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Global Trends in Medical Journal Publishing

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Chairman of Elsevier

Academic journal publishing dates back to the 17th century, with the establishment of *Journal des sçavans* and *Philosophical Transactions of the Royal Society* in 1665. Since then, the core responsibilities of academic publishers have remained constant: to register, certify, disseminate, and preserve research literature. In the 20th century, the Internet and other digital technologies led to a proliferation in the available channels and processes for disseminating scientific research. Now, manuscripts and the peer review process are managed via online editorial platforms; researchers download papers from electronic databases such as ScienceDirect and read the papers on portable e-devices like Samsung Galaxies; web-based articles are preserved in digital archives such as Portico and CLOCKSS.

In many ways, digital technologies have made content more accessible than ever: in 2012, 1.8 million scientific research articles were published (1). That is more scholarly literature published in one year than any single scholar can possibly hope to read in a lifetime. This abundance of scientific literature is not new: the number of scholarly articles published each year has grown steadily by about 3% (2). Indeed, thirty years ago, Betty L. Siegel, President of Kennesaw College, observed, "there is enough scientific information written every year to keep a person busy reading day and night for 460 years (3)."

The difference today is that we now have the technology and the tools to enable us to find what we need and want to read more quickly. It is not enough for publishers to provide high-quality content to the scientific and medical communities: publishers now must provide the right content at the right time in the right context.

There are four trends defining the medical research landscape today which reflect this new role: research management, big data analytics, solutions content, and reuse of content. First, at both the individual and institutional level, better research management tools are crucial for increasing researcher efficiency. Publishers recognize that researchers do not just need to find content—they must also be able to manage it effectively and share it easily with peers. One way my company, Elsevier, is helping researchers do this is through Mendeley, an innovative platform we recently acquired that assists researchers with document and reference management, collaboration, analytics, and networking. Mendeley stores and sorts research papers, facilitates searches within a researcher's "collection," suggests articles and potential collaborators, and allows research groups with members located on different continents to work together easily. Mendeley Institutional Edition (MIE) helps universities analyze research activity in real time. By aggregating anonymous statistics on the paper-reading habits of faculty and students, MIE enables librarians to optimize their subscriptions to extract more value out of limited resources.

The second trend is the increased use of big data analytics. With the amount of digital data created globally doubling every two years (4), the ability to interpret and make sense of that information is becoming critical. The global economic crisis has led to tighter research budgets, in turn leading to fiercer competition for funding amongst researchers. Individuals and organizations alike are increasingly seeking deeper insights into their work and their workflow through data analytics. The institutions that most effectively allocate their limited resources will be the ones that find the most success.

Big data analytics has become an integral part of this decision-making. Elsevier's Scopus database is the world's largest abstract and citation database of peer-reviewed literature. Drawing on the data from Scopus—or, our information about information—Elsevier's SciVal Suite is a powerful set of customized, web-based tools that allow researchers and decision-makers to harness the power of big data. Products include SciVal Spotlight, which analyzes institutional and national research strengths; SciVal Strata, which benchmarks performance of researchers and teams; SciVal Experts, which establishes a directory of research expertise; and SciVal Funding, which visualizes funding opportunities and intelligence for researchers. Each of these tools leverages vast quantities of data on research output to help drive better institutional decision-making.

The third trend is solutions content—that is, tailored information and solutions provided quickly and in the right context. One example is a product called ClinicalKey, Elsevier's answer to a common dilemma among physicians: to quickly find content that is comprehensive and trusted. ClinicalKey incorporates Elsevier's vast medical portfolio, with over 500 medical journals, 1,000 medical reference books and 13,000 surgical videos, as well as indexes trusted third-party content, including 20 million Medline abstracts. It draws on these sources to deliver relevant content to physicians quickly through semantic searches that improve content discoverability and produce more

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accurate search results. This functionality is powered by Elsevier Merged Medical Taxonomy (EMMeT), a proprietary taxonomy which allows ClinicalKey to understand not only clinical terms, but also common words and abbreviations. With EMMeT, ClinicalKey is able to discover the content most germane to the original search term as well as related content that would be missed by traditional keyword searches. The result is a fast, relevant answer that reduces search time, creating more time for patient care.

The fourth and final trend is the reuse of content, which helps medical researchers make new discoveries and innovations more quickly and efficiently. The reuse of content has major implications for the ways in which we access and use medical research. It makes it possible to create easily understandable visualizations from immense datasets and social webs of an institution's collaborating partners, based on its publishing history. It means we can take disparate multimedia files from thousands of different journals and bring them together on a central platform that is searchable and sortable. For example, hospitals and healthcare systems often struggle for months to create or update a single order set because they lack an integrated system to support order set creation and review. Correspondence between multiple authors and approvers is seldom streamlined, resulting in incomplete or insufficient order set systems which quickly fall apart. Elsevier has sought to mitigate this problem through the reuse of content with its product, InOrder. InOrder is an intuitive, cloud-based order set solution that enables clinicians to author, review and publish order sets in a collaborative environment. To translate evidence-based knowledge into better patient care, InOrder combines a highly efficient content management workflow solution with hundreds of customizable evidence-based order sets. The cloud-based delivery model ensures that InOrder is available across multiple technology platforms. At the same time, localization tools incorporate hospitals' clinical terminologies and import existing order sets to provide enhanced clinical guidance and seamless functionality.

The future of medical journal publishing is not so much a departure from the past, but an evolution into an additional role for publishers. Publishers need to continue to ensure the scholarly literature is high quality while simultaneously ensuring that high-quality content is discoverable by their readers through introducing new solutions that leverage new technologies to meet the changing needs of researchers. Innovative digital tools, such as ClinicalKey, the SciVal Suite, InOrder, and Mendeley, will offer more insightful and time-efficient analytical solutions. Effectively harnessing these four industry opportunities—solutions content, big data, reuse of content, and research management—will help publishers transform scientific and medical research processes and decision-making.

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