

70,000 Editorial Board Members. One of the major changes for a journal publisher is that, whereas once librarians had to rely upon random surveys to determine whether journals were being used, we now know precisely how many times an article is downloaded and we can see steadily growing use of peer reviewed papers. ScienceDirect, for example, has supplied one than one billion article downloads since its creation.

Despite the size of our organization and activities, in the end one individual is central to our business and that is the author. To a large extent, all the others involved in the process whether editor, board member, reviewer or publisher, are only in that role in order to satisfy the key author needs of :

- certification of research,
- continuation of funding and employment, and
- recognition and career development.

Certification of research is achieved through the author's interaction with reviewers and editor, facilitated by publisher services, support and by ensuring that the right editors and board members are in place.

Dissemination and archival retention is achieved through tools such as ScienceDirect and through the archival agreements between publishers and national libraries. This is underpinned through the continued existence of paper, which is important for many, and by publishers' own archival arrangements which have become increasingly important. Dissemination is also achieved through making meta data about articles widely available through services like the Astrophysics Data Service (ADS), which Elsevier has been supplying data to since the Service's inception – we were the first publisher to enter into an agreement with ADS – and now through services like Google Scholar.

While much of the public discussion of changes in publishing focuses on new trends such as social networking sites, new media formats and Open Access, the commitment to ensure the long term availability of articles as technologies change and evolve – remains an on-going concern and one that new data formats make ever more challenging to address.

2. Journal Publishing Market Trends

2.1. WHERE WE ARE NOW

Blogging, social networking and other technological developments compete with business model developments, such as the many different types of Open Access, for the attention of publishers. Important as these developments are, they tend to conceal the other substantial changes taking place in the industry, not least of which is the growth in electronic dissemination.

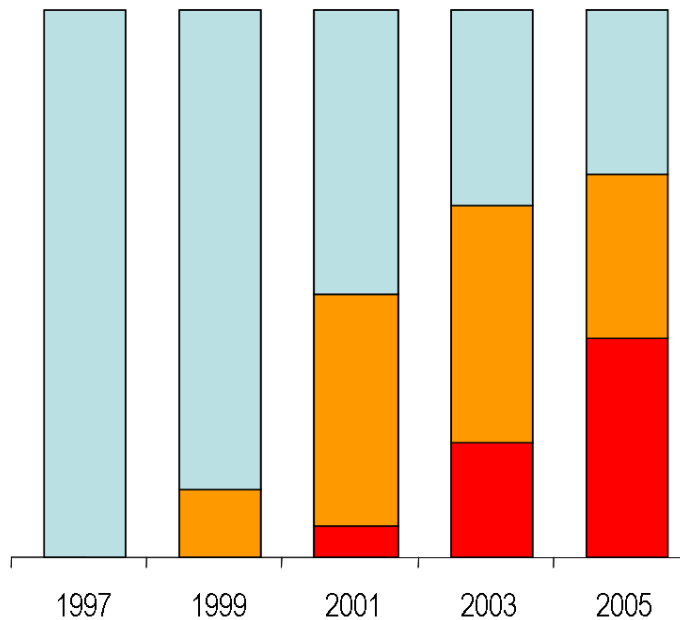


Figure 1. Migration of Elsevier customers from print to electronic. (blue = print, orange = print + electronic, red = e-only)

We tend to take for granted the most significant changes affecting the publishing industry since 1997, which has been the increased dissemination provided by electronic services, such as ScienceDirect.

For researchers, the key benefit has concerned more extensive, more complete and more reliable access from their own desktop. Completeness is especially important, as the work by publishers to digitalise their journals, from volume one, demonstrated. The exercise of creating digital back files starkly illustrated that the paper holdings of many libraries, and publishers, was incomplete with certain key and highly requested articles no longer available in libraries. Secondary, but still important, benefits have included searching, interlinked articles and so-called e-functions such as email alerts and RSS feeds. For librarians, these electronic services have led to easier collection management, usage data at the journal level, significantly reduced storage costs and time efficiencies.

For 2007 and beyond, we will see further integration of articles within the researchers' workflow; increased usability, including fewer clicks to reach article content; enhanced, more dynamic content such as additional data sets and enhanced imagery; and new tools such as social bookmarking and personal tagging. These developments are discussed in more detail below.

We are also seeing some of the benefits of web-based technologies coming

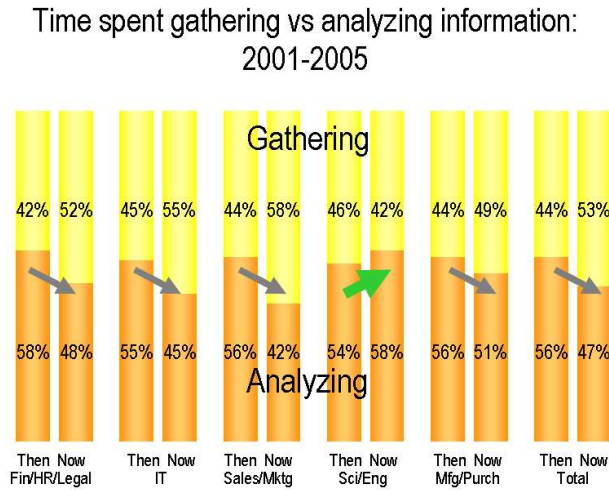


Figure 2. Time spent gathering data for different professions. (source: Elsevier)

into the article submission and peer-review system, as papers are increasingly submitted through web-based submission systems, such as Elsevier's Electronic Submission (EES) platform which is currently live on more than one thousand journals. In particular, such systems reduce geographical barriers and let multiple Editors-in-Chief manage peer review on a journal. One consequence of this is that Editors increasingly organize themselves on the basis of subject specialization rather than geography, with increasingly few journals having distinct 'European' or 'American' editors.

While publishers are very conscious of these changes, what has it meant to researchers?

If we compare different professions, as shown in Fig. 2, we see that from 2001 to 2005, most professions found that the time spent gathering information has increased relative to the time spent analysing that information. The development of the internet certainly gave everyone access to more information but not necessarily the information that they were seeking. The one exception was Science and Engineering where the time spend gathering information had declined.

2.2. WHERE SCIENTIFIC PUBLISHING WILL BE IN THE FUTURE?

Within Scientific Publishing, we are conscious of the technological and societal changes that are affecting all levels of communication and, consequently, every business. Generally, scientific communication follows general changes in internet communication albeit rather less quickly than some

other areas.

Scientists need dissemination, not simply validation or derived reputation from publishing. While there are enhanced opportunities for dissemination through new services and through self-posting of articles to pre-print servers and institutional repositories, the large publisher platforms continue to serve as the primary source of dissemination of research results for the majority of areas. The exception to this is high-energy physics where the arXiv has, for many scientists, taken this role.

Separately, we are concerned that among some younger scientists there is little appreciation for the value of scientific journals and some scepticism about peer review which, while always present among some scientists, is now more frequently articulated through the internet.

To some extent, journals face the same risks as the quality newspapers in Europe. Much as traditional quality newspapers are seeing their mix of a sales and advertising based business model being undermined by free newspapers, funded by advertising, and web-based services, the traditional journal is often presented as being threatened by search-derived business models.

Nevertheless, there is stability in the underlying fundamentals of the scholarly journal publishing model. In particular:

- the large majority of authors feel that peer review remains important;
- current open peer review experiments get hardly any traction;
- authors get tremendous value and prestige from high quality brands like Science, Nature or Cell;
- there is a lack of trust in information that is not validated; and
- a lack of trust in scientific communication based on opinions, such as blogs.

When we poll our authors¹, we find that 90% were “very satisfied” with the journal in which they published; 90% feel that reasons supporting the final decisions from the Editor were clear; and 85% feel that the peer review improved the article.

When considering change in scholarly publishing, there is one noteworthy phenomenon which is rarely commented on, yet is possibly the most significant change we are facing. That is the change in the size of the actively engaged academic community through developments in countries such as China, India, Turkey and South Korea which are seeking to publish a greater proportion of their research output in international journals.

Fig. 3 shows how research papers from Taiwan, Brazil, Turkey, South Korea, India, Mexico and China have evolved during the period from 1999

¹Through our regular author feedback programme surveying all published authors.

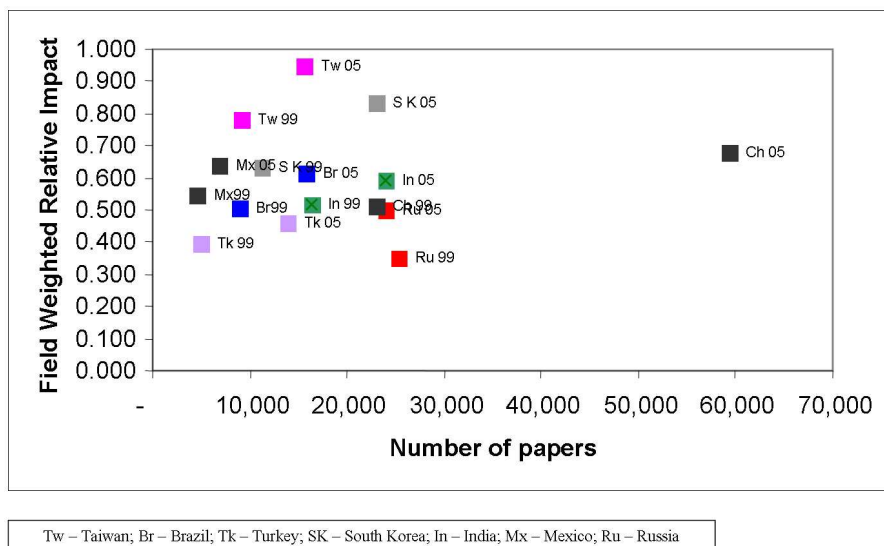


Figure 3. Growth in the quantity and quality of research from China. The term *Field Weighted Relative Impact Factor* is a measure in which the impact of articles, as determined by number of citations, is adjusted to reflect an article's relative impact when compared with other articles in the same field. This avoids the distortion created by the differing citation trends seen in life science, where articles are typically cited soon after publication, and maths and physics which typically have longer citation lives.

to 2005. Fig. 3 shows results for each country in 1999 and then again for 2005.

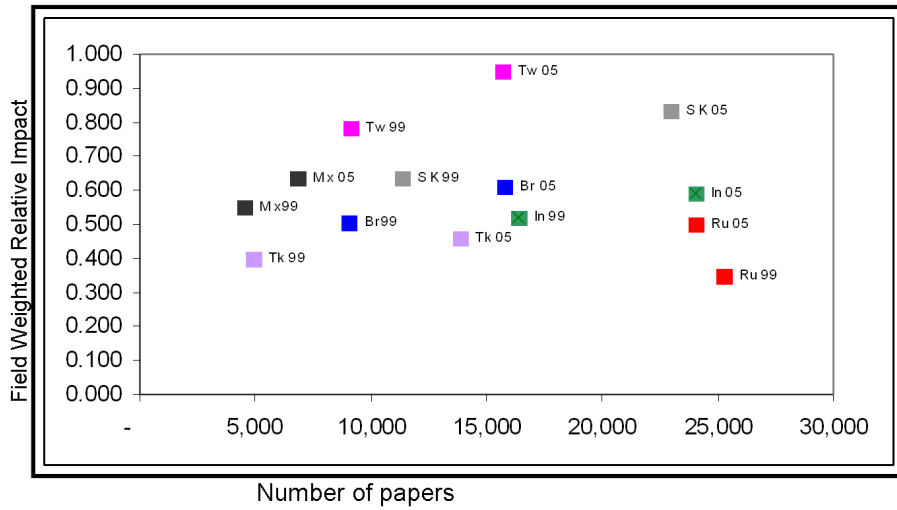
With the exception of Russia, each country saw both the volume and the quality of their published work increase in that time. While countries like India and Mexico saw modest improvements, the figures for China are exceptional. Cumulatively, these changes represent a fuller integration of scientific communities across the world and major investments in terms of personnel and resources in science and technology in the emerging economies.

While the result from China tend to put other countries in the shade, Fig. 4 shows that growth in countries such as India and South Korea is still substantial.

3. Responding to Trends: Ongoing Actions to Improve Publishing Processes and Output

At Elsevier, we look at each stage of the journal publishing process to see what we can do to improve our processes and policies to ensure a better service for authors.

We see the key relationships here as between the author and each of



Tw – Taiwan; Br – Brazil; Tk – Turkey; SK – South Korea; In – India; Mx – Mexico; Ru – Russia

Figure 4. Growth in Papers (excluding China).



Figure 5. The relationship between publisher, editor, reviewer and editor.

the other actors in the relationship. For a publisher like Elsevier, each of these is sustained through a mix of technologies and services which we are seeking to develop and extend.

3.1. SUBMISSION AND PEER REVIEW TOOLS AND SUPPORT

With Elsevier Electronic Submission (EES) we have a robust system which is relatively simple to use with lots of support and productivity tools. In developing this tool, we have been seeking to make the increasing number of submissions manageable for authors, reviewers and editors. Development areas include tools to automate early assessment of papers to identify possible duplicate submissions or repurposing material from other papers, and dealing with data sets and other research outputs.

Other elements in supporting the editorial and peer review functions include providing editors and board members with personal access to ScienceDirect and Scopus, frequent performance reports, bibliometric analysis on key issues affecting journal performance and 24 hour support for technical or status questions.

3.2. ELECTRONIC DISTRIBUTION THROUGH SCIENCEDIRECT

ScienceDirect, Elsevier's electronic publishing platform, remains an extremely robust, reliable, class-leading product. Going forward, Elsevier will look to develop this service through the following development areas:

- a broader definition of articles (including more related information, as seen in Fig. 8 below);
- better search/indexing functionalities with cross-linking below the article level;
- web 2.0 functionality, and
- continued investment in infrastructure to sustain the quarter of a billion downloads that we see each year.

Social bookmarking, for example, enables groups of users to comment on articles, as in Figs. 6 & 7.

We also recognise that the peer-reviewed article is only the condensed end result of an intensive research process. During the publication process, multiple documents and files are created which can hold interesting and useful information not represented in the article. Additional Article Information (AAI) should give authors the ability to share this information while the added information should be searchable and findable by the end-user. See Fig. 8 for an example of how this would be handled in ScienceDirect.

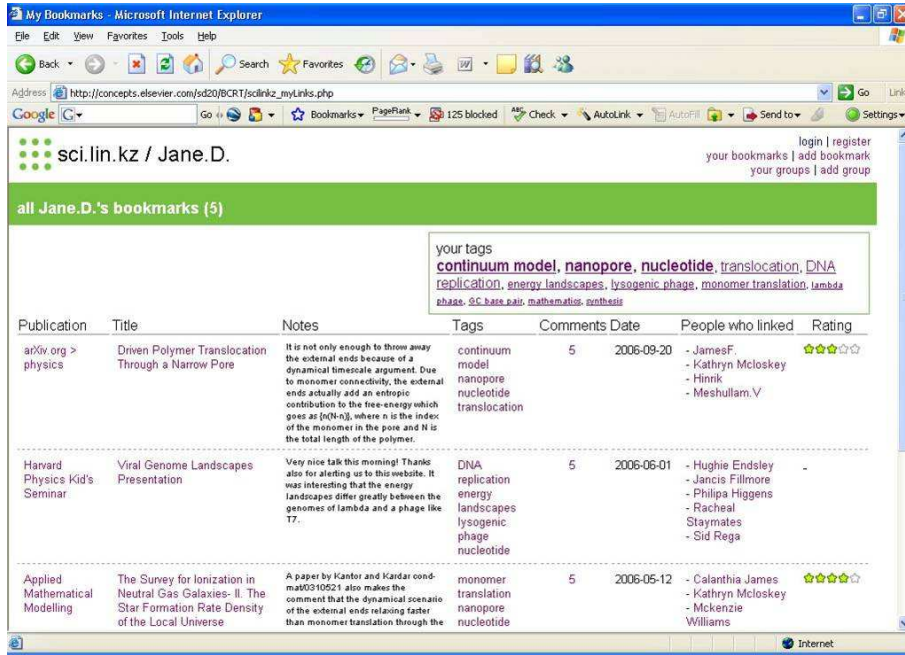


Figure 6. Social Bookmarking in ScienceDirect.

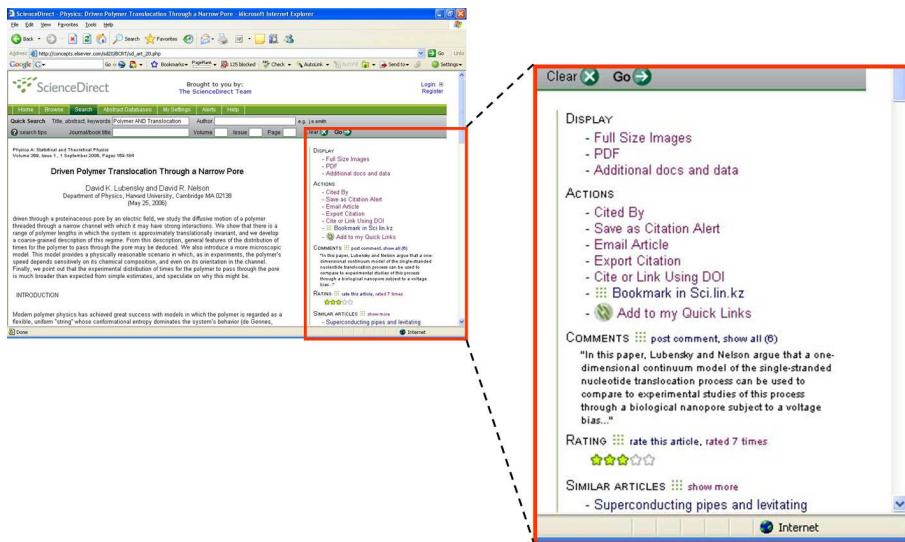


Figure 7. Social Bookmarking in ScienceDirect.

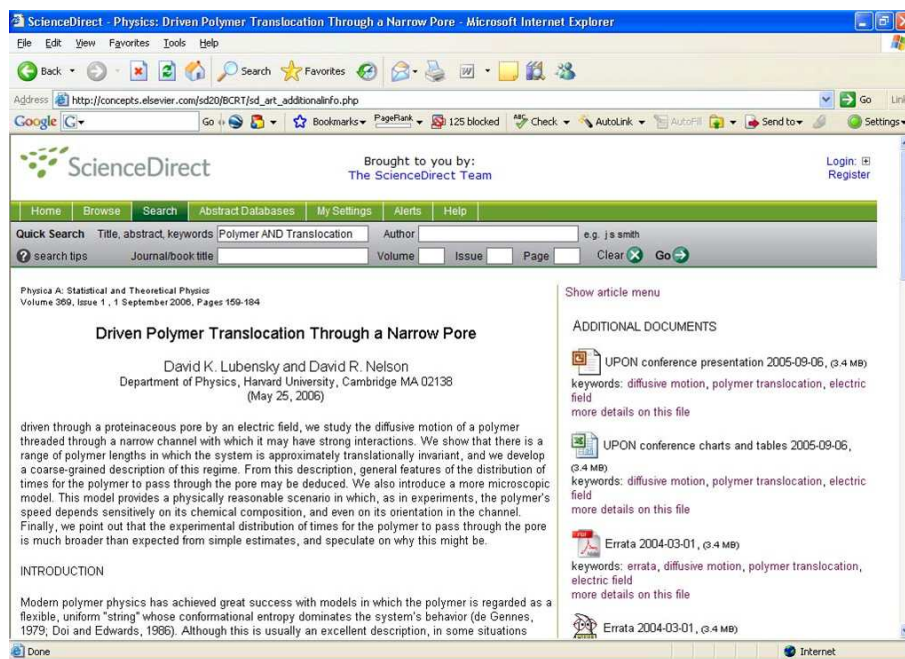


Figure 8. Additional Article Information in ScienceDirect.

3.3. EDITORIAL/PRODUCTION SERVICES AND FUNCTIONS

To handle the 260,000 articles that Elsevier publishes each year, we have a skilled, experienced production service, well-appreciated by authors, as recorded by our author feedback programmes. This needs to develop to meet emerging needs such as more language support for authors with limited familiarity with English; an electronic-first approach with new material and information that cannot be supported by conventional production; and the need for greater consistency (especially with Astronomical data items) and standard setting.

To address the language issues, we now offer Editors technical screening of submissions prior to peer review to help better educate authors in how to submit an article which will be comprehensible to a reviewer and meet the normal criteria for a scholarly article. For 2008, we aim to screen 80,000 articles in this way. We have also been funding language editing – before peer review – for some particularly promising authors. This work is complemented by workshops that we have held with potential authors in countries such as China where some authors are starting to submit work to international journals for the first time.

There is also a need to make the work that publishers carry out in the

production and editorial stages more visible to authors, many of whom assume that the final, submitted article is ready to be published without any additional work.

3.4. WORKING WITH AUTHORS

One of the key concerns of any publisher is not to put any barriers in the way of an author submitting work to a journal. To do this effectively, we have introduced one of the most liberal copyright policies in the industry. A full description of that policy is available on Elsevier's website², but the key rights can be summarised below:

- to make copies (print or electric) of the journal article for their own personal use and classroom teaching use;
- to make copies and distribute copies (including via e-mail) of the journal article to research colleagues, for personal use by such colleagues;
- to post a pre-print version of the journal article on Internet web sites including electronic pre-print servers; and
- to post a revised personal version of the text of the final journal article (to reflect changes made in the peer review and editing process) on the author's personal or institutional web site or server, with a link to the journal home page (on [elsevier.com](http://www.elsevier.com)).

3.5. WORKING TO MAKE OUR JOURNALS AVAILABLE IN DEVELOPING COUNTRIES

Elsevier has been closely involved in a variety of programmes to make articles available in developing countries where almost any form of scientific literature will be unaffordable. All of our physics and astronomy journals are being included in the key United Nations Hinari, Agora and OARE projects to make scientific literature available to more than 100 of the world's poorest countries.

3.6. ADDRESSING THE CHALLENGE OF OPEN ACCESS

In looking at the Open Access issue, Elsevier has sought to address concerns about the sustainability of such business models and the need for journals not to exclude authors who may not be able to afford the fees typically associated with Open Access publishing.

We recognise that while the term Open Access is often used to cover a very wide range of practices and business models, it can be broken down to approximately four separate models. Elsevier has direct experience of a

²<http://www.elsevier.com/>

number of these models and I have set out our assessment of each of these below:

- First, **Author Pays Journals** are typified by up-front author charge with no subscription fee. To date, these journals represent approximately one per cent of published articles and more than 70% of authors³ do not believe that they should pay to see their work published. Elsevier's position is to listen and learn, keep an open mind, but we have no current plans to launch such journals. We remain concerned that this model excludes many authors, especially those from developing countries.
- Second, **Sponsored Articles** give authors the option to pay to make accepted articles available to non-subscribers. To date, the volume of these articles remains low with perhaps as few as 1% of Springer articles made available this way and with Blackwells having less than 300 articles in the last two years. Nevertheless, we recognise that there is genuine interest in this model and we are ourselves testing this on approximately 40 journals.
- Third, **Delayed Open Access** is an approach which makes established publishers' articles available to non-subscribers on their website after a certain time period. Approximately 6% of articles are made available 12 months after publication including a number of Elsevier journals.
- Fourth, **Open Archiving** where authors post manuscripts to institutional or subject repositories. Currently about 7% of articles are voluntarily posted in this way and Elsevier's position is to support individual authors posting of preprints and manuscripts to their own websites, but not to third party websites.

There is a diverse movement of people urging policy makers and others to embrace Open Access but, as yet, this model has not proven its sustainability. Elsevier continues to engage, test and learn, based on the experience we are acquiring through our growing experience of the various models of Open Access.

³CIBER survey.