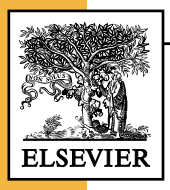
pamphlet # 9



Library Connect
Partnering with the Library Community

Using Scopus for Bibliometric Analysis: A Practical Guide

CONTENTS

Produced by
Library Connect, in collaboration with the Scopus Marketing Team

SCOPUS™

2006

Library Connect Editorial Office
ELSEVIER
525 B Street, Suite 1900
San Diego, CA 92101, USA
Phone: (+1) 619.699.6719
libraryconnect@elsevier.com

Introductory Comments

David Tempest

The researchers of *bibliometrics* – "the application of statistical analyses to study patterns of authorship, publication and literature use" (Lancaster, 1977) – over the last 50 years have developed several indicators which have become widely used by funding bodies, librarians, publishers and researchers.

Of all the indicators developed and postulated, the most used has been the impact factor. This indicator proposed a method by which the above-mentioned users could assign a theoretical, calculated "quality" and ranking to a journal. The impact factor was pretty much installed as the industry standard indicator, but there have always been others bubbling under the surface and, following recent scrutiny of the standard, there have been calls for these other indicators to rise to the surface.

At the same time, other players have entered the bibliometric playing field alongside Thomson Scientific (formerly ISI), where the impact factor had its origin. In particular, Elsevier's development of Scopus has brought about significant changes to how users approach bibliometric analysis and a shift toward analysis of the author or the actual article, rather than the journal. In addition, citation databases have evolved to become navigation tools through the literature (with users linking through references) as much as quality assessment tools. Indeed both Scopus and Thomson Scientific's Web of Science endeavor to provide this functionality to users.

We are now entering a new era of bibliometric analysis, where not just traditional applications of the citation are important but in which new technological metrics using Internet and usage statistics have been proposed. These have now been developed into specialized fields described as *webometrics* and *cybermetrics*. A key point concerning any newly developed metrics is that many issues that have been discussed regarding the impact factor will remain with all these new metrics – issues such as how to deal with or account for subject field of the author, article type, size of the community and so on. If these are not corrected or accounted for within a particular indicator, then many issues users had with the impact factor will pass to these second-generation indicators.

The following articles discuss ways in which one of the new citation databases, Scopus, was developed and how it is updated and guided by its advisory board, as well as ways Scopus is utilized as a bibliometric tool by researchers and their institutions.

To address the issue of new indicators, one article focuses on one of the most widely discussed metrics, the H Index, which was proposed by Professor Hirsch at the University of California, San Diego, Department of Physics. This indicator was developed to assist in quantifying an individual's scientific research output, primarily in physics, but has been rapidly taken up and studied in depth around the world, leading to its application to researchers in diverse disciplines. The article demonstrates to the reader how Scopus can be utilized to develop an H index.

I hope you will find this pamphlet offers useful insights into how Scopus, the world's largest bibliographic database, can provide practical assistance to researchers and institutes in their day-to-day work.

Regards,

David Tempest, Associate Director, Scientometrics & Knowledge Management, Elsevier, Oxford, UK

Lancaster, F.W. (1977). *Measurement and evaluation of library services.* New York: Academic Press.

David Tempest, who serves as associate director of Elsevier's Research & Academic Relations Department, specializes in scientometrics (the study of science, economics and bibliometrics) and knowledge management. A frequent presenter at events around the world, David often addresses bibliometric analysis regarding journals and has given many presentations on the impact factor, including its use, abuse and misconceptions. In 2005, his article examining the effect of title changes on the impact factor was published in the journal *Learned Publishing*. David also speaks on publishing matters in general – such as the publishing industry, development of journals and writing scientific articles. Having earned a degree in pharmacology from the University of Sunderland in the UK, David is currently studying for an MBA.

Scopus Takes Research Evaluation Where It's Never Gone Before

By Iris Kisjes, Manager, Scopus Marketing, Elsevier, Amsterdam, The Netherlands

Launched in November 2004, Scopus has rapidly become the premier tool for librarians and researchers who need to find and track scientific, technical, medical or social science literature. Marshall Clinton, the director of information technology services at the University of Toronto Libraries, predicted in 2004 that: "... there is no question that Scopus will not only become a key information source for science, technology and medicine, but also supplant some of the more traditional information sources." And that prediction has indeed become reality.

Scopus is named after Chiffchaff (Phylloscopus collybita), a bird with great navigational skill.

Scopus is, quite simply, the largest and easiest to use navigation tool ever built. Winner of the International Information Industry Award for best Scientific, Technical and Medical (STM) Information Product (2005), it has become an acknowledged leader in STM product innovation, raising the bar in such areas as interface design and content coverage.

Scopus has already achieved significant acceptance throughout the scientific community with academic, government and corporate library customers worldwide. One of the primary factors contributing to its growth in popularity is the growth of Scopus content over the last two years.

> *"Scopus is, quite simply, the largest and easiest to use navigation tool ever built."*

Extremely Broad Coverage Helps Users

Featuring the broadest abstract and citation coverage currently available through any one online resource, Scopus covers over 15,000 titles from more than 4,000 publishers and includes open access and online-only journals. Users particularly appreciate Scopus' extensive international coverage, which enables retrieval of citations not covered by any other database alone.

To ensure users remain at the center of all Scopus development, Elsevier in 2004 established an international Content Selection and Advisory Board comprising independent experts from all fields of science, whose mission is to evaluate and select information sources for inclusion in Scopus. Following a rigorous evaluation procedure, over 4 million records and 2,200 journals and 29 book series have been added to Scopus in the last two years.

Scopus content is not limited to peer-reviewed journal articles. What sets Scopus apart from its competitors is coverage that extends to 250 million scientific Web pages, 13 million patents and book series. A recent enhancement, Selected Sources, has added courseware, standards, theses, lecture notes, presentations, manuscripts and prepress papers from institutional repositories and digital archives that the user can select. The results are presented in a simple, tabbed format so the user has all the results in one place.

While the Scopus journal coverage policy provides for comprehensive inclusion from 1996 onward, 16 million journal article abstracts from before 1996 are already covered (in comparison to 12 million after 1996), and more journal abstracts and bibliographies will be added over time. The next major content expansion will include pre-1996 journal backfiles beginning with more than 7 million records in chemistry, mathematics, physics and social sciences.

Intuitive Interface and Innovative Tools Help Users

Prior to the commercial launch of Scopus, every aspect of its functionality was designed and tested by scientists and librarians to ensure that the interface is highly intuitive and easy to use. But innovations didn't stop there.

Introduced in January 2006, the Scopus Citation Tracker enables users easily to evaluate research by using citation data. This tool offers at-a-glance intelligence about the influence of a set of articles, an author or group of authors over time, so users can quickly spot trends using a visual table of citations broken down by article and chronology.

In June 2006, the introduction of the Scopus Author Identifier meant that Scopus became the first database to "disambiguate" author names over such a comprehensive body of data. Using advanced algorithms, this powerful and innovative tool enables users to distinguish automatically between authors with the same name and match variations of author names.

Other important Scopus enhancements have included library integration tools, RSS feeds, compatibility with all major reference management tools and links from over 500,000 abstracts to chemical structures, compounds and reactions in MDL's DiscoveryGate product.

Innovations and Additions Are Continuing Now and into the Future

Elsevier's firm commitment to the Scopus user community and in broader terms to the global dissemination of scientific information means that Scopus development will extend throughout 2007 and beyond. Elsevier will continue to refine and enhance the interface, add functionality and expand the breadth and depth of coverage – ensuring that Scopus continues to help researchers focus on finding everything relevant, from the expected to the unexpected. ■

Scopus Marketing Manager Iris Kisjes (on the left) and Scopus Product Manager Helen de Mooij (author of the article on page 11)

Explore More

- PatentCites allows Scopus users to track how primary research is practically applied in patents.
- LiveChat helps Scopus users connect to technical support offered 24 hours a day, five days a week.
- WebCites – coming in late 2006 – will enable Scopus users to track the influence of peer-reviewed research on Web literature.

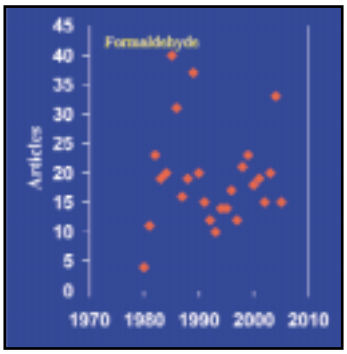
Identifying Research Trends, Supporting the Editorial Process, and Informing Evaluations

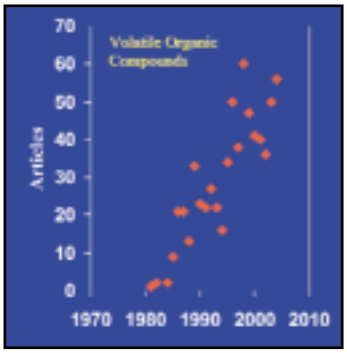
By Peter Brimblecombe, Senior Editor, *Atmospheric Environment,* and Professor of Atmospheric Chemistry, University of East Anglia, Norwich, UK

Like many researchers, I use Scopus to inform and shape my research by helping me connect to relevant abstracts quickly and easily. While using Scopus, I've found it provides additional benefits that seem worth mentioning in an article, just to help get the word out.

Identifying Research Trends

Recently, I needed to give a short talk about the effects of different trace substances on indoor air quality. Using Scopus, within minutes I identified and isolated many articles over the past 30 years pertaining to effects of formaldehyde and volatile organic compounds on indoor air quality. As I began to review the Scopus results, I noticed researchers appeared to be moving away from studying effects of formaldehyde in favor of studying effects of volatile organic compounds. Taking the results of my search, I plotted the number of articles against a timeline and found my initial assumption correct: Research behavior was changing, as shown in the following graphs.





These graphs show results of Scopus analysis indicating a significant change in research behavior.

Armed with this information and the abstracts, a researcher can derive some conclusions. First, there is clear interest within the research community in studying sick building syndrome, an area associated with the study of effects of volatile organic compounds on indoor air quality. Second, a researcher may need to decide whether to reexamine a research field that some seem to consider exhausted or a field where a lot of new research is being conducted.

Also recently, while working with then PhD student Talib Latif, who has now graduated, we easily discovered by using Scopus that research into effects of surfactants had been important in the eighties, but then died down only to explode in the late nineties. Talib and I investigated why interest had waxed and waned so sharply and ultimately wrote a short and much-downloaded paper, "Rediscovering Atmospheric Surfactants," published in *Environmental Chemistry* in 2004.

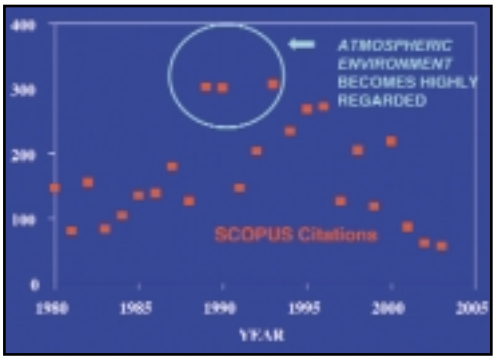
Powering Grant Writing

Writing grant proposals often poses different challenges compared to those encountered in conducting everyday scientific research. Successful grant proposals often require us to draw upon cross-disciplinary research or identify why previously obscure research deserves support to become mainstream. Since starting to use Scopus in 2004, I've found it indispensable for informing my grant writing.

Scopus has tremendous peripheral vision and helps find hidden gems: currently overlooked but valuable research. Recently I used Scopus to help prepare a proposal for funding to support investigation of how dust particles stick to indoor surfaces and how this affects the protection of historic interiors. Using Scopus, I made a serendipitous discovery: Cave scientists had been studying walls of caves and determining effects of dust and dirt particles carried in by tourists. This work had interesting implications for my own research plans. Scopus helped my team synthesize related research from different fields and structure our grant proposal accordingly.

Supporting the Editorial Process

As a journal editor, I strive to make our publication as strong as possible. This means tracking how well received the journal's articles are. One way to do this is by looking at citation activity. Recently, I ran an analysis using Scopus to examine the citations accruing to the most cited papers in *Atmospheric Environment* over the past 25 years. The following graph outlines my findings.



This graph shows results of Scopus analysis indicating that in 1990, Atmospheric Environment *became a highly regarded journal.*

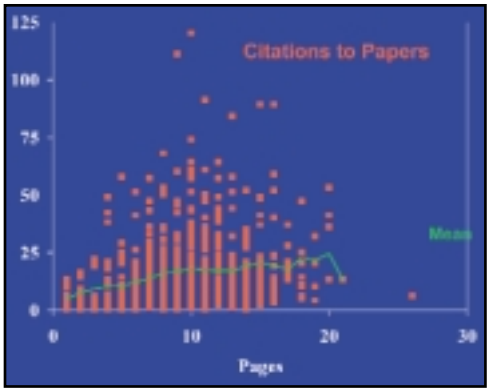
The first thing I noticed was that citations increased from 1980 to 1990. Some of this is due to the widening content of the databases, but some of this increase is due to the fact that during this decade *Atmospheric Environment* became a very highly regarded publication. The apparent dropoff from 1990 onward is mostly due to the time it takes for a critical mass of citations to build up. Ultimately citation numbers for the journal will be higher for more recent years.

In highly cited papers within the atmospheric sciences, which tend to gain citations from a wide range of journals, Scopus does rather well. This supports Elsevier's claims that the coverage of Scopus over the past ten years can match ISI's very closely. In recent years Scopus matches or exceeds ISI in papers that are most widely cited. More surprisingly given the focus of Scopus on more recent material, it does better than expected when going back further. As Scopus gains more historical depth and includes a larger number of sources, something happening every day, Scopus will likely match or exceed ISI's coverage over longer time periods.

As an editor, I also must balance my journal's space limitations with researchers' desire to publish longer pieces. There had been some concern from the journal's board that a preoccupation with shorter papers may have been weakening our impact factor. Using Scopus, I analyzed the relationship between citations and page length, and showed papers of some ten pages in length were

> *"Since starting to use Scopus in 2004, I've found it indispensable for informing my grant writing."*

able to achieve high citation counts. Researchers push for more space in journals, but the analysis shows shorter, more focused papers can achieve excellent responses. Now when a researcher insists that I should not require shortening a paper, I can use data from Scopus to show we cannot assume that making the paper shorter would necessarily lower its impact.



This graph shows results of Scopus analysis indicating longer papers do not equate to higher citation counts.

However, the most common tasks I deal with, as an editor, are recruiting referees to review submissions and evaluating author or referee suitability. With Scopus I can run a very quick search and find experts who would be ideal for judging the quality of a paper. Likewise, when a submission comes in, Scopus is very helpful in establishing a profile of the author's previous work, including an analysis of previous citations and collaborative links – especially useful in choosing an independent referee.

Informing Evaluations

A colleague seeking a new post was an engineer by training, but over the years had become more interested in studying the environment. As part of writing a letter of support for him, I decided to investigate how deep his interest in environmental sciences goes and used Scopus to find all the engineering and environmental articles he's published over the past 22 years. The following graph shows that while he began his career as an engineer and continues to publish fairly steadily in that field, his academic interests have come to lie more in the environmental sciences.

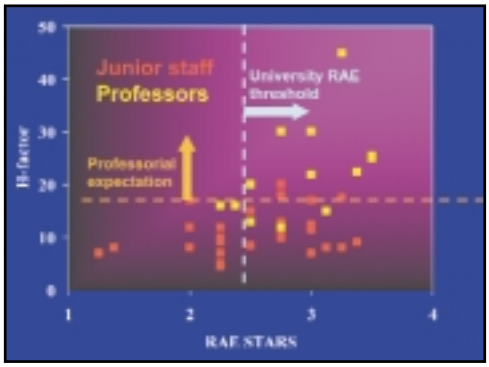
This graph shows results of Scopus analysis looking at a researcher's publications in two areas.

I have also used Scopus to conduct an analysis comparing H-factors and Research Assessment Exercise or RAE stars of researchers in a university department. H-factors measure researchers' long-term career impacts and are related to accumulated citations, but are of course comparable only within fairly narrow fields of research. The RAE stars derive from plans within the UK's Research Assessment Exercise and are rankings relating to recent papers.

Most professors included in my analysis had high H-factors and high RAE scores. Their junior colleagues had lower H-factors (the result of shorter careers) and were spread out across the range of RAE scores, which are less dependent on a larger number of research publications. It was gratifying to see that some young researchers were indistinguishable from their senior colleagues in this analysis, which indicated certain careers that are developing very rapidly.

> *"In short, Scopus has become an indispensable addition to my research toolkit and very often my first stop."*

Such information is useful for an administrator, in planning department reviews and sensing strengths and areas of weakness where a little attention could yield substantial improvements.



This graph shows results of Scopus analysis looking at H-factors and Research Assessment Exercise stars.

Conclusion

With its ease of use and comprehensiveness of coverage, Scopus is among the more important STM information resources I use. Frankly I find Scopus offers as much value through its unintended or serendipitous use as from its planned functions. In short, Scopus has become an indispensable addition to my research toolkit and very often my first stop. ■

Peter Brimblecombe

Born in Australia, **Peter Brimblecombe** attended university in Auckland, New Zealand where he earned a PhD on the aqueous chemistry of sulphur dioxide in the atmosphere. Currently he focuses his research interests on thermodynamics of the concentrated aqueous aerosol. His book *The Big Smoke*, said to read like a thriller, deals with historical aspects of changes in urban air pollution and its effects on health and building damage. His interest in material damage by air pollutants spans outdoor and indoor environments including the museum atmosphere. Regarding pollution and art, he has said, "Environmental pollution is not merely a matter of environmental chemistry. The smells have to be smelt. Painting and poetry can be as informative as a scientific description when trying to understand the complexities of environmental problems. Recently I have been thinking much about the representation of air pollution in cinema."

www.uea.ac.uk/~e490/www.htm

Tracking Researchers' Output, Identifying Their Collaborators and Competitors, and Identifying Important Publications

By Richard Sweeney, University Librarian, New Jersey Institute of Technology, Newark, USA

Scholarly output, a major part of the lifeblood of any research university, is getting a lot of airplay these days. Everyone's investing time and energy to track and analyze citations and thus prove the value of researchers and universities. Here I wish to say that tackling such a big job needn't be as hard as it might sound.

Through the use of Scopus, at the New Jersey Institute of Technology, I and library colleagues have been performing citation analysis quickly and efficiently and then applying the results to meet very important real-life needs. By using Scopus to perform citation analysis, we help our researchers by identifying their collaborators and competitors; we help our institute by identifying researchers and faculty worthy of recruitment; we help our institute by identifying faculty deserving of promotion and tenure; and we help our library by identifying data important to collection development.

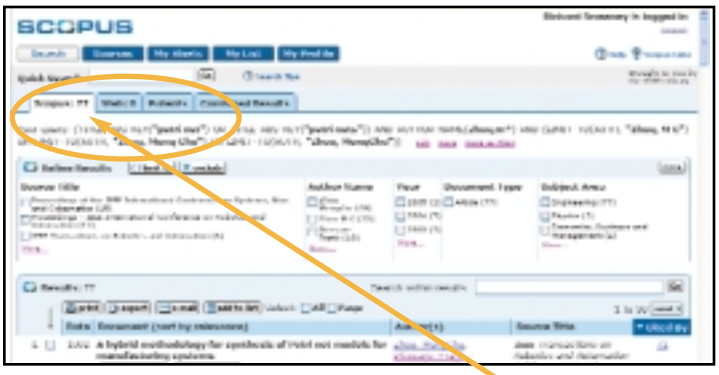
Here I'm going to show you how we use Scopus to perform citation analysis on our researchers' scholarly output, identify our researchers' collaborators and competitors, and identify publications important to our researchers and likely important to our library's collection.

We Use Scopus to Track Researchers' Scholarly Output and Identify Their Collaborators and Competitors

Let's take for example Dr. Mengchu Zhou, an NJIT professor. Dr. Zhou is an expert on Petri nets, or bipartite graphs that provide mathematically rigorous frameworks for modeling systems exhibiting concurrency, synchronization and randomness. Automated manufacturing systems especially make use of Petri nets, which are also known as "place/transition nets."

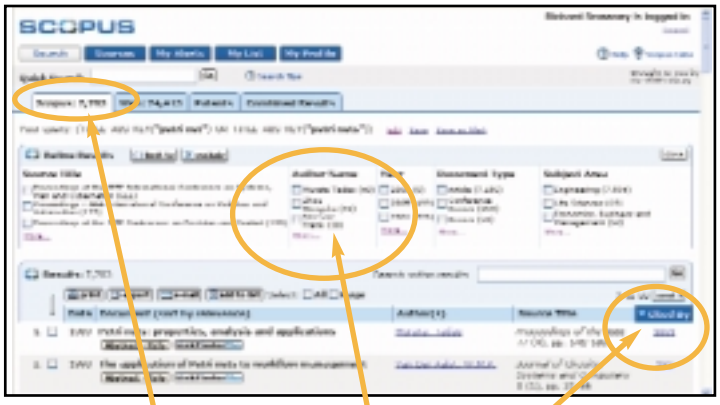
Using Scopus, we can gain insights into Dr. Zhou's scholarly output focused on Petri nets and we can quickly identify other researchers active in Petri net exploration. These individuals comprise Dr. Zhou's collaborators and competitors. By taking a look at Dr. Zhou's and his peers' scholarly output, we can assess how the researchers stack up against each other and how they rank in the field. Dr. Zhou very well may appreciate a copy of the findings; by providing this information, the Van Houten Library at NJIT can offer Dr. Zhou support in his research efforts. Naturally we can also make sure Dr. Zhou is aware of Scopus, knows how to access it through the library and feels happy doing his own similar research if he wishes.

1. To start to gain understanding of Dr. Zhou's output focusing on Petri nets, we use the term "petri net" and Dr. Zhou's name and search Scopus.



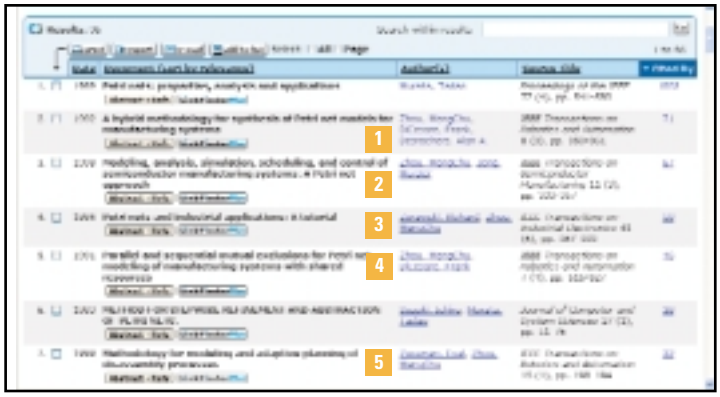
Scopus locates 77 articles.

2. To start to see where Dr. Zhou's output fits within the context of Petri net literature, we locate all Petri net articles published and indexed in Scopus.



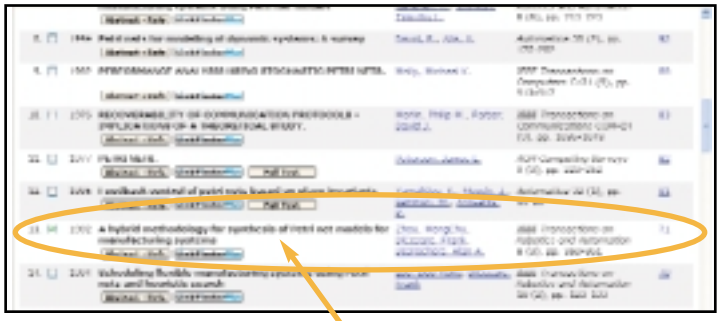
Scopus shows the total as 7,703. Scopus also reveals names of other researchers active in Petri net investigation. We see Tadao is tied with Zhou for the largest number of Petri net articles, but Tadao wrote the most cited article.

3. To gain understanding of how Dr. Zhou's output compares with that of the other most prodigious Petri net researcher over all the years for which Scopus has data, we look at the output of Zhou versus Tadao.



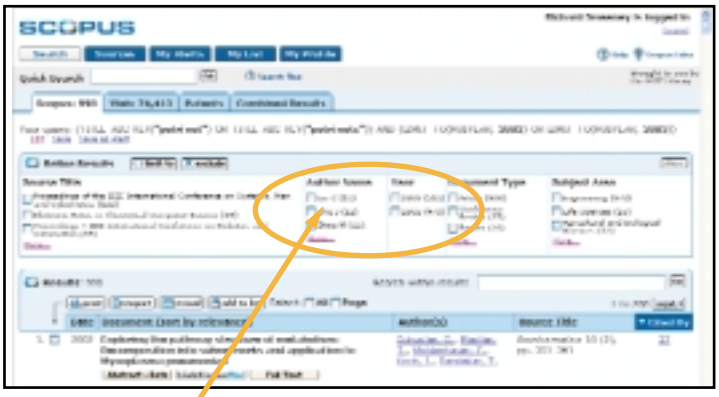
Scopus reveals that head-to-head, of the top seven cited articles written by Zhou or Tadao, Zhou wrote five.

4. To gain understanding of how Dr. Zhou's performance ranks in the Petri net field, we look at the output of Zhou versus that of all other Petri net authors whose work has been indexed by Scopus.



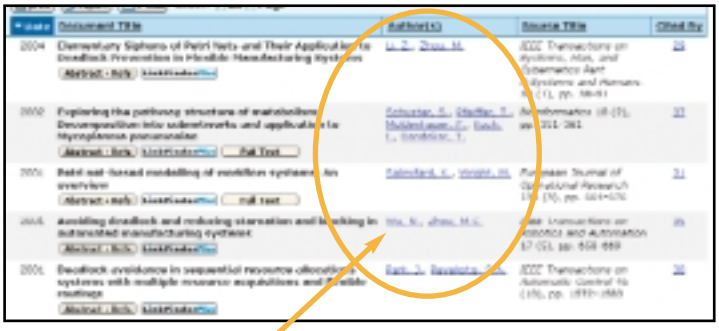
Scopus shows that Zhou wrote the thirteenth most-cited Petri net article.

5. To identify Dr. Zhou's current potential collaborators and competitors, we look at Petri net publications from recent years.



Scopus shows that especially Lin from China is likely a current potential collaborator or competitor.

6. To identify all most likely current potential collaborators and competitors, we drill down to the most "cited by" Petri net authors in the past five years.



Scopus reveals a small group of researchers who could be very important to Dr. Zhou's continued success.

We Use Scopus to Identify Important Publications

Space here doesn't allow for showing every step involved in searching Scopus and using it to pull data needed for analysis and decision making, data crucial to a library providing support to its researchers and institution. Suffice it to say that though this article omits steps, colleagues will find themselves navigating easily and well around Scopus – which offers a very usable and friendly interface.

Another way we at NJIT's Van Houten Library are using Scopus is to identify publications important to our researchers and thus comprising good candidates for our collection.

Still following the story of Dr. Zhou, we can simply take advantage of work already done on Scopus.

> *"But with Scopus at hand, we can easily identify publications most important to particular researchers and let citation-related data help guide us in acquisitions."*

Scopus reveals publications important to Petri net researchers and deserving consideration during acquisition decisions at our library.

To obtain a list of publications important to Dr. Zhou and his peers engaged in Petri net research, we simply need to look at the most "cited by" Petri net authors in the past five years and see in what titles they have published. The screenshot above shows part of the list Scopus generated.

This list of publications, so important to Petri net researchers including NJIT's own Dr. Zhou, deserves careful consideration when it comes time for acquisition decisions. For collection management, Scopus can provide librarians with data complementing or sometimes trumping usage statistics. When our library doesn't already subscribe to particular publications, of course we have no concrete information (beyond the anecdotal) on whether our researchers would use those titles. But with Scopus at hand, we can easily identify publications most important to particular researchers and let citation-related data help guide us in acquisitions.

This concludes my brief remarks, not intended to be any kind of comprehensive user guide but rather to illustrate a couple of ways Scopus has saved time and contributed to important efforts at NJIT. Believe it or not, it's taken longer to write down my thoughts than it did to conduct all the citation analysis shown here and conducted via Scopus. Happy navigating, everybody! ■

Richard Sweeney

Richard Sweeney serves as university librarian at the New Jersey Institute of Technology where he directs all the services and activities of the institute's libraries – which include the Robert W. Van Houten Library and Barbara & Leonard Littman Architecture Library. Rich joined NJIT as university librarian in 1995. For the previous 11 years, he directed the library at Polytechnic University in Brooklyn. Before that, he directed public libraries in Columbus, Ohio; Flint, Michigan; and Atlantic City, New Jersey. His research currently focuses on Millennials (born 1979 to 1994) and the impact this large, quite different, generation will have upon libraries and academic institutions. Rich sits on the executive board of VALE, the Virtual Academic Library Environment of New Jersey, and has served as a Snowbird Library Leadership Mentor.

www.library.njit.edu/staff-folders/sweeney

Finding Referees for Scholarly Journal Articles

By Tefko Saracevic, Editor-in-Chief, *Information Processing & Management,* and Associate Dean, School of Communication, Information and Library Studies, Rutgers University, New Brunswick, NJ, USA

As editor of the journal *Information Processing & Management,* I use Scopus to find good referees. This is the most important function for any editor.

What do I look for when searching for referees, also known as reviewers, for particular papers? The answer is pretty simple:

- Who has done what in a particular area or topic?
- How many times has a particular researcher been cited?
- What does a researcher's body of work look like?
- Also, has a researcher – someone I'm considering inviting to serve as a reviewer for articles submitted to my journal – engaged in what I call self-plagiarism? By this, I mean has this researcher republished her or his own work multiple times, disseminating the same research findings yet not innovating further?

Additionally, I do searches on the authors of submitted papers.

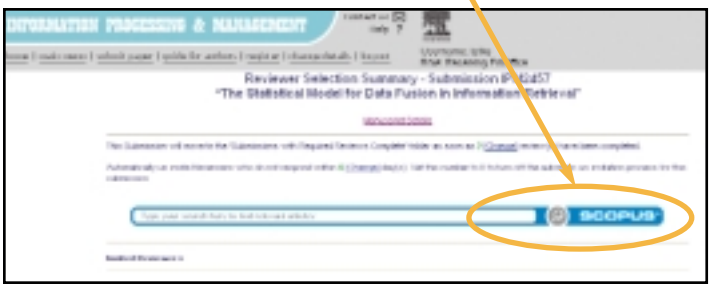
Scopus Integration into the EES Helps Find Referees

Scopus helps find referees, not just because this tool is very comprehensive and hence provides lots of data on researchers' output and topics or fields, but also because this tool is integrated into the Elsevier Editorial System.

This online system facilitates and speeds up editorial processes involved in bringing a scholarly journal issue to light of day. For authors, the EES helps by making it easy to submit articles and track their progress through review and – if they are accepted – through publication. For editors, this system allows us to view submitted papers, track referees' comments on the papers, guide discussion among referees and communicate with authors and other editors as well as referees.

A recent innovation, just introduced this year, that has made the EES even more helpful to me is that now Scopus is available from inside the EES interface. So to find referees for particular papers, all I need to do is click into Scopus and start searching. You can see on the screenshot below how Scopus appears inside the EES.

The Elsevier Editorial System interface takes editors right into Scopus.



Finding Referees by Using Scopus Is Easy

But what exactly am I doing, when searching for referees by using the Scopus search bar inside the Elsevier Editorial System? First I enter an author's name or keywords in the Scopus bar and then published articles relevant to my search terms come up. As you can see above, Scopus lets me enter the search terms and start my search while I'm still in the EES interface. After that, the interface links to Scopus which opens in a new window.

> *"Scopus helps find referees, not just because this tool is very comprehensive and hence provides lots of data on researchers' output and topics or fields, but also because this tool is integrated into the Elsevier Editorial System."*

In a recent search for referees for a particular paper dealing with data fusion in information retrieval, I used Scopus to find relevant published articles. First, to learn more about the authors of the paper, I did an author search for the paper's first author. Over time, he had been at two institutions and published seven papers, two on data fusion. However he had been cited only twice, and thus it was no use following his citation tracking. Second, still using Scopus, I did a subject search on "data fusion AND information retrieval" since 2004. I found authors who had been cited a few times on the topic and invited two to be referees. All this without having to leave the editorial system!

It's important to say a few words about citation versus subject searching. Each follows a different path for retrieval. Studies show that each retrieves different documents and when doing these kinds of searches, there's low overlap between what is retrieved. As a rule, when doing serious searching and evaluation, such as when trying to locate appropriate and good referees for particular papers, I do both types of searches. In my experience, most freely available, popular search engines are fairly useless for conducting both types.

Scopus Helps Perform Various Evaluations

Colleagues ask me: "What tool do you rely on the most, to help you in your work as a journal editor?" Today my answer is Scopus. It's easy to use, fast and comprehensive. Additionally it offers many very useful features, including allowing several modes of searching and allowing them to be combined, depending on the user's need and task. Boiling it down to a few words, Scopus is very useful for performing various types of evaluations.

What is not in Scopus, but I would love it? To Elsevier, I say, please give me a graphical display of connections, and add visualization and network maps. Yes, Scopus has holes, but every database has them and Scopus has fewer ones. Besides, Scopus comes with helpful people around, who are easy to reach and communicate with.

What are my conclusions? Actually, I do not have any earth-shaking ones. But besides being serious business and useful for evaluation, subject and author searching followed by citation tracking is fun! So try Scopus and have fun! ■

Tefko Saracevic

Tefko Saracevic studied electrical engineering at the University of Zagreb and completed his master's and PhD studies in information science at Case Western Reserve University where he taught and conducted research until 1985. Since then, Tefko has been at Rutgers University. His research interests include evaluation of information retrieval systems and evaluation of digital libraries.

www.scils.rutgers.edu/~tefko

Finding Data to Support University Funding Allocations

In July 2006, the University of South Australia (UniSA), University of Tasmania and University of Western Sydney decided to use Scopus to support their research and publication workflow. To find out more about why the University of South Australia made that decision, Scopus Marketing Manager Iris Kisjes recently spoke with UniSA Deputy Director of Library Services Stephen Parnell.

> *"For us, Scopus has moved from serving as a useful research tool to serving as an indispensable resource that plays an integral role in the assessment required for the Research Quality Framework."*

Q: *How important is it for your institution to collect and analyze publication and citation information?*

A: The University of South Australia is committed to the creation and application of knowledge. Its distinctive research profile is based on bringing together multidisciplinary teams from industry, business and the professions to work on projects that are relevant and beneficial to the community. Publication and citation information is considered one of the most widely recognizable indicators of research output and quality, and collection and analysis of this information is among means to judge alignment of the university's research activities with its strategic priorities and with the Australian government's national research priorities.

Q: *What does your university do with this information?*

A: The university collects and analyzes this data as one of the ways of matching resource allocation to research areas that best reflect priorities. The information is used by directors of the university's research institutes and centers, the central Research and Innovation Services Unit and deans of research in each of the academic divisions (faculties). Having said that, the main users of the information are researchers who use it to identify research in their own areas and track trends.

Q: *What factors led to the university's decision to use Scopus to support your research and publication workflow?*

A: Several. First, Scopus provides our academic divisions with a way to monitor the output of their researchers. It also allows students to identify the hottest topics and most cited papers and enables researchers to identify collaborators and keep up to date with developments in their fields. Another factor driving our decision to adopt Scopus is its bearing on the Research Quality Framework, an initiative announced by the Australian government in 2004 to assess the quality and impact of publicly funded research and its contribution to the nation.

Q: *What is the importance of the Research Quality Framework for Australian universities?*

A: Well, as the Honorable Dr. Brendan Nelson, at that time our minister for education, science and training, stressed in his foreword to a report commissioned by the Commonwealth of Australia, our nation's future depends on an effort by the Australian government, industry and education community to identify and advance areas of international research excellence in Australia. The framework can help us achieve that end. Perhaps more importantly for Australia's universities, the results of the RQF will inform the distribution of research funding in the future.

Q: *Hasn't the University of South Australia been using Scopus for some time?*

A: Yes. Within our university the application of Scopus has changed since we first licensed it in 2004. For us, Scopus has moved from serving as a useful research tool to serving as an indispensable resource that plays an integral role in the assessment required for the Research Quality Framework.

Q: *Why does the framework make Scopus more important?*

A: The framework recommends the use of quantitative indicators such as bibliometrics to support the assessment of research quality. Scopus, and its innovations such as the Scopus Author Identifier and Citation Tracker, make it easier for universities to provide this data.

Q: *Can you give us a specific example of how you might use Scopus data when you are providing RQF reports?*

A: At the moment it looks as though institutions will be required to submit a research evidence portfolio for each "research grouping." This is likely to include the four best pieces of research work for each eligible researcher, a full list of research work produced by the research grouping and an impact statement providing evidence of outcomes, beneficiaries and how the research was applied. Scopus will help in identifying the use and impact of research publications, the extent of collaborative research, the total research activity, the quality of the research outputs and the impact of the research on end users.

Q: *Can you give us more details regarding how Scopus data might lead to an increase in funding for your university?*

A: Since 1995, government funding for research has been allocated to each university based in part on the number of publications of its academic and research staff. The RQF looks set to change the nexus from publication-related funding to citation-related funding. There are differences in coverage of citations between disciplines and between different publication formats, with citations to books and conference papers harder to find than citations to journal articles. The university sees Scopus as a key tool for ensuring that as many cited works by its researchers are identified as possible.

Q: *Do you think other universities might be able to use Scopus data similarly, when they are seeking funding?*

A: There remain unanswered questions on the exact role of bibliometrics in the RQF, and clear details of the link between the RQF and funding are yet to be released. However there is little doubt that the sort of data that Scopus provides will be important to Australian universities in their preparations for the RQF by providing them with information about the use of published output of researchers. ■

Stephen Parnell

Stephen Parnell has served as deputy director of library services for the University of South Australia since 1998, and is responsible for information resources and technologies available to clients on and off campus. Having earned a master's in literature from the University of New England in New South Wales, Stephen currently focuses his research on interests including the influence of online information on teaching and learning in higher education as well as flexible delivery of library services and the costs, responsibilities and quality assurance involved.

www.unisanet.unisa.edu.au/staff/homepage.asp?Name=Stephen.Parnell

Finding Data to Use in Evaluating Faculty Scholarly Productivity

By Stefanie Altman, Operations Manager, Academic Analytics, Chester, PA, USA

Academic Analytics, LLC is a private research firm founded in 2003 as a result of collaboration between faculty and researchers at Stony Brook University and Educational Directories Unlimited. Since its founding, our company has focused on providing a new, wholly quantitative method to rank performance of doctoral programs at US research universities.

Scopus Drives the Faculty Scholarly Productivity Index

This ranking method, the Faculty Scholarly Productivity Index, or FSP Index, generates rankings based on the cumulative benchmarking of the research output of an institute's or department's faculty. The rankings can be compared against rankings of similar entities, as well as national standards, to determine the quality of scholarly work of a university or department. To sum up its complex methodology, the index leverages a set of statistical algorithms that measure scholarly productivity of faculty by using information on their financial and honorary awards, and by using information derived from Scopus.

Available at a price and produced annually since last year, the index has proven highly useful to dozens of universities and their individual departments for making decisions about faculty productivity, recruitment and retention, as well as program management, and putting together funding appeals. When requesting the index, a university or department identifies ten peers to be included also in the written report, thus providing comparative analysis and a benchmarking baseline. Above is an excerpt from a sample Faculty Scholarly Productivity Index report.

How does the FSP Index compare with its nearest equivalents, *Newsweek*'s annual *Kaplan College Guide* and the National Research Council's report titled *Research-Doctorate Programs in the United States: Continuity and Change*? A main factor setting the FSP Index apart is that it relies exclusively on hard facts; the index is drawn 100% from objective and quantifiable data.

The FSP Index is further set apart by its backbone – data from Scopus.

Sample Faculty Scholarly Productivity Index™

Economics	Publications			Journal Citations			Federal Research Funding			Awards & Honors	FSP
	%FacwPub	JPubs/Fac	BPubs/Fac	%FacwCit	Cits/Pub	Cits/Fac	%FacwGrt	#Grt/Fac	$$Grt/Fac	Awd/Fac	
Mean	0.47	1.10	0.16	0.21	0.65	0.81	0.05	0.08	$19,257.22	0.02	
Standard Deviation	0.16	0.59	0.19	0.13	0.50	0.96	0.06	0.13	$62,721.43	0.04	
Weight in FSP	15.00%	11.77%	3.23%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	
Institution	z-score	z-score	z-score	z-score	z-score	z-score	z-score	z-score	z-score	z-score	z-score
[redacted]	1.46	1.61	0.93	2.27	2.14	2.83	2.02	1.96	1.59	2.20	2.17
Stanford University	2.03	1.44	-0.01	2.70	2.25	2.77	2.30	0.98	0.40	1.91	2.09
Massachusetts Institute of Technology	1.96	2.86	3.25	2.73	0.93	2.40	1.99	0.85	0.17	1.42	2.05
[redacted]	0.85	1.26	-0.21	1.84	1.74	2.08	1.54	1.69	1.21	0.44	1.87
University of Southern California	1.22	4.47	2.04	1.45	1.27	4.17	0.27	0.14	0.00	1.08	1.71
First Decile Mean	*1.47*	*1.61*	*2.11*	*1.83*	*1.81*	*2.06*	*1.96*	*1.68*	*0.83*	*1.89*	*1.68*
University of Michigan-Ann Arbor	0.85	0.59	1.28	1.80	0.33	0.38	1.32	2.91	9.86	0.36	1.68
[redacted]	0.68	1.53	-0.14	0.86	0.89	1.44	0.81	1.40	0.84	1.03	1.67
Yale University	1.50	1.11	2.28	1.11	-0.11	0.24	1.47	0.94	0.02	1.08	1.65
University of Minnesota-Twin Cities	1.35	0.84	-0.50	0.78	0.74	0.85	1.32	0.34	-0.03	1.71	1.59
University of California-Los Angeles	0.93	0.56	0.28	0.24	1.09	0.93	0.93	0.99	0.73	0.73	1.58
[redacted]	1.50	3.04	4.20	3.31	3.32	6.12	-0.13	-0.30	-0.29	0.56	1.48
George Mason University	0.93	1.59	1.77	1.03	0.23	0.77	0.31	-0.11	-0.22	2.74	1.38
University of California-Berkeley	0.11	0.15	1.20	0.27	0.92	0.53	1.79	2.05	0.53	3.04	1.38
[redacted]	1.97	1.10	1.47	0.58	-0.36	0.01	-0.29	0.48	0.60	7.01	1.37
University of Rochester	1.47	0.73	-0.21	1.54	1.39	1.30	1.18	0.28	-0.27	-0.47	1.30
University of California-Davis	0.80	0.61	2.55	1.01	-0.32	-0.10	1.12	0.25	0.04	1.52	1.27
University of California-San Diego	0.31	0.94	0.57	1.05	0.07	0.33	0.63	0.21	-0.14	1.05	1.17

This excerpt from a sample, broad category report pulled from the Faculty Scholarly Productivity Index shows data for a specific institution, our client, as well as for ten peer institutions. Note the names of our client and randomly selected other schools are blacked out in this sample. A full sample report on our website gives definitions for each column shown here. See ***www.academicanalytics.com***

> *"Scopus' unparalleled breadth of coverage, its intuitive interface and its advanced features, including the Scopus Citation Tracker and Author Identifier, make compiling accurate citation information about a large group of researchers easier than ever before."*

Why We Selected Scopus

Scopus' unparalleled breadth of coverage, its intuitive interface and its advanced features, including the Scopus Citation Tracker and Author Identifier, make compiling accurate citation information about a large group of researchers easier than ever before. Thus, when it came to selecting the main research tool used in the process of creating the index, Scopus was our natural choice.

Recently Educational Directories Unlimited President and CEO Mark Shay commented, "We toyed with some other databases, but Scopus has a larger dataset, better data and more international coverage than anyone else. In addition, the way Scopus handles citation data and author disambiguation is a big plus, as it accelerates our ability to compile the information we need for our rankings. We've been very happy with Scopus."

As the Academic Analytics staff person handling the company's matters on a daily basis, I can confirm that Scopus is worth its weight in gold. Scopus saved us years of manpower and made it possible for our company to create the FSP Index.

Anyone wishing more information on the FSP Index can contact me at Stefanie@academicanalytics.com. ■

Stefanie Altman

As operations manager for Academic Analytics, **Stefanie Altman** is the go-to woman for the day-to-day management of the company. She joined the company in 2006, and is greatly interested in the various ways universities and their individual programs can track productivity and progress. Stefanie earned her bachelor's degree from Claremont McKenna College, where she studied film and government and served as a research assistant during the production of several books.

www.academicanalytics.com

By Helen de Mooij, Product Manager, Scopus, Elsevier, Amsterdam, The Netherlands

The Hirsch Index is rapidly gaining favor as a performance measurement tool for scientific authors. It is therefore important that we grasp its meaning and its uses. In 2005, University of California, San Diego Professor Jorge Hirsch published his new performance measurement formula and it read as follows:

A scientist has index h if h of his/her N_p papers have at least h citations each, and the other (N_p - h) papers have no more than h citations each. [1]

This still leaves many of us with questions as to how to calculate the index and, perhaps more importantly, how to interpret it. Interpreting it may be especially challenging, given the recent growth of metric-based research performance measures and their practical applications.

But first, let's discuss how to calculate the Hirsch Index using Scopus.

> *"Instead of relying heavily on indicators attached to the journals in which they have been published, authors can now submit the H Index, a performance indicator that is based on their work."*

Steps in Using Scopus to Determine Your H Index

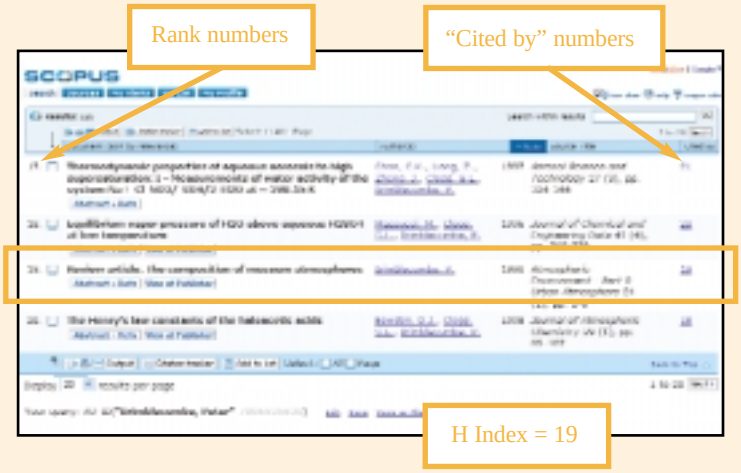
Step 1

First go to **www.scopus.com**, retrieve your articles and sort them by "cited by" so that publications with the most citations appear at the top. The following screenshot shows Scopus' retrieval of articles by Dr. Peter Brimblecombe.

Step 2

Scroll down your "cited by" results list and look at the rank numbers and citation numbers for your publications. Find the point where the number of citations is no longer higher than the rank number. This is your H index or H-factor as determined by using Scopus.

Because ***19*** of his 126 papers have at least ***19*** citations each, and the other (126 - ***19***) papers have no more than ***19*** citations each, Professor Brimblecombe has an index of ***19***.



Scopus Can Help You Evaluate Research Output

The H Index has a positive consequence for authors. Instead of relying heavily on indicators attached to the journals in which they have been published, authors can now submit the H Index, a performance indicator that is based on their work. Indeed researchers are starting to quote their H indexes on their websites and curriculum vitae. At Elsevier, we hope to assist this new look at performance measurement by providing Scopus, which offers exceptionally comprehensive coverage of research literature (including 15,000 journals indexed) and which can help authors locate as many of their relevant citations as possible to get an accurate assessment of their recent work.

Naturally, as we all know, a number on its own tells us very little about an author's performance unless some sort of comparative basis is involved. Also we must be sure that when a comparison is made we account for variances, especially including subject variances, because citation and publication patterns can differ from subject area to subject area. It's important to note that the Hirsch Index is intended to rank scientists with their peers in the same subject areas, and it must be interpreted as such. The H Index can assist in the evaluation of authors, but as with all research performance evaluation, it should not be looked at in isolation.

If you have any questions, please feel free to contact me at h.mooij@elsevier.com. ■

[1] Hirsch, J. E. (2005, September 29). *An index to quantify an individual's scientific research output.* Retrieved from **http://arxiv.org/abs/physics/0508025**

Additional Resources

Bennett, D. B., & Williams, P. (2006). Name authority challenges for indexing and abstracting databases. *Evidence Based Library and Information Practice, 1*(1), 37-57.
Retrieved from http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/7

Biehl, M., Kim, H., & Wade, M. (2006). Relationships among the academic business disciplines: A multi-method citation analysis. *Omega, 34*(4), 359-371.
DOI: 10.1016/j.omega.2004.12.002
Retrieved from www.sciencedirect.com

Boyle, F., & Sherman, D. (2006). Scopus: The product and its development. *The Serials Librarian, 49*(3), 147-153.
DOI: 10.1300/J123v49n03_12

Groot, T., & García-Valderrama, T. (In Press, Corrected Proof). Research quality and efficiency: An analysis of assessments and management issues in Dutch economics and business research programs. *Research Policy.*
DOI: 10.1016/j.respol.2006.07.002
Retrieved from www.sciencedirect.com

Hirsch, J. E. (2005, September 29). *An index to quantify an individual's scientific research output.*
Retrieved from http://arxiv.org/abs/physics/0508025

Kelly, C. D., & Jennions, M. D. (2006). The *h index* and career assessment by numbers. *Trends in Ecology & Evolution, 21*(4), 167-170.
DOI: 10.1016/j.tree.2006.01.005
Retrieved from www.sciencedirect.com

Kravetz, A. (2005). *The role of user centered design process in understanding your users.*
Retrieved from http://iadlc.nul.nagoya-u.ac.jp/archives/IADLC2005/kravetz.pdf

Quint, B. (2006, August 28). Institutional repositories on target: ARL survey and Scopus/Scirus features. *Information Today.*
Retrieved from www.infotoday.com/newsbreaks/nb060828-2.shtml

Stewart, J. B. (2005). Is there racism in economic research? Research networks and discrimination research. *European Journal of Political Economy, 21*(3), 790-794.
DOI: 10.1016/j.ejpoleco.2004.09.005
Retrieved from www.sciencedirect.com

Zhao, D. (2006). Towards all-author co-citation analysis. *Information Processing & Management, 42*(6),1578-1591.
DOI: 10.1016/j.ipm.2006.03.022
Retrieved from www.sciencedirect.com

WHITE PAPERS

Find the Scopus White Paper Series at

www.elsevier.com/wps/find/librariansinfo.librarians/whitepapers

#1 *Applying the User-Centered Design (UCD) process to the development of a large bibliographic navigation tool: A partnership between librarian, researcher and developer.* (2004)

#2 *The value of structure in searching scientific literature* (2004)

#3 *A report on the functionality of abstract & indexing (A&I) database platforms: Recent developments, library policies and a new evaluation technique* (2004)

Subscribe to "insideScopus, news for librarians" at

http://info.scopus.com/is/

Learn here about Scopus tips and new features.

CONTACT INFORMATION

Daria DeCooman
Library Connect Managing Editor
Elsevier
525 B Street, Suite 1900
San Diego, CA 92101, USA
Phone: (+1) 619.699.6719
Fax: (+1) 619.699.6380
libraryconnect@elsevier.com

Iris Kisjes
Scopus Marketing Manager
Elsevier
Radarweg 29
Amsterdam 1043 NX
The Netherlands
Phone: (+31) 20.485.3072
I.Kisjes@elsevier.com