertation advisor endorsing the proposal;
- (d) An up-to-date curriculum vitae.

6. SUBMISSION INSTRUCTIONS AND DEADLINE

Deadline for submission is January 31, 2013. All proposals should be submitted by e-mail to the society's president Ronald Rousseau at [ronald.rousseau\[at\]khbo.be](mailto:ronald.rousseau[at]khbo.be). An acknowledgment of receipt will be sent to the candidates.

7. CONFERENCE PRESENTATION

The recipient of the award will be given the opportunity to present his/her work either during a normal session (if his/her paper has been accepted for presentation), either as a special lecture on the same level as research in progress. This presentation will be referred to as the special Eugene Garfield Doctoral Dissertation Scholarship Lecture.

POST-DOC POSITION

AT THE KU LEUVEN — EXPERTISECENTRUM O&O MONITORING (ECOOM) /
DEPARTMENT OF MANAGERIAL ECONOMICS, STRATEGY & INNOVATION

The Centre for R&D Monitoring (ECOOM) – an interuniversity consortium housed within the Faculty of Economics and Business of the University of Leuven – is charged with developing a consistent system of R&D and Innovation (RD&I) indicators for the Flemish government. This indicator system is designed to assist the Flemish government in mapping and monitoring the RD&I efforts in Flanders. Within this context, ECOOM is the pre-eminent Flemish institute for the study and application of advanced bibliometric techniques in the evaluation of research, and has become a prominent research centre with international visibility.

The department of Managerial Economics, Strategy and Innovation (MSI) is a dynamic and growth-oriented research department within the Faculty of Economics and Business of KU Leuven. Research and teaching at the department span the domains of managerial economics, industrial organization, international business, innovation economics and management, political economy, and entrepreneurship. The department contributes to theoretical and empirical research on the organization of firms, industries and markets in an international context. Research is strongly focused on the development of an analytical basis that allows a better understanding and prediction of firm strategies and industry and market performance in open economies.

ECOOM and MSI are jointly recruiting a

Post-doctoral research Fellow

Applicants have the skills necessary to work with the bibliographic and patent databases as well as with indicators drawn from these databases, and should have an interest in bibliometric methods, quantitative science and technology studies and quantitative aspects of communication in science and research policy.

The research fellow contributes to the processing, development, statistical analysis and interpretation of data, intended to initiate, structure, process and report research results and collaborates in the modelling of complex research problems and the application of corresponding analyses. He or she furthermore contributes to bibliometrics related work necessary to accomplish the mission of ECOOM and MSI.

Candidates should have a completed PhD, a strong publication record and should have considerable research experience and original contributions in the field of bibliometrics/technometrics and research evaluation.

Candidates have knowledge of quantitative data processing, bibliometric and statistical methods, and skills in data engineering and information retrieval skill. Knowledge is also expected in computer science, particularly, in the field of text mining, network analysis and visualisation techniques. Fluency in written and spoken English is essential.

We offer a fulltime position in the internationally oriented research environment of the University of Leuven. The appointment will be for a fixed term of four years with flexible starting date. The salary will be determined in accordance with the legal salary grade systems existing at KU Leuven.

The KU Leuven pursues a policy of equal opportunity and diversity.

APPLICATIONS:

Candidates are invited to apply online before 31 January 2013 at: <http://www.kuleuven.be/personeel/jobsite/vacatures.htm>

For more information about the postdoc positions, please contact Dani Vandepoel ([dani.vandepoel\[at\]kuleuven.be](mailto:dani.vandepoel[at]kuleuven.be)). More information on the MSI department and ECOOM can be found at www.econ.kuleuven.be/msi and www.ecoom.be

DEAR COLLEAGUES, GREETINGS!



SUJIT BHATTACHARYA
Editor-in-Chief

You will be glad to know that a new journal Journal of Scientometric Research (www.jscires.org) has been launched. This journal comes from SciBiolMed. Org. which has around 20 journals with 16 journals in Scopus and 1 in SCI. From the second issue onwards, it will be published with Med-Know which has merged with Kluwer Health. The objective of this journal is to provide a platform for scholarship in Scientometrics and also act as an exchange between Scientometrics and other closely connected research domains i.e. Science Technology Studies, Innovation studies etc. To attract scholars from interdisciplinary research traditions and also keeping in view that scholars within Scientometrics are themselves from heterogeneous disciplinary traditions, we have created different categories for contributions. Along with Research Paper and Review Paper, the journal has Perspective, and Commentary, Webliography and Research-in-Progress paper for providing platform to young promising researchers or scholars announcing important work in progress.

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Journal URL : www.jscires.org
Current Issue : www.jscires.org/v1i1

Please send your comments, suggestions, and paper contributions to [editor\[at\]jscires.org](mailto:editor[at]jscires.org).
With warm regards, *Sujit Bhattacharya* (Editor-in-Chief)

THE UNIVERSITY OF VIENNA AND
THE AIT AUSTRIAN INSTITUTE OF TECHNOLOGY ANNOUNCE THE

14th INTERNATIONAL SOCIETY OF SCIENTOMETRICS AND INFORMETRICS CONFERENCE

16-19 JULY, VIENNA, AUSTRIA



Website: <http://www.issi2013.org>

Conference Chairs

Juan Gorraiz
Edgar Schiebel

Programme Chairs

Marianne Hörlesberger,
Christian Gumpenberger
Henk Moed

BACKGROUND

The ISSI 2013 Conference (14th International Society of Scientometrics and Informetrics Conference) will provide an international open forum for scientists, research managers, authorities and information professionals to debate the current status and advancements of informetric and sciento-

metric theories, concepts and indicators. In addition to the traditional evaluative focus, participants will discuss practical applications in related fields such as library and information science, history of science, philosophy of science, R&D-management, etc. The conference will take place at Vienna and is hosted by the University of Vienna and the AIT Austrian Institute of Technology. The conference

is organized under the auspices of ISSI – the International Society for Informetrics and Scientometrics (www.issi-society.info/).

CONFERENCE THEMES:

- Topic 1 Scientometrics Indicators:
 - Criticism and new developments
 - Relevance to Science and Technology, Social Sciences and Humanities
- Topic 2 Old and New Data Sources for Scientometric Studies: Coverage, Accuracy and Reliability
- Topic 3 Science Policy and Research Evaluation: Quantitative and Qualitative Approaches



The campus of the University of Vienna Photo copyright © University of Vienna

- Topic 4 Research Fronts and Emerging Issues
- Topic 5 Technology and Innovation Including Patent Analysis
- Topic 6 Collaboration Studies and Network Analysis
- Topic 7 Webometrics
- Topic 8 Visualisation and Science Mapping: Tools, Methods and Applications
- Topic 9 Management and Measurement of Bibliometric Data within Scientific Organizations
- Topic 10 Open Access and Scientometrics
- Topic 11 Modeling the Science System, Science Dynamics and Complex System Science
- Topic 12 Scientometrics in the History of Science
- Topic 13 Sociological and Philosophical Issues and Applications
- Topic 14 Bibliometrics in Library and Information Science

CONFERENCE VENUE:

Vienna lies in the very heart of Europe, making it an ideal and attractive conference venue.

The outstanding geographic position will hopefully not only attract bibliometri-

cians and scientometricians from all over the world, but also target a much broader audience in related fields.

Vienna is not only famous for its cultural attractions, but also has an outstanding culinary reputation.

LOCATION OF THE CONFERENCE:

The conference will be located at the Campus of the University of Vienna, a very special

place due to its history as the former General Hospital, its architecture and its overall concept (<http://campus.univie.ac.at/en/home/>).

IMPORTANT DATES

Deadlines:

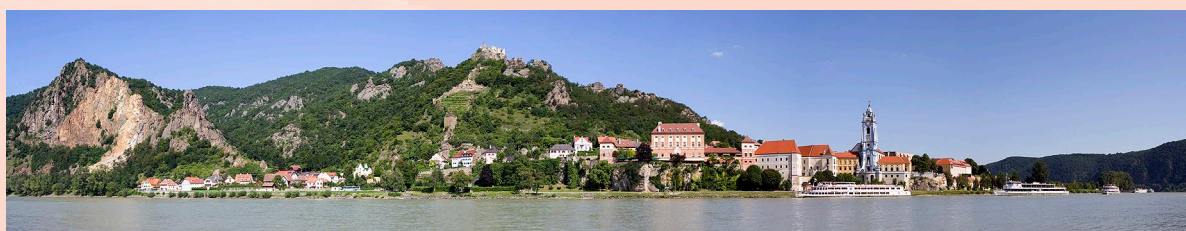
- ▶ for full and research-in-progress papers and workshops/tutorials: 21 January 2013
- ▶ for posters: 18 March 2013
- ▶ for Doctoral Forum: 4 February 2013

Early Bird registration:

- ▶ 1 March 2013 - 12 May 2013.

Social Event on Friday, 19 July 2013: Romantic Danube Valley – “Wachau“

We start our tour by bus to Wachau, the romantic Danube valley situated before Vienna. Our first destination is Melk, where we visit the magnificent Baroque monastery and admire the breathtaking view of the Danube. After lunch we embark on a boat trip on the Danube, which takes us from Melk to Spitz. We will pass the picturesque town of Dürnstein with the Kuenringer castle, where 800 years ago King Richard the Lionheart was held prisoner. This concludes our trip and we will return to Vienna.



Duernstein with the Kuenringer castle. Photo copyright © Austrian National Tourist Office www.austrianviews.at

CONFERENCE ANNOUNCEMENT AND CALL FOR PAPERS

In 2010 two prominent international conference series were merged - the ENID series and the 'Leiden' STI Series. The now annual STI Conference is devoted to bringing together researchers, STI indicator producers and users, as well as other stakeholders. It aims to provide a European and worldwide forum for presenting and discussing advances in constructing, using and interpreting STI indicators. Thus a better understanding is gained with regard to STI indicators applied in different contexts which range from understanding institutional structures, developmental processes and contexts of science itself to their use as analytical tools in knowledge management and science policy decision making.

Organized under the auspice of ENID, the European Network of Indicator Designers (www.enid-europe.org) the

18th SCIENCE AND TECHNOLOGY INDICATORS CONFERENCE (STI)

UNDER THE HEADING:
“TRANSLATIONAL TWISTS AND TURNS:
SCIENCE AS A SOCIO-ECONOMIC ENDEAVOR”

WILL TAKE PLACE FROM
4-6 SEPTEMBER 2013 IN BERLIN, GERMANY.

THEMES

In recent years the demand for and the use of science, technology and innovation indicators increased significantly. On the one hand science policy is asking for 'objective' data to assess the performance, position and interaction of the various players in the STI system. Among other things, this can be explained by the widespread move towards new modes of governance which increasingly can be characterized as 'governing by competition'. On the other hand science itself is calling for a better understanding of its knowledge production, dissemination and transfer processes. Both sides serve as continuous driving forces for the development of quantitative studies of science, technology and innovation.

New demands also emerged as a consequence of the growing complexity of science and innovation systems. This concerns, for instance, interactions at the regional, national

and international level but also changes in the scientific communication due to the increasing relevance of new communication channels. Consequently new data sources open up new analytical options and new indicators emerge addressing these aspects (e. g. collaboration indicators, web indicators, indicators on human resources, career advancement and mobility). Existing indicators are put to test whether they are still adequate and address the needs of science policy as much as science studies.

The conference aims to provide a locus both for general methodological discussion concerning new indicators, their use in policymaking and the realm of science of science studies. The requirements for data generation, indicator production, also for specific domains, their design, methodology, experimental development and application will be discussed.

We invite submission for papers to be presented to the conference on the following key topics:

- ▶ Measuring and assessing benefits of science (including scientific outputs, innovation, social and environmental benefits)
- ▶ Knowledge transfer, knowledge exchange and specific issues relating to translational research
- ▶ Science push or pull factors for societal change
- ▶ Governance by competition: modes, instruments, effects and impacts of competition in research funding
- ▶ Impact of performance-based funding systems
- ▶ Production and reproduction of hierarchy: pros and cons of university rankings
- ▶ The geography of science and higher education systems: globalization, regionalization and localization processes
- ▶ Cross-sectoral research collaborations: fertilization or impediment?

CALL FOR ABSTRACTS

The following types of contributions are invited:

- ▶ Full papers (up to 3,000 words, including an abstract, should outline the theoretical framework, research questions, methodology and possibly preliminary results) should have an analytical approach, starting from theories in economics or social sciences and formulating specific questions to be answered with existing or novel indicators. A broader view of the research system with regard to public and private players on the one hand and different types of research and innovation activities on the other hand is strongly encouraged.
- ▶ Work in progress (extended abstract up to 1,000 words). Presentations of ongoing projects and activities can be more descriptive in nature but should be contextualized in terms of policy-relevant questions and production of new indicators and datasets.
- ▶ Poster presentations (extended abstract up to 1,000 words). Posters are devoted to present preliminary and provisional research results, which would benefit from a broad discussion for further implementation.

IMPORTANT DATES

Paper submission: We will use the Easy-Chair system for paper submission. Detailed information will be available via the conference website in early 2013.

Deadline for submission is 1 March 2013. Submissions should contain the following information:

- ▶ Name and affiliation of the author(s)
- ▶ Name and email of the corresponding author
- ▶ Conference theme and subtheme (see topics outlined above)
- ▶ Selected references

All abstracts will be peer-reviewed.

Authors will be notified about the acceptance of their papers by 20 May 2013.

Conference registration will open on 1 June 2013.

CONFERENCE COMMITTEE AND CONTACT

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Leiden University, President ENID
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Benedetto Lepori, University of Lugano
Emanuela Reale, CERIS-CNR Rome
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Email: STI2013@forschunginfo.de
Web: <http://2013.sticonference.org/>

EUROPEAN SUMMER SCHOOL FOR SCIENTOMETRICS

Subsequent to the 18th STI Conference the 4th European Summer School for Scientometrics (esss), jointly organized by iFQ, Berlin, Germany, Katholieke Universiteit Leuven, Belgium and the Universität Wien, Austria will take place from 8 to 13th September 2013 in Berlin. Detailed information on the program and the venue will be available via www.scientometrics-school.eu

TWO NORDIC BIBLIOMETRIC WORKSHOPS IN HELSINKI

CONFERENCE REPORT

MARIA FORSMAN

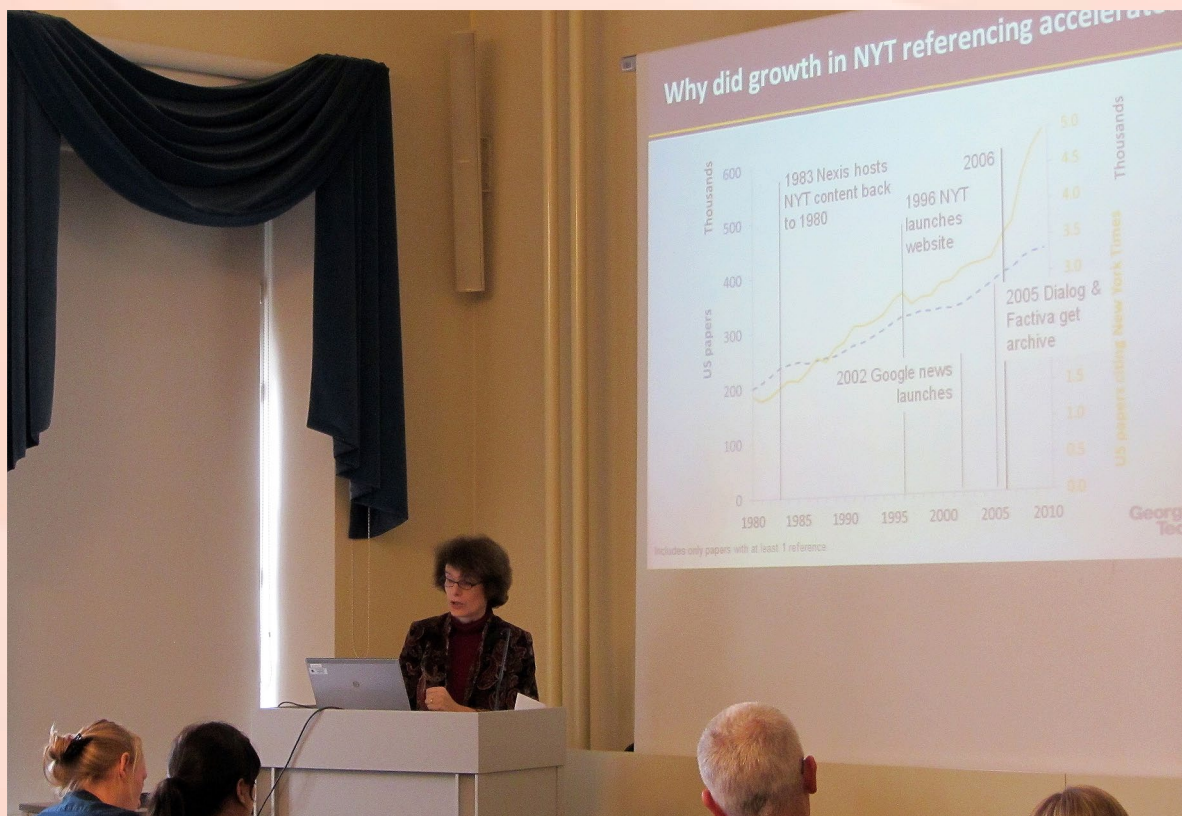
Helsinki University Library

HANNA-MARI PUUSKA

CSC – IT Center for Science, Finland

In October 2012, more than 120 people interested in bibliometrics met in Helsinki, Finland, where the annual Nordic

Workshop on Bibliometrics and Research Policy was held jointly with the Nordforsk Workshop on Bibliometrics for the Social



Professor Diana Hicks gave a keynote speech in both workshops.
Photo copyright: © Mari Elisa Kuusniemi



The participants had a chance to visit the new Helsinki University Library building, Kaia House, with a panorama view over the city campus of the University of Helsinki. Photo copyright: © Anna-Kaisa Hyrkkänen

Sciences and Humanities. The workshops were organized by the Helsinki University Library together with Nordforsk¹.

The participants of both workshops included bibliometricians, researchers of science studies, research administrative staff, as well as library and information specialists – not only from Nordic countries, but also from Baltic countries, Russia, Germany, Belgium, and the Netherlands. Most of the participants took part in the social events which included a visit to the new library building of the university and workshop dinners in nice old buildings in the city centre of Helsinki.

The keynote speaker of both workshops, professor Diana Hicks from the Georgia Institute of Technology, U. S., gave interesting presentations on the New York Times as a resource for scholarship and on Issues with data sources for social science and humanities bibliometrics. The other presentations of the 17th Nordic workshop dealt with theoretical and methodological questions in bibliomet-

rics, development and nature of sciences, as well as experiences of research evaluation and bibliometrics in universities and libraries.

The impulse for the workshop on bibliometrics in social sciences and humanities (SSH) came from the conclusion of NordForsk's report, Comparing Research at Nordic Universities using Bibliometric Indicators (2011) which highlights the need for better representation of SSH in the bibliometric data sources. The workshop included presentations on various topics from the viewpoint of SSH fields: applying bibliometric methods, research evaluation, co-publishing patterns, and the use of national publication data.

The presentations of both workshops are available on the websites:

- ▶ 17th Nordic Workshop on Bibliometrics and Research Policy
<http://blogs.helsinki.fi/nbw-2012/>
- ▶ Nordforsk Workshop on Bibliometrics for the Social Sciences and Humanities (SSH)
<http://blogs.helsinki.fi/nordforskssh2012/>

¹ NordForsk is an organisation under the Nordic Council of Ministers that supports Nordic research cooperation.

THE 8th INTERNATIONAL CONFERENCE ON WEBOMETRICS, INFORMETRICS AND SCIENTOMETRICS (WIS) & THE 13th COLLNET MEETING

KISTI IN SEOUL, SOUTH KOREA, 23-26 OCTOBER 2012
[HTTP://COLLNET2012.KISTI.RE.KR](http://collnet2012.kisti.re.kr)



HILDRUN KRETSCHMER
COLLNET Center
Hohen Neuendorf, Germany



KYUNG-RAN NOH
Korea Institute of Science and Technology
Information (KISTI), Seoul, Korea

INTRODUCTION

The 8th International Conference on Webometrics, Informetrics and Scientometrics & 13th COLLNET Meeting took place in Seoul, South Korea, on 23-26 October 2012. This joint meeting was organised under the auspices of the international organisation

COLLNET and by the Korea Institute of Science and Technology Information (KISTI).

This event is part of a successful conference series. Previous COLLNET meetings (www.collnet.de), part of which were jointly organised with other events, such as for nine years with the international conferences on Webometrics, Informetrics and Sciento-



metrics (WIS), had been held in Berlin (Germany) in 2000, New Delhi (India) in 2001, Sydney (Australia) in 2001, Beijing (China) in 2003, Roorkee (India) in 2004, Stockholm (Sweden) in 2005, Nancy (France) in 2006, New Delhi (India) in 2007, Berlin (Germany) in 2008, Dalian (China) in 2009, Mysore (India) in 2010 and Istanbul (Turkey) in 2011.

In conjunction with this conference, also the Asia Triple Helix Society (ATHS) has delivered a panel with more than 10 contribu-

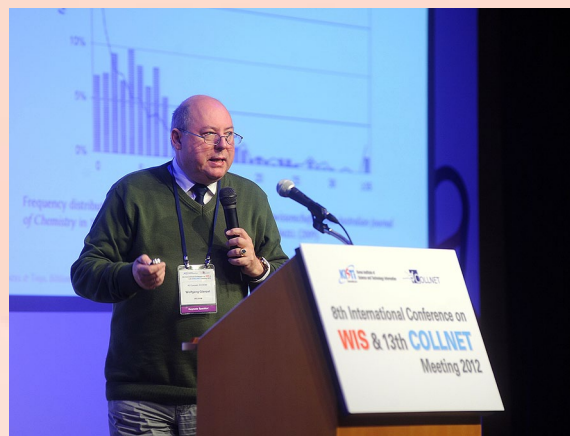
tions. For the detailed information, please refer to <http://asia-triplehelix.org> and <http://collnet2012.kisti.re.kr/wsp/main/main.jsp>.

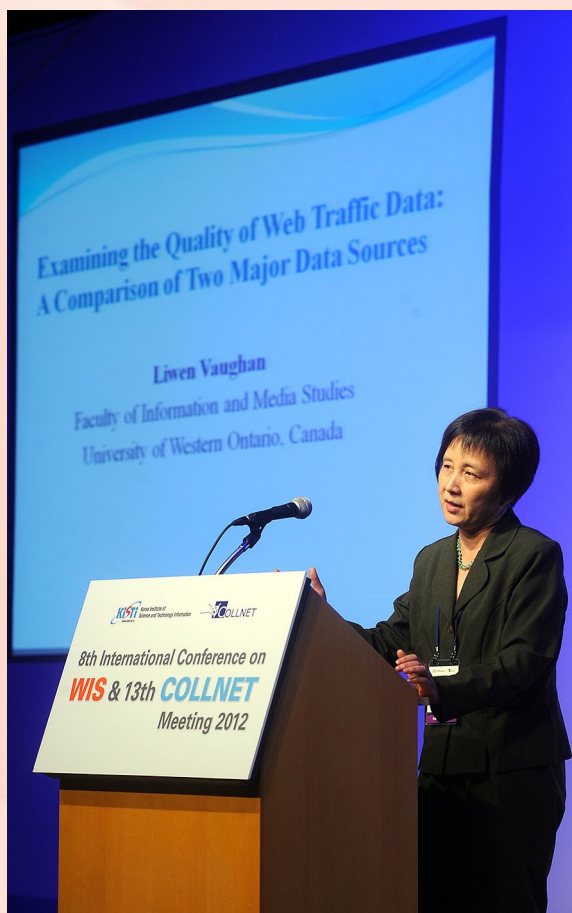
ABOUT THE CONFERENCE

The 8th International Conference on Webometrics, Informetrics and Scientometrics (WIS) & 13th COLLNET Meeting attracted more than 300 participants from more than

19 countries. At the conference, nine keynote lectures were presented, in particular, Wolfgang Glänzel (Belgium) delivered a talk on “High-End Performance or Outlier? Evaluating the Tail of Scientometric Distribution”, Hiltrun Kretschmer (Germany) on “Commemorating Professor Liu Zeyuan’s 50 Years Teaching: The Decade from 1999-2009 in Collaboration with COLLNET” and on “Who is Collaborating with Whom: Gender Differences in Co-authorship Networks: Empirical Testing of a Mathematical Model”, Ho-Nam Choi (Korea) on “Korean Scholarly Information Analysis Based on Korea Science Citation-index Database (KSCD)”, Ronald Rousseau (Belgium) on “Serials of Proceedings: The case of ACTA Horticulturae”, Leo Egghe (Belgium) on Dynamical Aspects of Information









Production Processes”, Liwen Vaughan (Canada) on “Examining the Quality of Web Traffic Data: A Comparison of Two Major Data Sources”, Donald deB Beaver (USA) on “Further Reflections on Scientific Collaboration”, Michel Zitt (France) on “Diversity of Citation Behavior across Fields and Related Normalization Issues” and Liu Zeyuan (China) on “Relationships and Forefront of the Scientometrics and its Sister Disciplines”. The variety of topics given by the keynotes is also mirrored by the about 60 oral and 15 poster contributions. The altogether 20 parallel sessions were mainly focused on the eight topics, particularly, Theory and Methodology of Scientometrics, Research Evaluation, Citation Analysis, Research Collaboration, Electronic Communication and Webometrics, Technology Studies, Gender Studies and National Research Performance.

Besides the Proceedings the WIS & COLLNET Meeting provided to the participants of the conference in Seoul, a selection of keynote and contributed papers will be published in 2013 in dedicated issues of the two international journals

- ▶ Scientometris (Springer) and
- ▶ COLLNET Journal of Scientometrics and Information Management (TARU Publications co-published by Taylor & Francis Group, UK)

ABOUT THE ORGANISER

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THE FOLLOWING EVENT...

...of this conference series will be organised in the coming year. The 9th International Conference on Webometrics, Informetrics and Scientometrics (WIS) & 14th COLLNET Meeting will be held at the Estonian Research Council, August 15-17, 2013 Tartu, Estonia.

<http://www.etag.ee/international-research-cooperation/collnet-2013/?lang=en>

THOUGHTS ABOUT THE ACTIVITY INDEX AND ITS FORMAL ANALOGUES



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Abstract. The fact that the activity index is a relative index and consequences of this fact are discussed.

Keywords: activity index, attractivity index, Balassa index, absolute and relative indicators

INTRODUCTION: DEFINITION OF THE ACTIVITY INDEX

We recall (Frame, 1977) that the activity index (AI) of country C with respect to a given field F (and with respect to the world, W, which in practice means with respect to the used database) in a given year Y (or, more generally, period P) is defined as:

$$AI(C,F,W,Y) = \frac{\text{the country's share in the publication output in the field } F}{\text{the country's share in the world's publication output in all fields}} \quad (1)$$

The activity index can also be expressed as (Schubert & Braun, 1986; Schubert et al., 1988):

$$AI(C,F,W,Y) = \frac{\text{the given field's share in the country's publication output}}{\text{the given field's share in the world's publication output}} \quad (2)$$

Denoting by $s(C,F)$ the publication output of country C in field F; by $t(C)$ the total publication output of country C; by $v(F)$ the total number of publications published in field F; and by w the total number of publications in the world over all fields, we see that:

$$\begin{aligned} \text{Equation (1)} &= \frac{\frac{s(C,F)}{v(F)}}{\frac{t(C)}{w}} = \frac{s(C,F) * w}{v(F) * t(C)} = \\ &= \frac{\frac{s(C,F)}{t(C)}}{\frac{v(F)}{w}} = \text{Equation (2)} \end{aligned}$$

Using the definition it can easily be shown that a country cannot have an activity index strictly larger than one in all fields. This is shown in the following proposition.

A country's activity index cannot be larger than one for all fields.

We assume that fields and countries are disjoint so that each publication is assigned to exactly one country and one field. We further assume that there are n different fields, denoted as F_j , $j = 1, \dots, n$.

Now, we consider country C and assume that for each $j = 1, \dots, n$ $AI(C, F_j) > 1$. Then we have for each $j = 1, \dots, n$:

$$\frac{\frac{s(C,F_j)}{t(C)}}{\frac{v(F_j)}{w}} > 1 \text{ and hence: } s(C,F_j) * w > t(C) * v(F_j)$$

As this inequality holds for each $j = 1, \dots, n$ we obtain:

$$\sum_{j=1}^n s(C,F_j) * w > t(C) * \sum_{j=1}^n v(F_j)$$

leading to $t(C) * w > t(C) * w$ which clearly is a contradiction.

This shows that a country cannot have an activity index larger than one for each field, and by the same reasoning a country cannot have an activity index smaller than one for each field. Even more can be said. The calculations above show that it is not possible that a country has an activity index equal to 1 for some fields and an activity index strictly larger than one in other fields (at least one such field).

In (Rousseau & Yang, 2012) we have shown that if the activity index is strictly larger than one then it is theoretically possible that an increase of $s(C, F)$ by D publications (and hence also $v(F)$ and $t(C)$ and w increase by D) may – depending on D and the other parameters – lead to a decrease of AI , and similarly a decrease by d publications, and no other changes, may lead to an increase in the activity index. This already suggests that $AI(C,F,W,Y)$ is difficult to interpret. Yet, we also showed that in the case of (real) countries and fields this counterintuitive behaviour did not happen.

ABSOLUTE AND RELATIVE INDICATORS

There is, however, another reason why the meaning of the AI is difficult to grasp. Indeed if the values of $s(C,F)$, $v(F)$ and $t(C)$ stay the same – and these are the parameters we are interested in – then $AI(C,F,W,Y+1)$ may differ from $AI(C,F,W,Y)$ if there is an increase or decrease in w , unrelated to country C or field F . Concretely, the activity index of the USA in physics may increase just because China, or any other country, has an increase in articles on chemistry (leading to an increase in w). Hence a change (increase or decrease) in the activity index can happen for reasons which have nothing to do with the country or the field one is interested in. Does this imply that the AI cannot be used in dynamical studies? No, the AI can be used in dynamical studies. One must, however, realize that the AI is a relative indicator, not an absolute one.

If AI were an absolute indicator then outside activities should have nothing to do with its value, and similarly, returning to the discussion in (Rousseau & Yang, 2012), an increase in $s(C, F)$ should always lead to an increase in AI . However, AI is designed as a relative indicator, not as an absolute one!

Considering the case that the values of $s(C,F)$, $v(F)$ and $t(C)$ stay the same and that w

increases, we realize that the fact that w increases and that $v(F)$ stays the same, means that worldwide the relative importance of field F has decreased. If now, in country C , the importance of field F has stayed the same, this implies that the importance of field F in country C has increased relative to the importance of field F in the world. Hence AI for country C and field F must increase, which is exactly the relation between $AI(C, F, W, Y+1)$ and $AI(C, F, W, Y)$.

Moreover, assume that the world output in a given field F is the same in the years Y and $Y+1$, denoted as $v(F, Y) = v(F, Y+1)$. Consider now a given country C , for which its output in field F and its total output is unchanged: $s(C, F, Y) = s(C, F, Y+1)$ and $t(C, Y) = t(C, Y+1)$. Even then the rank of this country according to its activity index in the field F may change. Indeed $AI = (s/v) \cdot (w/t)$, and while the first factor (s/v) is assumed to be constant, the second one differs between countries (activities outside the field F , determining the importance of field F in the world). Hence even for the dynamic study of rankings between countries based on the AI care must be exercised in their interpretation.

From the previous reflections we conclude that one must realize that the AI is a relative indicator, not an absolute one. It can even be considered a “double relative” indicator as it is a ratio of ratios. The relative specialization index $RSI = (AI-1)/(AI+1)$ (Glänzel, 2000) is just a transformation of the AI (which assures that the indicator stays bounded) and hence the same remarks hold for RSI (with 1 as point of comparison replaced by 0). Finally, as the attractivity index (Schubert et al., 1988), the activity index based on document types (Zhang et al., 2011) and the revealed comparative advantage or Balassa index (Balassa, 1965) have the same mathematical form as the AI , also for these and similarly constructed indicators the same warnings hold.

CONCLUSION

It is not because an indicator is not easily to understand that it is invalid or should

not be used. One just has to understand its meaning and use it appropriately. We hope that this short note has helped in clarifying the meaning of the activity index and related scientometric indicators.

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