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Comprehensive Approach to Open Access Publishing: Platforms and Tools

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ABSTRACT

The Open Access Initiative is gaining momentum due to the worldwide availability of advanced digital tools, online publishing platforms, and systems for tracking academic contributions. Several declarations and initiatives, including Plan S, have already laid a foundation for moving away from subscription to full and immediate open-access publishing. The global initiatives imply targeting journals satisfying the upgraded quality and visibility criteria. To meet these criteria, a comprehensive approach to Open Access is recommended. This article overviews the essential components of the comprehensive approach, increasing transparency, adherence to ethical standards, and diversification of evaluation metrics. With the increasing volume of quality open-access journals, their indexing with free databases and search engines is becoming increasingly important. The Directory of Open Access Journals and PubMed Central currently free searches of open-access sources. These services, however, cannot fully satisfy the increasing demands of the users, and attempts are underway to upgrade the indexing and archiving of open-access sources in China, Japan, Korea, Russia, and elsewhere. The wide use of identifiers is essential for transparency of scholarly communications. Peer reviewers are now offered credits from Publons. These credits are transferrable to their Open Researcher and Contributor iDs. Various social media channels are increasingly used by scholars to comment on articles. All these comments are tracked by related metric systems, such as Altmetrics. Combined with traditional citation evaluations, the alternative metrics can help timely identify and promote publications influencing education, research, and practice.

Keywords: Periodicals as Topic; Access to Information; Open Access Publishing; Peer Review; Bibliography as Topic

INTRODUCTION

Full and immediate Open Access is gaining momentum across most developed countries despite some difficulties and resistance in the process of moving away from the traditional subscription publishing.¹ The provision of grants by established global research funding agencies and

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professional associations implies that sponsored scientific reports should have short- and long-term implications, particularly due to the immediate Open Access, relevant indexing, and permanent preservation by reliable digital repositories and open-access platforms. On the positive side, the funder requirements drive the dissemination of scientific knowledge.

In 2018, radical plan (“Plan S”) was put forward by a coalition of 11 leading European grant funders and large non-commercial publishers to accelerate the transition from a subscription to an open-access publishing model by January 2020.^{2,3} The Plan implies that publicly funded research should be freely available immediately upon publication. China and India, the world's largest producers of scholarly articles, have already demonstrated willingness to join the global initiative and opt for immediate Open Access for publicly funded research projects.^{4,5}

The move has good intentions to speed up the implementation of Open Access, upgrade publishing standards, and cap open-access charges. Building on the statements of previously promoted documents, the so-called BBB (Budapest, Berlin, Bethesda) declarations of the early 2000s,⁶⁻⁸ Plan S aims to bring basic principles of scholarly openness to life. Such principles are outlined in Open Access definitions of the BBB declarations. Importantly, the definition proposed by the Bethesda Statement on Open Access Publishing (2003) was consulted by the National Library of Medicine (NLM) of the US and reflected in the “Open Access Publishing” keyword of the Medical Subject Heading (MeSH) in 2016.

The Plan S can be viewed as a continuation of the OA2020 Initiative that was launched at the 12th Berlin Open Access conference in 2015 to achieve a sustainable model of open-access publishing by converting resources of journal subscriptions.⁹

Some established publishers and representatives of large professional societies in Europe have criticized the key principles of Plan S that do not consider hybrid Open Access as a compliant model, unfairly disqualifying the majority of journals (85%) with rigorous peer review and highly selective publication strategies.¹⁰ Plan S is also ambiguously accepted by established publishers because of the fear that the flow of quality articles will soon move away from the leading subscription journals.^{11,12} The representatives of the established publishers may argue that there is lack of definitive evidence that Open Access publishing is more advantageous in terms of citations and endorsements by authors.

The publishing optimization plans are affordable for most developed countries where research infrastructure is well established and capable to further increase transparency across all fields of science.¹³ However, researchers and publishers in the rest of the world, those lacking funds, and representatives of social sciences, humanities, and emerging disciplines may find themselves in a disadvantaged position. The lack of funds is a barrier for publishing articles in gold (paid) open-access journals, which are now better ranked than platinum and green open-access periodicals.¹⁴ Some professional societies in the developed world that generate their income from the journal subscriptions may also fail to meet the new requirements of full and immediate Open Access and eventually collapse.¹⁵

Over the past decade, the number of well-cited open-access articles of numerous non-Anglophone researchers supported by international grants for advanced fields of science has multiplied.¹⁶⁻¹⁸ However, non-Anglophone scholars, particularly Russian and Chinese researchers who work in less advanced fields, still find it difficult to target most influential gold open-access journals.¹⁹ Publishers in non-Anglophone developing countries that rely

on the traditional subscription model for covering their publishing, distribution, and library archiving costs may also encounter major financial difficulties if they choose to abandon the subscription and switch to Open Access.

Despite controversies surrounding the radical transition initiatives, there are potentially positive outcomes for most open-access journals, repositories, and publishing platforms. The editorial policies of quality open-access journals are currently adjusted to respond to the global trends in the access, machine-readability, and distribution requirements. The adjustments are primarily aimed to employ liberal copyrights and distribution licenses and grant more rights to authors and readers, improve in-house checks and external peer review, digitize journal platforms, and supply institutional repositories with scientifically valuable items.²⁰ It is expected that the radical move toward Open Access will improve the efficiency, fairness, and value of the global publishing enterprise.²¹

In our times, researchers and authors are more inclined to publish their best articles in influential open-access journals that offer relevant indexing, free access, and wide dissemination of their works.^{22,23} With the changes in the global research funding, experts believe that full and immediate Open Access will outweigh the role of traditional impact indicators in the context of targeting journals.²⁴ Such a scenario is particularly beneficial for early-career researchers, those from developing countries, and representatives of emerging academic disciplines.

In view of the changing landscape, not only scholarly journals have to adjust their publishing models, access and distribution, but online repositories, search engines, and indexing databases should also upgrade their services to foster quality and fair access.²⁵ The journal editors and publishers should aim to actively seek potential readers and evaluate the author works not just by citations, but more so by views, downloads, shares, and social media comments.^{26,27}

The aim of this article is to overview available and emerging online platforms and tools for implementing a comprehensive approach to Open Access.

EXEMPLARY OPEN ACCESS PLATFORMS

Directory of Open Access Journals (DOAJ)

With the growing importance of full and immediate Open Access, several global and regional online platforms covering quality open-access journals and providing a window for searches of freely available peer-reviewed articles have emerged. Undoubtedly, DOAJ (<https://doaj.org/>) is the leading multidisciplinary search platform for journals adhering to the principles of transparency and best practice in Open Access.^{2,28} The DOAJ searches better than Scopus and Web of Science visualize current research outputs in Africa, Asia, and South America.²⁹ Some disciplines, including biomedical science, are also better represented on DOAJ than on other databases.³⁰ Nonetheless, DOAJ still lacks advanced search filters and tools for tracking article citations and social media reflections, which are embedded in the article records on Scopus and Web of Science.

The DOAJ was launched in 2003 at Lund University, Sweden to list open-access sources across all fields of science.³¹ Over the past years, it has improved and transformed into the largest

free multilingual registry, with the number of the registered journals increasing from initial 300 to 13,043, with 10,074 searchable at article level (as of April 16, 2019).

Although the DOAJ follows a strict evaluation policy examining the journal editorial policies, Open Access statements, content licensing, and archiving, the scientific prestige and impact indicators are not among its indexing criteria. Such a policy provides equal opportunities for registering highly influential and emerging periodicals, particularly those from countries underrepresented at the Scopus and Web of Science databases. The DOAJ strategy is in line with the requirements of most global funders and the San Francisco Declaration on Research Assessment (DORA).³²

With the fast advancing digitization, the DOAJ introduced its Seal in 2014 to distinguish journals with modern publishing and archiving technologies.³³ The initiative prioritized permanent digital preservation by CLOCKSS (<https://clockss.org/>), PubMed Central (PMC; <https://www.ncbi.nlm.nih.gov/pmc/>), and similar archiving platforms, employing permanent identifiers (e.g., Digital Object Identifier [DOI] from Crossref), liberal copyrights and licensing (e.g., the Creative Commons Attribution License [CC-BY]), supplying article metadata, and reliably depositing contents (e.g., at SHERPA/RoMEO) as conditions for acquiring the recognition stamp. To date, 1,392 periodicals (out of 13,043 [11%]) have been awarded the Seal, with the absolute majority published in English (1,374 [99%]) and predominantly represented the UK (755 [54%]), Switzerland (232 [17%]), and Germany (110 [8%]). Apparently, publishers with limited budgets, particularly those from developing countries, struggle to acquire the DOAJ Seal since most advanced digital tools, including permanent identifiers and online archiving systems, require regular payments. Open-access publishers that fail to acquire the Seal may, at least, opt for the expenditure rationalization to launch and maintain links with Crossref, Open Researcher and Contributor iD (ORCID), and other online services for global visibility and improved functionality of the online publishing.³⁴⁻³⁶

PubMed Central

PMC is a digital repository of the NLM of the US. It was launched in 2000 to permanently archive full-texts of English biomedical and health literature supplied by publishers in the Journal Article Tag Suite (JATS) eXtensible Markup Language (XML) format. The reliability of PMC as a global repository was recognized in the Bethesda Statement on Open Access Publishing (2003) that proposed a definition of Open Access focusing on liberal copyrights, “unrestricted distribution, interoperability, and long-term archiving”.⁸

PMC-archived articles are retrievable along with MEDLINE-indexed and MeSH-tagged items on the same PubMed platform. The platform provides a search window for 2,695 PMC-archived (<https://www.ncbi.nlm.nih.gov/nlmcatalog/?term=journalspmc>) and 5,283 MEDLINE-indexed sources (<https://www.ncbi.nlm.nih.gov/nlmcatalog/?term=currentindex>). Of the MEDLINE-indexed sources, only 705 (13%) are simultaneously archived by PMC.

Within the PMC platform, citations to the archived articles are tracked, but no any citation metrics are calculated. These articles can be shared via linked social media channels, such as Facebook and Twitter. PMC is integrated with ORCID, an important tool for visualizing individual scholar profiles. The archived article data can be transferred to ORCID iDs to maximize the discoverability of research.³⁷

Numerous global research funders mandate depositing the sponsored articles on PMC either by directly targeting PMC-archived journals or by self-archiving within 12 months the items published elsewhere. The latter option is available to the grantees of the National Institutes of Health (NIH) who may choose any target journal. Following an increase of individual article deposits from publishers with questionable practices in 2015–2016, the NIH issued a notice advising their grantees to choose reputable journals and circumvent questionable publishers.³⁸ Interestingly, the main subject categories related to the self-archiving were medicine, engineering, natural history/biology/zoology whereas the main publisher was the OMICS Group.³⁸

The proportion of non-indexed by MEDLINE records gradually increased in PubMed from 8% in 2008 to 34% in 2017, primarily due to the increase of PMC-archived items.³⁹ The proportion of PMC-archived records, however, sharply decreased in MEDLINE in 2000–2017.³⁹

In 2014, PMC revised its journal selection criteria related to the scientific quality, editorial policies, and machine-readability of full-texts. The re-evaluation of PMC and MEDLINE contents culminated in 2017, resulting in a discontinuation of indexing a large number of journals that failed to meet the upgraded criteria. Numerous non-Anglophone journals in the “Old MEDLINE” collection with poorly digitized contents and deficiencies in their metadata were primarily sidelined by the NLM experts. Additionally, 30 PMC-archived periodicals, including 14 gold open-access journals of Kowsar publisher were deselected based on the re-evaluation of the journal editorial policies and practice.^{40,41}

Although the renewed MEDLINE-indexing and PMC-archiving requirements do not affect the viability of PubMed, they substantially limit visibility of non-English sources. Also, PMC delisting of 14 Kowsar journals was a major blow for Iranian authors and decision-makers, who have to revisit their research and publication ethics strategies.⁴¹

ScienceCentral

In 2013, the Korean Federation of Science and Technology Societies (KOFTS) introduced ScienceCentral (<https://www.e-sciencecentral.org/>) as a platform for non-profit open-access journals. Technically, it is designed similar to PMC, but with an aim to broadly cover academic disciplines and journals in various languages. ScienceCentral employs strict acceptance criteria that focus on free and immediate Open Access, copyrights, distribution licenses, peer review, readability of article metadata and graphics, and availability of full-texts in the JATS XML format.⁴² The KOFTS introduced a validation scheme for ScienceCentral to check the quality of the XML conversion of texts, tables, chemical structures, and mathematical formula. Although the core of the platform consists mostly of Korean sources, it is open to journals in any languages from all over the world. The current list includes 211 open-access journals from 7 countries. Notably, ScienceCentral is integrated with ORCID and Funder Registry (known as FundRef until November 2015) to track individual author articles and connect with funding sources.

Korean Journal Publishing Service (KPubS)

An entirely different approach to fostering journal visibility and access is offered by the KPubS (<http://kpubs.org>). The KPubS was launched in 2014 by the Korea Institute of Science and Technology Information (KISTI) to offer the manuscript review, journal publishing, and archiving on the same multidisciplinary platform.⁴³ It currently covers 116 Korean open-access journals in science, technology, engineering, and medicine, which are predominantly

tracked by local indexing services. The KPubS is fully digitized and capable of supplying global indexing databases and postprint servers with compatible article metadata and full-texts.⁴⁴

KoreaMed Synapse

In the field of medicine, the Korean Association of Medical Journal Editors (KAMJE) with its 264 member-journals and several databases has improved the discoverability of Korean medicine. The KAMJE runs KoreaMed Synapse (<https://www.synapse.koreamed.org>), which is a digital archive of 113 Korean open-access journals. In partnership with XMLink, the KAMJE has managed to advance the reference linking, article tagging with DOI, and XML conversion, all of which resulted in a 5-fold increase of PMC-archived Korean journals in the past decade.^{45,46}

Other regional initiatives

Other national and regional initiatives have also attempted to increase visibility and discoverability of online journals with variable success (**Table 1**).⁴⁷ Importantly, there are several Japanese online platforms that helped to digitize and raise the indexability of a large number of English-language journals.⁴⁸ In 1998, the Japan Science and Technology Agency developed the largest journal publishing and archiving platform named Japan Science and Technology Information Aggregator, Electronic (J-STAGE; <https://www.jstage.jst.go.jp>). It aimed to implement Open Access in Japan and disseminate research produced by members of local professional societies. The platform is well integrated with local and global information services. It now hosts 2,824 sources, including 2,415 open-access journals.

Table 1. Examples of platforms for increasing visibility of local and regional journals

Platforms	Links	Launch year	Functions	Geography	Subjects	Journal numbers	Languages	Full text formats
J-STAGE	https://www.jstage.jst.go.jp/	1998	Publication platform, library	National (Japan)	Multidisciplinary	2,824 (2,415 open-access)	English, Japanese	HTML, PDF
CyberLeninka	https://cyberleninka.org/	2012	Library	Regional (Russian Federation)	Multidisciplinary	> 1,816	English, Russian	PDF
Redalyc	https://www.redalyc.org	2002	Repository	Regional (Latin America, the Caribbean, Spain, Portugal)	Multidisciplinary	1,301	English, Spanish, Portuguese	JATS XML, PDF
SciELO	http://www.scielo.org	1997	Database, library, journal provider to PubMed Central, Web of Science and Scopus	Regional (Latin America, Spain, Portugal, South Africa)	Multidisciplinary	1,285	English, Portuguese, Spanish	JATS XML, HTML, PDF
COAJ	http://www.oaj.cas.cn/	2010	Repository	National (China)	Multidisciplinary	660	English, Chinese	HTML, PDF
Hrčak	https://hrcak.srce.hr/	2006	Repository	National (Croatia)	Multidisciplinary	470	English, Croatian	PDF
AJOL	https://www.ajol.info/	1998	Repository	Regional (South Africa)	Multidisciplinary	523 (256 open-access)	English	PDF
ScienceCentral	https://www.e-sciencecentral.org/	2013	Repository	Global	Multidisciplinary	211	English	JATS XML, PDF
OAK Central	http://central.oak.go.kr	2014	Repository	National (Korea)	Multidisciplinary	87	English, Korean	JATS XML, PDF
KPubS	http://kpubs.org	2014	Publication platform, digital library	National (Korea)	Multidisciplinary	116	English, Korean	JATS XML, PDF
KoreaMed Synapse	https://www.synapse.koreamed.org	2007	Archive, reference-linking platform	National (Korea)	Medicine	113	English, Korean	HTML, JATS XML, PDF

J-STAGE = Japan Science and Technology Information Aggregator, Electronic, Redalyc = Red de Revistas Científicas de América Latina y El Caribe, España y Portugal, SciELO = Scientific Electronic Library Online, COAJ = China Open Access Journals, AJOL = African Journals OnLine, OAK = Open Access Korea, KPubS = Korean Journal Publishing Service.

In 2010, the Chinese Academy of Sciences launched China Open Access Journals (<http://www.oaj.cas.cn>), a multidisciplinary platform with Chinese interface that currently lists 660 Chinese open-access journals, including 340 journals searchable at article level. Although the platform aims to increase the discoverability of local articles, the absence of English interface, ambiguous perception of free and Open Access, and coverage of journals with mixed subscription and open-access models limit the attractiveness of the platform for global users. There are also concerns that the best Chinese research articles are published either in prestigious foreign open-access journals or in a few top Chinese journals,⁴⁹ negatively affecting the scientific prestige of the local digital archive.

There is yet another Korean multidisciplinary portal for archiving local scholarly journals — Open Access Korea (OAK; <http://www.oak.go.kr>). It is operated by the National Library of Korea, with archiving full-text contents of 87 Korean journals in JATS XML format at OAK Central (<http://central.oak.go.kr/>).

CyberLeninka (<http://cyberleninka.ru/>) is yet another multidisciplinary repository and a free platform for searches of Russian articles. It was launched in 2012.⁵⁰ Since then, the repository has joined Google Scholar, Directory of Open Access Repositories (OpenDOAR), and some global Open Access initiatives. CyberLeninka archives article PDFs that are freely available for distribution in line with the Creative Commons licenses. The repository increases visibility of a large number of local and some regional journals searchable at the Russian interface.

Several other regional initiatives in Europe, Africa and Latin America have also led to the growth of digital repositories that offer basic visibility and development prospects for a sizable proportion of online journals with variable publishing standards, access options, and preservation strategies (e.g., African Journal OnLine [AJOL] in South Africa, Scientific Electronic Library Online [SciELO] in Brazil, Hrčak in Croatia).⁵¹⁻⁵³

INSTITUTIONAL REPOSITORIES

The implementation of Open Access mandates has created an opportunity for launching and developing institutional repositories to concentrate faculty research works, scattered across thousands of scholarly journals, in a single digital platform. Institutional repositories are praised by experts because of their global visibility, promotion of intellectual works of academic communities, and impact on their research and continuing professional development.⁵⁴ Although such repositories are designed to aggregate information on scattered journal articles, other types of scholarly works and grey literature, such as theses, patents, non-peer-reviewed documents, can also be archived to provide a broader perspective on the scope of interests and achievements of the host academic institution. Complete journal archives published and maintained by the institution are also posted on the same platform. Importantly, the authors and data curators who archive scholarly items should consult the primary publisher copyright policies to avoid any infringement.⁵⁵ The repository, for its part, should offer services for uninterrupted archiving in an interoperable format and acquire digital tools for ensuring the authors' global visibility.⁵⁶

There are a few advanced platforms that have been proposed to maintain institutional repositories, with the Digital Commons widely promoted as the best solution for small

institutions.⁵⁷ The choice of a host platform is important for indexing the archived contents by Google Scholar and for meeting the listing requirements of the OpenDOAR (Directory of Open Access Repositories <http://v2.sherpa.ac.uk/opensoar/>) and the Registry of Open Access Repositories (ROAR; <http://roar.eprints.org/>). The OpenDOAR and ROAR are prestigious UK-based directories that list open-access repositories.⁵⁸

As of April 16, 2019, OpenDOAR and ROAR list 4,124 and 4,733 repositories, respectively (as of March 15, 2019). At OpenDOAR, for example, the US (575), UK (283), Germany (237), Japan (235) and Spain (145) are the top 5 countries with most open-access repositories. Contents are presented mostly in English (2,865 repositories), Spanish (526), German (305), French (252), and Japanese (236). The subject categories are mainly multidisciplinary (2,557), health and medicine (377), business and economics (305), history and archaeology (272), and science general (268).⁵⁹

While institutional repositories are instrumental for embracing Open Access and promoting intellectual works of academic communities, particularly in developing countries, a large number of universities worldwide still do not have mandates and strategies for launching and maintaining such platforms.⁶⁰ One of the reasons of the inadequate use of open-access repositories is the lack of the awareness of their importance among authors and research managers alike.^{61,62} Also, the subject coverage of institutional repositories from developing countries suggests that specialists in some domains, particularly in social sciences and humanities, underutilize the opportunities offered by the open-access platforms.^{63,64}

PREPRINT SERVERS AND OPEN PEER REVIEW

Peer review is important for validating journal submissions and processing methodologically sound and publishable research items. The whole process has some limitations, with its slowness often causing dissatisfaction of seasoned authors. Selecting skilled reviewers and obtaining their comments take time — shortest in medicine and longest in economics and business (average review for accepted papers takes 12 and 25 weeks, respectively).⁶⁵ Concerns have been voiced that the slow peer review may negatively affect the dissemination of innovative ideas.⁶⁶ Subsequently, suggestions have been brought forward to opt for new publication and evaluation modes by publicly archiving initial, non-reviewed versions of scholarly articles on prestigious preprint servers, such as arXiv and bioRxiv, and initiating peer review thereafter. The specialist preprint platforms have already been recognized as hubs for quality items, comparable to peer-reviewed journal articles.⁶⁷ Nonetheless, the ‘archive first and publish later’ option still remains unappreciated by the absolute majority of scholarly publishers, preserving values of publishing original contents that pass thorough reviewer evaluation.⁶⁸

With the growing importance of crediting reviewers and availability of prestigious reviewer platforms, such as Publons (<http://www.publons.com>), opportunities for switching to open pre- and post-publication review are also increasing.⁶⁹ Although experience with open peer review varies across disciplines, it is believed that such an innovation may improve the quality of reviewer comments and accountability of reviewers and editors.^{70,71}

Although the initial experiment with the PubMed Commons post-publication communication platform proved inefficient and closed down, it is likely that robust and better controlled

mechanisms implemented by Publons, ScienceOpen (<https://www.scienceopen.com/>), and F1000 Research (<https://f1000research.com>) will pave the way for open peer review.

Notably, ScienceOpen is an advanced multidisciplinary and multifunctional platform that offers rapid gold open-access publishing, post-publication open peer review with DOI assignment, content aggregation from PubMed Central, arXiv, and SciELO, and interactive networking for authors and reviewers. All articles and post-publication comments on the platform are linked with social media channels.^{72,73}

Although the attitudes toward open peer review vary widely across disciplines, and currently only a handful of journals allow to publicize pre-publication reviewer comments,⁷⁴ the situation may improve with the radical changes in the publishing.

SOCIAL MEDIA

Numerous social media and online news outlets are currently available to promote scholarly journals and complement their pre-publication peer review with post-publication public discussion. Infographics, video abstracts, and other visualisation tools are increasingly used to draw public attention to published works and initiate the interactive social communication.⁷⁵ The available evidence suggests that the journal accounts on Twitter, Facebook, and other popular platforms boost their profiles by instantaneously increasing abstract views, an emerging 'currency' of the publishing enterprise.⁷⁶ Additionally, an analysis of 3,448 Scopus-indexed and DOAJ-listed journals demonstrated that 1,236 (37%) of these sources were linked to various social media sites, and proved that open-access journals with the highest scientific prestige of their citations (first quartile of SCImago Journal Rank [SJR]) are better represented and have more followers on Twitter, Facebook, and other social media channels than periodicals with lower SJR.⁷⁷ Finally, experts view the development of start-up open-access journals in the context of transparent post-publication communication via reliable social media channels.⁷⁸

Academic and non-academic readers' online activities are currently tracked by Altmetric company (<https://www.altmetric.com/>) and reflected in the Altmetric Composite Score and Donut Badge. The Company employs its own algorithm to weigh social media attention and calculate the Altmetric Composite Score. For example, references of selected news outlets and blogs are the highest weighed factors in the ranking algorithm.⁷⁹ Most large publishers currently take into account social media attention to individual articles and display values of their Composite Scores along with the Donut Badges. Such an alternative evaluation provides information on the most influential articles and their potential societal implications.⁸⁰

Free access increases the journal exposure to the global readership, resulting in more views, shares, voluntary evaluations, and promotion of the whole journal and its individual articles. A recent comparative altmetric analysis of Korean subscription, hybrid, and open-access journals revealed the absolute advantage of full and immediate Open Access in terms of tweets.⁸¹ The same study pointed to scientific prestige as the driver of exceptional social attractiveness of two periodicals, *Journal of Medicinal Food* and *Journal of Korean Medical Science*.

Preliminary evidence suggests that social media attention to highly popular open-access journals increases their citations.⁸² There is also evidence associating individuals articles'

high alternative metrics with Open Access, English language, and quality of editorial work, which is particularly reflected in the ease of reading and understanding article titles.^{83,84}

Open-access research reports are increasingly discussed on Twitter and other major social media platforms for educational purposes.^{85,86} At the same time, social communication channels enable critical appraisal of published works, requiring corrections or even retractions.^{87,88} Open Access complemented with social networking may speed up the whole process of 'correcting and cleaning' the literature.

Despite the initial positive experience of appointing social media editors to promote journal articles,^{89,90} related social communication activities are still not thoroughly controlled by journal editors and publishers. In such a scenario, biased and misleading comments may find their way to the online platforms, leading to unintentional and intentional damages to scholarly outputs.⁹¹⁻⁹³ Skewed opinion polls and geographically disproportionate online activities can also negatively affect post-publication communication, particularly because of the active use of Twitter and other powerful social platforms by scholars in developed countries and passive stance of those in developing countries.^{94,95}

EDITORIAL MEMBERSHIP

Acquiring the quality stamp by indexing and archiving is a part of the development strategy of reliable open-access journals. It primarily allows to increase the journal visibility and boost the authors' scholarly profile. The journal membership at prestigious editorial societies has also emerged as yet another option to increase visibility and gain credibility.⁹⁶ The editorial societies advocate for their members and provide guidance, which is often reflected at the journal instructions and publication ethics statements.⁹⁷

As far as the journal credibility is concerned, joining the Committee on Publication Ethics (COPE), the largest forum of editors and publishers (12,593 members as of April 16, 2019; <https://publicationethics.org/members>) dealing with all aspects of publication ethics, can be a major step toward networking with experts in science editing and declaring adherence to the best standards in publishing.⁹⁸ The COPE membership is particularly important for start-up open-access journals, which are accepted by the global network upon completion of a scrutinized application procedure.⁹⁹

The Open Access Scholarly Publishers Association (OASPA), which was launched in 2008, is a non-profit organization specifically representing interests of open-access publishers and standalone journals.¹⁰⁰ The OASPA has strict membership criteria, which are similar to the DOAJ requirements to peer review, editorial practices, and archiving. The journals with OASPA membership qualify for DOAJ listing. One of the OASPA's latest position statements endorsed Plan S, welcomed transition to full and immediate Open Access, and encouraged all its members to join the global Open Access Initiative.¹⁰¹

Although the journal acceptance criteria of editorial societies and indexing services may overlap, there are major differences related to the absence of article searches at society platforms. This is why equally categorizing membership and journal indexing status is incorrect. Some journals mistakenly claim 'indexing' by COPE and the International Committee of Medical Journal Editors (ICMJE) to make an impression of credibility.^{102,103}

Separating indexing services from membership in editorial associations is, therefore, required to help readers perform related bibliographic searches and better understand international status of their target journals.

CONCLUSION

Over the past two decades, the publishing landscape has transformed enormously due to the digitization and introduction of online communication tools. The Open Access Initiative, launched in the early 2000s, has already improved visibility and use of scholarly articles in most parts of the world. The evaluation and crediting mechanisms have also evolved to adjust to the requirements of the digital communication.

The advanced online editorial management and publishing platforms are now widely employed to speed up the editing and publishing. Open Access, in turn, increases the use of scholarly outputs, particularly when all parties actively contribute to the pre- and post-publication communication. Preprint servers and institutional repositories are now inseparable components of such communications, increasing the exposure of innovative knowledge to their users.

Social media is becoming yet another major player in the scholarly publishing, highlighting the societal implications of scholarly outputs and adding a new dimension in the comprehensive (citation-based and alternative) impact evaluation. Research managers and publishers alike should accept that embracing Open Access with its established and emerging components (Fig. 1), such as social networking platforms, may result in a scientific breakthrough.

In view of the evolving standards, open-access publishers are encouraged to give more rights and credits to their authors and reviewers. The authors who publicly share and reuse their articles for research and educational purposes boost their own online profile and credit their primary publishers. The reviewers who record comments on specialist platforms, such as Publons, increase transparency of their contributions and thereby raise the journal quality. Social media channels are also increasingly used to promote freely available articles and reviewer comments, all of which allow timely picking both valuable and deficient contributions.



Fig. 1. Essential components of Open Access.

With the growing number of open-access journals, it is critical to appropriately categorize and index the most advanced and influential sources. Although Scopus introduced an indicator of Open Access for sources registered with DOAJ, the subscription barrier to Scopus limits searches through this largest multidisciplinary database, particularly in the developing world. The DOAJ is currently the only free registry of quality open-access journals, some of which are marked with the Seal for their advanced digitization and most of which are searchable at article level. There are, however, limitations of the registry too, mainly due to the lack of tools to track citations and alternative metrics of open-access sources.

The advantages and limitations of the currently available platforms and digital tools facilitating Open Access^{104,105} raise the issue of the comprehensive approach. The slow pace of the implementation of full and immediate Open Access in some parts of the world could be due to the lack of the awareness of the importance of all its components — from liberal copyrights to open post-publication communication. There could be also inherent differences in the implementation of Open Access across academic disciplines, with medicine being at the forefront whereas social sciences and humanities still struggling to adjust its language and publication venues to the trends in other disciplines.

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