ISSI Newsletter

QUATERLY E-NEWSLETTER OF THE INTERNATIONAL SOCIETY FOR SCIENTOMETRICS AND INFORMETRICS
ISSN 1998-5460

#28 / VOLUME 07 NUMBER 4
DECEMBER 2011

CONTENTS

EDITORIAL

Just a week away from the end of 2011 I hope that it is not premature to say that this year was a good one—at least ISSI-wise. Amongst others we celebrated Manfred Bonitz's 80th birthday with a Festschrift dedicated to him; Olle Persson's professional career was rewarded by the Price-medal at the 11th ISSI Conference in Durban; and ISSI carried out a successful presidential & partial board member election that attracted a relatively high nominating & voting activity from all over the world. The ISSI Newsletter marched forward by the help of no less than 27 contributors from 13 countries; and the Society itself could have welcomed 17 new members this year.

Speaking of what, it is my usual duty now to draw your attention: if you happen to belong to the 12% whose membership expires at the end of 2011, please, don't forget to renew it—it is easy and takes just a few minutes. For more info, please check out the ISSI website: http://www.issi-society.info/join.html.

On behalf of the editorial board, I wish you a very pleasant and relaxing holiday season, as well as a successful and happy new year for 2011.

Balázs Schlemmer
technical editor

ISSI e-Newsletter (ISSN 1998-5460) is published by ISSI (http://www.issi-society.info/).
Contributors to the newsletter should contact the editorial board by e-mail.

- **Wolfgang Glänzel,** *Editor-in-Chief:* wolfgang.glanzel[at]econ.kuleuven.be
- **Balázs Schlemmer,** *Technical Editor*: balazs.schlemmer[at]gmail.com

- **Judit Bar-Ilan**: barilaj[at]mail.biu.ac.il
- **Sujit Bhattacharya**: sujit_academic[at]yahoo.com
- **María Bordons**: mbordons[at]cindoc.csic.es
- **Jacqueline Leta**: jleta[at]bioqmed.ufrj.br
- **Olle Persson**: olle.persson[at]soc.umu.se
- **Ronald Rousseau**: ronald.rousseau[at]khbo.be
- **Dietmar Wolfram**: dwolfram[at]uwm.edu

Accepted contributions are moderated by the board. Guidelines for contributors can be found at http://www.issi-society.info/editorial.html

3rd INTERNATIONAL SYMPOSIUM ON INFORMATION MANAGEMENT IN A CHANGING WORLD

E-SCIENCE AND INFORMATION MANAGEMENT

SEPTEMBER 19-21, 2012
ANKARA, TURKEY

(SECOND CALL FOR PAPERS)

SYMPOSIUM WEB SITE

by2012.bilgiyonetimi.net/en/

ORGANIZER

Hacettepe University Department of Information Management, Ankara, Turkey (http://www.bby.hacettepe.edu.tr/eng/)

THEME

"E-Science and Information Management"

OBJECTIVES

IMCW2012 aims to bring together both researchers and information professionals to discuss the implications of e-science for information management. Some of these issues and challenges are as follows: information literacy, intellectual property rights, e-science and open access data archives, information processing and visualizations tools, collection development and management, e-science librarianship, and so on.

KEYNOTE SPEAKER

Dr. Tony Hey,
Corporate Vice President of Microsoft

PROCEEDINGS BOOK

Accepted papers and posters will appear in the proceedings book to be published by Springer under its CCIS series (http://www.springer.com/series/7899) and in the Symposium web site. Papers that appear in Springer's CCIS series are indexed in Thomson Reuter's Conference Proceedings Citation Index.

Main topics of the Symposium include (but not limited with) the following:

- Data Management Challenges in E-Science

- Data Life-cycle in E-Science
- Information Discovery, Organization, and Retrieval in E-Science
- Information Management and E-Science
- Information Architecture for E-Science
- Education for Information Management and E-Science
- Scholarly Publishing, Open Access and Digital Repositories in E-Science
- Digital Preservation of Scientific and Cultural Heritage
- Social and Cultural Issues and E-Science

HOW TO SUBMIT

In addition to papers, short papers (pecha-kucha), posters, workshops and panels on e-science and information management, general papers on information management are also welcome. Student papers and posters will also be considered. Please use the template available in the Symposium web site to prepare your contributions and proposals, and send them to us using the Conference Management Software (openconf).

IMPORTANT DATES

First Call:
July 2011
Second Call:
October 2011
Third Call:
December 2011
Last date to send papers and posters:
23 January 2012
Authors notification:
5 March 2012
Final papers submission and registration:
7 May 2012
Symposium:
19-21 September 2012

EX LIBRIS COMPETITION

Because IMCW2012 coincides with the 40th anniversary of the foundation of the Department of Information Management of Hacettepe University, to commemorate this event we organized an international ex libris competition with the theme "information management" (http://exlibris.hacettepe.edu.tr/index.php?lang=en&page=HomePage). The winning art works of ex libris will be exhibited during the symposium. (Please note: Different deadlines apply for the ex libris competition. Please check the ex libris web site above for further information.)

All suggestions and comments are welcome. Please send us your ideas about possible invited speakers at sempozyum@bilgiyonetimi.net.

Symposium Facebook event: https://www.facebook.com/event.php?eid=304487562911300&context=create

Twitter hashtag: #by2012

If you wish to receive updates on IMCW2012 Symposium and the other events organized by the Department of Information Management of Hacettepe University, you can also follow us on Twitter and Facebook.

Looking forward to your contributions to and participation in the Symposium.

Yaşar Tonta,
Chair of the Organizing Committee

Serap Kurbanoğlu,
Chair of the Programme Committee

Hacettepe University Department of Information Management
06800 Beytepe, Ankara, Turkey
Tel: 0312 297 82 00
Fax: 0312 299 20 14
E-mail:
tonta [at] hacettepe.edu.tr,
serap [at] hacettepe.edu.tr

ALTMETRICS:

TRACKING SCHOLARLY IMPACT ON THE SOCIAL WEB

A PLOS ONE COLLECTION

PLoS one
www.plosone.org

CALL FOR PAPERS

The huge increase in scientific output is presenting scholars with a deluge of data. There is growing concern that scholarly output may be swamping traditional mechanisms for both pre-publication filtering (e.g. peer review) and post-publication impact filtering (e.g. the Journal Impact Factor).

Increasing scholarly use of Web 2.0 tools like CiteULike, Mendeley, Twitter, and blogs presents an opportunity to create new filters. Metrics based on a diverse set of social sources could yield broader, richer, and timelier assessments of current and potential scholarly impact. Realizing this, many authors have begun to call for investigation of these metrics under the banner of "altmetrics." Specifically, altmetrics is the creation and study of new metrics based on the Social Web for analyzing and informing scholarship.

Despite the growing speculation and early exploratory investigation into the value of altmetrics, there remains little concrete, objective research into the properties of these metrics: their validity, their potential value and flaws, and their relationship to established measures. Nor has there been any large umbrella to bring these multiple approaches together.

Following on from a first successful workshop on altmetrics, this collection aims to provide a forum for the dissemination of innovative research on these metrics.

We seek high quality submissions that advance the understanding of the efficacy of altmetrics, addressing research areas including:

- Validated new metrics based on social media.
- Tracking science communication on the Web.
- Relation between traditional metrics and altmetrics including validation and correlation.
- The relationship between peer review and altmetrics.
- Evaluated tools for gathering, analyzing, or disseminating altmetrics.

Papers will be reviewed on a rolling basis in-line with PLoS ONE standard practices.

Please note that all submissions submitted before January 28th, 2012 will be considered for the launch of the collection (expected spring 2012); submissions after this date will still be considered for the collection, but may not appear in the collection at launch.

SUBMISSION GUIDELINES

If you wish to submit your research to the Altmetrics: Tracking scholarly impact on the social Web Collection, please consider the following when preparing your manuscript:

- All articles must adhere to the PLoS ONE submission guidelines.
- Standard PLoS ONE policies and publication fees apply to all submissions.
- Submission to PLoS ONE as part of the Altmetrics Collection does not guarantee publication.

When you are ready to submit your manuscript to the collection, please log in to the PLoS ONE manuscript submission system and insert 'Altmetrics' in the relevant field to ensure the PLoS ONE staff are aware of your submission to the Collection. Once you have registered, you can follow the steps for manuscript submission.

Please contact Lindsay King (lking@plos.org) if you would like further information about how to submit your research to the PLoS ONE Altmetrics Collection.

ORGANIZERS

Paul Groth, VU University Amsterdam
Dario Taraborelli, Wikimedia Foundation
Jason Priem, UNC-Chapel Hill

ABOUT PLOS ONE

PLoS ONE (eISSN-1932-6203) is an international, peer-reviewed, open-access, online publication. PLoS ONE welcomes reports on primary research from any scientific discipline.

It provides:

- Open-access – freely accessible online, authors retain copyright
- Fast publication times
- Peer review by expert, practicing researchers
- Post-publication tools to indicate quality and impact
- Community-based dialogue on articles
- Worldwide media coverage

PLoS ONE is published by the Public Library of Science (PLoS), a nonprofit organization.

REPORT ON SIG/MET ACTIVITIES AT THE ASIS&T 2011 ANNUAL MEETING

SUBMITTED BY THE OFFICERS OF SIG/MET

The American Society for Information Science & Technology (ASIS&T) special interest group on Metrics (SIG/MET) organized a one day post-conference metrics workshop at the ASIS&T Annual Meeting, held in New Orleans, Louisiana in October. The event attracted paper and poster submissions from eight countries. To encourage submissions by the next generation of metrics scholars, SIG/MET sponsored a student paper contest, won by Bei Wen and co-authors from the Netherlands. A summary of the presentations appears below.

SIG/MET also sponsored two panel sessions during the annual meeting. "Bibliometrics and LIS Education: How Do They Fit Together?" was organized by Dangzhi Zhao. The panelists discussed the current state of bibliometric education and the need for such education. The panel on "Using Information Obtained Through Informetrics to Address Practical Problems and to Aid Decision Making", organized by the SIG chair, Jonathan Levitt and officers of SIG/MET, presented different applications of informetrics. Both sessions prompted animated discussions among the attendees. An additional "informetrics" panel, not sponsored by SIG/MET, on "Shaking it up: Embracing New Methods for Publishing, Finding, Discussing and Measuring our Research Output" was organized by Alex Garnett, Kim Holmberg, Christina Pikas, Heather Piwowar, Jason Priem and Nicholas Weber. In this lively event the audience actively expressed their opinions on the use, value and the future of metric-based assessment. The results of this event were presented in the poster session.

SUMMARY OF METRICS 2011 PRESENTATIONS

A poster session, accompanied by breakfast, preceded the workshop presentations. The following posters were displayed.

Ulrich Houzanme (Indiana University) - Who are the most influential researchers in Library and Information Science in Africa? An informetrics and evaluative investigation of African LIS researchers' output in mainstream citation sources

Soohyung Joo and Margaret E.I. Kipp (both University of Wisconsin-Milwaukee) - Mining social tags to

explore the Semantic Web of health information resources

Jason Priem, Kaitlin Costello and Tyler Dzuba (University of North Carolina at Chapel Hill) - First-year graduate students just wasting time? Prevalence and use of Twitter among scholars

Papers were presented in three sessions. The first session was dedicated to citation analysis. The first talk was Kate McCain (Drexel University) on "Core journals and persistent research themes in health informatics 2005-2011", presenting visualizations of the themes and their development over time. Next Staša Milojevic (Indiana University) discussed "Citation practices in the field of Library and Information Science", based on the analysis of 18,063 LIS research articles published between 1956 and 2010. The focus of this study was on measures and methods to explore the citation and re-citation practices at a level of a whole scientific field. The last talk in the first session was by the winner of the student paper contest, Bei Wen (Rathenau Institute) on "Mapping science through bibliometric triangulation: An experimental approach applied to water research". This was a thorough investigation of the field of water research, applying analyses based on keyword co-occurrence, journal-journal citation, and title word-cited reference co-occurrence. This work was coauthored by Edwin Horlings (Rathenau Institute), Marielle van der Zouwen (KWR Watercycle Research Institute), Peter van den Besselaar (VU University Amsterdam) and Wim Van Vierssen (Delft University of Technology).

In the second session on author analysis, the first talk was by Kun Lu and Dietmar Wolfram (University of Wisconsin-Milwaukee) on "Measuring author relatedness", presented by Kun Lu. They applied static and dynamic word-based approaches on author publication content using vector space modeling, as well as a topic-based approach based on Latent Dirichlet Allocation to map and compare author research similarity. Next, Dangzhi Zhao (University of Alberta) presented "Author selection in author bibliographic coupling analysis", coauthored with Andreas Strotmann (Leibniz-Institut für Sozialwissenschaften) In this study, she extended her work in author bibliographic coupling to consider the effects of author selection--specifically, how selection by first, last and all authors changes the results of bibliographic coupling. The last talk in this session was by Chaoqun Ni and Cassidy Sugimoto (both Indiana University) on "Research diversity and intensity", presented by Chaoqun Ni. This talk introduced the concept of "author diversity", the degree to which an author publishes in a single domain or across domains.

In the final session of the workshop alternative metrics were discussed. Judit Bar-Ilan (Bar-Ilan University) presented a case study of "Articles tagged by 'bibliometrics' on Mendeley and CiteULike", showing the potentials and limitations of deriving bibliometric measures from these tools based on readership counts. Jason Priem (University of North Carolina-Chapel Hill) presented a large-scale analysis of the applicability of different alternative metrics derived from data on more than 24,000 articles published by PLoS. This work was coauthored by Heather A. Piwowar (NESCent), and Bradley Hemminger (University of North Carolina at Chapel Hill).

The workshop was well-attended, with high degrees of engagement from all attendees (approximately 30). In the last few minutes of the workshop, participants discussed the possibility of another workshop to be held in conjunction with ASIS&T 2012. It was agreed that the workshop was beneficial and another such workshop should be conducted. Participants also noted that maintaining a low degree of formality allowed for the best discussions and encouraged workshop organizers to keep this in mind for scheduling the next event. Plans are underway for a pre-conference workshop and student paper contest for the next ASIS&T meeting, to be held in Baltimore, Maryland in late October. A call for proposals will be sent out early in the new year.

esss 2011 – SCIENTOMETRIC EDUCATION IN INDIAN SUMMER AT THE UNIVERSITY OF VIENNA






CHRISTIAN GUMPENBERGER[1] JUAN GORRAIZ[1] WOLFGANG GLÄNZEL[2] KOENRAAD DEBACKERE[2] STEFAN HORNBOSTEL[3,4] SYBILLE HINZE[3]

[1] University of Vienna, Vienna, Austria
[2] Katholieke Universiteit Leuven, Leuven, Belgium
[3] Institute for Research Information and Quality Assurance (iFQ), Berlin, Germany
[4] Humboldt University of Berlin, Germany

According to the annual rotation idea the second esss (European Summer School for Scientometrics) was hosted by the University of Vienna from 11 – 16 September 2011. It was again jointly organized by the University of Vienna (Austria),the Humboldt University (Germany), the Katholieke Universiteit Leuven (Belgium) and the iFQ (Institute for Research Information and Quality Assurance, Germany).

While last year's debut programme in Berlin (1, 2) comprised of only three days, this year's event was expanded to six days including a free pre-programme, a conference, seminars, hands-on sessions and a workshop. The pre-programme as well as the conference took place at the appealing reading room of Teinfaltstrasse Library, which is part of the Vienna University Library. esss seminars, hands-on sessions and the work-

Photo copyright: http://scientometrics-school.eu/intern8.html

shop were then all held at the IT Seminar Rooms of the Vienna University Campus.

esss 2011 started unofficially with a free pre-programme on 11 September, which was a bibliometric crash course for esss participants short on experience in the field. The attendees were familiarized with the main terms and concepts of bibliometrics by a panel of experts composed of Wolfgang Glänzel (KU Leuven, Belgium), Sybille Hinze (iFQ, Germany), Juan Gorraiz and Christian Gumpenberger (both University of Vienna, Austria).

The official opening of esss 2011 took place on 12 September by the newly appointed Vice Rector Susanne Weigelin-Schwiedrzik from the University of Vienna, who emphasized the importance of bibliometrics and gave a warm welcome to the 120 attendees of the two days esss conference.

Conference day 1 was dedicated to "Theoretical and Practical Aspects" of scientometrics. Wolfgang Glänzel and Stefan Hornbostel (iFQ, HU Berlin, Germany) as the first speakers provided a concise overview of the "History and Institutionalization of Scientometrics", followed by Anthony van Raan (Leiden University, the Netherlands) whose talk "New developments in bibliometric methods for evaluation and mapping of scientific research" included opinions on bibliometric "mortal sins" that were entertaining and controversial at the same time. Werner Marx's (Max Planck Institute for Solid State Research, Stuttgart, Germany) talk about "Bibliometrics in the History and Philosophy of Science" then clearly demonstrated that bibliometrics is certainly not strictly limited to evaluation purposes. However, Henk Moed (Elsevier, the Netherlands) brought the audience back to reality and presented "New developments in the use of bibliometric tools in research assessment".

In the afternoon Koenraad Debackere (KU Leuven, Belgium) talked about "Practical Aspects of Scientometrics" and reflected on imperatives and indicators of modern science and innovation policy. Jonathan Adams (Research Evaluation, Thomson Reuters, UK) picked up where his previous speaker left off and presented "Bibliometrics, Research Evaluation and National Science Policy: What works and what goes wrong?". The final talks of the first day were given by representatives of Elsevier B.V. (Netherlands). Arthur Eger first provided an easy-to-follow "Scopus in-person tutorial", continued by Jörg Hellwig who brought along a fancy presentation of "The SciVal Suite – Helping institutions to establish, evaluate and execute research strategies".

Photo copyright: http://scientometrics-school.eu/intern8.html

The overall topic of conference day 2 (13 September) was "Procedures and Indicators". Wolfgang Glänzel and Sybille Hinze set the stage and introduced "Metrics for Research Evaluation: Indicators, Methods and Mathematical Foundations". The next two presentations were dedicated to the visualization trend in the discipline. Bart Thijs (KU Leuven, Belgium) and Edgar Schiebel (AIT, Austria) talked about background and techniques of "Mapping Science" and "Network Analyses".

After the lunch break Matthias Winterhager (Bielefeld University, Germany) showed quite plainly "What to do (and not to do) with corporate date" and pointed out the well-known issues with affiliations. And since one of the major requirements for bibliometric analyses are appropriate "Bibliometric Data Sources", Wolfgang Glänzel introduced the "usual suspects" (Web of Science, Scopus, Google Scholar), whereas Juan Gorraiz focused on less obvious alternative citation sources like MathSciNet, CAS SciFinder, Derwent Innovations Index, Espacenet, ArXiv.org, Citebase and CiteSeerX.

Like the day before the remaining afternoon was reserved for presentations from industry. Jeff Clovis' (Thomson Reuters, Philadelphia) first talk "Creating and Supporting Innovative Research Pathways" was intended to familiarize the esss attendees with the new interface of Web of Science, whereas the second talk "Assessing faculty productivity and institutional research performance:

Using publication and citation key performance indicators" gave an overview of the portfolio of Thomson Reuters products geared towards research assessment.

The last 3 days (14-16 September) were all about what a summer school is meant to be: seminars, hands-on sessions, group work and presentations. Due to the high demand the organizers doubled the number of accepted participants from 25 to 50 this year, who were split into two groups taught in parallel sessions.

14 September was dedicated to "Bibliometric Indicators". Wolfgang Glänzel and Juan Gorraiz talked about "Journal Impact Measures", whereas Jeffrey Demaine (iFQ, Germany) and William Dinkel (GESIS, Germany) presented "h-index and related measures" in the morning. The imparted theory was then consolidated in practical hands-on exercises in the afternoon.

The focus topics of 15 September were "Cooperation, Co-authorship, Social Networks" on the one hand, and "Mapping Science" on the other. The first topic was taught

by András Schubert (Hungarian Academy of Sciences, Hungary), who managed to also add a few anecdotes to his lecture. The second topic was presented by this year's De Solla Price Medal winner Olle Persson, whose lecture based on his software Bibexcel was exciting but challenging to follow due to Persson's speed and enthusiasm.

As a special treat a guided tour through the premises of the Austrian National Library concluded this day, where the esss participants could marvel at the beauty of the impressive State Hall and glimpse at the biggest collection of globes worldwide located at the Globe Museum.

16 September was the final day of the esss course and designed as a workshop titled "Research Evaluation in Practice". After a shared introduction for all by Wolfgang Glänzel, the participants were asked to work on specific tasks in small groups. Two topics were given (1. Bibliometrics – Citation Analysis, 2. Neurobionics), and the participants had to determine the most important players, the most frequent journals and subject categories in the field and the topics within the field and their distribution. Furthermore they should determine basic indicators of citation impact and analyse the h-core. Then an international collaboration analysis should be performed and the 5 most productive countries as well as the main partners identified. Finally publication activity and citation impact of the five most productive countries in the field should be determined.

Group work was individually supported by Wolfgang Glänzel, Sybille Hinze, Juan Gorraiz, Stefan Hornbostel, Jeffrey Demaine and Ambros Wernisch (University of Vienna, Austria).

After a hearty lunch break at the Universitätsbräu on the Campus in beaming sunshine, all participants regathered in the big forum to present their results. The organizers were happy to see the high quality of the presentations which proved that the participants actually used what they had learned during the whole week.

Photo copyright: http://scientometrics-school.eu/intern8.html

Overall esss 2011 was a huge success with highly positive and encouraging feedback from the participants, who came to Vienna from 22 countries (Algeria, Australia, Austria, Belgium, Colombia, Czech Republic, Denmark, Estonia, France, Germany, Italy, Lebanon, Lithuania, Netherlands, Norway, Poland, Saudi Arabia, South Korea, Sweden, Thailand, United Kingdom, United States). Thus the European Summer School for Scientometrics has already become a truly international event in the second round, and the organizers are looking forward to welcome the next participants for esss 2012 held at the Katholieke Universiteit Leuven in Belgium in the first week of July. Further announcements will be made via esss website (www.scientometrics-school.eu) and via the esss mailing list (to register please send an informal email to office@scientometrics-school.eu).

REFERENCES

1. Gorraiz J., Gumpenberger C., Hornbostel S., Hinze, S., Glänzel, W. & Debackere, K. (2010). European Summer School for Scientometrics (esss) to be launched. Scientometrics 83(2), 601-602. DOI: 10.1007/s11192-010-0206-8

2. Gorraiz J., Gumpenberger C., Glänzel, W., Debackere, K., Hornbostel S., Hinze, S. (2010). esss 2010: A review of the inaugurational European Summer School for Scientometrics in Berlin. Scientometrics 86 (1), 235-236. DOI: 10.1007/s11192-010-0279-4

16th NORDIC WORKSHOP ON BIBLIOMETRICS AND RESEARCH POLICY

A WORKSHOP REPORT

JENS PETER ANDERSEN
Aalborg Hospital, Denmark

JESPER W. SCHNEIDER
Danish Centre for Studies in Research and Research Policy, Denmark

BIRGER LARSEN
Royal School or Information Science, Denmark

Since 1996 bibliometric researchers in the Nordic countries have arranged annual Nordic workshops on bibliometrics and research policy. The general scope of these workshops is to present recent bibliometric research in the Nordic countries and to create better linkages between the bibliometric research groups and their PhD students. While the workshops are based in the Nordic countries, the workshop language is English, and researchers from all over the world are invited to participate. The tone of the workshops is relaxed, and works in progress are very welcome.

In 2011, the 16th workshop was held in Aalborg, in the northern part of Jutland, Denmark on September 22nd-23rd. The Royal School of Library and Information Science hosted the event with attendance of 35 researchers, librarians and policy makers from primarily the Nordic countries, but with representatives from Belgium, Germany, the Netherlands, and United Kingdom. The workshop was kick-started with a keynote presentation by Thed van Leeuwen from the CWTS Centre for Science and Technology Studies in Leiden. Thed presented an overview of the history of the CWTS and some insights in the future development of the centre. Following this, the first day of the workshop was split in two sessions with ample time for feedback, discussions and reflections. The first session was on national assessments, beginning with a presentation by Gunnar Sivertsen and Kaja Wendt on interpreting national indicators in relation to R&D statistics and research policy. Danielle Liu and Birger Larsen presented work from Danielles Master's thesis, on a portfolio of bibliometric indicators for assessing humanities researchers, followed by a presentation of the work on construct-

Coffee break at the Royal School of Library and Information Science.

The audience listening attentively.

Thed van Leeuwen giving the key note.

ing the regional publication database of Flanders by Truyken Ossenblok and Tim Engels. The second session discussed the applicability of new data material in bibliometric assessments in two presentations by Thed van Leeuwen, Rodrigo Costas and Martijn Visser. The first presentation focused on using editorial material, and the complications related hereto, followed by a preliminary analysis of the "Funding Acknowledgment" field in the Web of Science database.

The day was concluded with a workshop dinner at a cosy Italian restaurant in downtown Aalborg.

The second workshop day started with a session on research communities; Markus von Ins gave a presentation of Bibliometric Partners, followed by an analysis of the role of Nobel laureates in shaping the scientific landscape by Katarina Larsen and finally a presentation of a study of the Swedish Institute for Surface Chemistry with respect to basic and applied research and modes of knowledge production, by Karl Bruno.

Following lunch were two sessions on journals and external factors affecting bibliometric analysis respectively. In the journals-session, Carolin Michels presented a journal classification scheme to be created through citation analysis. The next two presentations were by the hosts; Jens Peter Andersen presented a study in progress on using Bayesian statistics to measure robustness and discriminatory strength of journal indicators and Jesper W. Schneider presented a discussion of some caveats for using statistical significance tests in research assessments. The final session started with a co-presented study by Dorthe Henriksen and Tine Mikkelsen, based on their Master's thesis, supervised by Jesper W. Schneider, on variables influencing citation counts in Nature. Putting the finishing touch on the workshop was Dag W. Aksnes, with an analysis of the influence of season of birth on success as a researcher.

The next Nordic Workshop on Bibliometrics and Research Policy will be hosted in Finland in 2012 - and as always researchers from all over the world are welcome at the workshops.

Link to workshop website: http://www.iva.dk/nbw2011

JAN VLACHÝ'S SCIENTIFIC ESTATE AT THE K.U. LEUVEN

HANS-JÜRGEN CZERWON
Bruno-Apitz-Str. 1, D-13125 Berlin (Germany)
hans.czerwon[at]gmx.de

One year went by since Jan Vlachý unexpectedly died on 27 September 2010 during a stay in Berlin (Czerwon, 2010, 2011). Jan, who was one of the pioneers and "founding fathers" of quantitative science studies, left a large scientific estate behind. His scientific estate is now at the Katholieke Universiteit Leuven; it came from Prague to Leuven in January 2011 and was completely disordered in many cardboard boxes. A first sifting through the material revealed a wide range of very different documents: collections of articles (preprints, reprints, copies) and books, manuscripts and drafts of his lectures and scientific articles, professional correspondence, photos and personal notes (handwritten manuscripts, typescripts, tables and graphs). A large number of Jan's personal documents are, of course, written in Czech, that is, in his native language. Because of his diverse scientific interests (physics, mathematical statistics, quantitative studies and sociology of science, R&D policy, history of science, contemporary studies in history, and musicology) quite different documents are available in the archive.

In a first step, all documents have been sighted and classified in subject categories according to their specific content. Different types of documents emerged from the estate allowing for the classification below.

Particularly noteworthy is the extensive scientific correspondence of Jan Vlachý. Fortunately, not only the letters are available in the archive that are written to him, but Jan Vlachý kept the copies of letters written by himself. It can be assumed that several hundred letters have been preserved. Above all, the correspondence to the biography of Alfred J. Lotka is worth mentioning in this context. Furthermore, one can assume that many documents are unique.

In addition to the vast print material, handwritten manuscripts and photographs, there are digital media in the estate (floppy disks, CDs). It will be abso-

Document type	Details
A. Documents related to quantitative studies of science	
1. Personal documents	
1.1. Curriculum vitae	
1.2. Publication lists	Lists of publications (1961-1997)
1.3. Dissertation, Prague 1973	Title: Interdisciplinarita ve vědě (Interdisciplinarity in science)
1.4. Scientific correspondence	
1.5. Correspondence in other contexts	Personal correspondence (genealogy: Lotka's family)
1.6. Photos	
1.7. Other documents	
2. Jan Vlachý's scientific publications	
2.1. Reprints of articles in scientific journals	
2.2. Manuscripts of publications	Publication languages: English, Czech, German, Russian, etc.
2.3. Publications in general journals	Publications in Czech journals
2.4. Reports	
2.4.1. Reports for national research organisations	ČSAV, SAV, Czechoslovak Acad. Agriculture etc.
2.4.2. Reports for international research organisations	e.g. European Union
2.5. Collections of documents for publications	Bibliographies, lists, tables, graphs etc.
2.6. Collections of documents to other science fields	e.g. quantitative musicology
3. Collections to the history of science	
3.1. Collections to Alfred J. Lotka	
3.1.1. Copies of publications of A.J. Lotka	
3.1.2. Photos of the family history of A.J. Lotka	
3.2. Collections to other scientists	Wilhelm Ostwald, Francis Galton etc.
3.3. General aspects of the history of science	Reprints, copies of scientific articles
4. Collections to quantitative studies of science and technology	
4.1. Preprints	
4.2. Reprints	
4.3. Copies	
4.4. Reports	
5. Collections to S&T policy of countries and regions	
5.1. European Union	R & D Reports of the European Commission
5.2.7. North European countries	
5.2.7. Non-European countries	e.g. USA
5.3. International organisations	e.g. OECD
5.4. National organisations	
6. Books	
6.1. Sociology and history of science	
6.2. Quantitative studies of science	
6.3. Scientometrics, informetrics, bibliometrics	
6.3. Mathematics and mathematical statistics	
6.4. Research policy	
B. Documents not related to quantitative studies of science	
7. Collections to the history of Czechoslovakia	
7.1. Documents to Czech resistance fighters	Biographical information (especially documents 1938-1945)
8. Documents to German history	Fascism in Germany and reappraisal of German history after 1945
8.1. German universities 1933-1945	
8.2. Documents to individuals	
8.3. History of Huguenots in Germany	
9. Other books (not listed in 6.)	
9.1. History (especially 1933-1945)	different topics

lutely necessary to develop, organise and study Jan Vlachý's scientific archive systematically and in more detail in order to investigate the various aspects of his long-running scientific activity and especially of the early years of scientometric research. It is foreseeable that this will be a very time-consuming work, which, however, promises interesting insights into life and work of a great personality of our field, and will preserve the plethora of unpublished material for the history of science.

ACKNOWLEDGEMENT

The author would like to thank Professor Wolfgang Glänzel for useful suggestions and for the enabling of two stays at the K.U. Leuven.

REFERENCES

Czerwon, H.J. (2010). Jan Vlachý (1937-2010). A personal obituary. *ISSI Newsletter*, 6 (4), 86–89.

Czerwon, H.J. (2011). Jan Vlachý (1937-2010) Obituary. *Scientometrics*, 87 (3), 655–656.

RESEARCH IN EMERGING FIELDS: WHO TAKES THE LEAD?

WOLFGANG GLÄNZEL
Centre for R&D Monitoring (ECOOM) and Dept. MSI, KU Leuven (Belgium)
Institute for Research Policy Studies, Hungarian Academy of Sciences, Budapest (Hungary)

BART THIJS
Centre for R&D Monitoring (ECOOM) and Dept. MSI, KU Leuven (Belgium)

Abstract: In the present piece we study research performance and collaboration of the European Union and the most active countries in emerging topics that have been identified in a dynamic cluster analysis of selected Web of Science Subject Categories in the period 1999-2008.

INTRODUCTION

The US-EU race for world leadership in science and technology has become a favourite topic in both the US (e.g., Shelton and Holdridge, 2004) and Europe already long before the last EU extensions in 2004/2007 (e.g., REIST-2, 1997, REIST-3, 2003, Dosi et al., 2005). In Europe, more generally, competition and collaboration among the three world leaders in science and technology, the so-called 'triad' USA, EU and Japan, has come into the focus of interest. However, the spectacular growth of the emerging economies (cf. Zhou and Leydesdorff, 2006, Glänzel et al., 2008) have made this model obsolete. China's appearance among the world's leading nations has not only challenged the Triad but moved the centre of gravity in science and technology further towards the Far East. This development has already measurable effect on the balance of power as reflected by scientific production and patenting activity (cf., Glänzel et al., 2008, Rousseau, 2008). The economic growth of countries in other world regions contribute to the global changes in the scientific and technological landscape as well, although this development is somewhat overshadowed by the breath-taking growth of the economies in the Far East (Zanotti, 2002, Zitt et al., 2006, Glänzel, 2008). Several important macro-studies were placed in a broader economic context (e.g., May, 1997, King, 2004) and, therefore, based on an all-fieldscombined approach that provides a somewhat undifferentiated picture concerning a nation's particular contribution

to what is considered 'hot' or future-oriented in science and technology. In the present study we attempt to analyse the outcomes of a recent project that aimed at the identification of emerging topics within scientific disciplines with significant growth patterns in order to detect national contributions to these emerging disciplines and topics. Methodology will be based on previous results, above all on a recent study by Glänzel and Thijs (2012). As examples, four topics, one each from four different disciplines, have been selected. Two questions are of particular interest. Firstly, do the examples tell us anything about Europe's particular activity and competitiveness in the emerging research topics, and, secondly, what is the role of emerging economies in these disciplines with special regard to China, India and Brazil? In order to answer these questions, scientometric standard tools for the analysis of publication activity, citation impact and co-publication analysis are applied to the selected topics.

DATA SOURCES AND DATA PROCESSING

The study is based on bibliographic data extracted from Thomson Reuters' Web of Science (WoS) database. All documents recorded as articles, proceedings papers or reviews indexed in the period 1999–2008 have been taken into account. The papers were assigned to countries based on the corporate address given in the by-line of the publication. All countries indicated in the address field have thus been taken into account. A full counting scheme is applied, that is, papers are assigned to each country appearing in the list of corporate addresses without fractionation. This implies that a share of *x*% in the world total means, that this percentage of papers has at least one (co-)author from the country in question. Since the period 1999–2008 is studied, all counts for the 15 member countries of the EU according to its constitution prior to 2004 have been counted. Duplicates caused by internal collaboration among member countries of the EU15 have been removed to avoid double counting for this world region. For the analysis of international collaboration, co-authorship links of the most active countries were broken down by country pairs and used Salton's measure was used as an indicator of collaboration strength. For the hybrid text- and citation-based cluster analysis, the reference lists of all document pairs have been processed to obtain the strength of bibliographic coupling, while the textual component is based on term frequencies. Terms have been extracted from titles and abstracts, where keyword phrases have been kept, terms have been stemmed and stop words have been removed. Both the textual and the link component have been combined into a joined similarity measure as described by Glänzel and Thijs (2011a).

CONCISE SUMMARY OF METHODOLOGY

The idea of combining citation-link and text based approaches aimed at pronouncing the advantages of the two components and, at the same time, at reducing the by-effects of their shortcomings (cf. Braam et al., 1991a, b, Zitt and Bassecoulard, 1994). The combination of the two methods also makes it possible to cluster documents whenever citation links are weak or even missing. This feature is, above all, important in the applied sciences, most fields of the social sciences and in the humanities. Four WoS Subject Categories with striking growth patterns have been selected from the applied and social sciences. These disciplines are *environmental sciences*; *energy & fuels; public, environmental & occupational health* and *biomedical engineering*. In a first step, these disciplines have undergone a cluster analysis in two different not overlapping periods. The clustering resulted in 6–9 topics each per field and period.

In a second step, "core documents" (Glänzel and Czerwon, 1996) have been used to label clusters and to describe their content (Glänzel and Thijs, 2011a). By definition,

core documents are those documents that have strong (hybrid text-citation) links with many other documents in the field. They can also be used to create links between clusters of the different time periods (Glänzel and Thijs, 2011b) and thus to identify emerging topics, which are expected to have already reached a certain critical mass, to form (more or less) coherent clusters, and to still have strong links to their "mother fields". Three particular cases are considered to indicate such new, emerging topics.

(I) Existing cluster with an exceptional growth with regard to the second period,
(II) Completely new cluster with its root in other clusters in the previous period and
(III) Existing cluster with a topic shift in the new time period.

The identified topics are then validated by experts and further analysed using bibliometric methods. A set of scientometric standard indicators is used for this analysis. This set was first described in detail by Braun et al. (1985). The factual citation impact is expressed by the Mean Observed Citation Rate (MOCR), and an expected citation impact is based on the citation impact of the journals where the papers have been published. Its mean value, calculated over individual papers, is called Mean Expected Citation Rate (MECR). The ratio MOCR/MECR, called Relative citation Rate (RCR), is used to express the relation of the two values. The disciplines and topics are relatively narrow and homogeneous so that further field-normalisation is not necessary. All citation indicators are calculated on the basis of a 3-year citation window beginning with the publication year. An example for the structural-evaluative domain studies was prepared, for instance, for the field of bioinformatics (Glänzel et al., 2009).

RESULTS

ENVIRONMENTAL SCIENCES

The first Subject Category we analysed is environmental sciences. The number of clusters increased from six in 1999–2001 to eight in the second period (2008). One of the new clusters has been labelled "nano

Country	ISI Category (N=27961)					Topic (N=3533)				
	Papers	Share	MOCR	MECR	RCR	Papers	Share	MOCR	MECR	RCR
Belgium	464	1.7%	2.88	2.23	1.29	50	1.4%	1.62	1.83	0.89
Brazil	518	1.9%	2.38	2.23	1.07	57	1.6%	2.04	2.11	0.97
Denmark	384	1.4%	3.07	2.62	1.17	53	1.5%	3.23	2.81	1.15
France	1241	4.4%	2.39	2.33	1.03	143	4.0%	2.35	2.39	0.98
Germany	1629	5.8%	2.47	2.20	1.12	229	6.5%	2.68	2.36	1.14
Greece	462	1.7%	1.72	1.73	0.99	35	1.0%	1.17	1.90	0.62
India	1259	4.5%	1.97	1.88	1.05	186	5.3%	1.33	1.69	0.79
Italy	1244	4.4%	2.17	2.23	0.97	143	4.0%	2.10	2.12	0.99
Japan	1161	4.2%	2.06	2.29	0.90	144	4.1%	1.71	2.26	0.76
Netherlands	705	2.5%	2.76	2.39	1.15	63	1.8%	2.29	2.22	1.03
China	2947	10.5%	2.37	2.33	1.02	368	10.4%	2.15	2.35	0.92
Poland	603	2.2%	1.31	1.31	1.00	91	2.6%	0.69	0.98	0.71
Spain	1346	4.8%	2.64	2.34	1.13	178	5.0%	2.70	2.41	1.12
Sweden	664	2.4%	2.78	2.35	1.18	63	1.8%	2.14	2.05	1.05
UK	1802	6.4%	2.63	2.33	1.13	193	5.5%	3.39	2.57	1.32
USA	7722	27.6%	2.69	2.49	1.08	930	26.3%	2.81	2.58	1.09
EUR15	9279	33.2%	2.37	2.25	1.05	1109	31.4%	2.45	2.31	1.06

Table 1 Environmental sciences ("nano-pollution")
Data sourced from Thomson Reuters Web of Knowledge

pollution". This cluster comprises 3533 documents and represents 12.6% (i.e., ca. 1/8) of the discipline. The topic, which can be considered to be of Type II according to the above typology, can be described, e.g., by the following core documents (data sourced from Thomson Reuters Web of Knowledge).

- On colloid retention in saturated porous media in the presence of energy barriers: The failure of alpha, and opportunities to predict eta
- The significance of heterogeneity on mass flux from DNAPL source zones: An experimental investigation
- C-60 colloid formation in aqueous systems: Effects of preparation method on size, structure, and surface, charge
- Individual and mixture effects of selected pharmaceuticals and personal care products on the marine phytoplankton species Dunaliella tertiolecta
- Nanomaterials as possible contaminants: the fullerene example
- Exploring e-waste management systems in the United States
- Influence of electrolyte species and concentration on the aggregation and transport of fullerene nanoparticles in quartz sands
- Toxicity of aqueous fullerene in adult and larval Fundulus heteroclitus
- Effects of particle composition and species on toxicity of metallic nanomaterials in aquatic organisms
- Precise and Accurate Compound Specific Carbon and Nitrogen Isotope Analysis of Atrazine: Critical Role of Combustion Oven Conditions

The scientometric indicators for the most active countries in the discipline and the topic are presented in Table 1. In this case, the overall picture of the topic by and large mirrors that of the discipline. Roughly one third of all papers have an author in the EU, the share of the US lies only slightly above one fourth. China is with about 10% by far the most active country after the US. The larger EU activity is somewhat contrasted by a lower citation impact as compared with that of the USA.

The MOCR of the world total in "nano pollution" amounts to 2.18. The citation impact of the US and EU are distinctly above this reference value. Furthermore, the highest impact is achieved by the UK and Denmark. This is contrasted by the surprisingly low impact of Belgium and Greece. Finally, the relatively high impact of China's publications in this emerging topic is worth mentioning (cf. Glänzel et al., 2008). Its MOCR value exceeds that of Japan and is very close to reference standard. International collaboration in "nano pollution" is quite intense. The share of internationally co-authored papers in all papers ranges between more than 60% (Denmark and Belgium) and less than 20% (Poland, Brazil and India). The median amounts to 39.4%. The share of interna-

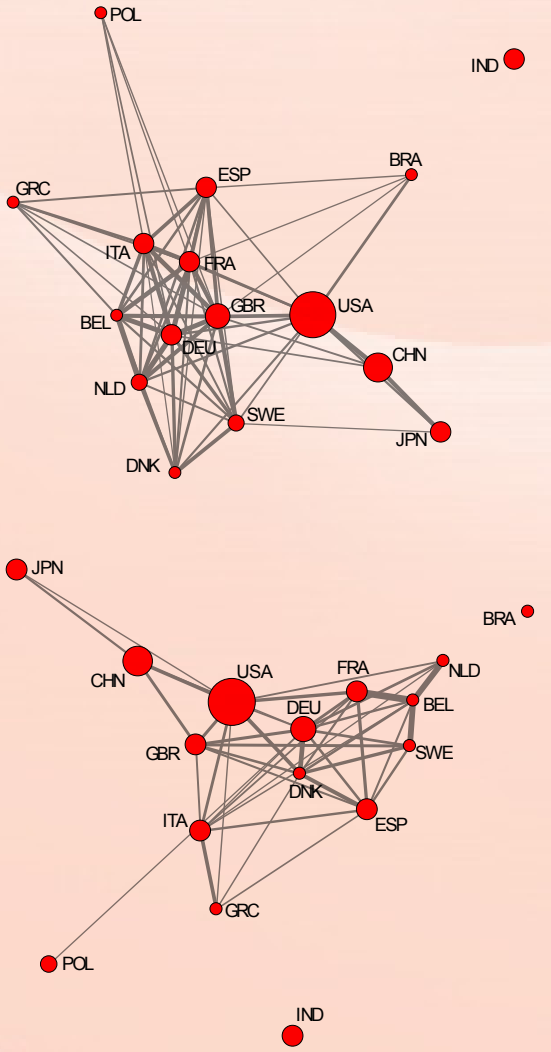

Figure 1 Environmental sciences (top: subject category; bottom: emerging topic) Data sourced from Thomson Reuters Web of Knowledge

tional co-publications in the US, China and Japan is traditionally moderate (25%–27% each). The members of the EU form a strong cluster in the WoS discipline (see Figure 1). The US are connected with the EU as well as with China and Japan. In the emerging topic, the coherence of the European cluster is less pronounced and the US form the most important node in the collaboration network.

ENERGY & FUELS

The second topic emerges from research in energy & fuels. The number of clusters increased from seven in 1999–2003 to eight in the second period (2006–2008). One of the clusters in the second period has been labelled "biofuel". This cluster comprises 7059 documents and represents 24.2% (i.e. about 1/4) of the discipline. This topic can be considered to be of Type 1 emerging from a former cluster on fuels. It can be described by the following selected core documents (data sourced from Thomson Reuters Web of Knowledge).

- Process optimization for biodiesel production from mahua (Madhuca indica) oil using response surface methodology
- Continuous production of biodiesel via transesterification from vegetable oils in supercritical methanol
- Temperature effects on biohydrogen production in a granular sludge bed induced by activated carbon carriers
- Biohydrogen generation from jackfruit peel using anaerobic contact filter
- Biohydrogen-production from beer lees biomass by cow dung compost
- Isolation of hydrogen generating microflora from cow dung for seeding anaerobic digester
- Fermentative hydrogen production from xylose using anaerobic mixed microflora
- Sulfate effect on fermentative hydrogen production using anaerobic mixed microflora
- Biodiesel production via non-catalytic SCF method and biodiesel fuel characteristics
- Biological hydrogen production in suspended and attached growth anaerobic reactor systems

The scientometric indicators for the most active countries in the discipline and the topic are presented in Table 2. Unlike in

Country	ISI Category (N=29160)					Topic (N=7059)				
	Papers	Share	MOCR	MECR	RCR	Papers	Share	MOCR	MECR	RCR
Belgium	198	0.7%	3.94	3.49	1.13	50	0.7%	4.14	3.82	1.08
Brazil	523	1.8%	3.50	3.82	0.91	140	2.0%	3.71	3.76	0.99
Denmark	318	1.1%	5.00	3.28	1.52	75	1.1%	10.01	3.44	2.91
France	1265	4.3%	3.27	3.23	1.01	328	4.6%	3.80	3.80	1.00
Germany	1294	4.4%	3.35	3.06	1.09	326	4.6%	4.63	3.80	1.22
Greece	462	1.6%	3.38	3.27	1.04	120	1.7%	3.59	3.13	1.15
India	1510	5.2%	4.11	3.97	1.04	421	6.0%	4.53	3.88	1.17
Italy	811	2.8%	3.40	3.44	0.99	223	3.2%	3.89	3.65	1.06
Japan	1524	5.2%	3.52	3.87	0.91	499	7.1%	4.29	4.14	1.04
Netherlands	480	1.6%	3.94	3.44	1.14	94	1.3%	4.65	3.89	1.19
China	3759	12.9%	3.68	3.58	1.03	1218	17.3%	4.12	3.78	1.09
Poland	339	1.2%	2.47	3.12	0.79	97	1.4%	3.66	3.66	1.00
Spain	1120	3.8%	3.51	3.76	0.93	262	3.7%	3.62	3.70	0.98
Sweden	568	1.9%	3.71	3.44	1.08	93	1.3%	3.66	3.64	1.00
UK	1424	4.9%	3.26	3.12	1.05	307	4.3%	3.78	3.09	1.22
USA	5136	17.6%	3.50	3.23	1.08	1036	14.7%	4.11	3.60	1.14
EUR15	7778	26.7%	3.38	3.31	1.02	1806	25.6%	4.02	3.58	1.12

Table 2 Energy & Fuels (biodiesel)
Data sourced from Thomson Reuters Web of Knowledge

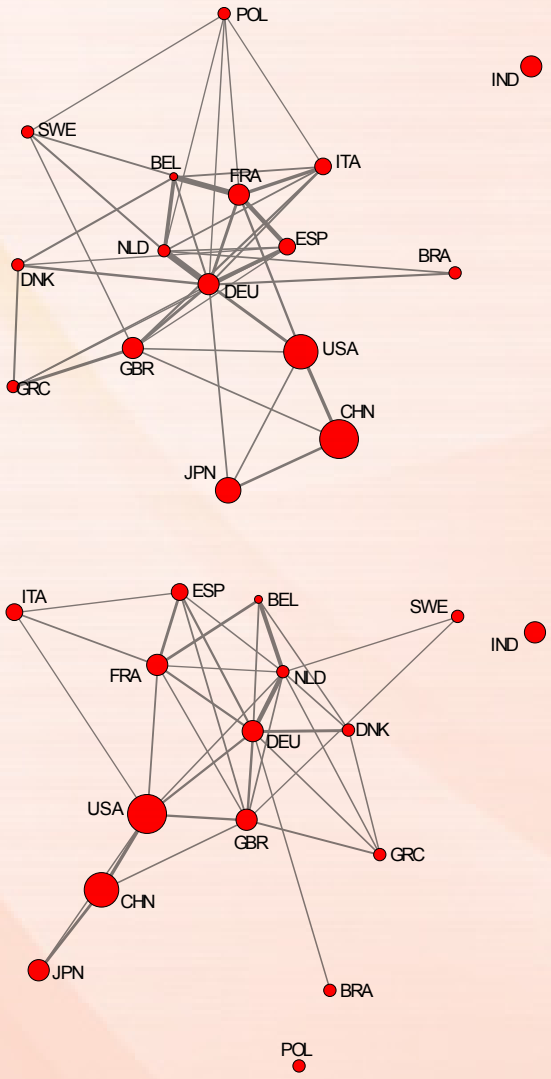

Figure 2 Energy & Fuel
(top: subject category; bottom: emerging topic)
Data sourced from Thomson Reuters Web of Knowledge

the previous case, the comparison of the emerging topic with the discipline reveals some interesting deviations. The EU is still responsible for slightly more than one fourth of all papers in both the topic and the domain, but US activity is rather low. In the emerging topic, it ranks even second after China. Beyond doubt, China is the most active country in biodiesel and Japan and India rank third and fourth after the US, respectively, outpacing all individual members of the EU. The MOCR of the topic "biofuel" amounts to 3.79. According to the expectation, both the EU and the US have an observed citation impact above this reference standard; however, their rather moderate MECR values implies that, on an average, neither the US nor the EU publish in journals with very high impact. The citation impact of the individual member countries reflect a quite differentiated picture with Denmark, Germany and the Netherlands at the high-end and Greece, Italy and France with indicator values somewhat above or even below the world standard. Japan, China and India are not only very active in this subject, their research is efficient as well. They outperform even several European countries in terms of citation impact (cf. Table 2). Biofuel related research apparently has become a strategic subject in these countries.

International collaboration is less intense than in the previous case. Only Belgium has more than 50% internationally co-authored papers in its publication output. The corresponding share amounts to less than 20% each in Poland, China and India. The share of international co-publications of most countries in the selection fluctuates in a wide range around the median of 31.3%. Also the network is "looser" than was in nano pollution; the European cluster is less coherent, more scattered and it forms kind of an agglomerate of local clusters (see Figure 2). The USA form the bridge between the Far Eastern and the Europe groups.

PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH

The third Subject Category is *public, environmental & occupational health.* This discipline is covered by both the Science Citation Index Expanded (SCIE) and the Social Sciences Citation Index (SSCI). The first period chosen for this subject category is 1999-2001 and because of the size of this discipline, about 40% of papers in the period 2004-2008 were selected for the second period. The number of clusters changed from six in the first period to seven in the second one. A new cluster comprises 5945 documents and represents 20.5% (i.e. about 1/5) of the discipline. Since many

Country	ISI Category (N=29044)					Topic (N=5945)				
	Papers	Share	MOCR	MECR	RCR	Papers	Share	MOCR	MECR	RCR
Belgium	335	1.2%	3.79	3.08	1.23	106	1.8%	4.27	3.39	1.26
Brazil	1049	3.6%	1.90	1.95	0.97	282	4.7%	2.20	2.49	0.88
Denmark	515	1.8%	5.22	3.86	1.35	107	1.8%	5.58	3.82	1.46
France	963	3.3%	3.91	3.43	1.14	344	5.8%	4.07	3.51	1.16
Germany	1131	3.9%	4.18	3.17	1.32	265	4.5%	4.69	3.56	1.32
Greece	184	0.6%	4.55	3.63	1.25	50	0.8%	6.14	3.74	1.64
India	404	1.4%	2.34	2.61	0.90	148	2.5%	2.20	2.71	0.81
Italy	759	2.6%	3.77	3.29	1.15	209	3.5%	3.55	3.26	1.09
Japan	773	2.7%	2.69	2.99	0.90	186	3.1%	3.09	3.16	0.98
Netherlands	1046	3.6%	4.29	3.86	1.11	245	4.1%	4.44	4.00	1.11
China	709	2.4%	3.17	3.15	1.01	193	3.2%	2.85	3.19	0.89
Poland	210	0.7%	2.79	2.85	0.98	53	0.9%	2.96	3.01	0.98
Spain	728	2.5%	3.25	2.89	1.13	193	3.2%	3.28	2.92	1.13
Sweden	983	3.4%	4.08	3.39	1.20	163	2.7%	4.11	3.45	1.19
UK	3387	11.7%	4.23	3.52	1.20	697	11.7%	4.65	3.70	1.26
USA	13349	46.0%	4.44	3.97	1.12	2279	38.3%	4.89	4.09	1.19
EUR15	9088	31.3%	3.77	3.33	1.13	2126	35.8%	4.01	3.47	1.16

Table 3 Public, environmental & occupational health (environmental factors)
Data sourced from Thomson Reuters Web of Knowledge

documents are related with the effects of global warming and air pollution, it has been labelled "environmental factors". We have selected ten core documents for the description (data sourced from Thomson Reuters Web of Knowledge).

- Mortality in 13 French cities during the August 2003 heat wave
- Ambient carbon monoxide may influence heart rate variability in subjects with coronary artery disease
- Temperature and mortality among the elderly in the United States - A comparison of epidemiologic methods
- Effects of air pollution on heart rate variability: The VA Normative Aging Study
- Association of air pollution with increased incidence of ventricular tachyarrhythmias recorded by implanted cardioverter defibrillators
- The estimation of SARS incubation distribution from serial interval data using a convolution likelihood
- Mortality displacement of heat-related deaths - A comparison of Delhi, Sao Paulo, and London
- Multipoint linkage analysis for a very dense set of markers
- Association of ventricular arrhythmias detected by implantable cardioverter defibrillator and ambient air pollutants in the St Louis, Missouri metropolitan area
- Focused exposures to airborne traffic particles and heart rate variability in the elderly

Table 3 shows the indicators for the most active countries. Beyond any doubt, the US is the most important contributor although the EU has a similar large share in the emerging topic. In this topic, the UK is ranking second after the US in terms of activity, followed by France and Brazil; this is remarkable since China's contribution is low although SARS was one of the issues studied in the literature of this cluster. Also Germany's contribution is strikingly moderate.

The MOCR of the complete topic "environmental factors" amounts to 3.82. The observed citation impact of the EU and the US are again above this reference standard but the values are clearly in favour with the United States. Within the EU, Denmark,

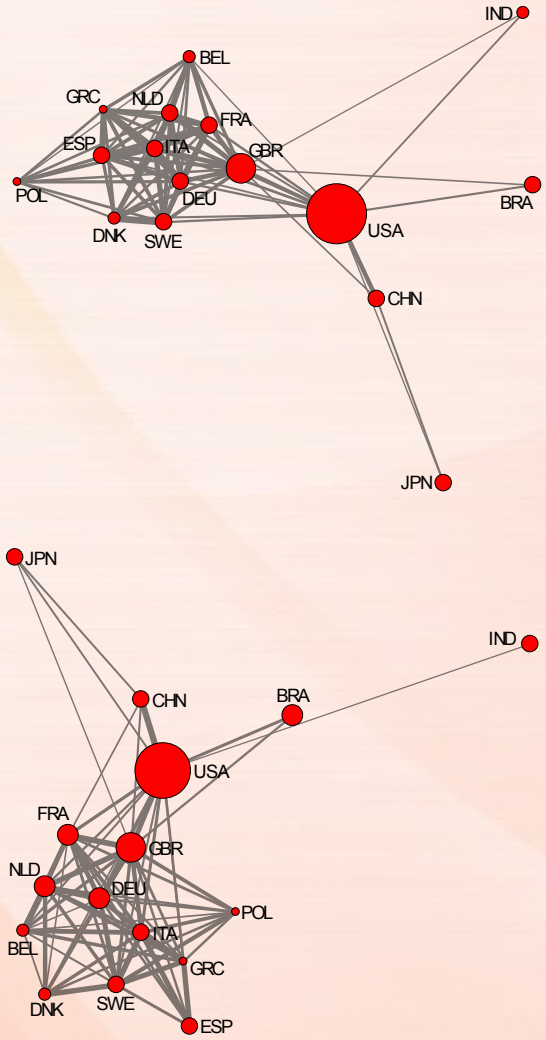

Figure 3 Public health
(top: subject category; bottom: emerging topic)
Data sourced from Thomson Reuters Web of Knowledge

the UK, Germany and the Netherlands attract most citations on an average. Most strikingly, Greece has the highest impact with MOCR=6.14 but this is based on a rather small set of papers (cf. Table 3). Also, 60% of the Greek papers in this topic have a co-author in the US and/or another EU country. The citation impact of Brazil and the Asian countries remain distinctly below the reference standard of 3.82.

"Environmental factors" is apparently a global topic; international collaboration is intense and the network has two important nodes, namely the US (globally) and the UK (locally) in Europe (see Figure 4). Three countries (Greece, Belgium and Denmark) have 60% or more internationally co-authored papers in its publication output and only India has a percentage of international papers below 25%. The median (51.2%) of the selection is pronouncedly high. Almost one third (31.9%) of the US papers in the emerging topic have a foreign co-author

BIOMEDICAL ENGINEERING

The last Subject Category, which has been selected, is *biomedical engineering.* Here the number of clusters increased from eight (1999-2003) to nine (2004-2008). The cluster labelled "brain-machine interface" existed already in the first period but it has considerably grown: The growth rate amounts to 35.4%. In the second peri-

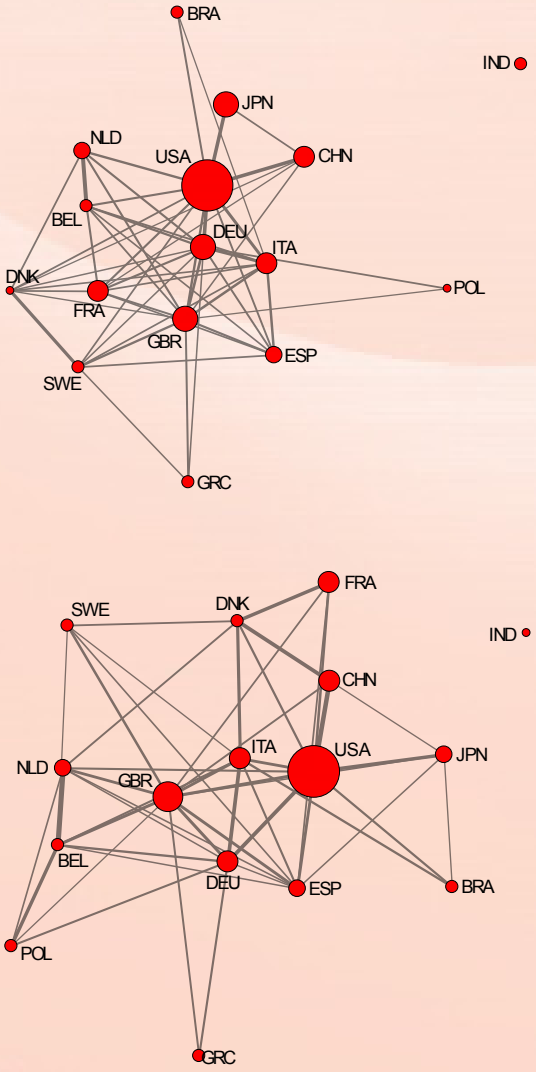

Figure 4 Biomedical research
(top: subject category; bottom: emerging topic)
Data sourced from Thomson Reuters Web of Knowledge

Country	ISI Category (N=29071)					Topic (N=5632)				
	Papers	Share	MOCR	MECR	RCR	Papers	Share	MOCR	MECR	RCR
Belgium	401	1.4%	4.33	3.61	1.20	83	1.5%	2.96	2.67	1.11
Brazil	466	1.6%	2.54	3.21	0.79	95	1.7%	2.00	2.68	0.75
Denmark	269	0.9%	3.97	3.82	1.04	94	1.7%	2.51	2.98	0.84
France	1165	4.0%	3.94	3.98	0.99	241	4.3%	2.95	2.95	1.00
Germany	2244	7.7%	4.07	3.86	1.05	338	6.0%	2.69	2.67	1.01
Greece	341	1.2%	2.60	3.00	0.87	98	1.7%	2.19	2.72	0.81
India	301	1.0%	3.02	3.44	0.88	48	0.9%	1.98	2.23	0.89
Italy	1617	5.6%	3.58	3.61	0.99	296	5.3%	3.05	2.88	1.06
Japan	1994	6.9%	3.87	4.34	0.89	221	3.9%	2.38	2.95	0.80
Netherlands	1103	3.8%	4.63	4.38	1.06	196	3.5%	3.53	3.17	1.11
China	1751	6.0%	4.17	4.15	1.00	256	4.5%	2.01	2.68	0.75
Poland	279	1.0%	1.91	2.52	0.76	71	1.3%	1.82	2.34	0.78
Spain	736	2.5%	3.39	3.64	0.93	207	3.7%	3.13	2.91	1.08
Sweden	535	1.8%	3.75	3.95	0.95	119	2.1%	2.63	2.83	0.93
UK	2553	8.8%	4.10	3.91	1.05	546	9.7%	3.00	3.04	0.98
USA	10278	35.4%	4.61	4.20	1.10	1990	35.3%	3.09	3.36	0.92
EUR15	10772	37.1%	3.80	3.81	1.00	2227	39.5%	2.84	2.88	0.98

Table 4 Biomedical engineering (BMI)
Data sourced from Thomson Reuters Web of Knowledge

od the cluster comprises 5632 documents and thus represents 19.4% (i.e. almost 1/5) of the discipline. The topic has been labelled "brain-machine interface". Typical core documents are listed below (data sourced from Thomson Reuters Web of Knowledge).

- "Virtual keyboard" controlled by spontaneous EEG activity
- Planar gradiometer for magnetic induction tomography (MIT): theoretical and experimental sensitivity maps for a low-contrast phantom
- Adaptive BCI based on variational Bayesian Kalman filtering: An empirical evaluation
- Model-based neural decoding of reaching movements: A maximum likelihood approach
- Ascertaining the importance of neurons to develop better brain-machine interfaces
- Anasynchronously controlled EEG-based virtual keyboard: Improvement of the spelling rate
- Boosting bit rates in noninvasive EEG single-trial classifications by feature combination and multiclass paradigms
- Support vector channel selection in BCI
- Classification of single-trial electroencephalogram during finger movement
- BCI2000: A general-purpose, brain-computer interface (BCI) system

Scientometric indicators for the most active countries in BCI and related issues are shown in Table 4. Nearly 40% of all papers have an author in the EU. The US has a distinctly lower share. Within the European Union, we find by and large the usual balance of productivity: UK, Germany, France and Italy are the most active members, where, in this case, Italy is even more active than France.

The MOCR of the world total in "brain-machine interface" amounts to 2.67. As in the previous case, the MOCR values of the EU and the US are above this reference standard and the US MOCR exceeds that

of the EU. The distribution within the EU somewhat differs from that of the discipline as well as of the previous emerging topics. Spain, the Netherlands and Italy attract, on an average, more citations than Denmark, the UK and Germany.

International collaboration is relative intense. Denmark has more than 60% internationally co-authored papers in its publication output and only two countries (India and USA) have a percentage of international papers below 25%. The median of 36.7% is in line with the expectations. However, the network differs from the previous ones as there is no distinct EU cluster. Europe, the US, Asia and Brazil form one large cluster. Only India remains somewhat isolated (cf. Figure 4).

CONCLUSIONS

Patterns of publication activity and citation impact, on one hand, and international collaboration, on the other hand, reflect important characteristics of emerging topics. Several topics might require intense international collaboration like the "environmental factors" in public health. Here, of course, regional aspects play an important part as well. Factors might, for instance, differ in individual world regions but the fundamental phenomenon remains a global one. By contrast, BCI related research might be a truly global issue since here we have not found any sub-clusters or polarisation. The loose networks in biofuel shows that national issues might be in the foreground here. The differentiation in industry between sugarcane in Brazil, corn in the US and rice straw in Japan might illustrate this regional aspect. "Nano pollution" is phenomenon of the industrialised world. Nevertheless, through environmental factors it becomes, in a sense, a global issue again.

The "scientific productivity" of the EU is except for "environmental factors" in public health distinctly higher than that of the USA. However, the US somewhat outperforms Europe in terms of citation impact in all selected topics, although the deviation between the US and EU indicator values is not dramatic. Several European countries achieved an outstanding citation impact, which, in particular, exceeded the European and the US standard by far.

Finally, the essential contribution of the emerging economies in Asia and South America to the research in the topics "nano pollution" and "biofuel" is worth mentioning. The high citation impact substantiates the efficiency of their efforts.

ACKNOWLEDGEMENT

Methodology has partially been developed in the context of the ERACEP project within the Coordination and Support Actions (CSAs) of the European Research Council (ERC) work programme. The authors wish to acknowledge this support.

REFERENCES

Braam, R.R., Moed, H.F., van Raan, A.F.J. (1991a). Mapping of science by combined cocitation and word analysis, Part 1: Structural aspects. *Journal of the American Society for Information Science*, 42 (4), 233–251.

Braam, R.R., Moed, H.F., van Raan, A.F.J. (1991b). Mapping of science by combined cocitation and word analysis, Part II: Dynamical aspects. *Journal of the American Society for Information Science*, 42 (4), 252–266.

Braun, T., Glänzel, W., Schubert, A. (1985), *Scientometric Indicators.*

A 32-Country Comparison of Publication Productivity and Citation Impact. World Scientific, Singapore – Philadelphia.

Dosi, G., Llerena P., Sylos Labini, M. (2005), *Science–Technology–Industry Links and the "European Paradox": Some Notes on the Dynamics of Scientific and Technological Research in Europe*. LEM Working Paper Series, 02/2005.

Glänzel, W., Debackere, K., Meyer, M. (2008), 'Triad' or 'Tetrad'? On global changes in a dynamic world. *Scientometrics*, 74 (1), 71–88.

Glänzel, W., Janssens, F., Thijs, B. (2009), A comparative analysis of publication activity and citation impact based on the core literature in bioinformatics. *Scientometrics*, 79 (1), 109–129.

Glänzel, W., Thijs, B. (2011a), Using 'core documents' for the representation of clusters and topics. *Scientometrics*, 88 (1), 297–309.

Glänzel, W., Thijs, B. (2011b), *Using 'core documents' for detecting new emerging topics*. Noyons, E., Ngulube, P. Leta, J. (Eds), Proceedings of ISSI 2011 – The 13th International Conference on Scientometrics and Informetrics, Durban, South Africa, 04-07 July 2011, University of Zululand, 224–235.King, D.A. (2004), The scientific impact of nations. *Nature*, 430 (6997), 311–316.

May, R.M. (1997), The scientific wealth of nations. *Science*, 275 (5301), 793–796.

REIST-2 (1997), *Second European Report on S&T Indicators 1997*. EUR 17639, Brussels – Luxembourg.

REIST-3 (2003), *Third European Report on S&T Indicators 2003*. EUR 20025, Brussels – Luxembourg.

Rousseau, R. (2008), Triad or Tetrad: another representation. *ISSI Newsletter*, 4 (1), 5–7.

Shelton, R.D., Holdridge, G.M. (2004), The US-EU race for leadership of science and technology: Qualitative and quantitative indicators. *Scientometrics*, 60 (3), 353–363.

Zanotto, E.D. (2002) Scientific and technological development in Brazil. The widening gap. *Scientometrics*, 55 (3), 411–419.

Zhou, P., Leydesdorff, L. (2006), The emergence of China as a leading nation in science. *Research Policy*, 35 (1), 83–104.

Zitt, M., Bassecoulard, E. (1994), Development of a method for detection and trend analysis of research fronts built by lexical or cocitation analysis. *Scientometrics*, 30 (1), 333–351.

Zitt, M., Thèves, J., Laurens, P., Ramanana-Rahary, S., Bassecoulard, E., Filliatreau G. (2006), *Assessing international visibility of nations in science: citations performances of large emerging actors (BRIC)*. Poster presented at the 9th Science & Technology Indicators Conference, 7-9 September Leuven (Belgium).