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Aims and scope

Science Editing (Sci Ed) is the official journal of the Korean Council of Science Editors and the Council of Asian Science Editors. It aims to improve the culture and health of human being by promoting the quality of editing and publishing scientific, technical, and medical journals. Expected readers are editors, publishers, reviewers, and authors of the journals around the world; however, specially focused to those in Asia. Since scholarly journals in Asia are mostly published by the academic societies, universities, or non-profit organizations, Sci Ed is sought to play a role in journal development. The number of publications from Asia is increasing rapidly and overpass that of other continents; meanwhile, the number of international journals and highly appreciated journals is yet to be coming forward. It is task of Asian editors to pledge the journal quality and broaden the visibility and accessibility. Therefore, its scope includes the followings in the field of science, technology, and medicine.

- Policy of journal editing
- Data mining on the editing and publishing
- Systematic review on medical journal publishing and editing
- Research ethics and medical ethics including clinical registration, statement of human and animal health protection, and conflict of interest
- Publication ethics: fabrication, falsification, plagiarism, duplicate publication, and authorship
- CrossCheck
- Legal issue in journal publishing
- Peer review process
- Reporting guideline for medical journals
- Medical and scientific literature databases
- Advanced information technology applicable to journal editing and publishing including PubMed Central schema, journal article tag suite schema, Digital Object Identifier, CrossMark, FundRef, ORCID, datacite, QR code, and App
- International standard of journal editing and publishing including International Committee of Medical Journal Editors' Recommendations
- Reference styles including Vancouver (NLM) style, APA style, IEEE style, and ACS style
- Digital publishing in the web and App
- Education and training of editors, reviewers, and authors
- Manuscript editing
- Journal evaluation
- Bibliometrics and scientometrics
- Finance of journal publishing
- History of scholarly journal
- Copyright and Creative Commons License
- Open access and public access approaches

Its publication type includes original articles, reviews, case studies, essays, editorials, meeting reports, book reviews, announcement, correspondences, and video clips. Other types are also negotiable with the editorial board. All unsolicited articles are subject to peer review. Commissioned articles are reviewed by the Editorial Board

About the journal

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Editorial

Science editing and publishing in Asia

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On July 2, the inaugural assembly of the Council of Asian Science Editors (CASE) was held in Seoul. Over 140 science editors from 10 Asian countries attended the meeting and expressed their enthusiastic support for the establishment of the CASE. I believe this is an important first step toward an organized effort in developing scientific editing and publishing in Asia rapidly.

Modern science has been created and developed by the efforts made mainly by scientists in Europe and North America during the last few centuries. Science journals were also invented by the Westerners, and even nowadays Europe and the US dominate the scientific publishing industry in the world. Since the latter part of the last century, many countries in Asia have undergone rapid economic development, which in turn lead to developments in many disciplines of science. Currently, the level of science in Asia is close to the global level both quantitatively and qualitatively. Asian scientists contribute well over 45% of the entire contents of all scientific publications in the world. Nevertheless the level of science journals published in Asia remains disproportionately and regrettably low.

There are many reasons why the level of scientific publishing in Asia is so low. I think the lack of tradition and experience in journal publishing, the insufficient education and training of publishing professionals, and the society's inability to recognize the importance of the scientific publishing industry are the main reasons for this situation. The main motivation for establishing the CASE is that science editors in Asia need to share a common recognition of the problem and collaborate intimately to raise the level of scientific publishing in the region to the level comparable to that of scientific research in Asia.

I believe the rapid expansions of the use of the internet in the publishing industry and online and open access journals provide a rich opportunity for late starters to catch up with more advanced publishers. Asian countries have long histories and unique cultures and have long traditions in academic research including science. By melding old traditions with new ideas, it will be possible for Asians to create new trends in scientific publishing, and thereby contributing to the development of human culture and well-being. I hope the CASE will grow to be an organization that can pioneer such a movement.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Review

The big picture: scholarly publishing trends 2014

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Abstract

It is important for journal editors to keep up to date with the changes happening in the international journal environment to ensure that their own publications remain current and meet international expectations. Dramatic changes have taken place in the journals environment during the last two decades, frequently driven by technology but also by increased global participation in scholarly and scientific research and concern about the commercial influence on dissemination of knowledge. Technical solutions have attempted to address the growth in research but have sometimes added to the tsunami of information and increased the need to manage quality. To this end experiments with the traditional quality control and dissemination systems have been attempted, but news of improvements are frequently overshadowed by alarms about ethical problems. There is particular concern about some of the new publishers who are not adhering to established quality control and ethical practices. Within a potentially fragmenting system, however, there are also emerging collaborative projects helping to knit together the different elements of the publishing landscape to improve quality, linkages and access.

Keywords

Innovation; Journals; Publishers; Publishing; Repositories

Introduction

This article considers the changes that have happened recently to the scholarly journal environment, starting with the changes in research and development and the influence of the emerging economies. It then considers the financial models and the serials crisis that led to the movement for more open access to research and greater involvement of the academic community. It looks at the ethical issues that have beset the recent years, and the new technologies that promise more efficient and ethical publishing.

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The Growth of Research and Journals

Until the mid 1960s, the majority of scholarly communication took place through journals published by Universities, Societies or Associations on behalf of their members, and containing content mostly written by their members. There then came the rapid growth of commercial publishers, who launched their own journals, realising that there was a market for interdisciplinary and inter-country research. The rapid growth in the numbers of journals in developed countries was echoed by a rapid growth in developing countries as they gained independence and developed their tertiary education and research institutions. It has been estimated that the growth of investment in research and development worldwide has been approximately 3% year-on-year for the past 30 years, and that the number of articles increases accordingly [1]. The latest report from the STM Association estimates that there are over 28,000 journals publishing over 1.8 million articles each year [2]—and it should be noted that this report only considers publications appearing in the main international indexes. This excludes most of those journals published in non-English languages and those in the periphery of the main research areas.

The Serials Crisis

In the 1990s journals were one of the early adopters of the Internet and eagerly encouraged digital dissemination. However this was also accompanied by substantial increases in journal subscription charges, partly due to the additional cost of processing more content and compounded by the costs of implementing new technologies, plus commercial opportunism. Meanwhile, the budgets available to libraries to purchase these journals did not increase similarly, and this led in the late 1990s to what was termed "the serials crisis" [1]. This, combined with the apparent ease of digital delivery, led to a call for government-funded information to be made freely available, and the start of the open access movement.

International Collaboration and Emerging Countries

Whilst these commercial tensions were growing in the western world, another influence was starting to be felt: increasing international collaboration and input. A report from the UK Royal Society in 2011 reported changes in global research outputs and found a large increase in participation from around the world. As an example, it cited an article published in *Physics Letters B* in 2010, which was authored by 3,222 researchers from 32 different countries [3].

Although this number of authors remains unusual, the situation it presents raises several issues which publishers, editors and even governments need to consider. Firstly, there is a need for these researchers to have access to the most recent and relevant research, regardless of where it is published. Second, all the authors need to agree to a common standard for ethical research and publication. Third, they all need to be able to communicate in a common language (English in this case). And lastly, that each of these authors needs to agree on the journal in which they wish to publish—which implies a common awareness and respect for the same publications.

One particular country of note, China, has recently emerged as a major exporter of articles [4,5]—many co-authored with researchers from different countries, but many more authored exclusively by Chinese authors. These authors have chosen to be published in what are considered international journals—usually those published in Europe or the USA. This highlights a trend towards the same value criteria being used by authors in China as those used by western researchers—in this case the decisions are greatly influenced by the Impact Factor calculated by the US-based commercial company Thomson Reuters.

Any consideration of the journal environment must take global influences into account, whilst at the same time acknowledging that most of the changes and trends are being driven from Europe and North America. The reasons for this are partly due to the research and development strengths of these regions as well as the strengths of their existing publishing industry. However many publishing developments in these regions are happening in response to the increasingly global environment.

Commercial Business Models

One of the main business trends during the past decade has

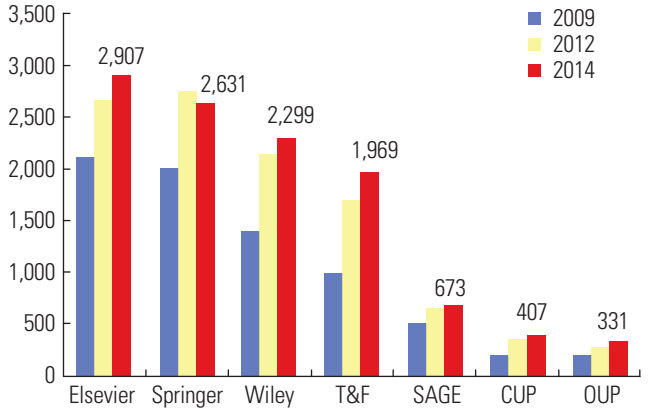

Fig. 1. The number of journals published by the largest publishers (Numbers taken from the publisher websites and are subject to change.). T&F, Taylor & Francis; CUP, Cambridge University Press; OUP, Oxford University Press.

been the merger of publishers and the growth of the largest publishers. Elsevier remains the largest publisher of journals, closely followed by Springer, then Wiley and then Taylor & Francis. It is notable that each of these publishers has increased the number of journals that it publishes each year (Fig. 1) and they now dominate the journal market. Part of their growth has been from new journal launches, but the majority has either been from acquisition of other, smaller, publishers or from becoming the contract publisher for a learned society or association. As the technical issues associated with publishing are increasing, many institutional journal publishers are turning to professional publishers to produce their journals and advise them on the best way to develop them. This has led to a delegation of skills and knowledge to the commercial publishers, and—it is arguable—a loss of publishing control within these scholarly and academic institutions.

Whilst the move to commercial publishers has been a pragmatic decision by these institutional publishers, it has raised concerns in the librarian and academic world about the commercialisation of research. Some efforts have therefore been made to develop new models that would revert control to academia. The most recent of these is a proposal from an American academic consultant for a collaborative publishing model for humanities and social science journals from nonprofit society publishers. The proposal would require learned societies to manage the editorial and quality control processes, libraries to manage the dissemination and archiving processes, and higher education institutions to fund the journals through a centralised platform [6].

The Growth of Institutional Repositories

In an attempt to counteract the control of the commercial companies on the dissemination of research, several repositories have emerged, managed and controlled by institutions. The best known of these is ArXiv.org managed out of Cornell University and containing items of interest to the physics and mathematical community. This emerged in 1992 as a place to deposit early article versions for public view and comment prior to submission to a journal. At the time of writing it contains almost 1 million items and the model has just been copied for the life sciences in the repository, bioRxiv.org. Interestingly, there has not been any problems with physics or maths journals considering the appearance of an article in this repository to be prior publication. However, in other disciplines such posting would constitute prior publication and cause the articles to be rejected.

Many institutions have also launched their own repositories, in an effort to capture the creative output of the institution—theses, working papers, data sets, book chapters and articles. The Registry of Open Access Repositories (http://roar.eprints.org/) currently lists over 3,500 repositories from around the world, with 94 in Africa, 604 in Asia, 1,315 in Europe, 685 in North America, 98 in Oceania and 290 in South America. These are generally managed within the institution library, and many institutions have a mandate whereby all faculty and students are required to deposit their works in the institutional repository. Most of these are made free for anyone, anywhere, to view and are seen as a window to the output of the institution, promoting its research.

There are, of course, tensions with the deposit of materials into these open repositories. In the first place these come from publishers who are not happy to find an article they wish to sell available for free in a repository. However, the institution itself (or the authors) may also wish to withhold some items due to patents pending or for other commercial or legal reasons.

Version Control

One unexpected consequence of the growth of repositories is the multiple version of artices that are now available. There are questions about what version of an article is available from the repository and how much it differs from what is published in a journal. This leads to questions about citation—how should repository versions be cited (and should they be cited at all if they are not the Version of Record?).

Recognising the problem over "early" versions being available, a project in 2008 identified 7 different article versions and provided a nomenclature to ensure correct citation [7]. The versions ranged from Author's original to Enhanced Version of Record. Although this nomenclature has not been widely adopted in the citation environment, the most important two versions (and those being most used) are Accepted Manuscript and Version of Record. The former is the version after peer review and the latter is the version published by the publisher. Most commonly it is the Accepted Manuscript that is found in repositories, and many publishers allow this to appear at the time of publishing with others allowing it to appear after a specified embargo period (commonly 6 or 12 months).

The question for readers, however, is which version to cite? Some readers will not be able to access the Version of Record, and so will read the Accepted Manuscript. However when they cite the work in their own publication, it is likely that they will cite the Version of Record as this has grants greater credibility on their work (even though they have not read this). It is quite possible that a change made to the Version of Record may result in it not supporting the argument of the citing author, and this uncertainty may be increased by early and later versions being made available in different places on the Internet. CrossMark is an initiative to alert readers of any

changes to the published version (the Version of Record), including later versions and errata, and is starting to be used on journal sites, but not yet in repositories and so is not yet addressing the potential versioning problems that they pose.

One journal working with multiple versions is *Faculty 1000Research* (http://f1000research.com/). This journal is making an attempt to promote the concept of multiple versions as something to be embraced within research—the justification being that research is not static and that iterative changes should be recorded and visible. The journal publishes each article as soon as it has undertaken what is called a "sanity check" (to confirm that it is not a totally unsuitable article). It is then published for open peer review. When reviews have been received, the authors can comment and update their articles, including updating and uploading new versions. At all stages the articles are identified with their status—"awaiting peer review", "approved with reservations", "published", etc., as well as the version number. All the comments and reviews can also be read next to the article.

Transparency of Reviews

Transparency of reviews is growing in popularity and many journals are not only using an open system (where the authors' and reviewers' identities are known to each other during the traditional, confidential, reviewing process), but also publishing the reviews alongside the accepted, published, articles. Examples of this include most of the BioMed Central journals, *EMBO*, and *PeerJ* [8].

Within this environment, quality control and the importance of peer review remain paramount, and editors throughout the world increasingly find problems in obtaining suitable reviews. There are some new initiatives that offer a reward to reviewers to provide an incentive. Some publishers offer benefits such as temporary free access, for example reviewers of Elsevier journals can access ScienceDirect for a month. Some journals pay reviewers, but until recently information about what incentivises reviewers has not been properly researched. Recently, however, one journal, *The Journal of Public Economics*, has undertaken research to find out what it could do to improve submission of reviews. It found that offering a shorter timescale did speed up the return of reviews, as did offering 100 US dollars as an incentive to return the review within the stipulated time period [9].

There are several peer review experiments outside the journals themselves. Publons (https://publons.com/), for example, is an initiative that asks researchers to upload post-publication reviews onto its site. These are given a Digital Object Identifier (DOI) and are therefore citable. The initiative is being promoted as a way for researchers to gain publication credit for their reviews. Another research networking site, ResearchGate, is also experimenting with a similar system. However, an article in *Nature* voiced concern that the emergence of these sites is potentially leading to a fragmented environment for posting and finding such reviews [10].

Apart from the problems associated with managing a peer review system, reviewing itself does not manage to guarantee the validity of all articles, and there is suspicion that misconduct is growing. The number of articles being retracted for errors and fraud is increasing [11] and the blog site, Retraction Watch, posts regularly on problem articles. There is some debate about the reason for this increase: whether malicious misconduct is to blame or if honest error accounts for the majority of the problems. Some researchers are under such pressure to publish that it inevitably leads to misconduct. In China, for example, not only are cash incentives offered to successful authors, but sometimes even housing benefits, and this must inevitably entice some researchers to fabricate data, plagiarise other works and generally behave unethically [12].

Predatory Publishers

Of course, authors are not alone in behaving unethically and several publishers and journals have also been criticised for potentially fraudulent behaviour. A Canadian librarian, Jeffrey Beall, maintains a list of what he calls "predatory publishers" who publish with little or no peer review and lure unsuspecting authors who need to publish their work. These journals promise a high quality (and therefore value) journal, but actually just provide a "vanity" publication which may harm the reputation of the author. The increasing numbers of these journals (from 23 in 2011 to over 225 in 2013) is a worrying side effect of online open access in which it becomes normal for the author to pay for publication, and a global environment where naïve authors are under pressure to publish without a support structure to help them identify suitable outlets for their research.

New Publishing Technologies

Addressing such ethical problems, publishing technologies have become increasingly sophisticated and can help to identify publication fraud in addition to providing extra reader and researcher benefits. On the negative side, however, they also provide worrying examples of how publisher systems are not foolproof. For example early in 2014, a French computer scientist, Cyril Labbé of Joseph Fourier University in Grenoble, discovered that IEEE had published 100 articles created by computer software, SCIgen—not by human authors. The articles had, apparently, been peer reviewed, but had not been

spotted as fraudulent. Such ethical issues are becoming a widely-reported part of the journal landscape.

A suite of softwares from the non-profit organisation, CrossRef, include systems that use the underlying bibliographic data within each article to provide services to editors, readers, publishers and funding agencies. These include CrossCheck, a plagiarism-checking software (now used by over 600 publishers worldwide), FundRef that enables grant funders identify the outputs of their research investment, CrossMark (mentioned above) that helps readers to identify updates and new versions of articles, and other systems that assist data and text mining. These have added to the now-established DOI system that provides direct article linking.

Data and Text Mining

Data and text mining is the most recent trend to gain traction—particularly within Governments. Not only is there interest in what can be done with large data sets, but there are concerns about the loss of data because it is not being systematically captured and stored. Data repositories such as Dryad and DataCite have started to emerge, following the model of content repositories discussed above. Several journals now require authors to make their supporting data available, either by depositing it in one of these public repositories, or by providing it as a supporting file to the article. For example all PLoS journals require authors to provide a Data Availability Statement guaranteeing that they will make all data publicly available, without restriction, immediately upon publication of their article.

Conclusion

Innovation in research communication is emerging from different areas and from institutions and people with different objectives. While this is resulting in a dynamic and innovative environment, it is also providing some tensions and examples of malpractice and unethical behaviours. The increased globalisation caused by widespread use of the Internet has brought a wealth of different perspectives and opportunities for improvements in the sharing of knowledge—but is also revealing some very different viewpoints and conflicts about what are considered acceptable behaviours. This article has considered some of the recently-emerging trends, but cannot claim to provide a complete overview of a landscape that is under pressures from governments, institutions, companies and individuals to increase access and usability of research findings within existing financial constraints. A comprehensive consideration of the changes, technologies, mandates, concerns and problems emerging within the scholarly publishing community would require a large book (and be out of date at the moment of publication).

For ongoing information about changes to the industry, readers are directed to relevant blogs, such as Scholarly Kitchen (http://scholarlykitchen.sspnet.org) run by the US Society of Scholarly Publishers, and to the updates and *ALERT* newsletter provided to members of the Association of Learned and Professional Society Publishers (ALPSP, http://www.alpsp.org) (Please note that the author of this article is also the author/editor of the *ALERT* newsletter.).

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Review

Handling digital images for publication

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Abstract

Currently, images in medical journals are produced in the form of digital image files. The quality of printed images can be easily recognized. However, what comprises the quality of a digital image file is more complex. Some images appear to have good quality when displayed on a computer monitor but do not have sufficient quality for scholarly publication. In this review, basic concepts of digital images for scholarly publication, such as resolution, raster images, and vector images, will be explained. The advantages and limitations of using PowerPoint for processing digital image files will also be touched on briefly.

Keywords

Graphic image; PowerPoint; Resolution

Introduction

Before the year 2000, most images for manuscript submission were printed on paper. Determining whether a printed image is of sufficient quality is easy. An image that appears large enough and clean enough on paper should be acceptable for publication. By the year 2000, most editorial offices had begun to use digital image files for their work. More recently, paper-printed images have no longer been accepted at all in most cases. Determining the quality of a digital image file is not as simple as that of a printed image. It can be said that "all digital images are not created equal." In some cases, an image may appear to be of good quality when viewed on a computer monitor, but the quality is far below that needed for print publication. Some institutions offer assistance to researchers through a graphic image specialist. However, sometimes this specialist cannot help salvage poor-quality image files if the researcher does not have a basic understanding of digital imaging. The author must generate a high-quality original image for the graphic image specialist to work with. This article will review some of the most important concepts necessary to produce high-quality images for manuscript preparation.

A Suggested Simple Universal Standard Resolution of 900 ppi and 4 inches

Resolution refers to a measurement of clarity or detail of the displayed image and is expressed as the number of pixels displayed per unit length [1,2]. The resolution of a printed image is

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most commonly expressed in terms of dots per inch (dpi) or pixels per inch (ppi). The most commonly recommended resolution for printing on paper depends on the nature of the images: 1) 300 dpi for color pictures, 2) 300 to 600 dpi for black and white pictures, 3) 600 to 900 dpi for combination art (photo and text), and 4) 900 to 1,200 dpi for line art.

In the digital image file, the number of pixels per inch itself has no meaning in terms of the image quality. For instance, if a color picture image file with 600 ppi is printed as a 1-inch picture, the image quality will certainly be good. However, if the same image file of 600 ppi is printed as a 10-inch picture, the final image quality will be much poorer. In a digital image file, the image "quality" (that is, the information density) is not determined by the number of pixels per inch but the number of actual pixels. A 1-inch 600 ppi image file has the same "quality" as a 10 inch 60 ppi image file because the horizontal pixel number is 600 for both images. Therefore, the actual number of pixels is the key determinant of the image quality for a digital image.

In order to determine the number of pixels, the physical size of the image must first be determined. But this introduces a problem. Only a few journals recommend the size of the artwork in their author guidelines. In most journals, only the minimum required number of pixels per inch is stated. *Gastroenterology*, for example, indicates that images "should be of high quality (300 ppi or greater, clear, and in good focus)" [3]. With the same number of pixels per inch, the effective image quality can vary widely by the image size in the printed article. The publisher may choose to greatly change the size of the image in the final editing step, without input from the authors. Therefore, the authors cannot know the final size of their image during preparation of images for submission. Some journals print the images quite large, but others prefer small images. Early in the research process, authors need to review the previously published articles in the same journal to guess at the final image sizes of their planned research article.

It is the opinion of this author that a universal recommendation could help authors prepare their images. The standard figure size of most academic journals is about 86 mm (single column). The standard pixels per inch for line art is 900 to 1,200 ppi. Therefore, an image file of 900 ppi and 4 inches is of sufficient quality for most publications; this means 3,600 pixels in a horizontal line. It is recommended that authors use this number as a universal guide.

Vector Images Should Be Used Instead of Raster Images Whenever Possible

There are two types of digital images: raster images and vector images. A raster image, also called a bitmap image, is a collection of pixels (picture elements) arranged on a rectangular grid. Usually, more pixels mean higher image quality. Raster images are resolution-dependent, meaning they cannot be scaled up to an arbitrary resolution without loss of quality. The original raster image is always the most detailed image. Any manipulation of the raster image makes the apparent quality poorer. Popular graphic formats for raster images are Graphic Interchange Format (GIF), Joint Photographic Experts Group (JPEG), Portable Network Graphic (PNG), and Tagged Image File Format (TIFF). The most popular image editor for raster images is Photoshop.

A vector image is based on vectors. A vector graphic is composed of mathematical formulas that describe each object in an image in terms of its outline shape, line weight, fill, and exactly where it is on the page. Because pixels do not exist in a vector image, it can be scaled up without loss of image quality. Popular graphic formats for vector images are Encapsulated PostScript (EPS), Scalable Vector Graphics (SVG), and Adobe Illustrator (AI). The most popular image editor for vector images is Adobe Illustrator. The Portable Document Format (PDF) is unique that it can handle both raster images and vector images.

How can vector images and raster images be distinguished? The simple way is to magnify the image to 500% or more. When raster images are scaled up, a loss of image quality can be expected. The text, lines, and curves become jagged. On the other hand, vector-based images can be scaled up by any amount without degrading the image quality (Fig. 1).

Images taken by a camera, a scanner, or from a picture archiving communication system (PACS) are always raster images. Vector images can be made using a vector-based image editor, such as AI, CorelDRAW, or Prism. An original raster image cannot be converted into a vector graphic. However, a vector image can be converted into a raster graphic through

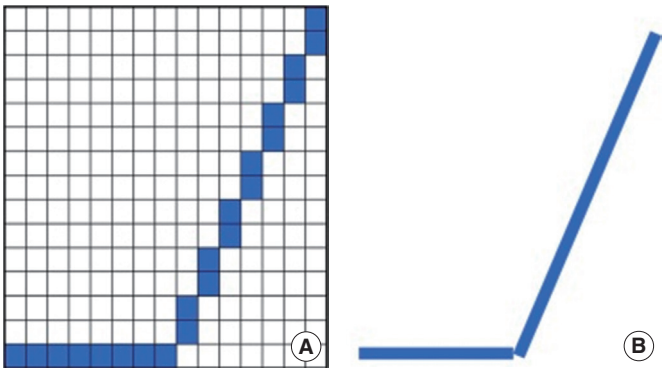

Fig. 1. Two methods for producing an image of a line: (A) many dots are combined to comprise a raster image and (B) lines are used composing a vector image.

the process of 'rasterizing' using an image editor like Photoshop. If a researcher produces a figure using a graphics program, the final image can be stored in either a raster format or a vector format. It is strongly recommend that a vector format be used because the file size of the figure is much smaller in a vector format. Furthermore, most graphics editors at scientific journals prefer vector graphics due to the small size of the file and the superior image quality.

Original JPEG Files May Be Good Enough

JPEG is the standard lossy format for raster images. The amount of compression of JPEG files can easily be adjusted. JPEG is a commonly used file format for digital capture due to its small file size and relatively good image quality. Nearly all digital cameras include JPEG format. JPEG should not be used as a working file format in Photoshop because it loses data every time it is opened and then resaved.

JPEG files also lose quality as compression increases. This is why most journals do not accept image files in the JPEG format. TIFF is the most commonly used standard format for biomedical journals. However, the JPEG format has certain advantages. Picture files taken by a high-quality digital camera and saved in TIFF format are too large to handle. In this case, the JPEG format can be a good alternative with minimal loss of quality. When pictures are printed in one-column width, most JPEG images are of sufficient quality. In addition, JPEG images may be the original files taken directly from PACS, scanners, and endoscopes. The quality of the original image file is always better than any processed image. Journal editors should accept JPEG files selectively, particularly when they are the original uncompressed files from various image sources.

Using PowerPoint for Producing High-quality Images

PowerPoint is an excellent presentation application [4]. It can handle various kinds of graphic images and video files. Simple vector-type graphic images can be generated with tools embedded in PowerPoint (Fig. 2). However, PowerPoint is not a professional graphics application like Photoshop or AI. PowerPoint can be used to prepare images for publication of an article, but only with care.

The most common error encountered when preparing images with PowerPoint involves the "Save As" function. If TIFF or JPEG image files are created directly from a PowerPoint file using the "Save As" function, it typically produces a low-resolution image, such as a 960×720 pixel image. These low-quality images cannot be used for publication purposes. Consider the proposed universal standard resolution of 900 ppi and 4

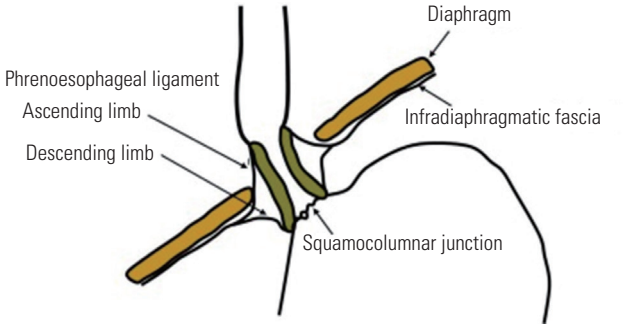

Fig. 2. An example of artwork produced with PowerPoint.

inches. This means that an image has 3,600 pixels in a horizontal line. PowerPoint typically produces 960×720 pixel images, which is far below the universal standard pixel number of 3,600. To produce a high-quality raster image for possible publication, professional graphics applications like Photoshop should be used.

PowerPoint can internally handle both raster images and vector images. Using PowerPoint, it is very easy to make a good combination artwork (raster image plus vector-type line art). The problem is that PowerPoint cannot make a separate high-quality raster image file or a separate vector file. It is recommended that authors use PDF as an interim format, because a PDF file can handle both raster images and vector images [5]. This can be accomplished by the following steps: first, create a high-quality image using PowerPoint. Second, convert the PowerPoint file into a PDF file using the "Save As" function. Third, open the PDF file with a sufficient resolution using Photoshop. This step is called "rasterization." Fourth, convert the image to a high-quality TIFF file using the "Save As" function of Photoshop. This image file should be acceptable for medical publication.

The abovementioned steps can be difficult for the average medical researcher. However, any graphics specialist can do this very easily. Most editorial offices have full-time or part-time graphics specialists. It is thus unclear why so many journals do not accept PowerPoint files. A carefully prepared PowerPoint file is an excellent starting point to generate high-quality graphic artwork for a journal. Raster images should be prepared separately. However, vector images in a PowerPoint file should be accepted. A special vector program like AI is not needed for simple work.

Tips for Using a Graphics Application Such As Prism

Prism is a very useful tool for producing complicated graphs from a large quantity of data. Images produced by Prism are

basically vector images. However, when a separate image file is produced using the "Export" function, most of the file type options are raster formats such as PNG, TIFF, Bitmap (BMP), Personal Computer Exchange (PCX), and JPEG. Only Windows Metafile (WMF) can handle a vector image without losing image quality. Actually, WMF is a vector graphics format that also allows the inclusion of raster graphics. It is strongly recommended that the WMF format be used to produce an image file. This file can then easily be transformed into a high-quality TIFF file using Photoshop.

Saving the Original Image File Safely

In the process of image preparation, it is very easy to accidentally lose the original untouched high-resolution image files. It is crucial to save a copy of the original digital or analog data exactly as it was acquired [6]. Keeping a copy of the original image is a mandatory step for all image processing. It is recommended that at least three copies of the original image be saved in three physically separate locations.

Conclusion

To summarize, in the internet age, graphic files are an important part of published articles. The quality of graphic files uploaded to the Web shapes the quality of an article and even the entire journal; therefore, high-quality graphic files are reguired. The minimum number of pixels should be suggested based on the width of graphic on the journal page. The width is usually a single column of 86 mm. In general, vector images are better than raster images with regard to image quality, file size, and versatility. A PowerPoint file may be a convenient solution for producing a high-quality vector image file. Editors and authors should be acquainted with the production of graphic files using vector images.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Original Article

Research output of science, technology and bioscience publications in Asia

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Abstract

Publication growth rates in Asia have been rapidly increasing since 2000. Amid this constant rise in the quantity of papers, however, concerns over the quality of research output in Asia have also increased. The purpose of this paper is to examine science and technology journals in Asia where research is burgeoning and to find ways to enhance the visibility and frequency of citation of articles published by non-Organization for Economic Cooperation and Development and developing countries in Asia. In this work, the research output of twelve countries in science and engineering over the last five years is studied, using the Scopus database. We compared publication growth, number of citations per publication, the field-weighted citation impact of publications, national and international collaboration rates, and the number of journals in each country found in the Scopus database. We find that a predominant number of research papers produced in developing Asian countries are in technology. Hence, most research papers produced in Asian regions appear to have lower citation rates and are often devaluated. We suggest this devaluation relates to an individual state's strategy for national development, or policy priorities for choosing whether to invest primarily in basic science or applied science. Further, this work suggests that enhancing the accessibility and visibility of local academic journals can be conducive to enhancing the quality of research output, both in developing countries and in the world overall.

Keywords

Asia; Citation; Publication; Science; Technology

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Introduction

Among 1,685,703 total academic papers published on science, technology and bioscience in 2013 [1], 33.4% were produced in the European Union, 20.7% in the United States, and 38.3% were from the largest countries in Asia (the sum of China, India, Japan, Korea, and Taiwan). Publication growth rates in Asia have been rapidly increasing since 2000, particularly in China. China has now become the world's second largest country in terms of size of research publica-

tion: the country has published more research work than the United Kingdom, and is projected to surpass the United States as the largest academic producer by 2020. Other emerging academies in countries such as Brazil, India, and South Korea are also expected to surpass France and Japan in terms of research output in the next six years [2].

Amid this constant rise in the quantity of papers, however, concerns over the quality of research output in Asia have also increased. In Asia, technology appears to be a more important field than science, given an emphasis in many countries on practical subjects. The purpose of this paper is to examine science and technology journals in Asia where research is burgeoning, and to find ways to enhance the visibility and frequency of citation of articles published by non-Organization for Economic Cooperation and Development (OECD) and developing countries in Asia.

Methods

This work analyzed the research output of twelve countries in science (physics, chemistry, mathematics, and earth and planetary sciences), technology (engineering, computer science, chemical engineering, energy, and materials science), and bioscience (biochemistry, genetics, agricultural and biological sciences, and neuroscience). The outputs of China, India, Indonesia, Japan, Korea, Malaysia, Mongolia, the Philippines, Singapore, Taiwan, Thailand, and Vietnam over the last five years (2009 to 2013) were compared using the Scopus database. We compared publication growth, number of citations per publication (CPP), national and international collaboration rates, and the number of journals from each country in the Scopus and SciVal databases.

Results

Science research performance

Approximately 90% of sciences papers in Asia come from four countries: China, Japan, India, and Korea. Since 2010, China and India have shown rapid publication growth rates (Fig. 1). Excepting Japan, research output has increased in all other Asian countries. In Japan, research output in the sciences has grown only in earth science. The share of Chinese articles in science has grown at a compound annual growth rate of 8.14% from 2009 to 2013. When compared to other subjects, publications in mathematics in China have grown slowly. However, output of articles from Indonesia, Malaysia, and Vietnam's output have nearly doubled.

On citation value, Singapore leads Asian countries. While citation of Chinese papers is generally low, however, CPP are gradually increasing, which may suggest the quality of Chinese publications is increasing (Fig. 2). In mathematics, physics, chemistry, and biochemistry, Singapore has the highest CPP, suggesting high quality papers, while Vietnam and Japan show high CPP rates in mathematics and earth and planetary science, respectively.

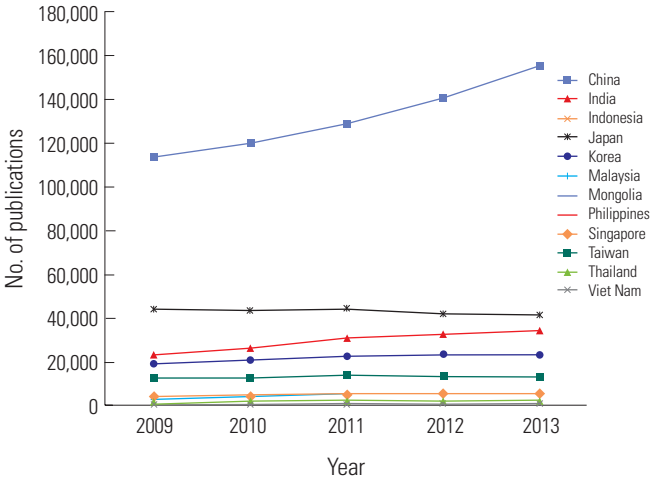

Fig. 1. Number of publications by science field of Asian countries from 2009 to 2013.

Mongolia is the most collaborative of the twelve countries studied (Fig. 3). Excepting China, the collaboration rates in all other countries are above average (world average rate, 23.1%). Japan has shown a marginal increase in international collaboration over the past five years. Both the relatively high level and growth of international collaboration in Singapore may be one of key factors contributing to their increasing citation impact.

Technology research performance

Research output among the five relatively large Asian economies—China, Japan, Korea, India, and Taiwan—occupies 93% of total publications in technology (Fig. 4). In China, Japan, Korea, Taiwan, and Singapore, the growth rate of research output in technology was higher than that of science. Computer science research output in China has declined by 25.2% since 2010. Japan experienced declines in all sectors—including 11% in engineering and materials—save a 6.6% increase in environmental sciences (Fig. 5). India experienced sharp output increases in computer science (75.7%) and chemical engineering (63.7%) during the study period. In Asia, the CPP rate in technology was lower than the CPP rate in science overall, except in Malaysia. As in science, Singapore's CPP rate in technology is remarkably higher than in other countries.

In technology, Mongolia is the most internationally collaborative country (Fig. 6). Overall, collaboration figures are larger for smaller and less scientifically active countries. China's

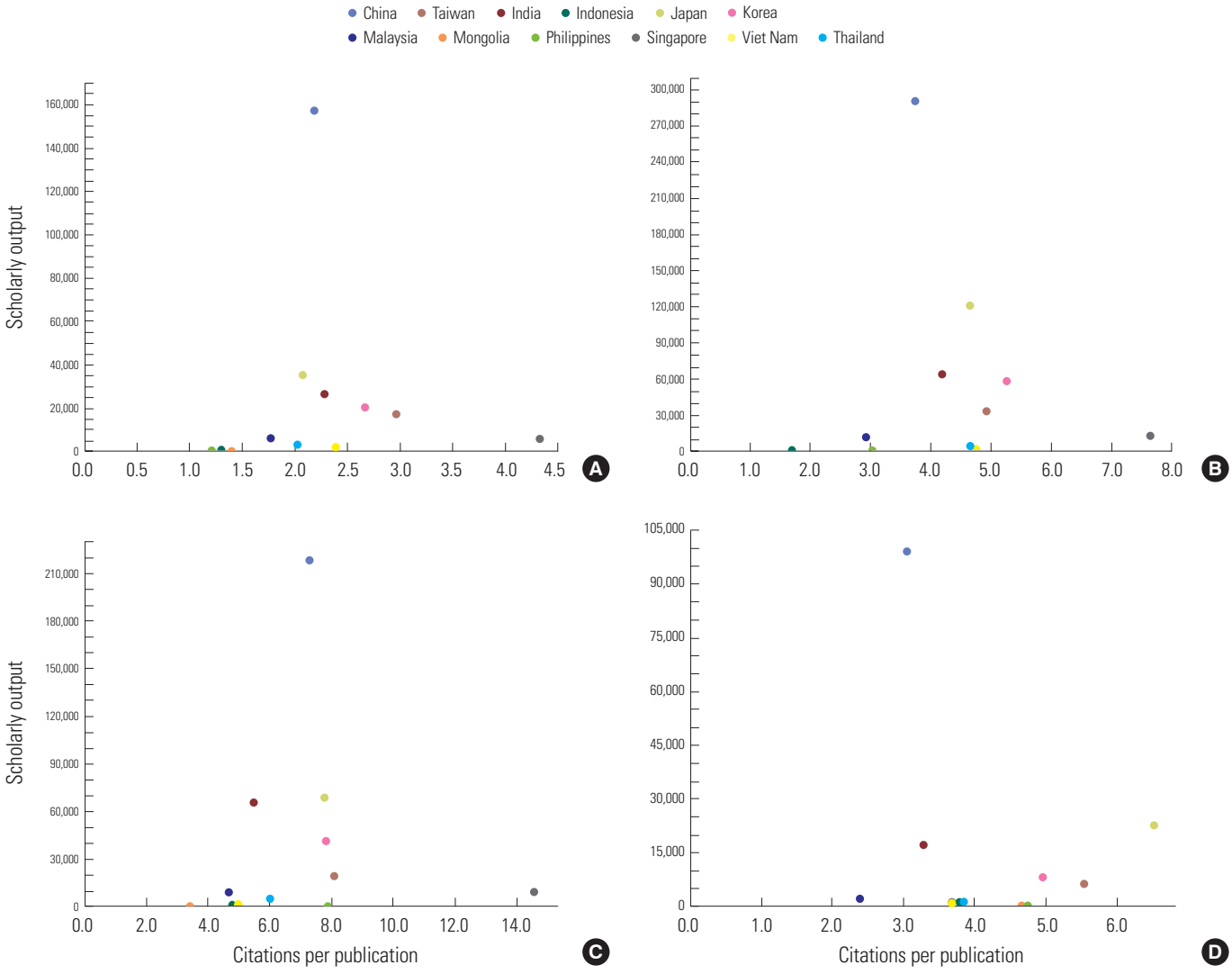

Fig. 2. Number of publications and citations per publication, by Asian country in sciences fields, from 2009 to 2013: (A) mathematics, (B) physics, (C) chemistry, and (D) earth and planetary science.

publication growth is the fastest, however, but many researchers need time to become established before they are in a position to seek collaborators. While India, Taiwan, and China's collaboration rates are under 20%, Korea and Japan's collaboration rates are 25.8% and 24.4%, respectively; these are relatively low compared to European countries. These countries need to boost their collaboration rates to increase research impact.

Bioscience research performance

Among twelve countries, Malaysia shows the highest output increase in bioscience, while both Vietnam and Indonesia have increased bioscience output by over 100% (Fig. 7). Bioscience articles in Japan, in contrast, increased by only 0.8%, while science and technology output decreased. Overall, the rate of publications has increased more in bioscience than in science and technology.

In addition to Bioscience research output, it is important to measure of quality of publications. As verified data (Table 1), Citation and its CPP in Biochemistry and NuroScience in Citation is very higher than other subjects. However, 11 countries' CPP in 'Biochemistry, Genetics and Molecular Biology' and 'Nuroscience' except Singapore is lower than world average CPP of 8.7 and 8.4 respectively. (Fig. 8) It is noticeable that Philippine is strong at its CPP in Agricultural and Biological Sciences as compared to 11 countries.

India, Japan, Korea, and Taiwan's collaboration rates in bioscience are lower than in science, while world averages trend

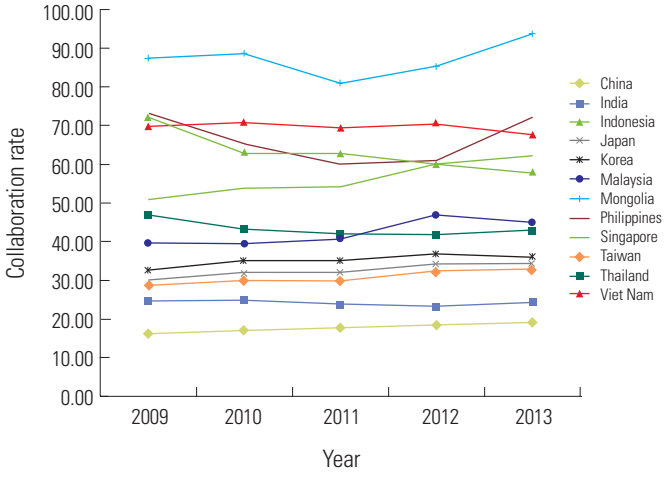

Fig. 3. International collaboration rate of Asian country by science field.

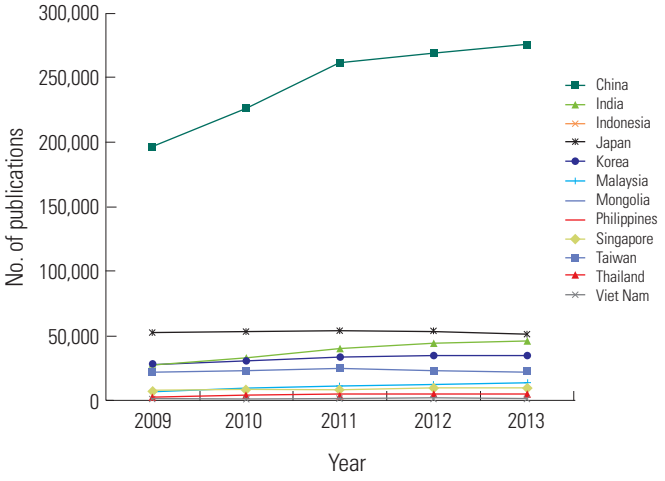

Fig. 4. Number of publications by technology field in Asian countries from 2009 to 2013.

in the opposite direction (Fig. 9). Given China's slowly increasing rate of international collaboration, it seems likely that increased quality of output will follow. Indonesia, Mongolia and Vietnam' collaboration rate in bioscience are around 80%; researchers in these countries may be selected by researchers in other countries with stronger supports for research. Over the last ten years, Singapore's international collaboration rate has steadily increased, while collaboration in bioscience in other countries is fluctuating.

Comparing science, technology, and bioscience

In most Asian countries, research output is predominantly in technology- rather than science-related disciplines (Fig. 10). Forty eight percent of articles are assigned to technology, with agricultural and biochemistry making up an average of 21.5% of these. Overall, output ratios in agricultural and biology fields (agricultural and biological sciences, biochemistry, genetics, and molecular biology) are lower than average in all twelve countries. Individually, however, India and Mongolia show strength in science while the Philippines shows better performance in agriculture and biology. China shows a predominant focus on technology rather than science, agricultural, and biochemistry. Japan and India have more strength in science, agriculture, and biology than in technology. Taiwan's percentage of agricultural and biology articles are lower than that of other countries (average, 21.5%). The Philippines and Mongolia seem to focus more on agriculture and biology than other countries.

Average CPP in bioscience was higher than in science and technology (Fig. 11). CPP in Singapore stands out among other countries. Japan's CPP rate in bioscience is higher only than Korea, but Korea has second highest CPP rate overall. Only Malaysia's CPP in technology was higher than its CPP in science and bioscience. Given their publication rate, CPP rates in the Philippines are strong. Overall, the bioscience CPP rate among these twelve countries is relatively low compared to the world average (7.67), while the technology CPP rate is higher than the world average (4.88). Only Malaysia's CPP in technology was higher than science and bioscience. Philippine CPP is quite good as compared to its publication quantities.

Discussion

China, Taiwan, Malaysia, and Singapore show a tendency to focus more on technology than on science and bioscience (Fig. 10). In Japan, academic works focus more on science than technology; Japan's bioscience output rate is similar to the average rate for the twelve countries. Korea's output rate in both science and technology are higher than that of bioscience. Meanwhile, scientific research in the Philippines, Thailand, and Mongolia focus more on bioscience compared to other countries. Amid the constant rise in the quantity of papers, however, concerns over the quality of research output in Asia have also been increasing (Figs. 1, 4, and 7). To find ways to enhance the visibility and frequency of citation of articles published by non-OECD and developing countries in Asia, we consider both increasing collaboration to increase CPP, and improving the visibility of articles by indexing journal titles on international indexing databases.

In countries overall, the average CPP rate in science-related disciplines (except mathematics) are higher than technology-related disciplines (Table 1). The same trend appears in Asia. A country's average CPP generally increases when publications in science-related, rather than technology-related, disciplines increase. CPP is higher in biochemistry, genetic and molecu-

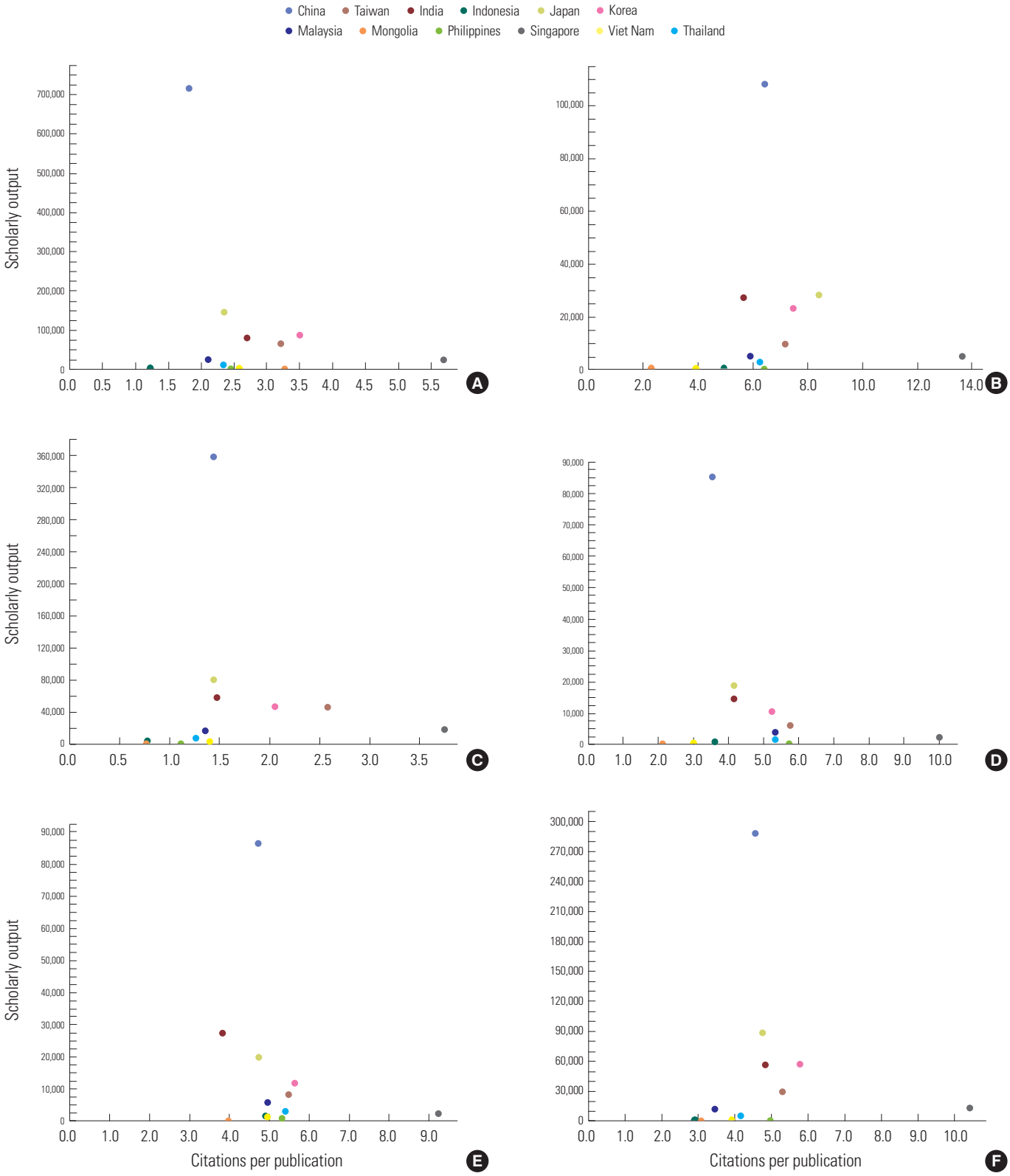

Fig. 5. Number of publications and citations per publication in Asian countries by technology field from 2009 to 2013: (A) engineering, (B) chemical engineering, (C) computer science, (D) energy, (E) environmental science, and (F) materials (continued to the next page).

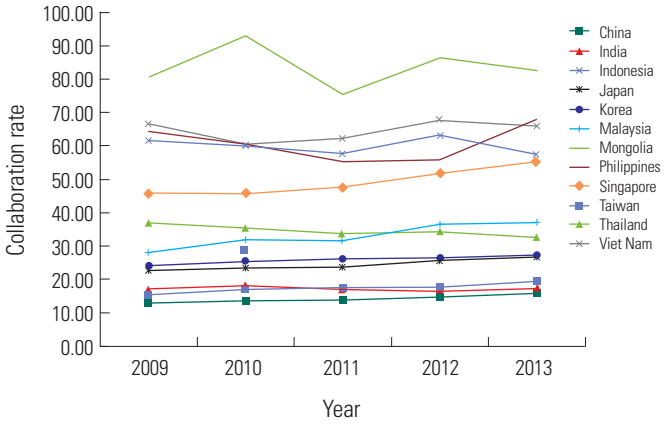

Fig. 6. International collaboration rate of each country by technology field.

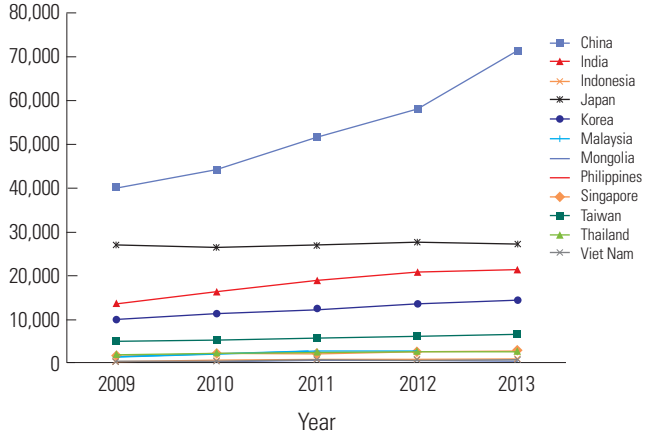

Fig. 7. Number of publications by bioscience field for Asian countries from 2009 to 2013.

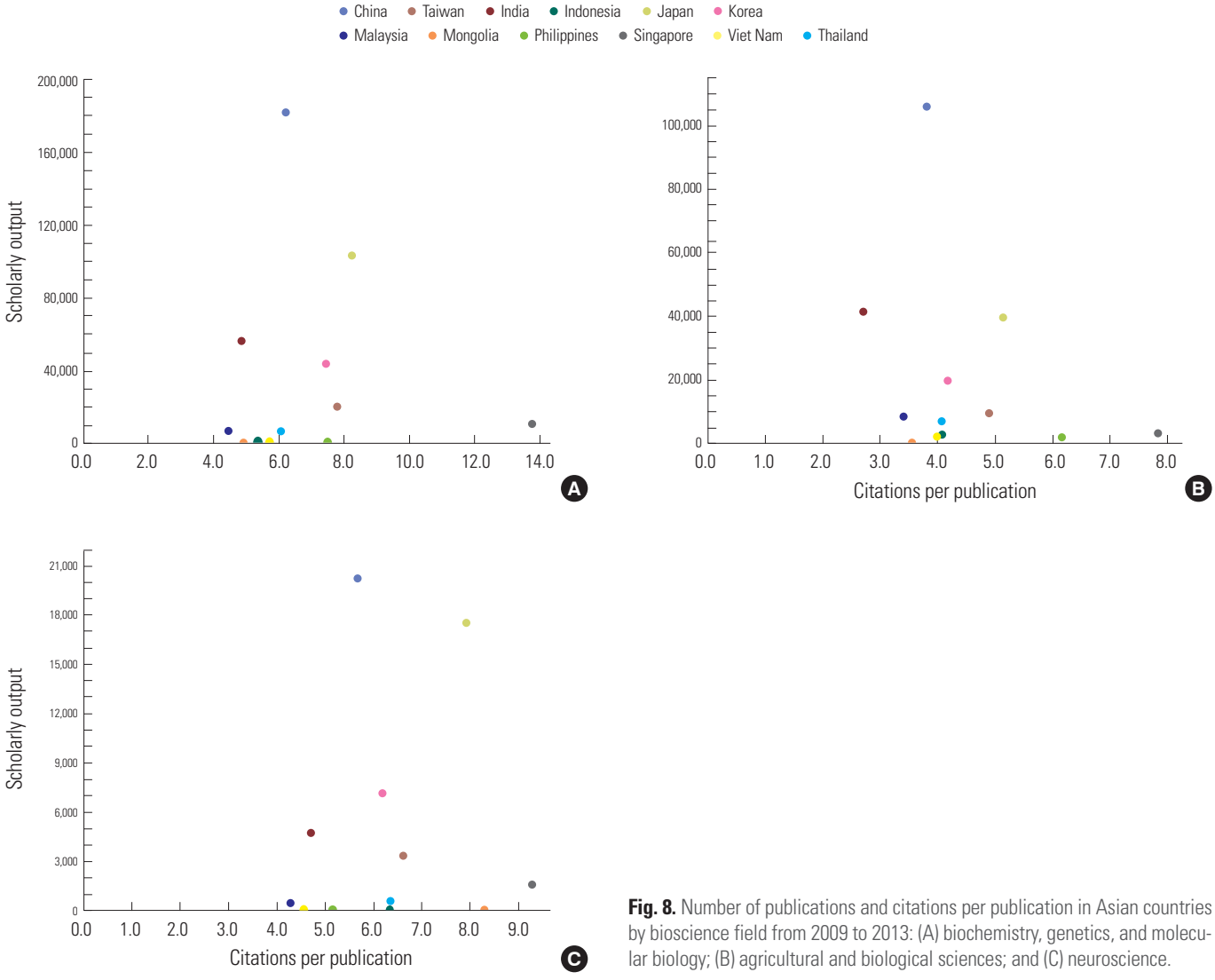

Fig. 8. Number of publications and citations per publication in Asian countries by bioscience field from 2009 to 2013: (A) biochemistry, genetics, and molecular biology; (B) agricultural and biological sciences; and (C) neuroscience.

Table 1. Comparison of CPP rates, by discipline, in Asia and the world overall

	2011		Rank of CPP
	Asia	World	
Biochemistry, genetics, and molecular biology	8.0	9.1	1
Chemistry	8.0	8.1	3
Chemical engineering	7.9	7.6	4
Environmental	5.2	5.2	5
Materials	5.3	5.1	6
Agricultural and biological science	4.9	5.1	6
Earth	4.2	4.6	8
Physics	4.2	4.6	8
Engineering	2.3	2.6	11
Math	2.5	2.6	11
Computer	1.8	2.2	13
Energy	4.8	4.4	10
Neuroscience	7.2	8.7	2

CCP, citations per publication.

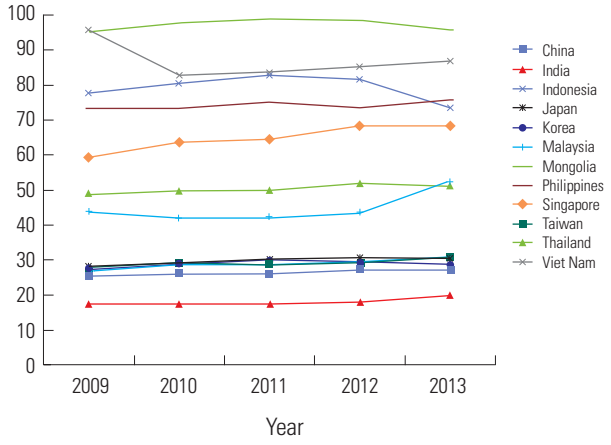

Fig. 9. International collaboration rate for Asian countries by bioscience field.

lar biology, chemistry, and chemical engineering, while notably lower in computer science, engineering, and mathematics due to the characteristics of the subjects in those disciplines. Lower CPP is generally understood to reflect lower quality of paper. In fact, however, the number of average authors per paper, cited publication ratio and journal count in several sectors such as engineering, mathematics and computer science are smaller than those of other disciplines like chemical engineering and chemistry. These factors lead to relatively low citation: the number of authors per paper, 1.69 for computer, 1.56 for mathematics, 1.75 for engineering, 2.12 for chemical engineering, 1.89 for chemistry and 2.46 for biochemistry.In-

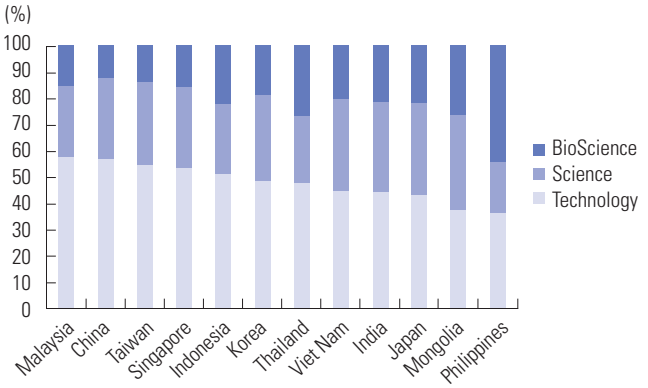

Fig. 10. Comparison of research output in science, technology, and bioscience.

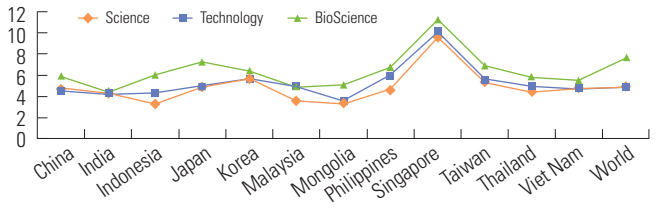

Fig. 11. Comparison of citations per publication in science, technology, and bioscience.

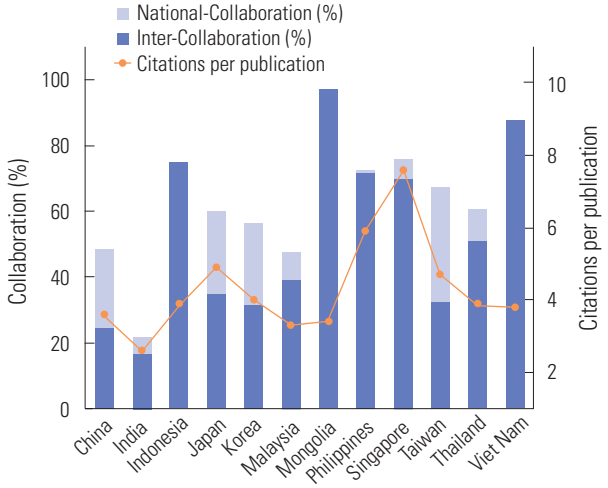

Fig. 12. Collaboration rate (national and international) and citations per publication.

ternational collaboration strongly affects the citation rate of papers [2]. Including an international author brings a corresponding increase in CPP rate or the impact of research. A project that includes two countries gives twice as many citations, and increasing the number of countries involved creates a linear increase in citations. Excepting a few countries—Mongolia, Vietnam, and Indonesia—higher inter-collaboration

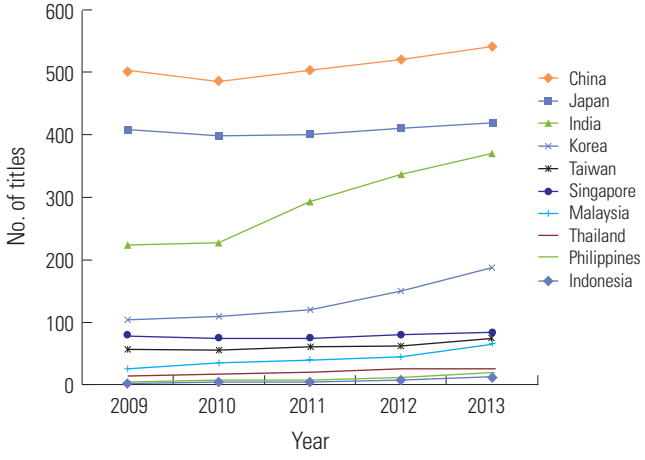

Fig. 13. Number of indexed titles by country in Scopus database.

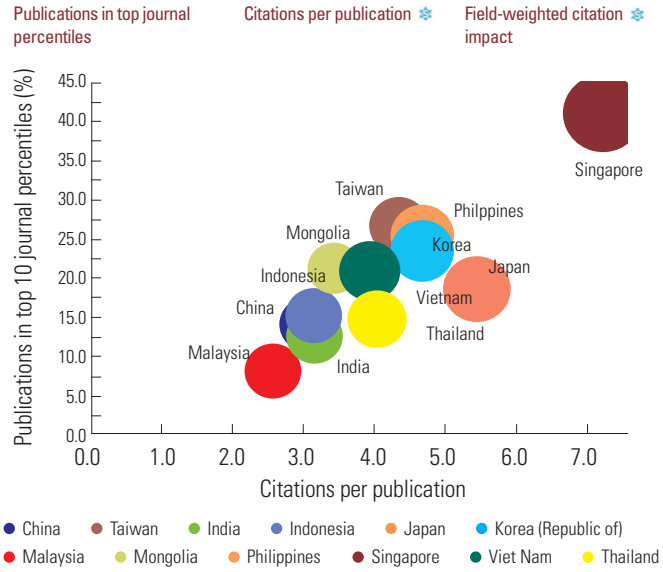

Fig. 14. Relationship between percentiles of publication in top journals (in science, technology, and bioscience) and citations per publication.

rate leads to a higher CPP rate (Fig. 12). Countries with higher international collaboration rate are relatively strong in technology compared to science.

Among twelve countries, Mongolia is the most internationally collaborative country (Fig. 12). International collaboration figures are larger for smaller and less scientifically active countries. China's publication growth has been the most rapid, but many researchers need time to become established before they are in a position to seek out collaborators. Japan has shown a marginal increase in international collaboration over the past five years. Relatively high level and growth of international collaboration in Singapore may be one of key factors contributing to their increasing citation impact. Compared to other European countries (the collaboration rate in France is about 50%), Japan, China, Korea, India, and Taiwan need to boost their collaboration rate to increase research impact.

The surprisingly high level of international collaboration in some developing countries (e.g., 80% in Mongolia) merits further inquiry. In Mongolia and Vietnam, high international collaboration can imply low indigenous research capacity. Where local institutions lack the necessary human and financial resource, foreign scholars are generally the principal investigators that lead most of the research conducted in such countries. Similar explanation can be applied to other developing research economies, including many Sub-Saharan African countries (Daniel Calto, private communication, 2014). Meanwhile, as a country begins to establish a stronger research base or in-country capabilities that are critical for a country to pursue independent research, international collaboration rates also start to decline.

Increasing the number of Asian journals indexed in global databases can contribute to enhancing the visibility of articles. The higher CPP rate of individual countries can be related to the number of journals indexed in Scopus. Though the Scopus database includes non-science and technology disciplines, a higher number of titles indexed from a particular country indicate higher visibility to world readers. The share of journals from China and India indexed in Scopus is rapidly growing, by 2.6% and 2.0%, respectively (Fig. 13). The growth rate of indexed titles in Japan is the lowest among the twelve Asian countries, because of the country's well-developed academia. Since 2009, indexed titles in Indonesia and Philippines have increased by 32% and 31% respectively. Though the total number of indexed titles may be marginal in these two countries, this growth is expected to have a positive effect on increase of publication.

The numbers of citations is entirely dependent on citation culture of research fields, that is, different citation patterns and different publication velocities. For this reason, when comparing different fields it is recommended to use field-weighted citation impact (FWCI) (Daniel Calto, private communication, 2014). There is a linear relationship between percentiles of publications in top journals (in science, technology and bioscience) and CPP, as shown in Fig. 14. This trend is also related to FWCI. For this work, we used FWCI as the measure of citation impact. This is a measure of citation impact that normalizes for differences in citation activity by subject field, article type, and publication year. The world is indexed to a value of 1.00, meaning that values above 1.00 indicate above average citation impact. More specifically, a citation impact of 1.52 indicates a citation impact which is 52% above the average. This result might be explained by the low quality of pa-

pers published by many Asian journals: these papers are not referred to by many scholars worldwide. In the future, however, low CPP rates in Asia would be improved by increasing international collaboration and improving the visibility of articles by indexed titles on international indexing databases.

In conclusion, this study finds that a predominant number of research papers produced in developing Asian countries are in technology, a field with a relatively short citation span than natural science. Hence, most research papers produced in Asian regions appear to have lower citation rates and are often devaluated. We suggest this difference relates to the national development strategies or policy priorities for individual states, which choose whether to invest primarily on basic science or applied science. Further, this work suggests that enhancing the accessibility and visibility of local academic journals in Asian developing countries can be achieved by understanding the characteristics of the disciplines of each country, through collaboration with international projects for high CPP rates, and by indexing titles on international indexing databases.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Original Article

The current status of science journals in Indonesia

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Abstract

Indonesia is the fourth most highly populated country in the world. Every year, there are more than 1.5-million students enrolled into universities across Indonesia. This large number of students is a potential source of scientific publication, as all students are required to publish a paper before they take their final examination. To accommodate this publication demand, good-quality journals need to be established in Indonesia. Therefore, this paper will describe the current status of scientific journals in Indonesia and some other information related to Indonesian scientific journals. The data presented in this article were obtained from the websites of government institutions such as Indonesian Institute of Sciences, Ministry of Education and Culture, and Indonesian Scientific Journal Database. Currently, there are 5,900 scientific journals in Indonesia that are grouped into three classes, namely non-accredited journals (5,579 titles), accredited journals (342 titles), and international journals (16 titles). Most journals are published by universities, faculties, or departments. Other journals are published by research centers and scientific associations. In recent years, the number of journals indexed in Scopus has increased substantially, from only 2 journals before the year 2000 to 16 journals in 2013. In addition, the number of journals registered in the DOAJ (Directory of Open Access Journals) increased sharply from 3 titles in 2009 to 109 titles at the end of 2013. In the year 2012, the number of papers published in the abovementioned journals was 145,000, but only 1,314 papers were published internationally. This number is still very low, even when compared to some Southeast Asian countries. To improve the quality of journals and to increase the number of papers published, a high commitment from the government is required, particularly in terms of regulation formulation and funding provision.

Keywords

Accreditation; Directory of Open Access Journals; Indonesia; Scientific journal; Scopus

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Introduction

Indonesia is the fourth-largest populated country in the world with a population of nearly 240

million. A high population requires a large number of schools and universities. In 2013, more than 3 million students graduated from high school, but only 1.5 million enrolled in a university; half of them (780,000 students) joined the national free test selection to enter a university, but only 150,000 students were accepted to a public university [1]. The rest enrolled in a private university.

Based on the regulation of the Directorate General of Higher Education (DGHE) no. 152/E/T/2012 regarding student publications, it is mandatory for all undergraduate and postgraduate students to publish papers before taking their final examination. Undergraduate students have to publish one paper in any journal, master's students must publish one paper in a nationally accredited journal, and PhD students must publish one paper in a nationally accredited journal and one paper in an international journal. This means that every year, at least 150,000 papers need to be published in Indonesian journals. Currently, there are more than 5,900 journals that can be accessed; of these, only 16 journals are classified as international journals, 342 journals are nationally accredited, and the rest are non-accredited journals [2]. To fulfill the need for good-quality journals, the universities, scientific associations, and the government need to work together to improve the quality of the existing journals, particularly to increase the number of accredited journals and international journals; otherwise, the abovementioned government regulation will have a negative effect on a student's length of study. Therefore, this paper aims to describe the current status of Indonesian scientific journals, and some efforts that have been undertaken by the universities, scientific associations, and the government to increase the journal quality.

Methods

The information presented in this article is based on secondary data obtained from some sources such as the website of the Ministry of Education and Culture (http://www.dikti.go.id), the website of the Indonesian Scientific Journal Database (ISJD), Indonesian Institute of Sciences (http://isjd.pdii.lipi.go.id), Scimago journal ranking (http://www.scimagojr.com), and the website of the Ministry of Research and Technology (http://www.ristek.go.id). The processed data are presented in the form of tables and figures.

Results

University and students' access to university

In the year 2013, the number of students who graduated from high school was more than 3 million, but only 1.5 million enrolled in a university, and only half of them, that is, approximately 780,000 joined the free test national selection to enter a university. Among these, only approximately 150,000 students were accepted to public universities, and the remaining ones went to private universities and non-formal education institutions [1].

To facilitate the large number of students, currently, there are 3,216 universities in Indonesia consisting of 92 public universities and 3,114 private universities [3]. The quality of the universities varies considerably, and only a few universities are accredited by the government. Some universities (or study programs) are already internationally accredited and run double degree programs with a well-known international university.

Scientific journals

According to the data released by the ISJD [2], there are more than 7,000 scientific journals in Indonesia, but only 5,900 scientific journals can be accessed through the database and only 16 journals are categorized as international journals and are registered in international indexes (Scopus, Compendex, and web of science). The number of journals that are already registered in the Directory of Open Access Journals (DOAJ) is 109 journals. In the last four years, the number of journals registered in DOAJ has increased rapidly from only 3 journals in 2009 to 109 journals in 2013 (Fig. 1), and some journals are still in the process of evaluation for registration in DOAJ.

The Ministry of Education and Culture of Indonesia through the DGHE established Regulation no. 29/Dikti/Kep/2011 regarding journal accreditation, according to which all journals must be accredited by the government. Journals published by a university/faculty/department are accredited by the DGHE, but journals published by non-education institutions are accredited by the Indonesian Institute of Sciences (IIS). Previously, the period of accreditation was three years, but since 2011, the period of accreditation has been five years. The number of journals accredited by DGHE and IIS is 144 titles and

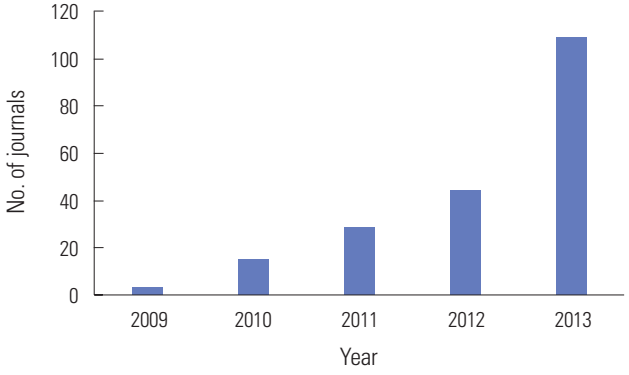

Fig. 1. Journals registered in the DOAJ (Directory of Open Access Journals) in the Years 2009 to 2013.

Table 1. Number of papers published by the top 10 institutions of Indonesia recorded in Scopus in 2012

Institutions	Documents
Bandung Institute of Technology	398
University of Indonesia	250
Gadjah Mada University	168
Bogor Agricultural University	108
Indonesian Institute of Sciences	94
Sepuluh Nopember Institute of Technology	63
Center for International Forestry Research	74
Diponegoro University	59
Airlangga University	52
Pajajaran University	48

198 titles, respectively.

Publications

In 2012, 145,000 papers were published, but from the top ten institutions in Indonesia (Table 1), only 1,314 papers were published in international-class journals included in Scopus. The remaining papers were published in national journals and mostly in non-accredited journals. Among the Southeast Asian countries, publication by Indonesian scientists is still lower than that by Singapore, Malaysia, and Thailand, and only slightly higher than that by the Philippines and Vietnam (Fig. 2) [4].

Research scheme and focus

Most of the published papers were supported by research grants provided by the government, and only a few reported research supported by private industry. Academic staff in the universities mainly obtained competitive research grants from DGHE. Some other government institutions such as the Ministry of Agriculture, Ministry of Research and Technology, Ministry of Fisheries, Ministry of Forestry, and Ministry of Mining and Energy Resources, and local governments also provide competitive research grants. Due to budget limitations, the competition to obtain a research grant is very high, and only a limited number of academic staff members receive these grants, mostly those from a top-ranked university. In the last five years, the DGHE has tried to give equal opportunity to all universities to receive research grants by creating two categories of research grants, namely centralized and decentralized research grants. The centralized research grants are open to all academic staff, and the selection is conducted nationally. The decentralized research grants are open to academic staff only in a certain university (public university) or

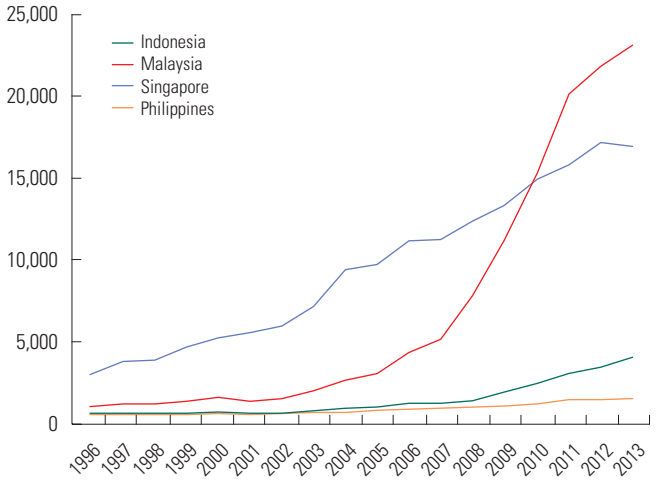

Fig. 2. Number of papers published by some Association of South East Asian Nations countries (1996 to 2013)).

under coordination of a private university coordinator. There are twelve areas under private university coordinators in Indonesia.

The centralized research grants include the following: National Priority Strategic Research, International Collaborative Research and Publication, National Strategic Research, Competency Research, and Collaborative University and Industry Research. Meanwhile, the decentralized research scheme consists of the following: University Priority Research, Postgraduate Team Research, Fundamental Research, Competitive Research, Inter-university Collaborative Research, PhD Dissertation Research, and Young Academic Staff's Research. Most research grants are multiyear grants, ranging from 1 to 5 years, and the budget ranges from USD 5,000 to 100,000 per year. Each research scheme has a specific goal, but in general, the purposes of research in the university are as follows: to improve the research capability of academic staff; to enrich the teaching materials; to produce goods, models, concepts, appropriate technology, etc.; to strengthen the collaboration between university, industry, and government; to support national development; and to increase scientific publication at the national and international levels.

The focus areas of research at the Ministry of Education and Culture [5] include the following: poverty alleviation; climate change, environmental conservation, and biodiversity; renewable energy; food security; nutrition and tropical diseases; disaster management and mitigation; nation integration and social harmony; decentralization and autonomy; art and literature (creative industry); and infrastructure, transportation, and defense. In addition, the areas of research with national priority under the Ministry of Research and Technology [6] include the following: food technology, technology of

health and drugs, technology of energy, technology of transportation, technology of information and communication, technology of defense and security, and technology of materials.

Discussion

As the fourth most populated country in the world, Indonesia requires a large number of universities to accommodate the increasing number of high school graduates who intend to pursue higher education. The existing number of universities (3,216) is considered sufficient to accommodate the new high school graduates, particularly if the capacity of each university is increased. Therefore, the most urgent task of the government is to improve the quality of the existing universities, particularly the private universities, because they form the largest proportion of universities in Indonesia (97%) and their quality varies considerably.

The number of scientific journals is determined by the number of university students because all students are required to publish their final year project before the final exam. This is based on the regulation of the DGHE no. 152/E/T/2012, which states that every undergraduate student must publish one paper in any journal before the final exam, a master's student must publish one paper in a nationally accredited journal, and a PhD student must publish one paper in an international journal and one paper in a nationally accredited journal. This means that at least 1.5 million papers need to be published in journals each year according to the number of new students enrolled into the university. The regulation has some positive effects, such as increasing the number of papers published, particularly in international journals, which is currently still very low even compared to that of some Southeast Asian countries. On the other hand, the government also needs to make a significant effort to improve the quality of journals, particularly in terms of increasing the number of international class journals, to accommodate the increasing demand for student publications; otherwise, the regulation will have a negative effect on a student's length of study.

Some positive efforts have been made by the government to improve the quality of journals and to internationalize the accredited journals. The government regulation on journal accreditation is an example of the good effort made to improve the journals' quality. This regulation encourages each journal's management to work hard to fulfill the accreditation criteria. Another excellent government effort is providing a three-year grant for the accredited journals to internationalize their journals so that the journals become more visible to scientists all over the world. The government efforts seem to be yielding positive results, as the number of journals registered in the international indexes (Scopus, Compendex, and Thomson Reuters) in the last ten years has increased from 2 journals before the year 2000 to 16 journals in the year 2013. In addition, the number of journals registered in DOAJ has increased from only 3 journals in the year 2009 to 109 journals in 2013 (Fig. 1).

Scientific journals in Indonesia are mostly published by university or research centers, but since the accreditation regulation has been implemented, many journals are published by scientific associations because journals receive a high score if published by an association. Further, the sustainability of a journal is better guaranteed if the journal is published by a scientific association due to sustainable funding and manuscripts from the association's members. Scientific associations can play an important role in the development of science through the commencement of scientific conferences, seminars, and workshops and provide articles for journals from these activities. In addition, scientific associations provide some services to their members in order to improve their ability to write a good scientific paper through trainings and workshops. Every year, DGHE provides some grants for associations to host international scientific conferences, seminars, and workshops, although the number of grants is still limited.

Many journals are not accredited yet, and these journals are dying because nobody wants to submit papers to these journals. On the other hand, the requirement of students to publish their papers is enormous and is not sufficiently accommodated by the accredited journals. Therefore, it is necessary to help these journals' editors to improve their management to fulfill the accreditation requirement. It is the obligation of the government through DGHE to improve these journals, but as the human resources at DGHE are limited, the government needs to establish an association to take over the task. The association is likely to be named the Indonesian Association of Science Editors. The association will play an important role in improving the management of journal editors through the commencement of regular workshops and providing direct assistance from accredited journal editors. This association will also be the representative of Indonesian Science Editors in international science editor associations. This international interaction will significantly contribute to Indonesian journals improving to become world-class journals as expected by the government.

The government decision to divide research schemes into centralized and decentralized categories is expected to increase the amount of academic staff participation in research. The consequence of this regulation is that the government will increase the research budget. In the last two years, a significant increase in the research budget has provided good opportunities for many academic staff members to participate in research activities. This regulation also aims to stimulate every university to develop its own research uniqueness on the basis of the

resources available in the area so that the collaboration between the university, local government, and local industry can be strengthened through research collaboration. Decentralization of research selection and management has some drawbacks, such as a decrease in the number of opportunities for young researchers in well-established universities to win a research grant because they must compete with high-quality senior researchers at the same university for the grant. A similar problem is faced by researchers in less-established universities. They have reported that there may be unfair proposal evaluation processes, as many research grants are obtained by people who have structural positions (such as rectors, deans, and heads of research institutions). Although during the evaluation process, some national reviewers are involved, the final decision is made by local university leaders.

On the basis of the explanation given above, we can conclude that Indonesia has the potential to become a major contributor in scientific publication, as the number of university students is increasing every year. Some efforts need to be made, particularly to improve the quality of non-accredited journals so that the journals become accredited and to improve that of accredited journals so that they can become international journals. The commitment and support of the government through DGHE to scientific journals has accelerated the achievement of these goals, although some work remains to be performed, particularly the establishment of the Indonesian Association of Science Editors, which, it is believed, will further accelerate the progress.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Training Material

The basics of CrossRef extensible markup language

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Abstract

CrossRef is an association of scholarly publishers that develops shared infrastructure to support more effective scholarly communications. Launched in 2000, CrossRef's citation-linking network today covers over 68 million journal articles and other content items (books chapters, data, theses, and technical reports) from thousands of scholarly and professional publishers around the globe. CrossRef has over 4,000 member publishers who join as members in order to avail of a number of CrossRef services, reference linking via the Digital Object Identifier (DOI) being the core service. To deposit CrossRef DOIs, publishers and editors need to become familiar with the basics of extensible markup language (XML). This article will give an introduction to CrossRef XML and what publishers need to do in order to start to deposit DOIs with CrossRef and thus ensure their publications are discoverable and can be linked to consistently in an online environment.

Keywords

Citation-linking network; CrossRef; Digital Object Identifier; Extensible markup language

Introduction

CrossRef's general purpose is to promote the development and cooperative use of new and innovative technologies to speed and facilitate scholarly research. CrossRef's specific mandate is to be the citation linking backbone for all scholarly information in electronic form. CrossRef is a collaborative reference linking service that functions as a sort of digital switchboard. It holds no full text content, but rather effects linkages through CrossRef Digital Object Identifiers (DOIs), which are tagged to article metadata supplied by the participating publishers. The end result is an efficient, scalable linking system through which a researcher can click on a reference citation in a journal and access the cited article.

Reference linking via CrossRef hinges on linking via the DOI. CrossRef DOIs are most frequently found in the reference lists at the end of scholarly articles and link persistently to other academic literature. However, a DOI is not a standalone object. Publishers register their DOIs with CrossRef by providing bibliographic information regarding the piece of content to Cross-

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Ref, which distinguishes it from any other published work. This information is most commonly delivered to CrossRef in extensible markup language (XML) format. This article will cover the basics of CrossRef XML, or what publishers need to provide to CrossRef in order to register DOIs and therefore use them to maintain consistent links to their online content.

Getting Started

Although it may seem obvious, the first step a publisher needs to take in order to start assigning CrossRef DOIs to the content that they publish is to become a member of CrossRef. By becoming a member, a publisher is committing to maintaining DOIs for their content, and linking their references via DOIs and adhering to other criteria such as what the DOI response page should show.

Details on how to join are available via the CrossRef website at http://crossref.org [1] and there is an annual fee for membership. This is based on the annual revenue of the publisher. Once a publisher is a CrossRef member, they will be given a DOI prefix and log-in information for the CrossRef deposit system so that they can start to register DOIs.

What Is a Digital Object Identifier?

Similar to a bar code for a physical object, a DOI is a unique alphanumeric string assigned to a digital object, such as an electronic journal, article, report, or thesis. Each DOI is unique and serves as a stable, persistent link to the full-text of an electronic item on the Internet (Fig. 1) [2].

The advantages of assigning DOIs to content and linking references via the DOI are link persistence; unlike uniform resource locators (URLs), DOI links continue to function even if content moves or changes ownership. DOIs also aid content visibility and accessibility as CrossRef helps drive traffic to content by making it discoverable for linking and easier to link to. A single agreement with CrossRef serves as a linking agreement with all participating publishers. As such, it enriches the end-user experience, the scholarly research process, and the utility of published resources.

DOIs are the only widely adopted persistent identifier for scholarly works. DOI names appear in printed materials and online as links. A DOI name consists of two segments. The first is the prefix, a unique numeric string beginning with the numeral 10 assigned by CrossRef to the publisher that submitted the information about the digital object. The second is the suffix, an alphanumeric string or series of strings used internally by the publisher to identify the digital object.

In this sample DOI name: 10.6087/kcse.2014.1.13, '10.6087' is the prefix (in this case, for the publisher Korean Council of Science Editors) and 'kcse.2014.1.13' is the publisher-assigned suffix for the particular item (in this case, indicating that it is from the journal *Science Editing* and was published in 2014). DOIs will often be displayed as links, so the DOI above may be represented as: http://dx.doi.org/10.6087/kcse.2014.1.13. CrossRef encourages display of DOIs in this way for three reasons. 1) Users will more easily recognize CrossRef DOIs as an actionable link, regardless of whether they know about DOIs. 2) Users who do not know how to right-click on the link and choose "Copy Link", will still be able to easily copy the http URI. 3) Programs (e.g., bots, etc.) will recognize the DOI as a link.

When a publisher joins CrossRef, they are given a DOI prefix, but they can choose the pattern or system for the suffix themselves.

The DOI suffix has a very flexible syntax. It can be any alphanumeric string, consisting of a single node or multiple nodes. A node is a portion of a character string. A single node has no delimiters (periods, colons, pipes, and so on), for ex-

Fig. 1. Reference linking using the Digital Object Identifier (From Jeong GH et al. Si Ed 2014;1;24-6) [2].

ample: 123456. A character string with multiple nodes must include a delimiter (a period, colon, pipe, and so on) between each one, for example: 12.34.56. Each suffix must be unique within a prefix.

Because the DOI is an opaque string intended to remain unique and persistent throughout changes in ownership and location of the content, a publisher does not need to include any specific or descriptive information in the DOI. Such information forms the metadata associated with each DOI, which is submitted along with the DOI and URL. As such, if a publisher chooses to include such bibliographic information in a DOI string, it will have no meaning within the CrossRef or DOI system. Existing identifiers can also be used for the DOI suffix, such as an ISBN (International Standard Book Number) or existing internal numbering scheme.

Full guidelines advising on best practice for DOI suffixes are available at http://help.crossref.org/#establishing_a_doi_suffix_pattern [3], but in short, they suggest making the suffix concise, unique, case insensitive (DOIs are case-insensitive: 10.5555/ABC123 is the same DOI as 10.5555/abc123), consistent and extensible so that they could be used for parts of articles as well such as figures, tables, graphs but still reference the parent DOI of the article itself.

Depositing with CrossRef

To register a DOI with CrossRef, the DOI that a publisher has chosen for a piece of content should be deposited into the CrossRef system with some basic bibliographic information about the piece of content it is being assigned to.

Depositing metadata to CrossRef involves the creation of XML according to the CrossRef deposit schema. The deposit schema sets out the structure that the XML must adhere to in order to be accepted by CrossRef. This XML is submitted to the CrossRef system via public or machine interfaces. During the submission process, DOIs and metadata are added to the CrossRef system, and DOIs are registered with the Handle resolver which deals with the management and resolution of persistent identifiers.

The basic process for depositing with CrossRef consists of these steps:

1. Creating XML using the CrossRef deposit schema (non-technical users may use the Web Deposit form).
2. Verifying the XML that has been created.
3. Uploading the XML (via a web interface or programmatically).
4. Submitting the deposit.
5. Reviewing the submission logs to verify the success of the deposit.

Step 1: Creating Extensible Markup Language

There is a minimum set of information that should be deposited with CrossRef via the XML. This is basic bibliographic information on the piece of content, which serves to distinguish it from other works, and also serves the purpose of trying to stop publishers depositing more than one DOI for one piece of content.

There are details on the minimum metadata that should be submitted for each type of content here: http://help.crossref.org/#elements [4]. However, this can be worked through in a step-by-step way. Many publishers who are new to CrossRef may not have expertise in XML and as such, may start depositing using the web deposit form [5] which is freely available and helps compile the XML needed to deposit DOIs for their content (Fig. 2).

The web form enables publishers to select what type of content they are depositing (book title, journal article, and conference proceedings) and then enter the information on it using free-text. Information that is required is marked with an asterisk and users will not be able to proceed with deposit without providing the minimum information necessary.

If a publisher selects 'Journal' then the first thing they will be prompted to enter is the journal title, abbreviated title, ISSN (International Standard Serial Number) and publication dates.

When they have done this, they can then use the 'add articles' button to register DOIs for articles from the journal they have just named. By the time they reach the next page to add these articles, the system is already starting to compile the XML needed for their CrossRef deposit (Fig. 3).

The publisher or editor can then add the bibliographic information for the article; title, the DOI they have chosen, the URL where the article is located and they can also add information on all authors of the paper (all authors should be entered for completeness of the record) and also the page numbers if applicable. There is also a button that users can click to fill out CrossMark metadata for the submission. The insertion of CrossMark metadata will be covered in a later document.

When the user has entered this information, they can choose to add another article or finish to deposit the articles with CrossRef. Choosing 'Finish' will prompt the user to enter their user name and password, provided by CrossRef when they joined. They should then enter an email address. This is where the results of the deposit will be sent. The article metadata can then be deposited with CrossRef and users will see a page and receive an email to say their deposit has been successfully received by the system.

The upload process is very basic and performs no data validation at the time of upload. The 'Success' acknowledgment displayed after submission step simply indicates that your file

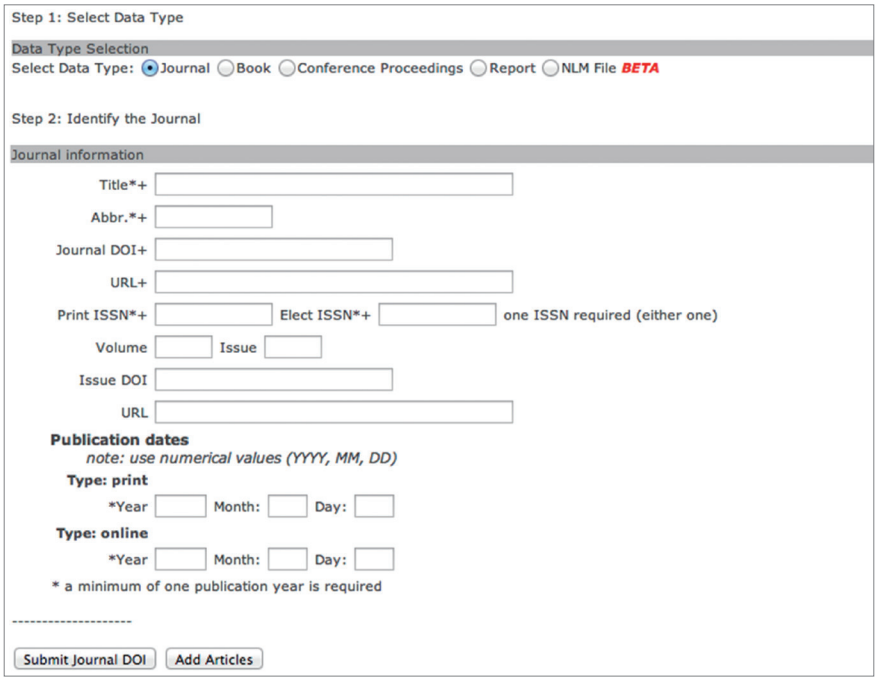

Fig. 2. The first page of the web deposit form on the CrossRef website.

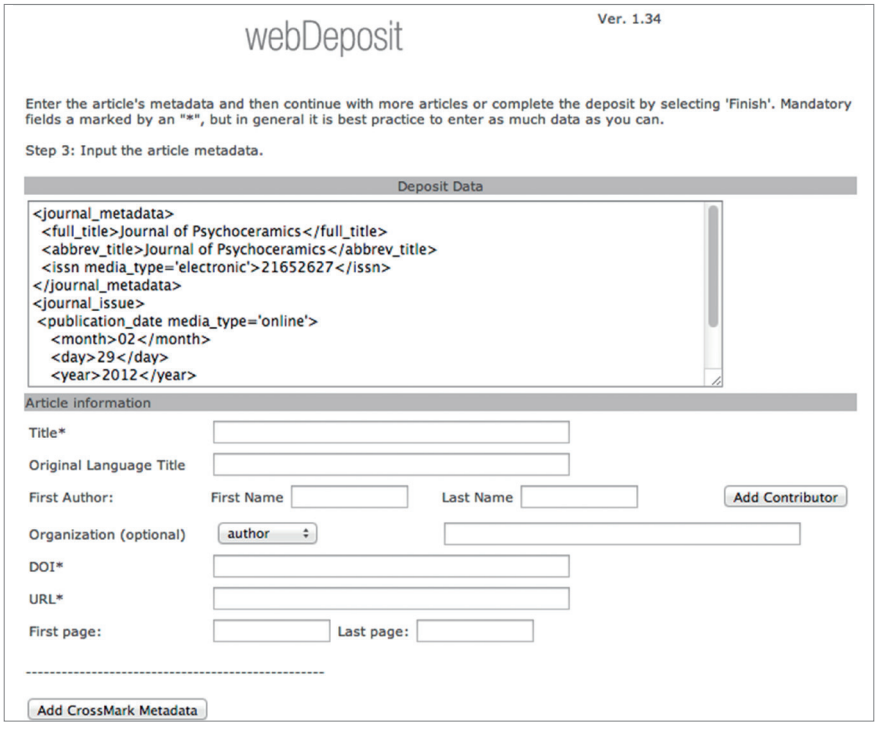

Fig. 3. The 'Deposit Data' section at the top of this page on the web deposit form shows the extensible markup language that is being compiled for CrossRef deposit.

has been received. Each uploaded file then goes into a queue to await processing which checks the XML submitted using a parser. This step verifies that the XML is well formed and conforms to the rules of the CrossRef schema. It also performs certain logic checks on the data in the file, for example publication title ownership is enforced. This means that

CrossRef recognizes a single publisher as owning a title and thus only DOIs using the prefix of that publisher may be assigned to the publication.

For a publisher or editor who is relatively new to XML, making a deposit in this way can be helpful as it clearly shows what information should be entered. Then, upon completion of their deposit they are sent the XML file of the deposit via email. The file contains the information shown below:

Journal section of CrossRef XML

```
<?xml version="1.0" encoding="UTF-8"?>
<doi_batch xmlns="http://www.crossref.org/schema/
  4.3.0" xmlns:xsi="http://www.w3.org/2001/XMLSche-
  ma-instance" version="4.3.0" xsi:schemaLocation=
  "tinyhippos-injected"/>
<script id="tinyhippos-injected"/>
<head>
<doi_batch_id>-58cd1699144411615d6-6cc1</doi_
  batch_id>
<timestamp>201405130618</timestamp>
<depositor>
<name>creftest</name>
<email_address>rlammey@crossref.org</email_ad-
  dress>
</depositor>
<registrant>WEB-FORM</registrant>
</head>
<body>
<journal>
<journal_metadata>
<full_title>Journal of Psychoceramics</full_title>
<abbrev_title>Journal of Psychoceramics</abbrev_title>
<issn media_type="electronic">02643561</issn>
</journal_metadata>
<journal_issue>
<publication_date media_type="print">
<month>08</month>
<day>13</day>
<year>2008</year>
</publication_date media_type="online">
<mnoth>08</month>
<day>14</day>
<year>2008</year>
</publication_date>
<journal_volume>
<volume>5</volume>
</journal_volume>
<issue>11</issue>
</journal issue>
```

Article section of CrossRef XML

```
<journal_article publication_type="full_text">
<titles>
<title>
  Toward a Unified Theory of High-Energy Metaphysics:
  Silly String Theory
</title>
</titles>
<contributors>
<person_name sequence="first" contributor_role=
  "author">
<given_name>Josiah</given_name>
<surname>Carberry</surname>
</person_name>
</contributions>
<publication_date media_type="print">
<month>08</month>
<day>14</day>
<year>2008</year>
</publication_date>
<pages>
<first_page>1</first_page>
<last_page>3</last_page>
</pages>
<doi_data>
<doi>10.5555/12345678</doi>
<resource>
  http://psychoceramics.labs.crossref.org/10.5555-1234
  5678.html
</resource>
</doi_data>
</journal_article>
</journal>
</body>
<doi_batch>
```

So the system has taken the text entered and transformed it to XML, which is helpful for the purposes of this article and also for the publisher to see how the elements they entered in the form appear in CrossRef XML format.

CrossRef encourages publishers to save the XML file sent via email post-deposit, as using it is the easiest way to perform updates of the data entered using the form. Instead of re-entering all the metadata, a publisher can edit the XML and resubmit using the system interface found here: http://doi.crossref.org/ [6].

Explaining the Basic Extensible Markup Language Elements

To explain the basic XML displayed, it may be useful to dis-

sect what is shown in journal and article section of CrossRef XML and look at some of the individual elements entered.

The sections that the system adds are some standard elements to encase the deposit, for example:

- <head> The container for information related to the DOI batch submission. This element uniquely identifies the batch deposit to CrossRef.
- <body> The container for the main body of a DOI record submission. The body contains a set of journal, book, conference proceedings or stand alone component records. It is not possible to mix genres within a single DOI submission. It is possible to include records for multiple journals, books, conferences, or stand alone components in a single submission.
- <doi_batch> Top level element for a metadata submission to CrossRef. This element indicates the start and end of the XML file. The enclosed information, "http://www.crossref.org/schema/4.3.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" version="4.3.0" xsi:schemaLocation="http://www.crossref.org/schema/4.3.0" http://www.crossref.org/schema/deposit/crossref4.3.0.xsd, shows the version of the schema you want the XML you are depositing to be checked against, and where that schema is located.

The <doi_batch_id> is automatically generated using the web-form, but for publishers not using the web form, you will need to enter this ID that uniquely identifies the DOI submission batch. It will be used as a reference in error messages sent by the deposit system, and can be used for submission tracking. The publishers decides on and enters this number themselves and should ensure that this number is unique for every submission to CrossRef. It should be more than four characters long.

The <timestamp> indicates version of a batch file instance or DOI. Again, this is automatically generated by the web form and is used to uniquely identify batch files and DOI values when a DOI has been updated one or more times. Every time a DOI is deposited it must be given a timestamp, the value of which must increment with subsequent updates. This value is a string of text that gets interpreted as a number. The recommended format is YYYYMMDDHHMM (ex: 200810021422). If a publisher wants to redeposit a DOI using the same XML, they should always increment the timestamp to a greater number so that the system recognises it as a more recent deposit, and will generate an error message if this is not done.

The <depositor> section is quite self-explanatory, but provides Information about the organization submitting DOI metadata to CrossRef. The name The name placed in this element should match the name under which a depositing organization has registered with CrossRef i.e. Elsevier, AIP. The email section refers to the e-mail address to which batch success and/or error messages are sent. It is recommended that this address be unique to a position within the organization submitting data (e.g., "doi@...") rather than unique to a person. In this way, the alias for delivery of this mail can be changed as responsibility for submission of DOI data within the organization changes from one person to another. The registrant is the organization that owns the information being registered.

It is also necessary to add the declaration: <?xml version="1.0" encoding="UTF-8"?> at the top of the form. Version="1.0" means that this is the XML standard this file conforms to, and encoding="utf-8" means that the file is encoded using the UTF-8 Unicode encoding.

The rest of the information contained is taken directly from the web form and tagged appropriately. Note that the URI where the content is located is described as a <resource>.

If a user is new to CrossRef, or if they intend to deposit a new content type, it is recommended that they verify the format and structure of an XML file before submitting it as a deposit to the system. Using these methods is quicker than verifying XML by trial and error after uploading it. There are two methods that can be used to do this. The first is to use the XML parser on the CrossRef website: http://www.crossref.org/02publishers/parser.html [7] which will quickly validate the files uploaded and let the user know how many DOIs it has found in the file. It will also bring up error messages for any badly-formatted XML but it will not deposit the XML in the CrossRef system.

CrossRef also has a test system at http://test.crossref.org [8]. This system functions identically to the live system but uses a test database and does not register DOIs. However, the test system is useful if a publisher wants to test large numbers of files or new titles. Once a publisher is satisfied that their XML is formatted correctly, they can submit it to CrossRef.

Reviewing Submission Logs

After a deposit is processed, the email address listed in the XML deposit will receive an email indicating the results (in an XML format), which lists the status of each DOI contained in the file. Note that while many DOIs in a file may successfully get deposited, individual DOIs may fail. Submission logs must be examined, and any flagged problems should be corrected and the file(s) resubmitted.

The submission log email will look like this:

```
<?xml version="1.0" encoding="UTF-8"?>
<doi_batch_diagnostic status="completed" sp="ds4.
  crossref.org">
  <submission_id>1366152368</submission_id>
```

```
<batch_id>-58cd1699144411615d6-6ef0</batch_id>
<record_diagnostic status="Success">
  <doi>10.5555/test05052014</doi>
  <msg>Successfully updated in handle</msg>
</record_diagnostic>
<batch_data>
  <record_count>1</record_count>
  <success_count>1</success_count>
  <warning_count>0</warning_count>
  <failure_count>0</failure_count>
</batch_data>
</doi_batch_diagnostic>
```

The section highlighted shows that the deposit was a success, and the success count shows how many DOIs were deposited from the XML file with the corresponding submission ID. However, if the deposit has failed, you will get an email like this:

```
<?xml version="1.0" encoding="UTF-8"?>
<doi_batch_diagnostic status="completed" sp="ds4.
  crossref.org">
  <submission_id>1366152357</submission_id>
  <batch_id>-58cd1699144411615d6-6ef1</batch_id>
  <record_diagnostic status="Failure" msg_id="4">
  <doi>10.5555/test05052014</doi>
  <msg>Record not processed because submitted version:
    201405051257 is less or equal to previously submitted
    version (DOI match)</msg>
  </record_diagnostic>
  <batch_data>
    <record_count>1</record_count>
    <success_count>0</success_count>
    <warning_count>0</warning_count>
    <failure_count>1</failure_count>
  </batch_data>
</doi_batch_diagnostic>
```

And the <msg> section will tell you why the deposit failed. In the case shown above, a publisher tried to redeposit a DOI but without incrementing the timestamp. They should increment the timestamp element in the original XML and redeposit.

There are a number of common error messages that correspond to the most common deposit mistakes. These are listed, with the appropriate follow-up actions on the CrossRef Help site: http://help.crossref.org/#suberrors [9].

Deposit Tips

So that submissions can be processed efficiently, the file sizes of deposits should stay under 150 kilobytes. And overall file size should never exceed 1.5 megabytes. During times of very heavy loads, deposits may take several hours to reach the top of the queue and large files can take an hour or more to process. A publisher can track their submission's progress and, if necessary, request that CrossRef staff move it up in the queue. When the deposit is successful, the DOI will then start to work and resolve to the URI listed in the resource section of the XML.

Conclusion

Publishers and societies join CrossRef predominantly to allocate CrossRef DOIs to their content. All other CrossRef services such as Cited-by linking, CrossMark, CrossCheck, and FundRef are dependent on the DOI and associated bibliographic metadata. This article covers the basic information for publishers and editors who are starting out with XML and aims to answer some of the basic questions they may have. More complex aspects of CrossRef XML and depositing will be covered in a later article.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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www.crossref.org/02publishers/parser.html/
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Training Material

How to apply CrossMark and FundRef via CrossRef extensible markup language

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Abstract

CrossRef is an association of scholarly publishers that develops shared infrastructure to support more effective scholarly communications. In the 14 years since CrossRef launched, it has developed a number of services that hinge around the Digital Object Identifier (DOI) and the publication metadata submitted to CrossRef by publishers registering DOIs. CrossMark and FundRef are two additional services from CrossRef that publishers can choose to participate in, and both require publishers to provide additional information with the bibliographic metadata provided within their CrossRef deposits. This article will aim to show what this additional metadata is, how it should be formatted and why, so that publishers can use it to enhance their content and participate in additional CrossRef services that benefit the scholarly communications industry.

Keywords

Bibliographic metadata; CrossMark; CrossRef; Digital Object Identifier; FundRef

Introduction

It is important to explain the function of the CrossMark and FundRef services from CrossRef, before looking at the extensible markup language (XML) deposit details. CrossMark [1] was launched in April 2012 and sends a signal to researchers that publishers are committed to maintaining their scholarly content. It gives scholars the information they need to verify that they are using the most recent and reliable versions of a document. Readers simply click on the CrossMark logos on portable document format (PDF) or hypertext markup language (HTML) documents, and a status box tells them if the document is current or if updates are available. The CrossMark dialogue box can also be used to convey additional publication record information on things like the peer review process, copyright and licensing information and funder information by way of FundRef.

FundRef provides a standard way to report funding sources for published scholarly research. Publishers deposit funding information from articles and other content using a standard taxonomy of funder names [2]. This funding data is then made publicly available through CrossRef's

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search interfaces and application programming interfaces (APIs) for funders and other interested parties to analyse. FundRef metadata can be deposited as part of the CrossMark metadata (which is preferred) or separately for publishers who have not yet implemented CrossMark.

Adding CrossMark Metadata to CrossRef XML

CrossMark metadata can be deposited as part of a regular CrossRef Digital Object Identifier (DOI) deposit for new deposits. For backfiles, publishers can provide a resource-only deposit which means that publishers only have to deposit the CrossMark metadata plus the DOI it relates to in order to populate the record for those deposits. This is often preferable for publishers as it means that they do not have to redeposit the complete record and associated metadata and it puts less weight on the CrossRef system to process the files in an efficient manner.

The CrossMark-specific section of the CrossRef XML needs to contain, at a minimum, the DOI of the content the CrossMark is being applied to, the DOI for the publisher's CrossMark Policy Page and the DOI of any piece of content that is being updated. An example of this section of the CrossRef metadata with the minimum information necessary is as follows:

```
<crossmark>
<crossmark_version>1</crossmark_version>
<crossmark_policy>10.5555/crossmark_policy</crossmark_policy>
<crossmark_domains>
<crossmark_domain>
<domain>psychoceramics.labs.crossref.org</domain>
</crossmark_domain>
</crossmark_domains>
<crossmark_domain_exclusive>true</crossmark_domain_exclusive>
</crossmark>
```

This section is taken from the Annotated Example Site [3] that CrossRef has created to show publishers how to apply CrossMark metadata in various scenarios. In standard, full DOI deposits, the CrossMark section sits above the <doi_data> section.

The parts of the deposit can be described as follows. The CrossMark version should be kept as '1' as standard. This is not tied to any article versioning that the publisher may implement but is the version of the CrossMark metadata being used. The CrossMark policy section should be the DOI of the CrossMark policy page that the publisher has created. When a publisher is implementing CrossMark, they must create a CrossMark policy page on their own website. This page should be assigned a DOI and registered with CrossRef.

A publisher can choose to have one CrossMark policy page for all of their titles, or separate policy pages for each title if your policies and guidelines vary between publications. What the page should do is describe what CrossMark is and link to the publisher's correction and retraction policies (Fig. 1). Sample wording is available on the CrossMark support site at: http://crossmarksupport.crossref.org/crossmark-policy-page/ and publishes are free to use this to help decide on their own wording.

CrossMark policy pages should be assigned a DOI so that they can be linked to permanently from the CrossMark dialogue box. Assigning a DOI to the page means that if a publisher updates the URL of their policy page, they only have to update the DOI of the policy page and all CrossMark dialogue boxes will update to point to that. CrossMark Policy pages should be deposited as datasets with a "database" called "PublisherName CrossMark Policy Statement". If a publisher has multiple policy pages (for example different policy pages for different journals) they should include them in the database deposit as multiple datasets. An example deposit file for the CrossMark policy page is available here: http://crossmarksupport.crossref.org/wp-content/uploads/2013/04/CrossMark_policy_page.xml [4].

The final section shown in the snippet of CrossMark XML is the CrossMark domain. A CrossMark domain is a domain name/website address (URL) where the content associated with the CrossMark metadata is hosted and maintained by the publisher. The CrossMark domain is an optional field in CrossMark metadata only to be supplied if a publisher wishes their content to be "domain exclusive".

When a user clicks on the CrossMark logo, the system will check whether the content is located on one of the specified CrossMark domains, and it will display the appropriate status message. If the content is on the publisher's site or a third party site that the publisher has committed to updating (a CrossMark domain), the known CrossMark status will appear in the status window in the CrossMark dialogue box. If the content is on a non-CrossMark domain the CrossMark status message will have a statement that the particular copy of the content is not being maintained by the publisher and may not be up to date, and will advise that the user should follow the CrossRef DOI link to the publisher-maintained copy. If a publisher does not supply any CrossMark domains, a researcher will see the latest status in the CrossMark dialogue box regardless of where they have located the content.

Publishers do not have to supply CrossMark domains. If a publisher's content is likely to legitimately appear in many places on different websites then they can choose to be "non

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PLOS Journals

Corrections Policy

Introduction

PLOS publishes corrections, retractions, and expressions of concern as appropriate, and as quickly as possible. We follow the ICMJE (http://www.icmje.org/) and COPE (http://publicationethics.org/) guidelines where applicable.

Corrections

A notice of correction will be issued by PLOS to document and correct substantial errors that appear in online articles when these errors significantly affect the content or understanding of the work reported (e.g., error in data presentation or analysis) or when the error affects the publication's metadata (e.g., misspelling of an author's name). In these cases, PLOS will publish a correction that will be linked to the original article.

In very rare cases, we may choose to correct the article itself and re-post it online. If that course is taken, a correction notice will also be created to document the changes to the original article.

Authors who wish to alert PLOS to a situation where a correction may be warranted are requested to contact us with the relevant details (journal, full citation of the article, and description of the error) at: corrections@plos.org

Authors are encouraged to post comments to their articles to note typographical errors, and other problems that do not significantly affect the scientific integrity of the work.

CrossMark

PLOS Journals now participate in the CrossMark service, which is a multi-publisher initiative to provide a standard way for readers to locate the most up-to-date version of an article. By applying the CrossMark logo PLOS is committing to maintaining the content it publishes and to alerting readers to changes if and when they occur.

Clicking on the CrossMark logo will tell you the current status of a document and may also give you additional publication record information about the document.

Fig. 1. The *PLOS Biology* CrossMark policy page (Available from: http://dx.doi.org/10.1371/journal.pbio.corrections_policy).

domain-exclusive" and not register any CrossMark domains. However, in the deposit schema, the domain is a required element. The reason CrossRef requires at least one CrossMark domain (even if the publisher marks it as not being domain exclusive i.e., <crossmark_domain_exclusive>false</crossmark_domain_exclusive>) is so that search engines can prioritise search results and point to the originating domain of the document.

Publishers entering multiple domains can enter them as follows:

```
<crossmark_domains>
<crossmark_domain>
<domain>domain 1</domain>
</crossmark_domain>
<crossmark_domain>
<domain>domain 2</domain>
</crossmark_domain>
<crossmark_domain>
<domain>domain 3 </domain>
</crossmark_domain>
</crossmark_domains>
```

The final element necessary for a CrossMark deposit is only required if the deposit is correcting or updating another piece of content.

An update section can be added as follows:

```
<crossmark>
<crossmark_policy>10.5555/crossmark_policy</crossmark_policy>
<crossmark_domains>
<crossmark_domain>
<domain>psychoceramics.labs.crossref.org</domain>
</crossmark_domain>
</crossmark_domains>
<crossmark_domain_exclusive>true</crossmark_domain_exclusive>
<updates>
<update type="retraction" label="Retraction" date="2009-09-14">10.5555/12345678</update>
</updates>
</crossmark>
```

The section highlighted shows what type of update is being applied (a retraction), the date that retraction was issued, and

the DOI of the piece of content is being updated by the retraction.

There are many "types" of updates. "Corrections", "clarifications", "retractions" and "withdrawals" are just a few of the better-known types. For these common types, CrossRef recommends that publishers use the values "correction," "clarification," "retraction" and "withdrawal" respectively.

The Terms & Conditions [5] for CrossMark stipulate that "updates" should only be deposited for changes that are likely to effect "the interpretation or crediting of the work." In other words, updates should only be deposited for editorially significant changes. Updates should not be deposited for minor changes such as spelling corrections, formatting changes, etc.

When a correction is made in situ (i.e., replaces the earlier version completely), then the DOI of the corrected content will be the same as the DOI for the original CrossRef deposit. Examples of in situ corrections, and other more complex updates such as a correction that updates more than one DOI are illustrated, along with their XML on the annotated example site.

Along with the basic CrossMark metadata, publishers can also provide additional publication metadata that, if deposited, will appear in the CrossMark record tab as shown in Fig. 2.

Publishers are encouraged to provided any non-bibliographical metadata that they feel might help the researcher evaluate and make better use of the content that the Crossmark record refers to. For example, publishers might want to provide funding information, clinical trial numbers, information about the peer-review process or a summary of the publication history of the document. This particular data from another of our pilot participants, the IUCr (International Union of Crystallography), and they are sharing some really useful information on the copyright, review process and publication history.

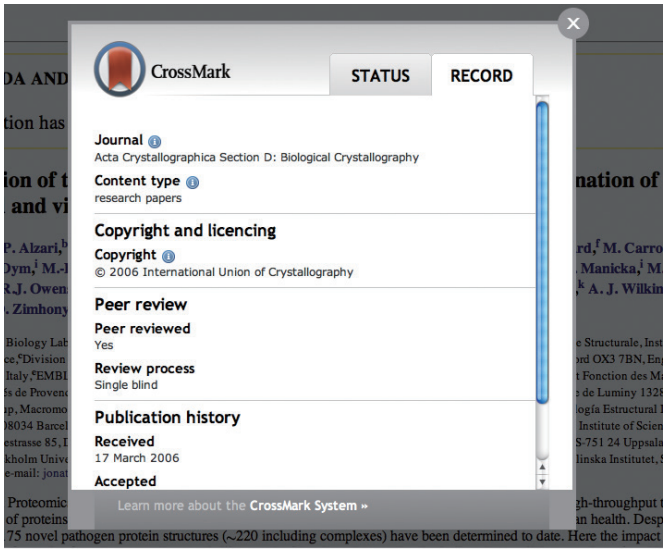

Fig. 2. The CrossMark record tab showing additional publication record information.

To add this metadata, CrossMark participants should add a custom metadata snippet of XML below the CrossMark domain entry (but above the </crossmark> enclosing tag).

```
<custom_metadata>
<assertion name="orcid" label="ORCID" group_name="identifiers" group_label="Identifiers" order="0" href="http://orcid.org/0000-0002-1825-0097">http://orcid.org/0000-0002-1825-0097</assertion>
<assertion name="received" label="Received" group_name="publication_history" group_label="Publication History" order="0">2012-07-24</assertion>
<assertion name="accepted" label="Accepted" group_name="publication_history" group_label="Publication History" order="s1">2012-08-29</assertion>
<assertion name="published" label="Published" group_name="publication_history" group_label="Publication History" order="2">2012-09-10</assertion>
</custom_metadata>
```

To explain the metadata displayed here, it begins with an assertion, which is a piece of custom, non-bibliographic metadata that the publisher is stating about the content to which the CrossMark refers.

The assertion attributes that can be used are as follows.

explanation: If the publisher wants to provide a further explanation of what the particular "assertion" means, they can link to such an explanation by providing an appropriate URL on the "explanation" attribute.

group_label: This is the human-readable form of the "group_name" attribute. This is what will be displayed in the group headings on the CrossMark metadata record dialog. For example, 'Publication History' in Fig. 2 is a group label.

group_name: Some assertions could be logically "grouped" together in the CrossMark dialog. For instance, if the publisher is recording several pieces of metadata related to publication timelines, then they may want to make sure that these assertions are grouped next to each-other in the CrossMark dialog. The group_name attribute is used for grouping such assertions.

label: This is the human-readable version of the name attribute which will be displayed in the CrossMark dialog. If this attribute is missing, then the value of the assertion will not be displayed in the dialog. Publishers may want to "hide" assertions this way in cases where the assertion value is too large or too complex to display in the dialog, but where the assertion is nonetheless valuable enough to include in API queries and metadata dumps (e.g., detailed licensing terms).

name: This is the machine-readable name of the assertion. Publishers can use the "label" attribute to provide a human-readable version of the name.

order: The publisher may want to control the order in which assertions are displayed to the user in the CrossMark dialog.

All assertions will be sorted by this element if it is present, but it is not required. As explained, this information is added at the publisher's discretion and contain any information they deem relevant.

The CrossMark record tab can also be used to display funder information for the piece of content, by way of FundRef. If a publisher submits funding metadata as per the FundRef requirements, the information will display with the FundRef logo as seen in Fig. 3.

Adding FundRef Metadata to CrossRef extensible markup language

CrossRef supports the recording of funding information for a publication via the FundRef program. FundRef defines an open, standard registry of funder names and funder identifiers that can be used in order to increase the accuracy of the funding information recorded. FundRef benefits a host of stakeholders within the research and communications industries. More accurate funding information will aid funding organizations, which will be able to better track the results of their funding policies. It will help authors, in simplifying their submission process, as they will be able to choose from a list of funding sources and have their paper handled in accordance with funder mandates. Research institutions will be able to track the productivity of their employees and publishers will be able to better analyse the sources of funding for their published content. Finally, it will also benefit readers and the public, by providing greater transparency into the results of Research & Development funding.

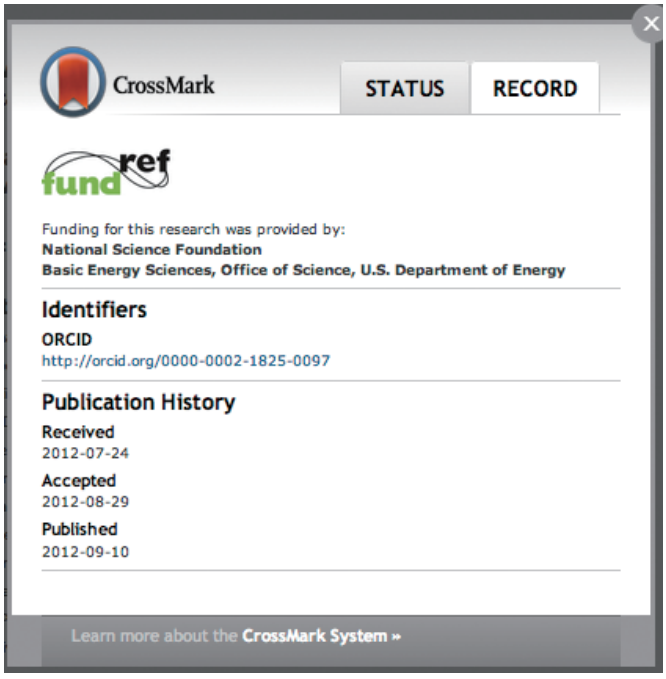

Fig. 3. The CrossMark record tab showing FundRef information.

CrossRef member publishers should deposit FundRef data as part of a CrossMark record if they already are (or are planning to become) a participant in CrossMark. There are two reasons for this: first, it ensures that the funder metadata is available both in a standard machine-readable format and via a standard interface for readers. Second, it ensures that the funder metadata is made maximally reusable via a CC Zero license waiver. Note that publishers do not need to have implemented CrossMark yet (i.e., displaying CrossMark logos on their HTML pages and on PDFs to deposit Funder metadata via CrossMark).

The example below shows FundRef metadata nested within the CrossMark metadata.

```
<crossmark>
  <crossmark_version>1</crossmark_version>
  <crossmark_policy>10.555/cm_1</crossmark_policy>
  <crossmark_domains>
     <crossmark_domain><domain>www.crossref.org
     </domain></crossmark_domain>
  </crossmark_domains>
  <crossmark_domain_exclusive>true</crossmark_do-
    main_exclusive>
  <updates>
    <update type="correction" label="Correction" date=
      "2011-04-10">10.5555/cm_test2.1</update>
  </updates>
  <custom_metadata>
    <assertion name="received" label="Received" group_
      name="publication_history" group_label="publi-
      cation History">2011-04-12</assertion>
    <fr:program name="fundref">
      <fr:assertion name="funder_name">IMA Funder
        <fr:assertion name="funder_identifier">http://
          dx.doi.org/10.13039/xxxxxxxxxx</fr:assertion>
      <fr:assertion>
      <fr:assertion name="award_number">HPC-227</
        fr:assertion
    </fr:program>
  </custom_metadata>
</crossmark>
```

Publishers can also deposit FudRef metadata as part of their

standard article metadata if they choose not to participate in CrossMark as below:

```
...
<publication_date media_type="print">
  <year>2011</year>
</publication_date>
<pages>
  <first_page>15</first_page>
</pages>
  <fr:program name="fundref">
    <fr:assertion name="funder_name">ABC Inc.
    <fr:assertion name="funder_identifier">http://dx.doi.
      org/10.13039/xxxxxxxxxx</fr:assertion>
    </fr:assertion>
    <fr:assertion name="award_number">BXDFSDS</
      fr:assertion>
  </fr:program>
  <doi_data>
    <doi>10.5555/cm_test_1.1</doi>
    <resource>http://www.crossref.org/crossmark/index.
      html</resource>
  </doi_data>
</journal_article>
```

FundRef metadata must include the name of the funding organization and the funder identifier, where the funding organization is listed in the Registry, and may include an award/grant number assigned to the fund. Funder names should only be deposited without the accompanying ID when the funder is not found in the Registry. Although FundRef supports recording award numbers along with funder identifiers, FundRef does not define standards for recording award numbers as practice varies so greatly across funders.

The metadata attributes associated with FundRef are as follows.

fundgroup: This is used to group funding information for items with multiple funding sources. It is required for items with multiple funder_name or funder_identifier assertions.

funder_name: The name of the funding agency as it appears in the FundRef Registry. Funder names that do not match those in the registry will be accepted to cover instances where the funding organization is not listed.

funder_identifier: The funding agency identifier in the form of a DOI, must be nested within the "funder_name" assertion. The funder_identifier must be taken from the FundRef Registry.

award_number: The grant number or other fund identifier.

"funder_name" and "funder_identifier" must be present in a deposit where the funding body is listed in the FundRef Registry. Multiple "funder_name", "funder_identifier", and "award_number" assertions can be included.

When publishers are depositing FundRef metadata, they should add the additional element <fr:program> to the schema declaration at the top of their CrossRef XML deposits which is shown below:

```
<doi_batch xmlns="http://www.crossref.org/schema/4.3.1"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-in-
  stance"xmlns:fr="http://www.crossref.org/fundref.xsd"
  xsi:schemaLocation="http://www.crossref.org/schema/
  4.3.1 http://www.crossref.org/depositSchema/crossref
  4.3.1.xsd" version="4.3.1">
```

This basically means that the schema will support the FundRef program and therefore the language it adds to the CrossRef XML and can check it to make sure it's compliant before accepting the deposit. FundRef metadata is collected in this way to try to ensure the accuracy and consistency of the data.

From the previous examples, publishers should note that in the CrossRef XML, the relationship between "funder_identifier" and "funder_name" is established by nesting "funder_identifier" within "funder_name". For example, the deposit excerpt shown below has the funder "National Science Foundation" with its corresponding funder identifier in the FundRef registry of "http://dx.doi.org/10.13039.10000001":

```
<fr:assertion name="funder_name">National Science
  Foundation
    <fr:assertion name="funder_identifier">http://dx.doi.
      org/10.13039.10000001</fr:assertion>
    </fr:assertion>
```

A "funder_name", "funder_identifier", and "award_number" should be included in FundRef deposits whenever possible. If the funder name cannot be matched in the registry, a publisher may submit funder_name only and the funding body will be reviewed and considered for addition to the official registry. Until it is added to the Registry the deposit will not appear in search results in FundRef search [6].

Obviously research is not always as simple as one funder for one paper, and the CrossRef schema has some flexibility that allows for this. If a publisher needs to add two grant numbers for one funding organisation, they can do so as follows within the CrossRef schema:

```
<fr:program name="fundref">
  <fr:assertion name="funder_name">National Science
    Foundation
    <fr:assertion name="funder_identifier">http://dx.doi.
      org/10.13039/100000001</fr:assertion>
  </fr:assertion>
  <fr:assertion name="award_number">CBET-106</
    fr:assertion>
  <fr:assertion name="award_number">CBET-7259</
```

```
    fr:assertion>
</fr:program>
```

Note that the funder_identifier is nested within the funder_name assertion, establishing "http://dx.doi.org/10.13039.100000001" as the FundRef identifier for funder name "National Science Foundation." Two award numbers are present.

Multiple funding organisations and grant numbers may also be deposited as per the example shown below:

```
<fr:program name="fundref">
  <fr:assertion name="fundgroup">
    <fr:assertion name="funder_name">National Science Foundation
      <fr:assertion name="funder_identifier">http://dx.doi.org/10.13039/00000001</fr:assertion>
    </fr:assertion>
    <fr:assertion name="award_number">CBET-106</fr:assertion>
    <fr:assertion name="award_number">CBET-7259</fr:assertion>
    </fr:assertion>
    <fr:assertion name="fundgroup">
    <fr:assertion name="funder_name">Basic Energy Sciences, Office of Science, U.S. Department of Energy
      <fr:assertion name="funder_identifier">http://dx.doi.org/10.13039/100006151</fr:assertion>
    </fr:assertion>
    <fr:assertion name="award_number">1245-ABDS</fr:assertion>
    <fr:assertion name="award_number">98562-POIUB
      </fr:assertion>
  </fr:assertion>
</fr:program>
```

This example contains two funder_name/identifiers and two award_numbers for each funder. Each funding organization is within its own "fundgroup" for clarity for the reader.

If a publisher has more complicated funder information to submit, they can contact support@crossref.org to get help on how to format their XML accordingly.

Conclusion

CrossMark and FundRef are services offered by CrossRef that provide important information to readers, funding bodies, librarians and other important stakeholders within the communications industry. This article has aimed to provide information for publishers and editors on how they should add CrossMark and FundRef data to their CrossRef XML in order to participate in both initiatives. Further information is available via CrossRef's help documentation, and CrossRef staff are on-hand to help with any queries that may arise.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Training Material

Practice of CrossRef extensible markup language coding and more advanced information for CrossRef deposits

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Abstract

CrossRef is an association of scholarly publishers that develops shared infrastructure to support more effective scholarly communications. This infrastructure is centred around the Digital Object Identifier (DOI), and the associated bibliographic metadata that publishers deposit with CrossRef. To deposit this metadata, publishers need to provide the relevant information to CrossRef in extensible markup language (XML). Some publishers have a high level of XML expertise, and some are less familiar with formatting XML and need more assistance in order to register DOIs with CrossRef. There are some basics of depositing which can be picked up quickly, with the help of CrossRef tools, but there is a lot of information that publishers can provide via their XML to supplement the basic deposit information. This article will cover some of the more advanced information that publishers can deposit with CrossRef when they register DOIs, to help them participate in additional CrossRef services and provide additional value for the scholarly research community.

Keywords

Coding; CrossRef; Practice; Extensible markup language

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Introduction

Publishers interested in learning about depositing the minimum required metadata with CrossRef can refer to the earlier article 'The basics of CrossRef extensible markup language', also published in *Science Editing* [1]. This article will provide details on the additional information that can be deposited within the CrossRef extensible markup language (XML) including references (to facilitate CrossRef's Cited-by Linking service [2]), Open Researcher and Contributor IDs (ORCIDs), abstracts and full-text links and license information (which will facilitate participation in CrossRef Text and Data Mining Services [3]). It also provides brief information on the machine interfaces that publishers can use to efficiently upload XML to the CrossRef deposit system in a more automated way.

Depositing and Distributing References

In addition to article metadata, CrossRef members may also deposit reference lists. Reference deposit is recommended and there is no extra charge associated with it, but it is required for publishers who want to participate in Cited-by Linking. CrossRef Cited-by Linking is a service that allows publishers and their authors to discover how their articles are being cited. This information can be incorporated into a publisher's platform so that this is available for their readers who can use it to find connections between related content. There is no charge for publishers to participate in this service, however in order for a CrossRef member to discover what publications cite their content, they must in turn submit metadata listing the works that their own publications cite.

In practice, this is not hard to do. Reference metadata can be easily included within normal DOI deposits, and it is now even possible to deposit references for Cited-by Linking through the cut-and-paste Simple Text Query interface [4].

Although there are other services that provide cited-by facilities (e.g., Google Scholar, Scopus, ISI and some hosting providers.), CrossRef Cited-by Linking complements these other services because: 1) It is controlled and managed by the CrossRef membership. As such, it enables direct primary publisher-to-publisher linking without the use of intermediaries. 2) It is not tied to any particular "metric", although the metadata provided by the service could be used by others to either validate existing metrics or as the foundation for creating new metrics. 3) It is not constrained by discipline and, as such, may prove useful for discovery of otherwise hard-to-find interdisciplinary citations and for use by publishers in fields that are underserved by the other services. 4) It is not constrained by content type. CrossRef can accept reference data for journals articles, monographs, reference works, etc. 5) The CrossRef Cited-by Linking service is built on top of the DOI infrastructure and, as such, is very precise. 6) CrossRef is finding that those who seek to use CrossRef's metadata services (CMS) [5] are increasingly interested in collecting reference metadata as well. CrossRef is concerned that, if they cannot get citation metadata from CrossRef, they will resort to using the much less accurate metadata that they can gather through screen scraping and services like Google Scholar.

Reference-only deposits are really nothing more than the list of references in an article's bibliography. Under CrossRef's normal linking service, members deposit an article's metadata and then—in a separate process—query for the DOIs of the references [6]. In order to do that querying, the references must be extracted from the article. Reference-only deposits simply combine the identity of the article (the DOI in the metadata deposit) with its list of references.

References can be deposited by publishers in two ways. The first way is as part of their standard CrossRef metadata deposits along with the relevant article information. To do this, the XML metadata should be structured as shown below [7]:

```
<doi_data>
  <doi>10.50505/test_20051229930</doi>
  <resource>http://www.crossref.org/</resource>
</doi_data>

<!-- ======= Here is the list of references cited in the
  above article -->

  <citation_list>
  <citation key="ref1">
    <journal_title>Current Opinion in Oncology</jour-
      nal_title>
    <author>Chauncey</author>
    <volume>13</volume>
    <first_page>21</first_page>
  </citation>
  <citatioin key="ref2">
    <doi>10.5555/small_md_0001</doi>
  </citation>
 </citation_list>
</journal_article>
</journal>
</body>
</doi_batch>
```

Publishers who do not wish to modify their existing metadata deposit process to include the deposit of reference information may instead deposit the reference lists in a separate reference-only deposit. A special schema [8] has been developed which allows for the deposit of references for an article (or indeed other items of additional metadata) that already has a CrossRef DOI. For publishers who want to deposit references in this way instead, they can follow the XML format shown below:

```
<doi_citations>
<! - ***** The DOI of the article that contains the citations
  ***** -->
<doi>10.5555/small_md_0001</doi>
<citation_list>
<! - ***** The metadata for one of the citations  in the
  above article ***** -->
<citation key="ref1">
    <journal_title>Current Opinion in Oncology</jour-
      nal_title>
    <author>Chauncey</author>
    <volume>13</volume>
```

```
      <first_page>21</first_page>
    </citation>
<!-- ***** Or, if we know the DOI of the cited articles we
  can use it directly ***** -->
  <citatioin key="ref2">
    <doi>10.5555/small_md_0001</doi>
  </citation>
</citation>
</citation_list>
</doi_citations>
</body>
</doi_batch>
```

In both approaches, an article's references are described using the <citation_list> XML element. This element contains one or more <citation> elements (this is also common to both methods of depositing references). The current elements for citation tagging are: <issn>: ISSN (International Standard Serial Number) of a series (print or electronic), <journal_title>, <author>: first author of an article or other publication, <volume>: volume number (journal or book set), <issue>: journal issue, <first_page>, <cYear>: year of publication, <article_title>: journal article, conference paper, or book chapter title <isbn>, <series_title>: title of a book or conference series, <volume_title>: book or conference proceeding title, <edition_number>, <component_number>: the chapter, section, part, etc. number for a content item in a book.

CrossRef also accepts unstructured citations, which can be deposited using the <unstructured_citation> tag. These are citations for which no structured data is available, sometimes because they have been extracted from portable document formats (PDFs) or other systems that cannot tag the individual elements of the information extracted. CrossRef's ability to process unstructured citations is limited, just because it means that it is more difficult to match them to related articles. As such, publishers should also include the DOI wherever possible (using the <doi> tag) when depositing reference information as matches may be made using the DOI as a key point of similarity.

By default, references deposited for a DOI are only distributed to the current owner of the DOI or to Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) subscribers i.e., as those participating in advanced CMS when given permission by the current publisher. OAI-PMH is a protocol for metadata harvesting and is how advanced CMS participants retrieve the CrossRef metadata they subscribe to [9].

Publishers may also now choose to include deposited references in unified extensible markup language format (UNIXML) query results as well as OAI-PMH results. UNIXML querying returns the exact data submitted by the publisher of the DOI and not processed by the CrossRef system. This differs from other query result formats, like OAI-PMH that return data that has been processed by the CrossRef. If publishers elect to include their deposited references in the UNIXML query results, this makes the references publicly available. A publisher can contact support@crossref.org if they would like reference distribution enabled for the prefixes they manage. CrossRef encourages reference distribution for all members.

Depositing Open Researcher and Contributor IDs within CrossRef Extensible Markup Language

ORCIDs [10] are unique identifiers for researchers, and CrossRef supports the deposit of ORCIDs for authors. Publishers can ask authors to provide them with their individual ORCID ID upon submission or acceptance of their work, and then deposit them with CrossRef with the rest of the article metadata. The presence of ORCIDs in the CrossRef XML enriches the information that can be discovered about an article and enable a reader to disambiguate between the author and another researcher who may share the same name.

Combined with CrossRef's FundRef [11] service, the presence of ORCIDs will also allow funding agencies to tie agency funded research publications directly to researchers. In the long-term, widespread use of ORCIDs in CrossRef deposits could even let agencies start to develop publication key performance indicators (KPIs) for researchers that they fund.

An author's ORCID ID can be deposited with their details within the CrossRef XML as shown below:

```
<contributors>
  <person_name sequence="first" contributor_role=
    "author">
    <given name>Josiah</given name>
    <surname>Carberry</surname>
    <ORCID authenticate="true">http://orcid.org/0000-
      0002-185-0097</ORCID>
  </person_name>
```

Publishers can also show if the ORCID has been authenticated or checked for validity within the XML. This is shown by the <ORCID authenticated="true"> tagging.

Depositing Abstracts with CrossRef

CrossRef changed their deposit schema in mid-2013 to support the deposit of abstracts within the XML. It is optional to include abstracts in CrossRef deposits, but if publishers do include them then they will be included in CrossRef's established metadata distribution services—CMS and other CrossRef application programming interfaces (APIs). These services

already are very effective at disseminating bibliographic metadata with the option to include references. Including abstracts in these services will benefit both members (some of whom are eager to include abstracts) and CrossRef, as it will enhance the information on content available via CMS.

Another stakeholder in academic research—funding agencies—have an interest in building custom portals that highlight agency-funded research. In order to provide users of these portals with the best experience, agencies will want, where possible, to display abstracts of publications along with their standard bibliographic metadata.

If publishers want to deposit abstracts, these must conform to the Journal Article Tag Suite (JATS) [12] abstract element. JATS is a set of XML elements and attributes used to tag journal articles that differs in some aspects from the CrossRef XML. Many publishers already use JATS XML and it made sense for CrossRef to use the JATS abstract formatting for that reason. To deposit abstracts, publishers should add tags as per the example shown below [13]:

```
...
  </person_name>
</contributors>
<jats:abstract> <jats:p> We describe a method for cloning
  nucleic acid molecules onto the surfaces of 5 &#x03BC;m
  micro-beads rather than in biological hosts. A unique tag
  sequence is attached to each molecule, and the tagged li-
  brary is amplified. Unique tagging of the molecules is
  achieved by sampling a small fraction (1&#x0025;) of a
  very large repertoire of tag sequences. The resulting li-
  brary is hybridized to microbeads that each carry &#x
  2248;10 <jats:sup> 6 </jats:sup> strands complementary
  to one of the tags. About 10 <jats:sup> 5 </jats:sup>
  copies of each molecule are collected on each microbead.
  Because such clones are segregated on microbeads, they
  can be operated on simultaneously and then assayed sep-
  arately. To demonstrate the utility of this approach, we
  show how to label and extract microbeads bearing clones
  differentially expressed between two libraries by using a
  fluorescence-activated cell sorter (FACS). Because no pri-
  or information about the cloned molecules is required,
  this process is obviously useful where sequence databases
  are incomplete or nonexistent. More importantly, the
  process also permits the isolation of clones that are ex-
  pressed only in given tissues or that are differentially ex-
  pressed between normal and diseased states. Such clones
  then may be spotted on much more cost-effective, tissue-
  or disease-directed, low-density planar microarrays. </
  jats:p> </jats:abstract>
<publication-date media_type="print">
  <year> 2000 </year>
  </publication-date>
...
```

Further details can be found in the CrossRef Schema Documentation of the <abstract> element [14].

Recording Links to Full Text of Documents, etc.

For some time, CrossRef member publishers have needed to be able to record links to the full text of the content to which a DOI refers. Additionally, publishers may want to offer different versions (e.g., Accepted Manuscript or Version of Record) and different representations (e.g., PDF for viewing, XML for text and data mining, etc.) of the content tailored for specific applications.

The <resource> element in CrossRef metadata is most often used to record an hypertext transfer protocol (HTTP) uniform resource identifier (URI) pointing at the publisher's landing page for the publication identified by the CrossRef DOI in question. However, the CrossRef schema has long supported the recording of multiple <resource> elements in order to enable, for example:

- Multiple resolution [15]: a service that allows multiple URLs to be allocated to a DOI, in case content is legitimately co-hosted on more than one platform.
- Search engine indexing: the ability to associate the DOI of the item with the location at which it was indexed. Search services often index content by where it was found (URL) which may not be a stable/reliable key. Adding the DOI as an index key adds stability.
- CrossCheck indexing [16]: CrossCheck is CrossRef's plagiarism screening service [17], and providing full-text links in the CrossRef metadata enables the content to be indexed in the CrossCheck database so that other works can be checked against it.

Funders are also interested in making sure that the full text content of the best available version of an article is made available for reading, automated processing and archiving.

CrossRef has extended the ability to record multiple <resource> elements in order to allow the recording of URIs which point to the full text of content identified by the CrossRef DOI. The publisher can record multiple representations of the full text (e.g., PDF, XML, plain text) using the new mime_type attribute and then, through their access control systems, control who is able to reach which representation of an article and under which conditions. It is important to note that, by recording a <resource> that points to the full text, a publisher is not necessarily guaranteeing that the URI will be accessible—this would still be managed by their access control systems.

The <collection> property should be used as a container for one or more items each holding a DOI or a resource (URI) which is related to the DOI in the <doi_data> element. Publishers can use the <resource> element for recording links to the full text, as per the example below [18]:

```
<doi_data>
  <doi>10.555/pubdate1</doi>
    <resource>http://www.yourrl.org/article1.html</resource>
    <collection property="crawler-based">
      <item crawler="altavitsta">
        <resource>http://www.yourrl.org/article1_altavista.html</resource>
      </item>
      <item crawler="google">
        <resource>http://www.yourrl.org/article1_google.html</resource>
      </item>
      <item crawler="iparadigms">
        <resource>http://www.yourrl.org/article1_crosscheck.html</resource>
      </item>
  </collection>
</doi_data>
```

A collection must be qualified by a property attribute or the multiple resolution attribute to show how it is intended to be used. Property attributes can be list-based: i.e., takes users to an interim page and presents the list of items to the user (via Multiple Resolution), or crawler-based: i.e. identifies resource to be crawled by the specified crawlers.

Information on how to record links to full-text in the deposit schema, as part of enabling the new CrossRef text and data mining service, is available on the text and data mining support site at: https://apps.crossref.org/docs/tdm/full-text-uris-technical-details/. Full text links for text and data mining can be used to point to the full-text of the piece of content in all of the forms that the publisher can provide it in. For example, if a publisher has the full-text of a paper available in PDF and XML format, they can specify both in their XML so that a researcher wanting to text and data mine the content can choose the format they wish to harvest it in. This is called Content Negotiation [19] and is supported by CrossRef and by Datacite [20], another DOI registration agency.

License Information

One of the main drivers behind the FundRef service was that many funding bodies are required to report on the public availability of the results and publications arising from their funder-financed research. Funders are therefore interested in understanding how publications related to funded research are licensed.

As such, CrossRef added the additional element <ai:program> to support the Access Indicators schema. Access indicators for published content are most commonly included in metadata deposits in the form of license information, so that a publisher can show which license(s) a piece of content is published under and therefore it's permitted usage. License information metadata collected by CrossRef includes:

- license URL element (license_ref)
- *start_date* attribute, optional, date formated YYYY-MM-DD
- *applies_to* attribute, optional, allowed values are:
  - vor (version of record)
  - am (accepted manuscript)
  - tdm (text mining)

Access Indicators may be included in a metadata deposit or submitted as a resource-only deposit.

To deposit license information, publishers must use the <license_ref> element. The value of the <license_ref> element must be a stable HTTP URI which points to a human-readable document that either includes, or guides the reader to, any copyright and/or licensing information related to the CrossRef DOI of the content. The URI should point either to a location on the publisher's site or to the stable location of any well-known licenses such as those of the Creative Commons.

It is also acceptable to record a <license_ref> URI as a "placeholder." If a publisher is still working out specific licensing terms, the URI recorded in the metadata can point to a blank page or even a simple re-assertion of the document's copyright. This at least indicates an intent on the part of the publisher to eventually clarify licensing information.

Use of the <license_ref> element is best explained through examples. The <license_ref> for content licensed under the popular CC-BY [21] license, would look like this:

```
<license_ref>http://creativecommons.org/licenses/by/3.0/deed.en_US</license_ref>
```

Where as the *Journal of Psychoceramics* (a fake journal used by CrossRef for demonstration purposes) might record that their content is licensed under a proprietary license like this:

```
<license_ref>http://www.psychoceramics.org/license_v1.html</license_ref>
```

A publisher can also deposit multiple <license_ref> elements, so the following would indicate that a document was available under a dual license (e.g., one for commercial applications and one for non-commercial applications):

```
<license_ref>http://www.psychoceramics.org/non_commercial_license_v1.html</license_ref>
<license_ref>http://www.psychoceramics.org/commercial_license_v1.html</license_ref>
```

Publishers may also want to record that a document is under embargo. In other words, that it is available under access control and a proprietary license for a set period of time, after which it is available under an open license. Publishers wishing to record embargoes can use the optional start_date attribute on the <license_ref> element.

For example, the following records that the content is under a proprietary license from its date of publication on February 3, 2014 and that it is under a CC-BY license a year later on February 3, 2015:

<license_ref start_date="2014-02-03">http://www.psychoceramics.org/license_v1.html</license_ref> <license_ref start_date="2015-02-03">http://creativecommons.org/licenses/by/3.0/deed.en_US</license_ref>

It is important to note that the value of the start_date element must be recorded using the format YYYY-MM-DD The start_date attribute can be combined with multiple <license_ref> elements to indicate that a document is under a proprietary license during an embargo, but that it is then under a dual (commercial/non-commercial) license a year later):

<license_ref start_date="2014-02-03">http://www.psychoceramics.org/license_v1.html</license_ref> <license_ref start_date="2015-02-03">http://www.psychoceramics.org/non_commercial_license_v1.html</license_ref> <license_ref start_date="2015-02-03">http://www.psychoceramics.org/commercial_license_v1.html</license_ref>

There is no corresponding end_date attribute for the <license_ref> element. This is because including end dates could introduce ambiguities. For example:

· Open Licenses, such as CC, do not have "end dates".
· With end dates, it would be possible to inadvertently record "gaps" between licenses.

By recording that another license takes effect in the future, a publisher is informing the user of the metadata that the current restricted license is only for the embargo period. In short, the publisher is recording the intent to change the license when the embargo is done. Providing additional metadata for a current publication at some future date is an additional chore for the publisher that might well be overlooked. Again, this may not be something that publishers go into a lot of detail with when starting out with CrossRef, but they should consider adding this information to their CrossRef deposits in the longer term to provide useful information to a large number of interested parties in the publishing industry and beyond.

Using Hypertext Transfer Protocol to Upload Files to CrossRef

This article has mainly focused on extra metadata that can be included in CrossRef deposits. However, another aspect of depositing with CrossRef that more technical users may be interested in is being able to bulk deposit files programmatically with CrossRef. The following information is more technical, and publishers can refer back to the related article, 'The basics of CrossRef extensible markup language' [1] for more manual means to deposit files.

Uploading files (for deposit or for bulk queries) are submitted using HTTP post with the encType: multipart/form-data. Multipart/form-data is a more complicated encoding, but one that allows entire files to be included in the data. The URL for all submissions is http:// doi.crossref.org/servlet/deposit. The parameters required within the encoding are shown in Table 1 [22].

The CrossRef website shows some sample transactions that publishers can use to format their own submissions as below:

POST http://doi.crossref.org/servlet/deposit?operation=doMDUpload&login_id=USER&login_passwd=PSWD&area=live HTTP/1.1
Accept: image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*

Table 1. Parameters required within the encoding for HTTP (hypertext transfer protocol) post submissions to CrossRef

Form field	Description	Possible values	Mandatory	Default
Operation	Depends on submission type	doMDUpload: For metadata (XSD) submissions doDOICitUpload: For DOI citations or resources submissions doQueryUpload: For query submissions doDOIQueryUpload: For DOI-to-metadata query submissions	NO	doMDUpload
SubType	Subtype for metadata submissions	cm:For conflict management submissions	NO	N/A
Login_id	CrossRef supplied login	N/A	YES	N/A
Login_passwd	CrossRef supplied password	N/A	YES	N/A
		Contents part		
Fname	Submission contents	N/A	YES	N/A

Crossref. Using HTTP to post files (upload) [Internet]. Lynnfield: CrossRef [cited 2014 May 27]. Available from: http://help.crossref.org/#using_http_to_post

```
Accept-Language: en-us Content-Type: multipart/form-data; boundary = ----------7d22911b10028e
User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; Q312461)
Host: Myhost
Ontent-length: 1304 Pragma: no-cache ----------7d22911b10028e
Content-Disposition: form-data; name = "fname"; filename = "crossref_query.xml"
<?xml version = "1.0" encoding = "UTF-8"?>
<doi_batch version = "4.3.0" xmlns = "http://www.crossref.org/schema/4.3.0" xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation = "http://www.crossref.org/schema/4.3.0 http://www.crossref.org/schemas/crossref4.3.0.xsd">
<head>
...
</head>
<body>
 <journal>
 ....
 </journal>
 </body>
 </doi_batch>
 ----------7d22911b10028e--
```

For backward compatibility, the CrossRef system also accepts the login_id, login_passwd, operation, and area parameters in a multi-part request, shown below [22]:

```
----------7d22911b10028e
Content-Disposition: form-data; name = "login_id"
atypon
----------7d22911b10028e
Content-Disposition: form-data; name = "login_passwd"
_atypon_
----------7d22911b10028e
Content-Disposition: form-data; name = "fname"; filename = "hisham.xml"

... file contents ...
```

A sample Java program that performs file uploads to CrossRef can be downloaded from www.crossref.org/08downloads/doUpload.zip. This program allows a publisher to upload a single file, a list of files, or a whole directory of files. Unzipping the archive will create a folder called doUpload. A user can open a Windows command window (Start→Run→cmd) and go to this folder and type 'java -jar "doUpload.jar"'. Usage: java -jar "doUpload.jar" -u username -p password -f file-name <-o upload-option>.

This program uploads files to the CrossRef system. If the given file has a '.list' extension it is considered to be a file with a list of files to upload. Any other extension is considered a single file upload. If the file is a directory then all files in the directory will be uploaded.

The default upload option is DEPOSIT, but alternatively it can be set to DEPOSIT_REFS for reference deposit. Other optional arguments are: -h (host) -hp (port) -ph (proxy host) -pp (proxy port), and users should note that -h defaults to doi.crossref.org, and -hp defaults to port 80. Again, for further information on this, users can contact support@crossref.org.

Conclusion

CrossRef offers a host of services to publishers that hinge on the registration of DOIs and article metadata within the CrossRef deposit system. The basic bibliographic metadata for a piece of content is useful for a host of purposes, the main one being persistent discoverability of publisher content. However, providing additional optional metadata such as references, full-text links, ORCIDs, abstracts, and license information serves to increase the functions that the metadata can perform and enable publishers to participate in additional CrossRef services like Cited-by linking and CrossCheck (via the deposit of as-crawled URLs). Participation in these extra services then adds value for various stakeholders; researchers, funding bodies, libraries and third parties like search engines. This document has aimed to describe what this extra information can encompass, and how publishers can add this supplementary information to their CrossRef metadata to engage with the increasing scope of the scholarly communications industry.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Training Material

Journal Article Tag Suite 1.0: National Information Standards Organization standard of journal extensible markup language

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Abstract

In the era of information technology, scholarly journals cannot escape the rising tide of technological advancement. To be exposed more easily to readers, the web forms of scholarly journals and articles become more important year after year. Furthermore, there is a trend of print journals closing, and a significant emergence of online journals. Journal Article Tag Suite (JATS) extensible markup language (XML) became an National Information Standards Organization standard language in online journal publishing in 2012. It is an essential format to present readers with a more user-friendly interface. JATS XML was developed by PubMed Central (PMC) XML, which was a deposit form of articles to PMC. Editors and other publishing-related personnel should be able to understand the concept and production process of XML files. When JATS XML is produced, a variety of web presentation views can be generated, such as PubReader and epub 3.0. Further, JATS XML can be easily converted to digital object identifier CrossRef XML, CrossMark XML, and FundRef XML. Small scholarly society journal editors and publishers can promote the visibility of their journals by depositing JATS XML files to PMC or ScienceCentral. Owing to these benefits of JATS XML, publishers and editors should now adopt JATS XML for journal publishing.

Keywords

Extensible markup language; Information technology; Journal Article Tag Suite; Journal publishing; Open access

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Introduction

Journal Article Tag Suite (JATS) extensible markup language (XML) became a National Information Standards Organization (NISO) standard of the journal XML in 2012. In this article,

the definition of JATS, its history, and its merits will be presented to help publishers and editors understand the benefits of adopting JATS XML for journal publishing.

Definition of Journal Article Tag Suite

JATS is an application of NISO Z39.96-2012, which defines a set of XML elements and [1]. In this section, some terms are defined: NISO Z39.96-2012, XML, elements, attributes, tagging, and three article models.

National Information Standards Organization Z39.98-2012

Initially, NISO was where content publishers, libraries, and software developers resorted to for IT industry standards that would allow them to work together [2]. NISO is an US-based organization, whereas ISO is the International Standard Organization. Occasionally, NISO applications are adopted by ISO. In 1935, the first standard by NISO was published as Z39.1, entitled "Reference data for periodicals." The number after "Z39" is changed when new standards are published. For example, NISO Z39.98-2012 is an "Authoring and interchange framework for adaptive XML publishing specification." The last four digits, "2012" in this case, denote the year of the publication.

Extensible markup language

XML is a markup language that defines a set of rules for encoding documents in a format that can be read by humans as well as machines. It describes not only the presentation format of content, but also its attributes. Every unicode language is supported and therefore, all character-based languages in the world can be presented via XML on a web site. XML was developed by the XML Working Group under the auspices of the W3C (World Wide Web Consortium) in 1996 [3].

Element

An element is a logical document component that begins with a start tag and terminates with a matching end tag. For example, consider the following elements:

<country>Korea</country>
<email>shuh@hallym.ac.kr</email>

The tags <country> and <email> are start tags; the tags </country> and </email> are end tags; and "Korea" and "shuh@hallym.ac.kr" are contents. In certain cases, empty element tags are used, for example, consider the following tags.

<fig>
<graphic xlink:href="sun.jpg" /> <label>Photo of Sun Huh</label>
</fig>

Attribute

An attribute is a markup structure that comprises a name and value pair in the element.

For example, in the element <graphic xlink:href="sun.jpg" />, *xlink:href="sun.jpg"* is the attribute.

The attribute's name is *xlink:href* and its value is *sun.jpg*.

Tagging

Tagging is the process of adding tags. A tag is a markup construct that begins with "<" and ends with ">." There are three types of tags: start, end, and empty. An empty tag exists as a single tag, i.e., there is neither a start tag nor an end tag. Examples of the three tags are given below.

Start tags: <country>, <email>
End tags: </country>, </email>
Empty tags: <graphic xlink:href="sun.jpg" />

Three articles models

The first model is the Journal Archiving and Interchange Tag. Set for the preservation of the intellectual content of journals. The second model is the Journal Publishing Tag Set, which is a moderately prescriptive set optimized for archives such as PubMed Central or ScienceCentral. The third model is the Article Authoring Tag Set that was optimized for authorship of new journal articles. From these three models, the second model is widely used by journals because the deposition to archives is either necessary or mandatory.

History of Journal Article Tag Suite Extensible Markup Language Development

JATS was developed by the NISO Working Group and published as NISO Z39.96-2012 on August 19, 2012. In 2000, the United States National Center for Biological Information (NCBI) launched PubMed Central (PMC) with two journals: *Proceedings of the National Academy of Sciences* (PNAS) and *Molecular Biology of the Cell* [4]. For the presentation of PMC XML files, a tag suite was developed. The first one is pmc-1.dtd. In 2003, NCBI released the National Library of Medicine (NLM) Archiving and Interchange Tag Suite or NLM data type definition (DTD) version 1.0 including the first and second article models. In 2005, the third article model was included and released as version 2.1. In November 2008, version 3.0 was released. After the additional comment of version 3.0, JATS XML was released, which corresponds to NLM DTD 3.1. The most remarkable characteristic of JATS version 1.0 is an acceptance of all character languages in the world, which was accomplished by adding language encoding [5]; therefore, it was possible to establish ScienceCentral as a free, open-access, full-text archive of scientific society journal liter-

ature at the Korean Federation of Science and Technology Societies regardless of the journals' languages available at http://e-sciencecentral.org.

ISO Standards Tag Set (ISOSTS) was developed in 2011 by the ISO Central Secretariat. ISOSTS is based on NISO Z39.96 JATS: Journal Article Tag Suite [6]. However, there are some modifications in ISOSTS. New elements are introduced, for example, <annex-type> or <iso-meta>. Further, JATS elements are also modified. For example, <ref> is used to exclude notes from the citation content.

Merits of Producing Journal Article Tag Suite Extensible Markup Language

It is not common to find a JATS XML-based homepage for society journals, except in Korea. In Korea, most medical journals have adopted the JATS XML-based homepage. In other scientific fields, only a small portion of society journals have adopted it. For editors to adopt JATS XML for their journals, they must be convinced of its merits. The following can be suggested as evidence:

First, if JATS XML files are produced for each article, then the journal can be included in international full-text databases such as PMC or ScienceCentral. When a journal is included in those databases, it can be crawled immediately by Google Scholar so that there is a greater chance for each article to be exposed to researchers globally. The more the frequency of exposure increases, the more the impact factor elevates [7]. The quality of journal articles is gauged by the impact factor or citation frequency, and therefore, the exposure platform is important. In particular, ScienceCentral accepts articles related to all scientific fields regardless of language. It also provides a translation function in cooperation with Google; therefore, local-language journals can be circulated to the global scientific arena.

Second, authors who have published research results supported by the United States National Institute of Health need to deposit their articles to PMC. The publisher should be able to produce JATS XML files to deposit these articles although the journal is not open access because it is necessary to fit to the author's request.

Third, the journal's homepage can be promoted on an international level, such as those of international commercial printing companies. The closing of print journals and the increase in online-only publishing is a recent trend in the scholarly journal market. The user-friendliness of the journal homepage is of critical importance. The success of open access online-only journals has accelerated this trend. The traditional format of publishing a journal in print and online has rapidly moved to an online-only format. The online-only format also satisfies author requirements such as rapid publication after submission.

Fourth, it is considerably easy to convert files to another compatible viewer formats such as PubReader (Fig. 1) and

Fig. 1. PubReader format of the Journal Article Tag Suite extensible markup language-based article (Available from: J Educ Eval Health Prof 2014;11: 11. http://dx.doi.org/10.3352/jeehp.2014.11.11).

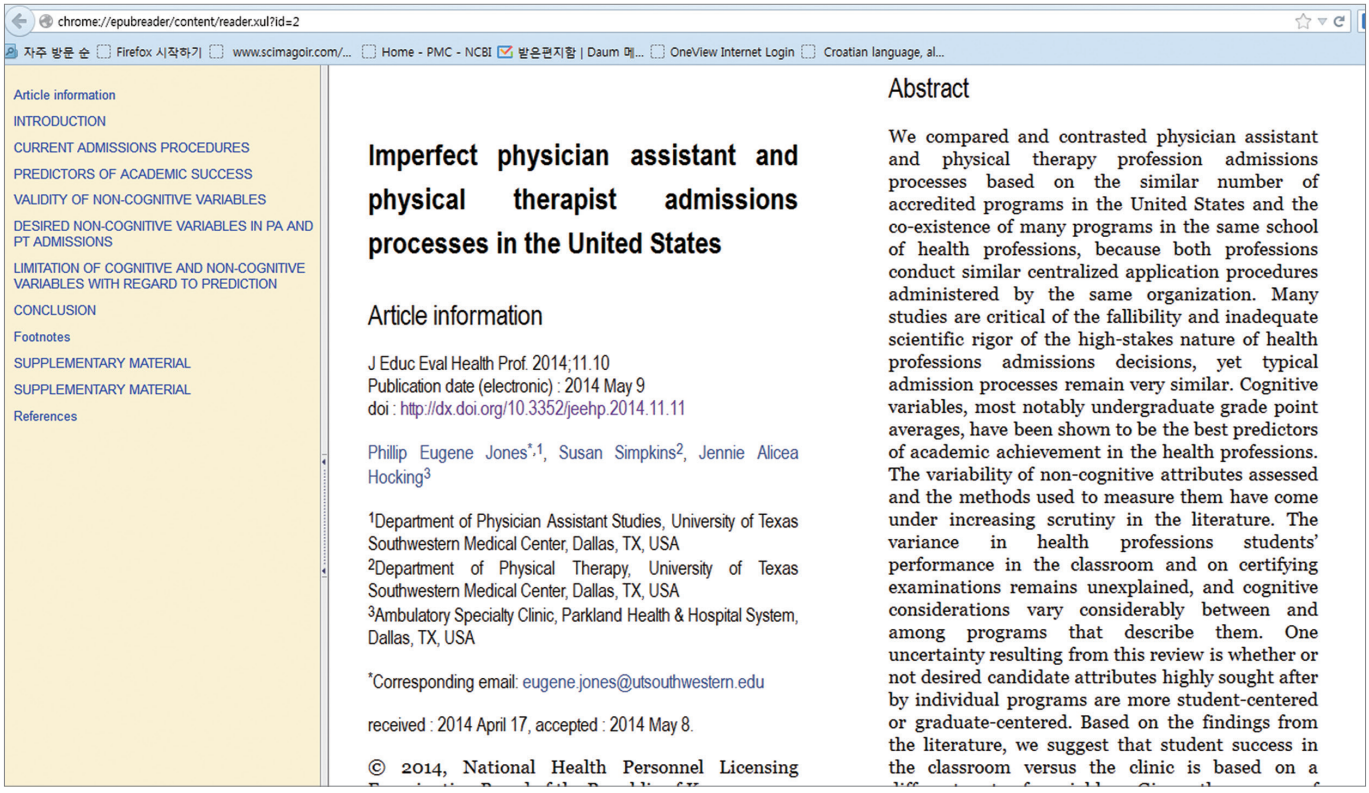

Fig. 2. ePub 3.0 format of the Journal Article Tag Suite extensible markup language-based article (Available from: J Educ Eval Health Prof 2014;11: 11. http://dx.doi.org/10.3352/jeehp.2014.11.11).

epub 3.0 (Fig. 2). These new formats are convenient because the size of the font does not change across various reader platforms such as laptops, smart pads, smart phones, smart televisions, and other viewer tools.

Fifth, JATS XML conversion to another XML format can be performed automatically through a filter program; for example, to digital object identifier (DOI) CrossRef XML, CrossMark XML, or FundRef XML. These three services are provided by CrossRef [8]. Since new technological standards have been suggested and implemented immediately by scholarly journals, editors should adopt JATS XML to easily introduce new standards to their journals.

Sixth, it is possible to realize the cited-by function and reference hyperlink via DOI by adding an application programming interface.

Seventh, an error in the article text can be detected and revised by producing JATS XML because an error in the XML context can be easily determined, even though it is difficult in the usual manuscript editing process. For example, in the year element, if 2024, 2018, or 204 were input, it can be automatically checked by a program.

There may be other merits of JATS XML production. Currently, PDF files can be generated from JATS XML files through a filtering program. The upgraded JATS versions may provide functions that are currently unimaginable.

How Should Society Journal Editors Plan to Adopt Journal Article Tag Suite Extensible Markup Language?

If editors decide to adopt JATS XML, what shall they do? First, they should persuade their publisher to accept JATS XML. Of course, some editors may not acknowledge the importance of JATS XML production, in which case there is no need for them to act. This problem may be resolved by the next editor who better understands the trends of the journal market.

Second, when the publisher agrees to invest in JATS XML production, the editor must choose someone to implement JATS XML. If it is a large society that publishes more than five journals or the number of articles per year is more than 1,000, then it would be feasible for the society to employ a specialist to produce XML files after installing the XML production program; however, the above case is rare except for a very few societies. The easy and effective method is to enter in a con-

tract with commercial companies or non-profit institutes to produce JATS XML files. In Japan, Japan Science and Technology Agency has produced JATS XML and deposited the files to J-STAGE since 2012 [9]. Commercial companies that produce JATS XML files can be searched easily on the web.

Third, the editor should decide with whom he or she works. If a company has succeeded in depositing XML files to ScienceCentral or PMC, the company is considered reliable. Apart from PMC XML, the ability to produce table XTHML, MathML, and ChemML should be considered because, in 2013, PMC started accepting XML files that include table XTHML, MathML, and ChemML. Furthermore, similar to PMC, ScienceCentral accepts only complete JATS XML files.

Fourth, the cost of XML production should be negotiated. The cost varies according to the company. The internationally accepted price is 50 to 60 US dollars per article. It depends on the publisher's budget and the company's technological excellence. Some companies provide additional functions of JATS XML without an extra cost, whereas others produce only XML files.

Fifth, after the production of JATS XML files, editors should dispatch a request for an inclusion in the JATS XML-based full-text databases. In addition, the journal homepage should be re-constructed. Other functions should be developed by the society itself or by a commercial company. Editors should listen to the feedback from their society's members and make appropriate revision when necessary.

In Korea, the most common hindrance to adopting JATS XML is a lack of knowledge about JATS XML on the part of editors. If an editor wants to produce a JATS XML file, it is easy and simple because the cost of JATS XML production is considerably reasonable. The price varies according to the number of tables, chemical formulae, and mathematical formulae in the article. Furthermore, because the Korean government supports the publication of society journals, budget is not a problem for editors in Korea.

Conclusion

To compete with other scholarly journals throughout the world, a society journal has certain handicaps: a shortage of professional editors, managing editors, and IT engineers. Therefore, the society journal editors should be more knowledgeable than those of commercial printing company on a variety of topics in the field of journal publishing. Among them, JATS is one of the most important concepts for journals to survive in the internet age, where most articles are connected to each other. Editors should not hesitate and act immediately to adopt the JATS XML technology. The adoption of this technology will improve the satisfaction level of authors, readers, and society members who love the journal.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Training Material

Coding practice of the Journal Article Tag Suite extensible markup language

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Abstract

In general, the Journal Article Tag Suite (JATS) extensible markup language (XML) coding is processed automatically by an XML filtering program. In this article, the basic tagging in JATS is explained in terms of coding practice. A text editor that supports UTF-8 encoding is necessary to input JATS XML data that works in every language. Any character representable in Unicode can be used in JATS XML, and commonly available web browsers can be used to view JATS XML files. JATS XML files can refer to document type definitions, extensible stylesheet language files, and cascading style sheets, but they must specify the locations of those files. Tools for validating JATS XML files are available via the web sites of PubMed Central and ScienceCentral. Once these files are uploaded to a web server, they can be accessed from all over the world by anyone with a browser. Encoding an example article in JATS XML may help editors in deciding on the adoption of JATS XML.

Keywords

Cascading style sheets; Document type definition; Extensible stylesheet language; Journal Article Tag Suite; Journal publishing

Introduction

Anyone who can understand English and has a modest knowledge of journal editing and publishing can produce Journal Article Tag Suite (JATS) extensible markup language (XML) files. Manually coding such documents according to a document type definition (DTD) requires 12 hours for a single article, even if any existing extensible hypertext markup language (XHTML), mathematical markup language (MathML), and chemical markup language (ChemML) portions are treated as figure formats. Therefore, most printing companies employ a special XML conversion program. In general, the preliminary XML file for a single article is generated within 15 minutes. Then, the validation check and trimming of the file is performed. XML coding of articles requires some knowledge of bibliographic formatting conventions in order to differentiate the bibliographic characteristics of data in the articles. For example, in the reference section, journals, books, web sites, or PhD theses may be cited. Typically, these distinct reference

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types should be formatted differently. The objective of this article is to explain how editors can code journal articles according to JATS 1.0 XML specification and to observe the results through a web browser. In particular, at least 20 XML tags are considered and the role of DTDs, extensible stylesheet language transformations (XSLT), and cascading style sheets (CSS) are explained. It is expected that after gaining some experience with the article coding process, editors will have an incentive to adopt JATS XML.

Programs and Sample File

An editor program that supports Unicode and a web browser are necessary for coding JATS XML file. JATS XML sample files are provided as Supplement 1. Further, the DTD, XSLT, and CSS files are available as well: a journalpublishing1.dtd file was available from https://github.com/PeerJ/jats-conversion/blob/master/schema/jats/publishing/1.0/JATS-journalpublishing1.dtd; a jats-html.xsl file was available from: https://github.com/ncbi/JATSPreviewStylesheets/blob/master/xslt/main/jats-html.xsl; and a jats-preview.css file was available from: https://github.com/wendellpiez/oXygenJATSframework/blob/master/jats-preview-xslt/jats-preview.css.

Coding an XML File and Browsing Using DTD, XSLT, and CSS

First, open the sample coding article within your text editor. Save the file (sample.xml) to a specific directory, ensuring that UTF-8 encoding is maintained. Open the file in a web browser and observe how it appears. It is presented as Fig. 1. Next, copy the DTD file (journalpublishing1.dtd) into the same directory where the sample file is located. Re-open the sample file in a browser and observe how its appearance has changed. To the same directory, add the XSLT file (jats-html.xsl) and then the CSS file (jats-preview.css). Each time re-open sample.xml in a browser and observe any changes (Figs. 2, 3). With each additional file, you should note any improvements in the layout and appearance of the document, and these changes should suggest the function of each file added.

Since a DTD provides the attributes and elements only, the format of the sample file as viewed in the browser does not change (Fig. 1). XSLT files, in contrast, typically define how an XML document is to be rendered or transformed into hypertext markup language (HTML) for example (Fig. 2). Finally, CSS files describe the look and formatting of documents written in mark-up languages such as HTML (Fig. 3).

How to Declare an XML Document?

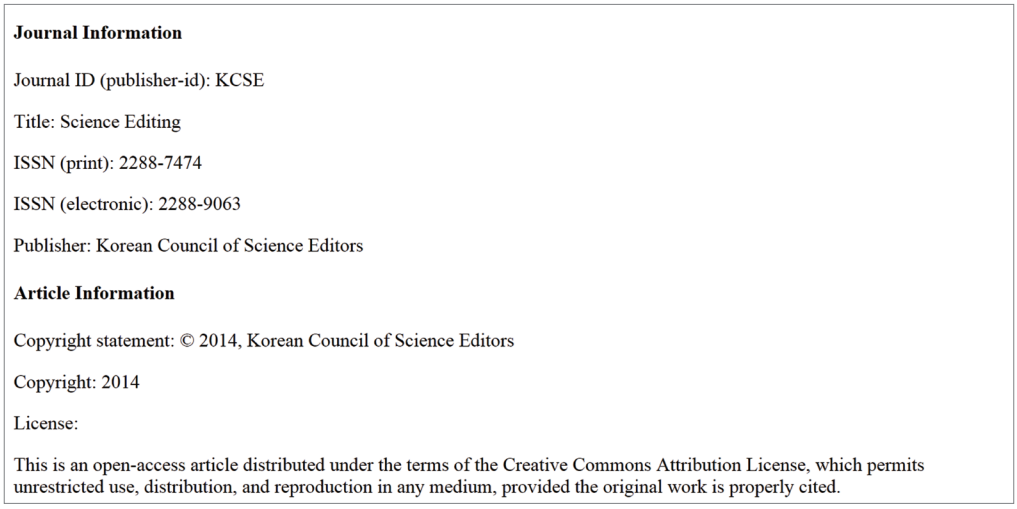
An XML document begins as follows:

```
<?xml version="1.0" encoding="UTF-8"?> ---(1)
<?xml-stylesheet type="text/xsl" href="jats-html.xsl"?>
---(2)
<!DOCTYPE article PUBLIC "-//NLM//DTD JATS (Z39.
96) Journal Publishing DTD v1.0 20120330//EN" "http://
jats.nlm.nih.gov/publishing/1.0/JATS-journalpublish-
ing1.dtd"> ---(3)
```

(1) <?xml version="1.0" encoding="UTF-8"?> means that the xml version is 1.0 and encoding is according to UTF-8. It is the most common declaration for XML documents.
(2) The <?xml-stylesheet type="text/xsl" href="jats-html.xsl"?> tag determines the stylesheet. Layout is assigned in jats-html.xsl.
(3) The declaration on line three beginning with '<!DOCTYPE article' indicates the online location of the DTD

KCSE Science Editing 2288-7474 2288-9063 Korean Council of Science Editors http://dx.doi.org/10.6087/kcse.2014.1.15 sciedit-1-15 Educational Material Coding practice of Journal Article Tag Set eXtensible Markup Language HuhSun 1 * 1Department of Parasiotology and Institute of Medical Education, College of Medicine, Hallym University, Chuncheon, Korea * shuh@hallym.ac.kr 2014 20 08 2014 1 15 04 06 2014 26 06 2014 © 2014, Korean Council of Science Editors 2014 This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Journal Article Tag Set eXtensible Markup Language (JATS XML) coding is usually processed automatically by XML filtering program and the accuracy of tagging is checked by validation process..... Journal Article Tag Suite journal publishing Introduction Production of Journal Article Tag Set eXtensible Markup Language (JATS XML) files can be done by anyone who can understand English and have minimum knowledge on journal editing and publishing.... Programs and sample files Unicode supporting text editor. Edit plus (R) and web browser, Firefox are necessary. Conclusion JATS XML coding can be done according to the JATS DTD which provide the

Fig. 1. Screenshot of sample.xml file seen with browser when there was no other file or journalpublishing1.dtd file at the same directory with sample.xml.



Journal Information

Journal ID (publisher-id): KCSE

Title: Science Editing

ISSN (print): 2288-7474

ISSN (electronic): 2288-9063

Publisher: Korean Council of Science Editors

Article Information

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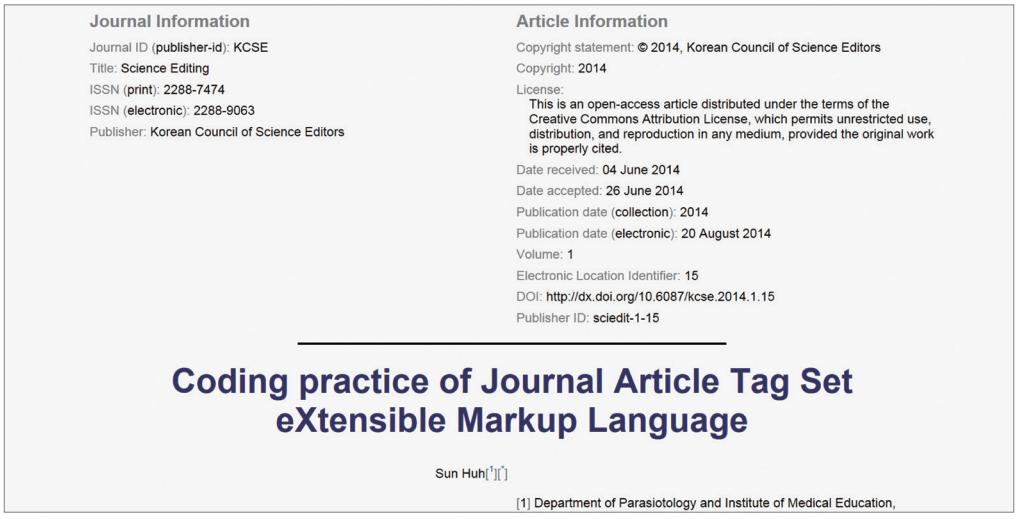
Fig. 2. Screenshot of sample.xml file seen when there were journalpublishing1.dtd and jats-html.xsl files at the same directory with sample.xml.



Journal Information

Journal ID (publisher-id): KCSE
Title: Science Editing
ISSN (print): 2288-7474
ISSN (electronic): 2288-9063
Publisher: Korean Council of Science Editors

Article Information

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Date received: 04 June 2014
Date accepted: 26 June 2014
Publication date (collection): 2014
Publication date (electronic): 20 August 2014
Volume: 1
Electronic Location Identifier: 15
DOI: http://dx.doi.org/10.6087/kcse.2014.1.15
Publisher ID: sciedit-1-15

Coding practice of Journal Article Tag Set eXtensible Markup Language

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[1] Department of Parasiotology and Institute of Medical Education,

Fig. 3. Screenshot of sample.xml file seen when there were journalpublishing1.dtd, jats-html.xsl, and jats-preview.css files at the same directory with sample.xml.

file. If the DTD file is instead located on a local file system, the declaration would appear as <!DOCTYPE article PUBLIC "-//NLM//DTD JATS (Z39.96) Journal Publishing DTD v1.0 "JATS-journalpublishing1.dtd">

The DTD determines the elements and attributes that are permissible within any XML document that refers to it. Previously, different DTDs were used by each publisher; however, the JATS XML DTD is now conventionally used.

Article Declaration

<article
article-type="research-article" --- (4)
dtd-version="1.0" xml:lang="en" --- (5)
xmlns:mml=http://www.w3.org/1998/Math/MathML --- (6)
xmlns:xlink=http://www.w3.org/1999/xlink --- (7)
xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance --- (8)
>

Above is an example of an article declaration.

(4) article-type="research-article" specifies that the publication type is "research article." A variety of types are available, such as "editorial," "letter," and "case report."

(5) dtd-version="1.0" xml:lang="en" declares the language in which the article is written. If there is no language declaration, the default value is "en" (English).

(6-8) The last three lines in the article declaration above indicate that this article follows W3C MathML, XLINK, and XML Schema-instance.

Tag Construction

Articles are comprised of three sections classified as "front matter," "body," and "back matter." Each of these sections is enclosed within the corresponding tag pair as follows:

```
<front> --- (9)
....
</front>
<body> --- (10)
...
</body>
<back>--(11)
...
</back>
```

(9) "Front matter" consists of citation details, an abstract, keywords, and masthead.
(10) The "body" section includes the article's primary content from the introduction to conclusion.
(11) "Back matter" comprises conflict of interest, acknowledgments, footnotes, references, appendices, and/or supplements.

Special Characters

Special characters such as *, <, and > must be specified using the corresponding Unicode character entity reference, for example:

```
*  &#x002A;
<  &#x003C;
>  &#x003e;
```

All Unicode character entity references can be specified with a four-digit hexadecimal code, prepended with &#x and appended with a semicolon. For example, the code for the % character is 0025; therefore, the complete character entity reference is %. A full list of codes for all special characters is available at http://www.unicode.org/charts/.

Use of Local Language

To make a full-text JATS XML file for articles in Croatian, it is necessary to add a language tag such as <xml:lang="hr"> in the article declaration. The language element is specified as an attribute with a two-letter alphabetic code in accordance with the IETF RFC 5646 (http://tools.ietf.org/html/rfc5646) recommended by the Internet Engineering Task Force in September 2009. For example, "fr" (French), "en" (English), "de" (German), "se" (Swedish), "hr" (Croatian), "es" (Spanish), and "ko" (Korean) were used [1].

Tagging Practice

After adding the journal article's content to the appropriate sections of the sample file, you can then check how it appears in a web browser.

Validation of JATS XML

Once the JATS XML file has been produced, it can be validated with any variety of tools available online, such as http://www.ncbi.nlm.nih.gov/pmc/tools/xmlchecker/ or http://www.e-sciencecentral.org/tools/stylechecker/. Any indicated errors should be fixed in accordance with the JATS DTD.

Why Is It Necessary to Establish a JATS XML Producing Company That Deals with Each Language?

There is still small portion of full-text JATS XML-based society-directed journals in the web. A number of scientific journal publishing societies in Korea have begun to produce full-text JATS XML files and deposit them to ScienceCentral, since at least three Korean firms can generate perfect JATS XML files with table XHTML, ChemML, and MathML [2]. It is the base of producing JATS XML files both in English and in Korean. There are other excellent global companies that can produce JATS XML files; however, they usually process articles in English. Therefore, JATS XML-producing company of which specialists fluent in each language is needed in order to make articles accessible internationally via the Web and to deposit them to ScienceCentral for wider exposure.

Conclusion

JATS XML coding can be performed according to the JATS DTD, which provides the specification for elements and attributes. XSLT provides the stylesheet for XML; whereas CSS provides the stylesheet for HTML. With DTD, XSLT, and CSS, the JATS XML file can be viewed in a user-friendly fashion via a web browser. Journals in local languages can be specified in JATS XML files with the appropriate code in the language attribute. Such journals will then be accessible to all readers in the world with a variety of formats including PubReader and ePub.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Acknowledgments

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1. Huh S, Choi TJ, Kim SH. Using Journal Article Tag Suite extensible markup language for scholarly journal articles written in Korean. Sci Ed 2014;1:19-23. http://dx.doi.org/10.6087/kcse.2014.1.19
2. Huh S. Application of new information technologies to scholarly journals: ORCID, CrossMark, and FundRef. J Korean Med Assoc 2014;57:455-62. http://dx.doi.org/10.5124/jkma.2014.57.5.455

Supplement 1. Sample file for exercise of Journal Article Tag Suite

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="jats-html.xsl"?>
<!DOCTYPE article PUBLIC "-//NLM//DTD JATS (Z39.96) Journal Publishing DTD v1.0 20120330//EN" "journalpublishing1.dtd">
<article
article-type="research-article"
dtd-version="1.0" xml:lang="en"
xmlns:mml="http://www.w3.org/1998/Math/MathML"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
>
<front>
<journal-meta>
<journal-id journal-id-type="publisher-id">KCSE</journal-id>
<journal-title-group><journal-title>Science Editing</journal-title></journal-title-group>
<issn pub-type="ppub">2288-7474</issn>
<issn pub-type="epub">2288-9063</issn>
<publisher>
<publisher-name>Korean Council of Science Editors</publisher-name></publisher>
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</article-title>
</title-group>
<contrib-group>
<contrib contrib-type="author">
<name><surname>Huh</surname><given-names>Sun</given-names></name>
<xref rid="af1-sciedit-1-15" ref-type="aff"><sup>1</sup></xref>
<xref rid="c1-sciedit-1-15" ref-type="corresp"><sup>&#x0002A;</sup></xref>
</contrib>
<aff id="af1-sciedit-1-15">
<label>1</label>Department of Parasitology and Institute of Medical Education, College of Medicine, Hallym University, Chuncheon,
<country>Korea</country>
</aff>
</contrib-group>
<author-notes>
<corresp id="c1-sciedit-1-15">
<label>&#x002A;</label> <email>shuh@hallym.ac.kr</email></corresp>
</author-notes>
<pub-date pub-type="collection">
<year>2014</year></pub-date>
<pub-date pub-type="epub">
<day>20</day>
<month>08</month>
<year>2014</year></pub-date>
<volume>1</volume>
<elocation-id>15</elocation-id>
<history>
<date date-type="received">
```

(Continued to the next page)

Supplement 1. Continued

```
<day>04</day>
<month>06</month>
<year>2014</year></date>
<date date-type="accepted">
<day>26</day>
<month>06</month>
<year>2014</year></date></history>
<permissions>
<copyright-statement>&#x00A9; 2014, Korean Council of Science Editors</copyright-statement>
<copyright-year>2014</copyright-year>
<license>
<license-p>This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.</license-p></license></permissions>
<abstract>
<p>
Journal Article Tag Set eXtensible Markup Language (JATS XML) coding is usually processed automatically by XML filtering program and the accuracy of tagging is checked by validation process.....
</p>
</abstract>
<kwd-group>
<kwd>Journal Article Tag Suite</kwd>
<kwd>journal publishing</kwd>
</kwd-group>
</article-meta>
</front>
<body>
<sec sec-type="intro">
<title>Introduction</title>
<p>
Production of Journal Article Tag Set eXtensible Markup Language (JATS XML) files can be done by anyone who can understand English and have minimum knowledge on journal editing and publishing....
</p>
</sec>
<sec sec-type="methods">
<title>Programs and sample files</title>
<p>Unicode supporting text editor and web browser are necessary.
</p>
</sec>
<sec sec-type="conclusion">
<title>Conclusion</title>
<p>
JATSXML coding can be done according to the JATSDTD which provide the information of elements and attributes.
</p>
</sec>
</body>
<back>

<fn-group><fn fn-type="conflict">
<p> No potential conflict of interest relevant to this article was reported</p></fn></fn-group>
<ack>
<p>This work is supported by the research grant of the National Research Foundation of Korea (policy research-2013-003-academic infrastructure promotion) and the Korean Federation of Science and Technology Societies (KOFST-2013), Government of the Republic of Korea.</p>
</ack>
<ref-list>
<ref id="b1-sciedit-1-15">
<label>1</label>
```

(Continued to the next page)

Supplement 1. Continued

```
<element-citation publication-type="journal">
<person-group person-group-type="author">
<name>
<surname>Huh</surname>
<given-names>Sun</given-names>
</name>
<name>
<surname> Choi</surname>
<given-names>Tae-Jin</given-names>
</name>
<name>
<surname> Kim</surname>
<given-names>So-Hyung</given-names>
</name>
</person-group>
<article-title>
Using Journal Article Tag Suite extensible markup language for scholarly journal articles written in Korean
</article-title>
<source>Sci Ed</source>
<year iso-8601-date="2014">2014</year>
<volume>1</volume>
<fpage>19</fpage>
<lpage>23</lpage>
</element-citation>
</ref>
</ref-list>
</back>
</article>
```

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http://dx.doi.org/10.6087/kcse.2014.1.113

Training Material

An introduction to using QR codes in scholarly journals

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Abstract

The Quick Response (QR) code was first developed in 1994 by Denso Wave Incorporated, Japan. From that point on, it came into general use as an identification mark for all kinds of commercial products, advertisements, and other public announcements. In scholarly journals, the QR code is used to provide immediate direction to the journal homepage or specific content such as figures or videos. To produce a QR code and print it in the print version or upload to the web is very simple. Using a QR code producing program, an editor can add simple information to a website. After that, a QR code is produced. A QR code is very stable, such that it can be used for a long time without loss of quality. Producing and adding QR codes to a journal costs nothing; therefore, to increase the visibility of their journals, it is time for editors to add QR codes to their journals.

Keywords

Homepage; Identifier; Journal publishing; Public code; Quick Response code

Introduction

This paper aims to provide an overview on Quick Response (QR) codes and the practice of reading and generating QR codes. Much of this material can be found in greater detail at QR Code.com (http://www.qrcode.com/en/), which is a website published by Denso Wave [1]. The essential content was extracted and rephrased for scholarly journal editors with permission from Denso Sales Korea.

What Is a QR Code?

QR codes were first created in 1994 by Denso Wave Incorporated, Japan. Denso Wave is the parent company of Toyota. QR codes were designed for car manufacturing plants to manage car part inventories.

A QR code is the abbreviation for quick response code, which is a machine-readable optical label with information on the associated item or product. In barcodes, information is coded in

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one direction or one dimension only. On the other hand, in a two-dimensional code, which the QR code is, information is coded in two directions: horizontally and vertically. It can be read easily and is capable of holding a great deal of information. Although Denso Wave could choose to retain the patent rights to the QR code, the company declared that it would not exercise them, with the aim that QR codes be used by as many people as possible. Thus QR codes can be used at no cost and without worrying about patent problems. They are becoming a public code used worldwide.

High Capacity Encoding of Data

Several QR code features are worth examining in more detail. The QR code's most important characteristic is the encoding of enormous quantities of data. Conventional bar codes can store up to 20 digits. On the other hand, QR codes can provide up to a hundred times more information than bar codes. QR codes can manage all types of data, for example, letters, numbers, graphics, and audio or video files. One QR code can encode up to just over 7,000 characters. For example, Fig. 1 shows the capacity of a QR code that encodes 300 alphanumeric characters.

Fig. 1. A QR (Quick Response) code symbol of the size that can encode 300 alphanumeric characters (From Denso Wave Incorporated. QR code.com [Internet]. Aichi: Denso Wave Incorporated; 2014, with permission from Denso Sales Korea) [1].

Fig. 2. Micro QR (Quick Response) code available for a smaller printout size (From Denso Wave Incorporated. QR code.com [Internet]. Aichi: Denso Wave Incorporated; 2014, with permission from Denso Sales Korea) [1].

Fig. 3. Partially dirty or damaged symbol from which data can be restored easily (From Denso Wave Incorporated. QR code.com [Internet]. Aichi: Denso Wave Incorporated; 2014, with permission from Denso Sales Korea) [1].

Small Printout Size

Since a QR code symbol is designed with a two-dimensional structure, it can encode 10 times more data than a barcode of same size. A micro QR code may be used for a smaller print size (Fig. 2).

Dirt- and Damage-resistant Durability

The QR code has the ability to perform error correction. Data in QR codes can be recovered even if parts of the symbol have been destroyed or damaged. Data restoration is dependent on the proportion of damage (Fig. 3).

Readable from Any Direction in 360 Degrees

A QR code is designed to be rapidly readable from any direction in 360 degrees. This is possible due to the position detection patterns at three corners of the symbol. These patterns make the QR code symbol quickly readable. This pattern is also designed to evade background interference (Fig. 4).

Structured Appending Feature

Another feature of the QR code is its structured appending feature. One QR code symbol can contain up to 16 separate smaller symbols, each of which contains different unique information. The advantage of this structure is that it can be printed in a smaller space. Conversely, multiple QR code symbols can be grouped in a single data symbol (Fig. 5).

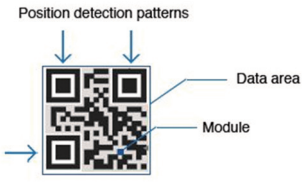

Fig. 4. Position detection patterns that guarantee stable high-speed reading (From Denso Wave Incorporated. QR code.com [Internet]. Aichi: Denso Wave Incorporated; 2014, with permission from Denso Sales Korea) [1].

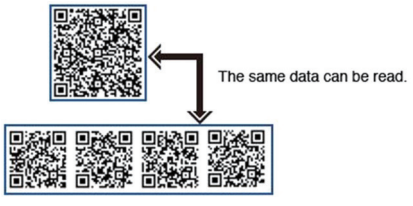

Fig. 5. A QR (Quick Response) code that can be divided into multiple data areas (From Denso Wave Incorporated. QR code.com [Internet]. Aichi: Denso Wave Incorporated; 2014, with permission from Denso Sales Korea) [1].

Fig. 6. A variety of Quick Response (QR) code types. (A) QR code model 1, (B) micro QR code, (C) iQR code, (D) SQRC, and (E) logoQ (From Denso Wave Incorporated. QR code.com [Internet]. Aichi: Denso Wave Incorporated; 2014, with permission from Denso Sales Korea) [1].

Types of QR Codes

It is worth examining each type of QR code briefly. QR code model 1 is the original QR code, and it can store up to 1,167 numerals (Fig. 6A). Model 2 was created by improving model 1 so that the code can be read more smoothly, and it can store up to 7,089 numerals. An ordinary QR code usually refers to model 2. Next is the micro QR code (Fig. 6B). There is only one orientation detecting pattern for this code. The advantage of the micro QR code is that it can be printed in a smaller space than the earlier models. An iQR code can be constituted of either square modules or rectangular ones (Fig. 6C). It can be printed as a turned-over code, black-and-white inversion code, or dot pattern code. SQRC has a reading restriction function (Fig. 6D). It can be used to store private information or manage a company's internal information. LogoQ can incorporate high-level design features such as illustrations, letters, and logos (Fig. 6E).

Examples of QR Codes in Marketing

Some QR codes have been designed creatively (Fig. 7). It is possible to have different shapes or styles as long as the square or rectangular modules are present. Recently, QR has become popular, such that it is easy to find QR codes nearby in everyday life, for example, in the advertisement of products, on business cards, on homepage banners, and even on scholarly journals.

Examples of QR Codes in Scholarly Journals

Fig. 8 is an example of a QR code used in a journal. Some journals add a QR code on the cover of the journal, or on the title page or end of each article, so that readers can go directly to the material linked, such as a website, an address or other contact info, a video, an animation, or other web content. One example of a journal that uses QR codes is the *Korean Journal of Urology*. The journal staff added a QR code on the title page of each article. If the reader scans this code, it leads to an accompanying video. Since the video file has been stored on the

Fig. 7. Example of a QR (Quick Response) code in marketing.

YouTube server, this link goes to the YouTube website (Fig. 8). The journal reader can then view the video on surgery with background music. On the last page of the article is another QR code, which leads to the supplementary material (Fig. 9). When the reader scans this code, the supplementary material that was not included in the paper journal PDF file is displayed. This material is available only on the journal website.

Reading a QR Code

Reading a QR code is simple. One option is to use a reading device such as a hand scanner, hand terminal, or fixed scanner. The most common and convenient devices for reading QR codes are smartphones or tablets equipped with a camera. Reading a QR code on a smartphone involves first installing an app from Google Play for Android or the App Store for iPhone. Searching for 'QR code reader' in the search box will yield a long list of apps. All of these apps are free to download, and are compatible with any QR code type. They need to be used on a smart phone that has a camera. After installing the app, selecting the app will activate the smartphone's camera, with an on-screen framing guide. The QR code can then be scanned with the camera. It may be necessary to hold the camera in one place for a while until a beep indicates that the scan is complete. The smartphone screen will then direct the user to the URL address where the information is stored.

Generating a QR Code

In addition to reading a QR code created by someone else, it is not difficult to create a QR code oneself. It is recommended that the code be created on a laptop computer, because this will make it easier to then scan the new code with a smartphone QR code reader. Of course, it is also possible to create a QR code with a smartphone, and each method has its advan-

Fig. 8. Example of a QR (Quick Response) code in a journal that directs to a video file uploaded to YouTube (Available from: Korean J Urol 2013;54:327-32. http://dx.doi.org/10.4111/kju.2013.54.5.327).

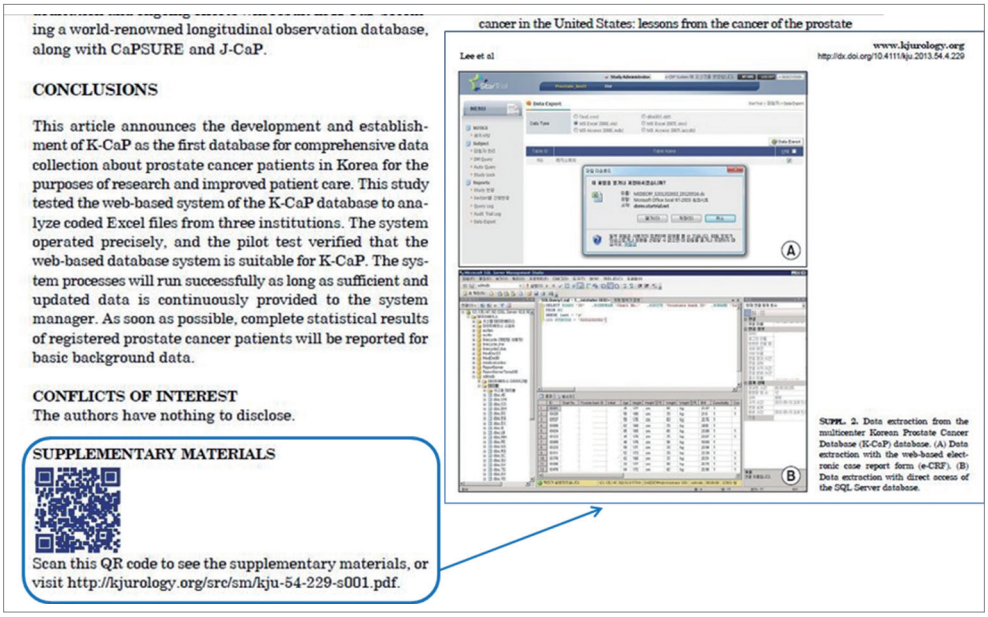

Fig. 9. Example of a QR (Quick Response) code in a journal that directs to a supplement on a journal web site (Available from: Korean J Urol 2013;54:229-33. http://dx.doi.org/10.4111/kju.2013.54.4.229).

tages and drawbacks. On a computer, QR codes are produced by a web-based tool. Typing 'QR code generator' in a search engine will yield the relevant sites. The site called 'QR code generator' enables the user to create one's own QR codes. On this site, QR codes can be created to link to free text, a URL, contact information, or SNS.

Conclusion

Producing a QR code is simple and free of charge. Any journal editor can produce QR codes following the procedures presented in this article. QR codes are useful for journals, individual articles, and even individual audio or video files and

supplements. All journal editors would benefit from incorporating these simple QR code techniques into their publication practices.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Essay

The Korean Journal of Internal Medicine's long road to being listed in the Science Citation Index Expanded

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Introduction

On February 7, 2014, *The Korean Journal of Internal Medicine* (*KJIM*) received a letter from Thomson Reuters indicating its acceptance into the Science Citation Index Expanded (SCIE) list of journals. It has been 28 years since the founding of the *KJIM*, and 7 years since preparations for its registration into the SCIE began in earnest. Herein, I have summarized the evolution process of the *KJIM* over the course of these preparations, in the hope that it will be of some help to other associations looking at developing journals with a global reach.

History of *the Korean Journal of Internal Medicine*

The first issue of the *KJIM* was published in January 1986. At the time, it was hard to even imagine writing articles in English. Nevertheless, the Korean Association of Internal Medicine (KAIM) seemed quite enlightened and open to the idea; many of its board members had an enterprising spirit. Despite its ambitious beginnings, the *KJIM* failed to grow further and could barely keep itself in existence for over 20 years. As Korean journals began to be listed on the SCIE one after another, fewer articles were being submitted to the *KJIM*. There was growing concern among the editorial board members of the *KJIM* that the journal might not be able to be maintained without extreme measures as long as the present situation continued to persist. This led the *KJIM* to establish specific plans to overcome this crisis by gaining entry into the SCIE.

Preparations for Indexing *the Korean Journal of Internal Medicine* in the SCIE

We had been planning to have the *KJIM* listed on the SCIE since 2007. The executive branch, including the Chairman of the KAIM, had made plans to have the journal listed on the SCIE as one of the ways to develop the association. It spared no effort toward that end, by providing not only institutional support, but also financial support. There was also an attempt to change the existing structure of the editorial board of the KAIM. Separate editorial boards for Korean and

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English submissions to the *KJIM* were established, and a task force charged with the registration of the journal into the SCIE was organized. We also reorganized the contribution rules and website of the *KJIM*, and improved its peer review system. Above all, we made a concerted effort to increase the number of editorial board members and pursue globalization.

The First Challenge toward Gaining Entry into the SCIE

The first submission to the SCIE for registration was sent in July 2009 after two years of preparations. At the time, the impact factor (IF) of the *KJIM* was 0.41, and the journal was ranked 111th out of 133 journals of internal medicine listed on the Web of Science. The result was disappointing; we received a rejection letter from Thomson Reuters in September 2010, a year after submission, stating that the rejection was due to the low IF of the *KJIM*. However, learning that the *KJIM* would at least be maintained in the Biosis Previews and Biological Abstracts brought some relief, as it implied that the journal could potentially be listed once we increased its IF.

Changes to *the Korean Journal of Internal Medicine* after the Failure of Its First Attempt to be Listed

A key task of the editorial board after failure to gain entry into the SCIE was to increase the journal's IF. Thus, strategies and specific goals were outlined.

First, we decided to increase the frequency of publication. The KAIM began to encourage its members to submit articles and contribute towards research funds in order to increase the frequency of publication, from a quarterly basis to a monthly one. The KAIM also revised the rules regarding research support or funding and thesis submission standards for medical specialist examination qualifications. Those who published their original articles in the *KJIM* were qualified to receive research funds and have their specialist exam qualifications approved. The editorial board selected outstanding articles that had been originally written in Korean, and encouraged the authors to translate the articles into English, exempting them from costs concerning translation, proofreading, publication, and supplementation. The editorial board members were also strongly encouraged to make submissions to the *KJIM*. As a result, the number of original articles gradually increased. Since 2011, the journal was able to be published every other month.

Second, we attempted to diversify the structure of the journal, as, based on our self-evaluations, its previous layout (consisting only of original articles and case reports) had failed to attract readers' interest. We created a diverse program, by adding sections for reviews, editorials, letters to the editors, images of interest, and guidelines, aside from original articles and case reports, in order to approach readers as a more interesting journal.

Third, we strived to secure excellent review articles. The results of an investigation we performed on IFs of articles published in 2010 and 2011 in different fields revealed that the average IF of a review article was 6.92, indicating that it was definitely higher than that of an original article (1.91) or a case report (0.61). First, we received recommendations from editorial board members regarding outstanding researchers who were able to submit review articles to the journal. We then drew up a list of researchers, and sent each one a letter of request for submissions. However, it was difficult to receive review articles from researchers who already had their hands full, and only 40% of those we approached agreed to make a submission. Nevertheless, we made every possible effort to receive even one more review article, through constantly sending out letters of request.

Fourth, we tried to improve accessibility to the *KJIM* for readers. We made a list of indexing organizations such as Thomson Reuters, Scopus, and Medline, and contacted theses organizations by sending the relevant letters/correspondences. Above all, the journal's IF increased flexibly, as full-text articles published in the journal were appearing on Pubmed and Pubmed Central.

Fifth, we sought to encourage our members and editorial board members to increase their use of citations from the *KJIM*. We first sent frequent e-mails to members about the journal's increased IF and letters of appreciation for citing articles published in the *KJIM*. We drew up a list of SCI citations from articles by the editorial board members published in the *KJIM*, and regularly monitored its status. In the process, the editorial board members showed increasing interest in the *KJIM*. Competent editorial board members also published review articles in the *KJIM* and made citations, contributing significantly to the increase in the journal's IF. We also paid due attention to the management of our members by regularly sending letters of appreciation to those who cited the *KJIM*.

Improvements in the Impact Factor of *the Korean Journal of Internal Medicine*

Along with human-powered efforts to increase the IF, we also regularly tracked the IF of the *KJIM*. The results showed that the journal's averaged IF was 0.36 from 2000 to 2008. It increased by at least 1.0 since then to 0.41 in 2009, 0.64 in 2010, and 1.1 in 2011. The average IF was 1.3 in 2012. Considering the fact that articles in other countries cited the *KJIM* more

than did those in Korea, and that those citing the *KJIM* were often from leading global organizations and world-class journals, we were able to see that the *KJIM* had developed into a world-renowned journal.

Evolution of *the Korean Journal of Internal Medicine*

With the increase in its IF, the *KJIM* implemented new changes within its format, incorporating a "cover page," sections on characters, the abstract format, and the key message of original articles, and modified table and figure formats to be more readable and appear more globalized and sophisticated. We also introduced English language editing services. The Website displayed the main contents of original articles on a real-time basis, and attracted readers' attention with the use of five key titles: "Ahead of print," "Current issue," "Archive," "Most read," and "Most cited." In particular, all the issues of the *KJIM*, from the first to the latest, were converted into PDF files and uploaded onto the Website for readers to have better access to the original texts. In conclusion, throughout the process of preparing the *KJIM* for acceptance into the SCIE, we made improvements to English proofreading, article proofreading, and publishing procedures, as well as to the journal's Website. The journal itself was reborn as a global journal through the renewal of its layout and structure.

There was a heated discussion over the title of the journal and an appropriate publisher until the very end. Some argued that the title "*the Korean Journal of Internal Medicine*" was too old fashioned, did not reflect current trends, and thus needed to be changed. However, we decided to keep the title, as it was a leading journal for internal medicine representing Korea. To select a publisher, we considered several world-renowned publishers that had prior experience with registration into the SCIE. However, we concluded that there would be no significant benefit from choosing a foreign publisher since the *KJIM* was already at the global level in many respects, and decided on a Korean publisher.

The Second Challenge toward Gaining Entry into the SCIE

After 3 years of preparations, the editorial board members had now gained some confidence. The journal's IF had tripled from 0.4 to 1.3 by then, and the *KJIM* had proven its competitive edge over other SCIE journals published in Korea. With the stabilization of journal publication, website, and publishing processes, we planned to take on the second challenge toward gaining acceptance into the SCIE.

First, we improved the strengths and remedied the weaknesses of the *KJIM* regarding the four criteria for journal selection provided by Thomson Reuters: journal publishing standards, editorial content, international diversity, and citation analysis. Unlike the first time, we decided on a specific point in time by which we hoped to be listed on the index: September 2013. We reviewed the journals to be evaluated—the September and November 2013 issues, and January 2014 issue—and planned on an electronic submission.

Unique Distinguishing Features of *the Korean Journal of Internal Medicine*

Our primary concern with making an electronic submission was how to describe the unique features that distinguished the *KJIM* from other journals. We came up with an outline by summarizing the features into a few points, and decided to emphasize the following. First, the *KJIM* was known for its long history as being a leading journal of internal medicine representing Korea. Second, it was organized to be highly readable in its communication of the extensive body of knowledge in internal medicine. Third, it had shown continuous growth in both quantity and quality. Fourth, the low IFs of citations, which had been pointed out in the submission 3 years ago, had increased consistently over the previous 3 years. We summarized all the efforts made by the *KJIM* in the last 3 years into six concise points, as shown below.

First, the *KJIM* merits coverage in Web of Science. *KJIM* publishes highly qualified and relevant scientific articles in a timely manner that can benefit the readers and enrich the scientific database. The *KJIM* is now among the top 5 Korean journals in impact factor rankings. Furthermore, the *KJIM* is cited more by international researchers than Korean researchers, indicating that the content of the journal is now valued at the international level.

Second, the *KJIM* fully satisfies basic publishing standards. Timeliness is one of the top priorities of the *KJIM*, and the journal maintains a strict peer-review process and includes funding acknowledgement. Every article is subjected to an English language editing process to ensure efficient transfer of knowledge and is provided free of charge to the authors. The *KJIM* follows international editorial conventions, and our editorial advisory board members and contributing authors include highly recognized scholars from all over the world.

Third, the *KJIM* has a convenient electronic submission system and fast publication process. Our electronic submission system is world's convenient process all accessed by internet. Therefore, the journal's process of publication is generally the fastest. Median turnaround time needed to publish—considering all submissions including peer reviews, revisions, production, and distribution—is within 6 months.

Fourth, the *KJIM* gives readers throughout the world free and easy access to articles. The *KJIM* is an Open Access journal. The *KJIM* provides free, easy access to articles for readers throughout the world. The *KJIM* is listed in PubMed, PubMed Central, SCOPUS, EMBASE, CAS, KoreaMed, Synapse, and CrossRef. Readers can access free full-text archives of the *KJIM* via PubMed Central and the *KJIM* homepage (http://www.kjim.org).

Fifth, the *KJIM* has been selected as an outstanding journal by the Korean government. The *KJIM* has been chosen as an outstanding international journal by the Korean Federation of Science and Technology Societies, and is currently being funded by the Korean government. Therefore, it is not surprising that the *KJIM* continues to maintain a high standard of quality and its official status, and is able to provide high quality content to subscribers at no financial costs.

Sixth, the *KJIM* developed a diverse array of contents to satisfy readers' medical needs. The editorial board of the *KJIM* developed six sections to get readers' interest. Among them are review articles dealing with hot issues in internal medicine, and editorials focusing on controversial issues. Each original article provides a "Key Message" to readers. Informative and educational cases are selected as case reports or images of interest. Thus, the *KJIM* is becoming a more interesting and popular journal in the field of internal medicine. After thorough evaluation of the *KJIM*, our editorial board decided to resubmit the *KJIM* for evaluation by Thomson Reuters. We are proud to publish a highly qualified journal, and we hope to get a positive response from the editorial team at Thomson Reuters.

The second submission for the *KJIM* to be listed in the SCIE was sent in August 2013 after a series of preparation processes. It was done in the form of an electronic submission. We waited around for a response from Thomson Reuters, as we could find no information or schedule regarding the progress of our submission. Then, 6 months after our submission, we sent a follow-up letter tiled "Journal Evaluation Status Request" to check on whether the *KJIM* would be listed. Three days later, we received a letter from Thomson Reuters confirming that the *KJIM* would be listed on the SCIE.

Conclusion

There were many rumors regarding the *KJIM*'s SCIE submission, all of which were negative. Some stated that there was no chance of the journal being listed on the index if its title included "Korea." Others pointed out that it would stand a better chance if a global publisher had been used, that it was not likely to be accepted within 5 years once the journal was rejected, and that the journal's impact factor had to be a "2" at least. However, by succeeding in being listed on the SCIE, the *KJIM* proved these rumors to be inaccurate. This progress was made in the process of creating a high-quality journal, matching the process of increasing the journal's impact factor. Moreover, it was possible thanks to the KAIM's vision and support, along with the will of the editorial board executives and members. The *KJIM* is finally listed on the SCIE, 28 years since its founding and 7 years since preparations for it to be listed were made. It has been a long, hard-fought journey.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Book Review

The book review: European Association of Science Editors Science Editors' Handbook (2nd edition)

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Product Information:
- Title: European Association of Science Editors Science Editors' Handbook, 2nd edition
- Editors: Pippa Smart, Hervé Maisonneuve, Arjan K.S. Polderman
- Publisher: European Association of Science Editors
- Year of publication: 2013
- ISBN: 9781906610203
- Paperbook: viii + 231 pages
- Price: £24.99 + postage and packing

The European Association of Science Editors (EASE) has recently published the 2nd edition of the EASE Science Editors' Handbook (the Handbook hereafter) which is undoubtedly an invaluable resource for anyone working in the field of editing and publishing scientific journal. Indeed a number of the world renowned academics and professionals were invited and have shared their knowledge and experiences on cutting age editorial and publishing practices.

The Handbook focuses all aspects of standard editorial practices in details—in its 56 chapters, arranged in six sections: editing, nomenclature and terminology, policies and processes, peer review, ethics, and publishing and promoting. Not only new but also experienced editors and publishers surely find it compelling in its content. Beside the basic norm of editing strategy including how to deal with texts of non-native English speakers, one will find invaluable insight of the Handbook on how to develop and how to establish a new journal with important considerations regarding editorial policies and strategies, editorial boards, legal and ethical issues and promotion.

The section, 'peer review system' deals with a much debated issues on current review process describing major advantages and disadvantages of the various systems. Recent innovation in peer review models are introduced in which it is based on pure scientific merit irrespective of perceived novelty, interest, or importance (pioneered by PLoS One and BioMed Central [BMC]), more transparent approaches in peer review processes with different levels of openness (BMC series of medical journal), 'cross-peer review' that encourages an interaction between peer review participants (European Molecular Biology [EMBO] and eLife), and alterna-

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tive peer review system. Concern with the 'wastage' of review effort in traditional peer review system, where manuscripts often go from journal to journal, being reviewed afresh at each, before being accepted for the publication, is also addressed. A number of new initiatives on 'alternative peer review' models including post publication review system are introduced.

Ethical issues from basic to more critical points on quality control measures and practices are discussed in depth on how to handle and cope up with conflicts of interest, commercial concerns that affect editorial decisions, importance of adopting and implementing rigorous policies on research and statistical reporting to uphold journal's reputation and business viability.

The last section of the Handbook devoted on different optimization practice of journal publication including the importance of using CrossRef and reference linking, citation metrics and multidisciplinary bibliographic databases. The Handbook allotted a few chapters dealing exclusively with promotional issues, in particular, how to promote journal, maximize research visibility, impact, and citation, and how to effectively use social and traditional media in order to promote awareness.

The Handbook is well written and easily understandable. Surely, the Handbook achieves its aim thoroughly and very well in its content which will definitely encourage good editorial and publishing practices to keep up with trends in the rapidly changing environment of scientific publishing world.

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Meeting Report

Asian Science Editors' Conference and Workshop 2014

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The Korean Council of Science Editors (KCSE) co-hosted the Asian Science Editors' Conference and Workshop 2014 with the Korea Institute of Science and Technology Information (KISTI) from July 2 to 4 at the Korea Science and Technology Center in Seoul, Korea. A total of 141 people attended the event, including 20 journal editors who represent other Asian countries: China, Japan, Mongolia, Russia, Philippines, Vietnam, Singapore, Indonesia, Thailand, and India. Members of KCSE and other science editors attended the meeting. The attendees shared their experiences and insights related to the common task of turning Asian scientific journals into world-class journals. The event especially provided an opportunity for them to reflect on the changing trends of the journal publication environment, which is rapidly changing along with advancements in information technology. Moreover, the attendees shared and reviewed relevant knowledge by introducing technologies and expertise that scientific journals must obtain to become advanced and globalized, as well as successful cases of developing outstanding journals.

The first day began with congratulatory messages delivered by the presidents of the Korean Federation of Science and Technology Societies (KOFST), KISTI, and Association of Academies and Societies of Sciences in Asia. The conference on the first day included an introduction of the status of scientific journals in each participating country, namely, Mongolia, Vietnam, Indonesia, Thailand, Singapore, Philippines, China, Japan, and Korea. In the afternoon session, the Asia-Pacific Association of Medical Editors and KCSE were introduced, along with the Journal Article Tag Suite extensible markup language-based free full text database entitled ScienceCentral ambitiously led by the KOFST. This session enabled the attendees to encounter the publication status of scientific journals as well as detailed introductions on several associations for editors in Asia. The final session in the afternoon was the general assembly, one of the key purposes of this workshop, where the Council of Asian Science Editors (CASE) was officially inaugurated. Its 137 founding members participated from 21 countries, including Asian countries such as Korea, Japan, China, Vietnam, Singapore, and India, as well as other regions such as the United States, Russia, Australia, Italy, and Greece. During the inaugural assembly, KCSE president Jong Kyu Ha was appointed as the president, whereas KCSE Vice President Hyeongsun Kim was appointed as the first secretary-general. The main goal of the CASE is to improve the level of Asian scientific journals, which are relatively underestimated than those in North America or Europe, to the world-class level in the near future. Its mission is to create a new standard of journals that

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reflect the diverse cultural and academic traditions of each Asian country. Thus, the KCSE, which has played a leading role in the foundation of the CASE, is expected to contribute significantly to achieving the above goals based on its experiences in Korea.

Rachael Lammey, a representative of CrossRef, began the workshop on the second day by introducing the latest technological advancement of CrossRef with up-to-date statistics of digital object identifier (DOI) registration and additional service programs: CrossCheck, CrossMark, FundRef, ORCID, DataCite, and data mining. CrossRef is an agency that leads the distribution innovation of academic information by systemizing DOI registration of scientific journals worldwide using cutting-edge information technology. In the afternoon session, the attendees engaged in in-depth discussions on the specific issues related to scientific journals: a successful case of a medical journal from Korea, *Archives of Plastic Surgery*; key issues in research ethics that arise in the review of articles; a case related to journal publication by a larger publisher, and a case on article review using CrossCheck.

In the final whole day, a lecture was delivered by Pippa Smart, an expert and international consultant in journal publications. This conference marked her second lecture in Korea following the first one in 2013, and it provided a valuable guide for all attendees in the frontlines of managing scientific journals, such as chief, executive, and managing editors. The contents of the lecture included the followings: recent global environmental changes in scientific journal publication; publication cooperation models, contracts, advantages, and disadvantages of cooperation; analysis of strengths and weaknesses of journals; and establishment of journal development plans and success strategies. The core contents of each subject were delivered concisely yet clearly, followed by a question-and-answer session. In particular, her introductions on recent changes of publication business environment, such as the emergence of cutting-edge journals that applied recent advancements in information technology and innovative service models, the breakthrough of open access policies, and the expandability of online journal platform services, highlighted the substantial threats that individual academic and scientific journals face, thereby compelling the attendees to ponder over ways to cope with these issues wisely.

In conclusion, the Asian Science Editors' Conference and Workshop 2014 had been a significant initiative in that the KCSE, since its foundation in September 2011, has built a foothold to join forces with Asian editors across borders and share practices for coping with current issues. The event also proved that education and interaction, in the long run, will be a foundation for the improvement of expertise for science editors as well as growth of individual journals.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Instructions to Authors

Enacted January 1, 2014

1. GENERAL INFORMATION

Science Editing (Sci Ed) is the official journal of the Korean Council of Science Editors (KCSE). Anyone who would like to submit a manuscript is advised to carefully read the aims and scope section of this journal. Manuscripts should be prepared for submission to *Science Editing* according to the following instructions. For issues not addressed in these instructions, the author is referred to the International Committee of Medical Journal Editors (ICMJE) "Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals" (http://www.icmje.org).

2. COPYRIGHTS AND CREATIVE COMMONS ATTRIBUTION LICENSE

A submitted manuscript, when published, will become the property of the journal. Copyrights of all published materials are owned by KCSE. The Creative Commons Attribution Non-Commercial License available from: http://creativecommons.org/licenses/by-nc/3.0/ is also in effect.

3. RESEARCH AND PUBLICATION ETHICS

The journal adheres to the ethical guidelines for research and publication described in Guidelines on Good Publication (http://publicationethics.org/resources/guidelines) and the ICMJE Guidelines (http://www.icmje.org).

1. Authorship

Authorship credit should be based on 1) substantial contributions to conception and design, acquisition of data, and/or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; 3) final approval of the version to be published; and 4) agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Every author should meet all of these four conditions. After the initial submission of a manuscript, any changes whatsoever in authorship (adding author(s), deleting author(s), or re-arranging the order of authors) must be explained by a letter to the editor from the authors concerned. This letter must be signed by all authors of the paper. Copyright assignment must also be completed by every author.

- Corresponding author and first author: *Science Editing* does not allow multiple corresponding authors for one article. Only one author should correspond with the editorial office and readers for one article. *Science Editing* does accept notice of equal contribution for the first author when the study was clearly performed by co-first authors.
- Correction of authorship after publication: *Science Editing* does not correct authorship after publication unless a mistake has been made by the editorial staff. Authorship may be changed before publication but after submission when an authorship correction is requested by all of the authors involved with the manuscript.

2. Originality and Duplicate Publication

Submitted manuscripts must not have been previously published or be under consideration for publication elsewhere. No part of the accepted manuscript should be duplicated in any other scientific journal without the permission of the Editorial Board. If duplicate publication related to the papers of this journal is detected, the manuscripts may be rejected, the authors will be announced in the journal, and their institutions will be informed. There will also be penalties for the authors.

A letter of permission is required for any and all material that has been published previously. It is the responsibility of the author to request permission from the publisher for any material that is being reproduced. This requirement applies to text, figures, and tables.

3. Secondary Publication

It is possible to republish manuscripts if the manuscripts satisfy the conditions of secondary publication of the ICMJE Recommendations (http://www.icmje.org/urm_main.html).

4. Conflict of Interest Statement

The corresponding author must inform the editor of any po-

tential conflicts of interest that could influence the authors' interpretation of the data. Examples of potential conflicts of interest are financial support from or connections to companies, political pressure from interest groups, and academically related issues. In particular, all sources of funding applicable to the study should be explicitly stated.

5. Statement of Informed Consent and Institutional Review Board Approval

Copies of written informed consent documents should be kept for studies on human subjects. For clinical studies of human subjects, a certificate, agreement, or approval by the Institutional Review Board (IRB) of the author's institution is required. If necessary, the editor or reviewers may request copies of these documents to resolve questions about IRB approval and study conduct.

6. Process for Managing Research and Publication Misconduct

When the journal faces suspected cases of research and publication misconduct such as redundant (duplicate) publication, plagiarism, fraudulent or fabricated data, changes in authorship, an undisclosed conflict of interest, ethical problems with a submitted manuscript, a reviewer who has appropriated an author's idea or data, complaints against editors, and so on, the resolution process will follow the flowchart provided by the Committee on Publication Ethics (http://publicationethics.org/resources/flowcharts). The discussion and decision on the suspected cases are carried out by the Editorial Board.

7. Editorial Responsibilities

The Editorial Board will continuously work to monitor and safeguard publication ethics: guidelines for retracting articles; maintenance of the integrity of the academic record; preclusion of business needs from compromising intellectual and ethical standards; publishing corrections, clarifications, retractions, and apologies when needed; and excluding plagiarism and fraudulent data. The editors maintain the following responsibilities: responsibility and authority to reject and accept articles; avoiding any conflict of interest with respect to articles they reject or accept; promoting publication of corrections or retractions when errors are found; and preservation of the anonymity of reviewers.

4. AUTHOR QUALIFICATIONS AND LANGUAGE REQUIREMENT

1. Author Qualifications

Any researcher throughout the world can submit a manuscript if the scope of the manuscript is appropriate.

2. Language

Manuscripts should be submitted in good scientific English.

5. SUBMISSION AND PEER REVIEW PROCESS

1. Submission

All manuscripts should be submitted to kcse@kcse.org by the corresponding author.

2. Peer Review Process

Science Editing reviews all manuscripts received. A manuscript is first reviewed for its format and adherence to the aims and scope of the journal. If the manuscript meets these two criteria, it is dispatched to three investigators in the field with relevant knowledge. Assuming the manuscript is sent to reviewers, *Science Editing* waits to receive opinions from at least two reviewers. In addition, if deemed necessary, a review of statistics may be requested. The authors' names and affiliations are removed during peer review. The acceptance criteria for all papers are based on the quality and originality of the research and its scientific significance. Acceptance of the manuscript is decided based on the critiques and recommended decision of the reviewers. An initial decision will normally be made within 4 weeks of receipt of a manuscript, and the reviewers' comments are sent to the corresponding author by e-mail. The corresponding author must indicate the alterations that have been made in response to the reviewers' comments item by item. Failure to resubmit the revised manuscript within 4 weeks of the editorial decision is regarded as a withdrawal. A final decision on acceptance/rejection for publication is forwarded to the corresponding author from the editor.

6. MANUSCRIPT PREPARATION

1. General Requirements

- The main document with manuscript text and tables should be prepared in an MS Word (docx) or RTF file format.
- The manuscript should be double spaced on 21.6×27.9 cm (letter size) or 21.0×29.7 cm (A4) paper with 3.0 cm margins at the top, bottom, right, and left margin.
- All manuscript pages are to be numbered at the bottom consecutively, beginning with the abstract as page 1. Neither the author's names nor their affiliations should appear on the manuscript pages.
- The authors should express all measurements according to International System (SI) units with some exceptions such as seconds, mmHg, or °C.
- Only standard abbreviations should be used. Abbrevia-

tions should be avoided in the title of the manuscript. Abbreviations should be spelled out when first used in the text—for example, extensible markup language (XML)—and the use of abbreviations should be kept to a minimum.
- The names and locations (city, state, and country only) of manufacturers should be given.
- When quoting from other sources, a reference number should be cited after the author's name or at the end of the quotation.

Manuscript preparation is different according to the publication type, including original articles, reviews, case studies, essays, editorials, book reviews, and correspondence. Other types are also negotiable with the Editorial Board.

2. Original Articles

Original articles are reports of basic investigations. Although there is no limitation on the length of the manuscripts, the Editorial Board may abridge excessive illustrations and large tables. The manuscript for an original article should be organized in the following sequence: title page, abstract and keywords, main text (introduction, methods, results, and discussion), acknowledgments, references, tables, figure legends, and figures. The figures should be received as separate files. Maximum length: 2,500 words of text (not including the abstract, tables, figures, and references) with no more than a total of 10 tables and/or figures.

- **Title page:** The following items should be included on the title page: 1) the title of the manuscript, 2) author list, 3) each author's affiliation, 4) the name and e-mail address of the corresponding author, 5) when applicable, the source of any research funding and a list of where and when the study has been presented in part elsewhere, and 6) a running title of fewer than 50 characters.
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Journal articles:

1. Kim JA, Huh S, Chu MS. Correlation analysis of the citation indices of Korean scientific journals listed in international databases. Sci Ed 2014;1:27-36. http://dx.doi.org/10.6087/kcse.2014.1.27
2. Brobo E, Cambon-Thomsen A, De Castro D, et al. Citation of bioresources in journal articles:moving towards standards. Eur Sci Ed 2013;39:36-8.

Books and book chapters:

3. Morris S, Barnas E, LaFrenier D, Reich M. The handbook of journal publishing. New York: Cambridge University Press; 2013.

4. Cho HM, editor. KOFST journals 2011. Seoul: The Korean Federation of Science and Technology Societies; 2012. http://dx.doi.org/10.5082/Kofst_J_2011
5. Booth BA. Peer review. In: Coghill AM, Garson LR, editors. The ACS style guide. 3rd ed. New York: Oxford University Press; 2006. p. 71-6.

Online sources:

6. Committee on Publication Ethics. Guidelines for retracting articles [Internet]. Committee on Publication Ethics; 2009 [cited 2013 Sep 20]. Available from: http://publicationethics.org/files/retraction%20guidelines.pdf
7. Testa J. The Thomson Reuters journal selection process [Internet]. Philadelphia: Thomson Reuters; 2012 [cited 2013 Sep 30]. Available from: http://wokinfo.com/essays/journal-selection-process/

Conference papers:

8. Shell ER. Sex and the scientific publisher: how journals and journalists collude (despite their best intentions) to mislead the public. Paper presented at: 2011 CrossRef Annual Member Meeting; 2011 Nov 14-15; Cambridge, MA, USA.
9. Kim HW. Challenges and future directions on journal "perspectives in nursing science" in Korea. Poster session presented at: Asia Pacific Association of Medical Journal Editors Convention 2013; 2013 Aug 2-4; Tokyo, Japan.

Scientific and technical reports:

10. Kim SN, Park JR, Bae HS, et al. A study on the meta evaluation of Korean university evaluation. Seoul: Korean Educational Development Institute; 2004. Report No.: CR 2004-45.

News articles:

11. Kim R. SNU ranked 51st in university evaluation. Korean Times [Internet]. 2007 Nov 8 [cited 2013 Sep 25]. Available from: http://www.koreatimes.co.kr/www/news/nation/2007/11/117_13423.html

Dissertations:

12. Kim K. Quantum critical phenomena in superfluids and superconductors [dissertation]. Pasadena, CA: California Institute of Technology; 1991.

- **Tables:** Tables are to be numbered in the order in which they are cited in the text. A table title should concisely describe the content of the table so that a reader can understand the table without referring to the text. Each table must be simple and typed on a separate page with its heading above it. Explanatory matter is placed in footnotes below the tabular matter and not included in the heading. All non-standard abbreviations are explained in the footnotes. Footnotes should be indicated by [a], [b], [c], ... Statistical measures such as SD or SE should be identified. Vertical rules and horizontal rules between entries should be omitted.
- **Figures and legends for illustrations:** Figures should be numbered, using Arabic numerals, in the order in which they are cited. Each figure should be uploaded as a single image file in either uncompressed EPS, TIFF, PSD, JPEG, and PPT format over 600 dots per inch (dpi) or 3 million pixels (less than 6 megabytes). Written permission should be obtained for the use of all previously published illustrations (and copies of permission letters should be included). In the case of multiple prints bearing the same number, English letters should be used after the numerals to indicate the correct order (e.g. Fig. 1A; Fig. 2B, C).

3. Reviews

Reviews are invited by the editor and should be comprehensive analyses of specific topics. They are to be organized as follows: title page, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract of no more than 200 words. The length of the text excluding references, tables, and figures should not exceed 5,000 words. The number of references is limited to 100.

4. Case studies

Case studies are intended to report practical cases that can be encountered during editing and publishing. Examples include interesting cases of research misconduct and publication ethics violations; experience of new and creative initiatives in publishing; and the history of a specific journal development. They are to be organized as follows: title page, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract of 200 words maximum. The length of the text excluding references, tables, and figures should not exceed 2,500 words. The number of references is limited to 20.

5. Essays

Essays are for the dissemination of the experience and ideas of editors for colleague editors. There is no limitation on the topics if they are related to editing or publishing. They are to be organized as follows: title page, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract equal to or less than 200 words. The length of the text excluding references, tables, and

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Editorials are invited by the editor and should be commentaries on articles published recently in the journal. Editorial topics could include active areas of research, fresh insights, and debates in all fields of journal publication. Editorials should not exceed 1,000 words, excluding references, tables, and figures. References should not exceed 10. A maximum of 3 figures including tables is allowed.

7. Book reviews

Book reviews are solicited by the editor. These will cover recently published books in the field of journal publication. The format is same as that of Editorials.

8. Correspondence

Correspondence (letters to the editor) may be in response to a published article, or a short, free-standing piece expressing an opinion. Correspondence should be no longer than 1,000 words of text and 10 references.

In reply: If the Correspondence is in response to a published article, the Editor-in-Chief may choose to invite the article's authors to write a Correspondence Reply. Replies by authors should not exceed 500 words of text and 5 references.

9. Video Clips

Video clips can be submitted for placement on the journal website. All videos are subject to peer review and must be sent directly to the editor by e-mail. A video file submitted for consideration for publication should be in complete and final format and at as high a resolution as possible. Any editing of the video will be the responsibility of the author. *Science Editing* accepts all kinds of video files not exceeding 30 MB and of less than 5 minutes duration, but Quicktime, AVI, MPEG, MP4, and RealMedia file formats are recommended. A legend to accompany the video should be double-spaced in a separate file. All copyrights for video files after acceptance of the main article are automatically transferred to *Science Editing*.

10. Commissioned or Unsolicited Manuscripts

Unsolicited manuscript with publication types of original articles, case studies, essays, and correspondence can be submitted. Other publication types are all commissioned or invited by the Editorial Board.

Table 1 shows the recommended maximums of manuscripts according to publication type; however, these requirements are negotiable with the editor.

Table 1. Recommended maximums for articles submitted to *Science Editing*

Type of article	Abstract (word)	Text (word)[a]	References	Tables & figures
Original article	250	2,500	20	10
Review	200	5,000	100	No limits
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Essay	200	2,500	20	10
Editorial	No	1,000	10	3
Book review	No	1,000	10	3
Correspondence	No			
Letter to the editor	-	1,000	10	3
In reply	-	500	5	3
Video clip	No	30 MB, 5 min	-	-

[a]Maximum number of words is exclusive of the abstract, references, tables, and figure legends.

7. FINAL PREPARATION FOR PUBLICATION

1. Final Version

After the paper has been accepted for publication, the author(s) should submit the final version of the manuscript. The names and affiliations of the authors should be double-checked, and if the originally submitted image files were of poor resolution, higher resolution image files should be submitted at this time. Color images must be created as CMYK files. The electronic original should be sent with appropriate labeling and arrows. The EPS, TIFF, Adobe Photoshop (PSD), JPEG, and PPT formats are preferred for submission of digital files of photographic images. Symbols (e.g., circles, triangles, squares), letters (e.g., words, abbreviations), and numbers should be large enough to be legible on reduction to the journal's column widths. All of the symbols must be defined in the figure caption. If the symbols are too complex to appear in the caption, they should appear on the illustration itself, within the area of the graph or diagram, not to the side. If references, tables, or figures are moved, added, or deleted during the revision process, they should be renumbered to reflect such changes so that all tables, references, and figures are cited in numeric order.

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