

“Open during renovation” : Open Science and libraries

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“Open during renovation”: Open science and libraries

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The popular term “Open Science” refers to a fast-growing movement with the noble intention of promoting unrestricted access to scientific research, data and dissemination during the various phases of the research process, from data collection through the analysis and publication of results. The paper reviews the interpretations and components of Open Science, such as Open Data, Open Source, Open Access, Open Peer Review, etc., and points out their relevance to libraries. It focuses on issues related to addiction professionals and researchers, including new technologies assisting collaboration and communication, alternative metrics to assess scholarly impact, and the opportunity to share research and knowledge via social media. There is a new role evolving for librarians who are willing to experiment with the venues of Open Science and assist researchers and practitioners; however, the new developments in making science more transparent and reproducible will affect everyone in the long run.

Keywords

Open access, Open science, Information technology

Open Science is one of today’s hottest topics. The phrase covers the noble intention to provide open access to the individual phases of research from data collection to publication and beyond: Open Data, Open Source, Open Access, Open Peer Review, Open Methodology, and Open Instructional Resources. Librarians, with their expertise in research assistance and new technologies, are primed to play a key role in opening science for broader audiences.

The interest in the Open Science movement stems from the daily work of the

Rutgers Center of Alcohol Studies (CAS) Library. In the past months, several journals that publish addiction science considered publishing or decided to publish openly accessible articles, such as the *New England Journal of Medicine*, *Nature*, *Science*, and *PLOS* journals. Additionally, scholarly social media applications such as ResearchGate, ORCID, and Mendeley have been adopted by researchers and have become more and more widely used in addiction science, prompting librarians to assess their potential usefulness to patrons and offer training and guidance.

The CAS Library staff has identified several emerging needs related to or derived from these endeavors to open up science and research. Enthusiastic and willing to experiment, we routinely assist researchers and practitioners in navigating the maze of open science. Recent challenges included the use of scholarly social media to benefit CAS and meeting the new NIH Biosketch requirement using SciENcv. New developments in making science more transparent will affect everyone's work in the long run. We strongly believe that librarians, famous for their adaptability and eagerness to explore, learn, and educate, now have a window of opportunity to stay abreast of the advances and can support scholars in every phase of the research cycle. Oftentimes, the first task is defining the task itself. Librarians with a global perspective of the processes of information retrieval and research can contribute to research and science by prioritizing tasks and promoting best practices.

Open Science defined

The [Wikipedia article](#) ("Open Science," 2015) on Open Science points out that the concept goes back as far as the 16th century, when scientists first shared knowledge and resources via newly-formed academic journals designed to promote collaboration. The term "Open Science" originates from a 2006 blog post by Jean-Claude Bradley, an Associate Professor of Chemistry at Drexel University, intended to clear the confusion about the definitions of Open Source Science and differentiate it from Open Source Software ("Open Notebook Science," n.d.). He suggested the phrase "Open Notebook Science,"

which has not yet suffered meme mutation. By this I mean that there is a URL to a laboratory notebook ([like this](#)) that is freely available and indexed on common search engines. It does not necessarily have to look like a paper notebook but it is essential that all of the information available to the

researchers to make their conclusions is equally available to the rest of the world. Basically, no insider information (Bradley, J.-C., 2006).

An umbrella term for the concept that encompasses multiple approaches and several interpretations, Open Science and its six main components (shown in Figure 1) can affect every facet of a researcher's everyday life. Challenges and opportunities include new technologies assisting collaboration and communication, alternative metrics to assess scholarly impact, and the opportunity to share research and knowledge via scholarly social media.

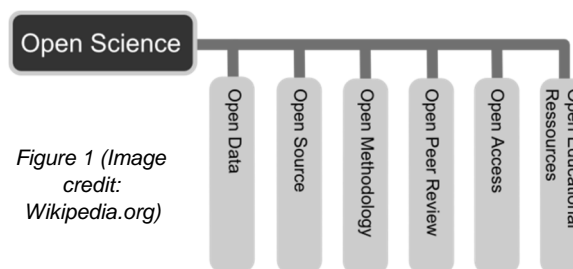


Figure 1 (Image credit: Wikipedia.org)

Open Data

One of the emerging positions in large academic libraries is the *data librarian*, i.e. a librarian specializing in data curation. The job includes storing and managing data during the research process, creating and applying metadata standards, and the time-honored tasks of finding, obtaining, and citing information. Systematic data collection and analysis by laymen, called *citizen science*, has become a popular form of public participation in scientific research. Such grassroots initiatives gather data in various locations and aggregate them in a common, open database. This is a form of *crowdsourcing*, where the collaboration of a large number of participants makes it possible to record events at an enormous scale – leading to “big data” in the open domain. Famous examples include [Project Feederwatch](#), documenting habits of birds in numerous locations, and [Galaxy Zoo](#), a large-scale interactive project classifying millions of galaxies. The scale of

such data collection and the improved capacity to record single occurrences of irreproducible events offer great promise for science. Louis Pasteur, Robert Koch, Joseph Lister, Florence Nightingale, and Ignaz Semmelweis, working separately in the 19th century, could hardly have imagined the possibilities that technologically-facilitated open data might hold for public health research.

Open Source and Open Educational Resources

Open Source refers to both sharing source codes, a trend now among programmers and scientists, and opening educational resources. Algorithms and codes are often valued and well-preserved secrets; however, young scientists, hoping to make their efforts reproducible, are more than willing to share theirs. It is also very helpful that scholarly social media platforms allow posting data sets and source codes as contributions to science. This practice has recently been acknowledged as scholarly activity by the NIH in its new Biosketch, which now uses the broader category “Contributions to Science” instead of the previously required “Peer-reviewed Articles.”

Opening up educational resources and sharing content in various formats makes knowledge available for larger audiences. A MOOC, or Massive Open Online Course, features traditional course elements provided via the web as well as forums and interactions within the class community. A notable initiative of open access content in the information science field is the Open Access Curricula for Researchers and Librarians, a UNESCO project to promote library and information science (“UNESCO’s Open Access,” 2015).

Open Peer Review

A remarkable segment of the Open Science movement is opening up the often-debated process of peer review. Transparent and fast new review methods have evolved in

addition to the often-criticized traditional process, in which pre-publication reviews are provided secretly by anonymous reviewers over a span of months or more. Authors can now share the first draft of their manuscript on scholarly social media web sites, soliciting opinions, comments, and criticism. Some critics of peer review are already predicting the end of the process, since with the removal of anonymity the review can become a more tactful and constructive process.

We should also note here a new publication format, the so-called *registered report* (Chambers, 2013). This is an unfinished and unpublished manuscript which can be submitted and accepted for publication before the results of the study have been finalized. The idea behind this is that more emphasis ought to be placed on the importance of the research question than on its final results, regardless of outcome.

Costs of Open Science

Open Science does not necessarily mean free science. Librarians are often consulted about the relative status and reputation of different scholarly journals by both senior and junior scientists. It is well known that most open access journals pass the costs of publishing on to the authors in the form of processing charges and page fees. The amounts range from \$500 to \$3,000 per article, although like anything else in a market-driven economy, these can go “on sale.” The discounted offers may also boast fast turnaround time and guaranteed publication. Addiction scientists working in reputable institutions have become a commodity and are bombarded with endless requests to publish their articles in open access journals or join editorial boards. Disoriented in the maze of open science, researchers often consult librarians about these dubious cases, creating a new role for librarians well-versed in evaluating online information.

Predatory journals

An academic librarian from Denver, Jeffrey Beall, took the initiative to establish a list of so-called predatory journals on his website, [Scholarly Open Access](#). Predatory open access publishing refers to an exploitative publishing business model. These venues take advantage of unsuspecting victims, who feel pressured to publish regularly. The “Publish or Perish” dilemma of academia may cloud the judgment of researchers when they receive an offer to publish their articles. They may ignore warning signs, such as the lack of the editorial and publishing services usually provided by respected and legitimate journals. If they read the fine print, they will discover hefty publication fees, usually assessed after the paper is accepted. The costs after publication are harder to calculate but no less severe: some readers may be misled by research that has not been properly vetted, while savvy consumers will lose respect for scholars and institutions associated with a low-quality venue. Being published in a disreputable journal hurts the author, the institution, and science in general.

Evaluating information in the online environment on a daily basis, librarians have long been aware that poor grammar and syntax, broken links, contorted English, and the lack of proper punctuation are all red flags that raise questions about the authority of a resource. Web sites and emails related to predatory publishers are no exception. However, the practice of adding or dropping a single word from a reputable journal title, called hijacking, demands particularly close scrutiny. For example, the Wiley journal *Depression and Anxiety* can easily be mixed up with the predatory *Journal of Depression and Anxiety* (Beall, 2015). Another trick is the “creative” use of journal titles already well-established on the OA market, such as using the name of the famous *Frontiers* published by *Nature* group and plagiarizing it as *Cancer Research Frontiers* with no actual affiliation (Beall, 2014b). More aggressive methods

include using old contact information for a journal that was recently bought out and became predatory, such as *Experimental and Clinical Cardiology*. The European owner kept the Canadian address, but the existence of an editorial board or peer review process is questionable. What is real, however, is the page charge on the invoice sent from a tax haven (Beall, 2014a).

New tasks for librarians

Open Science has created opportunities for librarians to fill new roles in research and help patrons navigate new resources and procedures. Large universities routinely use and publicize their repositories for scholars to share their work. Librarians have participated in designing and implementing these databases, and their task now extends to educating users about the benefits and actual use of the university repository, including version control and copyright issues. Their role is especially valuable in institutions with mandatory deposits. Librarians can train student assistants in order to ensure the proper use and maximum benefit of the repository.

Information dissemination

The most obvious areas for librarians to get involved include gathering and providing information on the new advancements of open science. Information sessions, one-on-one or in small groups, as well as ad hoc evaluation of online information resources, scholarly social media tools, and new software applications, can add value to the scholar’s daily work by saving precious time. Email blasts and newsletters can serve as an organized, structured, and non-invasive method of pushing information, especially if they are well-timed. Such services can be provided in a small, specialized library, as we have found at the Rutgers Center of Alcohol Studies. Table 1 shows our collection of resources on Open Science, presented in a recent issue of our newsletter (Ward & Haggis, 2015).

Open Science 101

RESOURCES

[Open Access Directory](#) contains simple factual lists about open access (OA) to science and scholarship, maintained by the OA community at large.

[Open Science Directory](#), with about 13000 scientific journals aims to provide a global search tool for all open access and special programs journal titles.

[Open Notebook Science Network](#), promotes Open Notebook Science, the practice of making the entire primary record of a research project publicly available online as it is recorded.

MISCELLANEOUS PROJECTS, WORKING GROUPS, AND BLOGS TO START WITH:

[OKF Open Science Working Group](#), a global network of researchers, librarians, students, policy-makers, publishers, data-curators, coders, entrepreneurs, activists and citizens who believe that open science is better science.

[Center for Open Science](#): a non-profit technology company providing free and open services to increase inclusivity and transparency of research, such as the [Open Science Framework](#) (OSF) supports the entire research lifecycle: planning, execution, reporting, archiving, and discovery.

[Open Science Grid](#): a global community of scientist, researchers, and experts in high throughput computing from all around the world.

[Open Science Data Cloud](#): provides the scientific community with resources for storing, sharing, and analyzing terabyte and petabyte-scale scientific datasets.

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Table 1 Open Science 101

The CAS' "Library Day" event is an occasion to showcase our involvement in the open science movement, complemented by informative articles in the quarterly *CAS Information Services Newsletter*. Recent topics include our collaboration with senior researchers to explore the NIH Biosketch requirement and to streamline a workflow. We worked closely with them to decipher the rules and software applications. The researcher, through his or her eRA Commons site (the NIH global grants platform), has access to [SciENcv](#), an intermediary platform. The Biosketch is generated from data fields filled out manually or populated by another application integrated with SciENcv. The National Library of Medicine designed SciENcv to link and integrate with MyNCBI, containing the author's publications, as well as ORCID, a researcher identifier social media platform. Since we had the opportunity to preview the new system at the 2014 MLA conference, and CAS researchers had eRA Commons accounts, we began on several rounds of testing to establish a workflow. This was then presented to the entire faculty in a workshop. We strongly believe that this type of collaboration is key to proving the importance and value of librarians in a new research landscape.

Scholarly social media

Scholarly social media applications, such as Academia.edu and ResearchGate, serve the noble goals of open science in addition to providing a free and open platform for researchers to showcase their work (Ward, Bejarano, & Dudás, 2014). Researcher profiles created on these platforms allow authors to share the bibliographic data (and full text, if copyright allows) of their publications in peer-reviewed journals as well as their non-traditional scholarly output, such as grey literature, datasets, presentations, educational materials, syllabi, etc. The preferred scholarly social media platform among addiction scientists, [ResearchGate](#), is only one of the many applications that can serve the scientific community. It helps users

build and maintain relationships, find collaborators, exchange ideas, and function in many ways to promote scholarly communication. Much like Facebook and LinkedIn, these sites involve activities like setting up a profile page, posting and sharing, endorsing, and writing recommendations. Statistics on scholarly impact are instantly provided and are openly available, in the form of alternative metrics, which all contribute to the evaluation of a scholar's work.

Alternative metrics, or altmetrics (Piwowar, 2013), which could be the topic of an entire article, is another area where librarians can serve research by monitoring trends. The NIH's recognition of altmetrics as a method for measuring scholarly output indicates its legitimacy, in addition to helping entry level and junior researchers get funded. Traditional metrics, such as citation counts and impact factor, are complemented by new statistics such as download counts, shares, and media mentions and cites, including scholarly social media. These metrics are meant to measure immediate impact on the actual readers in the field. In addition to traditional peer-reviewed articles, altmetrics provide readership data on unorthodox methods of scholarly output, such as datasets, presentations, syllabi, or virtually anything that attests to the scholar's scientific work. Librarians, already knowledgeable about bibliometrics, can take the lead in interpreting altmetrics and helping researchers with monitoring emerging tools.

[ORCID](#), as mentioned above, serves as a unique identifier in the research community. Its main advantage lies in consolidating the name variations of the individual author that may result from name changes or database input differences. Integrated with many applications, ORCID shows a great potential to eliminate discrepancies in citation counts observable in the various proprietary and free databases, as well as in scholarly social media. Librarians can promote its use and help researchers set up and link their IDs.

Librarians were early adopters and promoters of citation management software

applications such as EndNote, RefWorks, and, more recently, an open version called Zotero. The advantages of managing one's collection of downloaded articles now can be combined with those of scholarly social media. Such combinations in turn have fostered interest in new platforms that can accommodate the whole variety of applications relevant during the research process. [Mendeley](#), which was originally a social media application and is now owned by Elsevier, has introduced one solution, which is available for researchers in its basic form for free. Premium versions include individual and institutional platforms on a subscription basis. In addition to providing guidance and training, librarians can help a research community decide which version of such a service best suits its needs.

A brave new world for librarians

Thoroughly enmeshed in the infrastructure of addiction research,

librarians have the right to claim a part in the advent of open science. Moreover, we strongly believe that by taking the initiative and assuming the active role of the "informationist," librarians can play a significant role in shaping the research process, as they did in making the Internet what we know today.

Scholarly social media, along with other Open Science initiatives, will newly invigorate science, research, and scholarly publishing (Rinaldi, 2014). Librarians can monitor new advancements and assess new platforms, tools, and applications. It is worth paying attention to these initiatives, following the trends, and finding the loopholes and challenges where the help of an information professional can make a difference. At a minimum, we can always look up and check out resources, and recommend a good read (Bartling & Friesike, 2014).

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