

The Challenges and Possibilities of the Open Science for the Libraries and Information Studies

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Abstract: The Open Access movement in scientific publishing has been gathering momentum in the European Union and its member states, partly due to the policies of some of its main research funders. Similar policies are being implemented worldwide. Already we have seen encouraging research results on the effects of openness on the dissemination of scientific outputs. As business models of Open Access publishing are still under development, but there already is evidence that open access is becoming a major trend in scientific publishing. Recently the requirement of openness is also set to the research data.

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1. Open science

The Open Access movement in scientific publishing has been gathering momentum in the European Union and its member states, partly due to the policies of some of its main research funders. Similar policies are being implemented worldwide. The business models of Open Access publishing are still under development, but there already is evidence that open access is becoming a major trend in scientific publishing (Archambault & al. 2014). Recently the requirement of openness is also set to the research data.

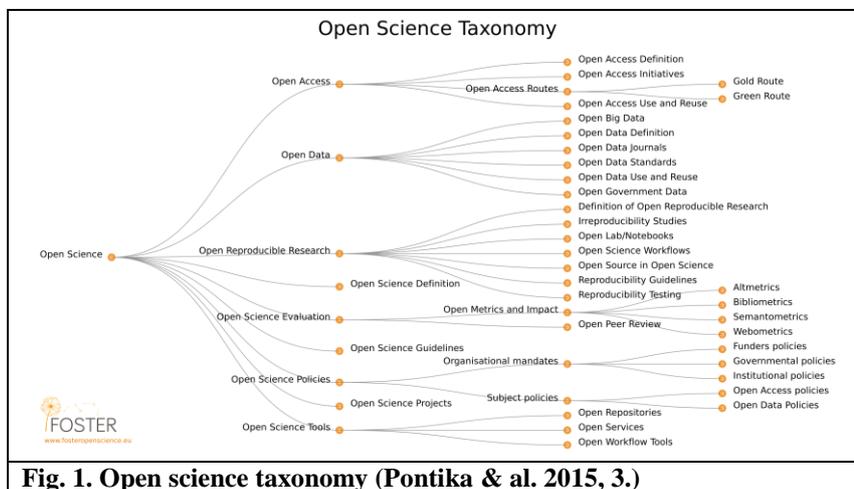


Fig. 1. Open science taxonomy (Pontika & al. 2015, 3.)

Today, openness and transparency are crucial to the development of research: we have already seen promising results emerging from data mining and other digital techniques that surpass the abilities of the human mind to handle huge masses of digital data. This poses new challenges for academic libraries and their leaders as well as demands for new services (see Fig 1.).

Ideally, science should aim at complete open access to subject all research to the systematic critique of the whole scientific community and for the benefit of all the society and its members. Science can be better advanced when all researchers have access to both scientific publications and the material from which they draw, i.e., research data; and at the same time its effects to the society will increase. (Saarti & Tuominen 2017.)

To build this ideal world we need a lot of political lobbying, hard work from the libraries and from the scientific publishers and new methods and research to depict and analyze the rapidly evolving environment to give new tools to the researchers in all the disciplines. From the educational point-of-view there is a need for special education to give to the students the skills they will be needing in the future library work.

2. Challenges and possibilities of the open science for the libraries

The open science movement started already in 1990's, although the first discussions being more ideological than practical ones (Ilva & Laitinen & Saarti 2016, 13.). The birth of the pay-walled scientific e-publishing, as already mentioned, changed the paradigm of the academic libraries. They outsourced their collections to the publishers and at the same time news types of restrictions to the open access of scientific publishing started to evolve due to the copyright issues in the digital realm.

The policy level discussion about the open access started from the beginning of this millennium when research funders and national policy makers started to set the open access to the publicly funded research as an imperative not only as a wish (see e.g. European Commission 2012). This on the other hand led to a new type of access to the documents: libraries and other actors started to discuss and implement parallel publishing.

Parallel publishing means that commercially published documents are also published in some form openly, via a parallel publishing information system. For the users and for the libraries this means that another type of edition is being published. This means that the long-time preservation of these documents has become an issue, especially when there is speculations and actions in some libraries to collect all the published documents to be preserved, and if possible, also to accessed via these types of information systems.

The most recent phase of the open science is the need and requirement to open research data to the public including open source codes and open methodology to all the educational and research work produced within the academic community to enhance research and learning to all (Kraker & al. 2011, 645). It seems that the libraries are taking these tasks as a part of their collections and services or at least are collaborating in this process of opening the science. This means that a new and massive types of documents will most likely be integrated to the libraries collections and under their management.

Research data can be seen from the point-of-view of collection policy as very heterogenous, needing special care and knowledge and needing special technologies especially when one considers the long-time preservation of it for the future generations (see more e.g. European Commission 2017). And when comparing this to the traditional collection items that the libraries and archives are used to deal with at the present, one can say that there are a lot of open questions to be answered, not least the economic resources needed in this type of library work.

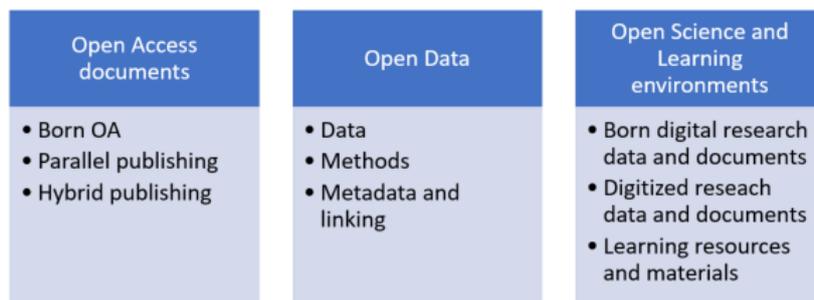


Fig. 2. Open science policies

Figure 1. depicts the already existing and developing new types of scientific documentation that is happening due to the open science policies implemented. One can already see that the open access will be part of the library collection and preservation policies. Its managing is also easier than the other open science elements since it relies on the traditional rules and practices of the scientific publishing.

Open data and open science environments are still evolving and most likely will be doing that almost chaotically in the future although there are already some initiatives towards joint services (e.g. EOSC, i.e. the European open science cloud). At the present, all one can say is that these both will be more difficult to manage than the analogue environment simply because they are both technology and discipline dependent, and they will be changing rapidly in the future. On the other hand, from the point of view of libraries and archives task to enable the reuse and referring to the science and its results, the library community must be active in planning the strategies, tools, and standards how this is enabled and done in a sustainable and manageable way.

3. Open science and information studies

The current movement towards openness in the academic work sets new requirements and tasks also for the information studies research and education. LERU, League of European Research universities has published its roadmap paper for openness titled “Open Science and its role in universities: a roadmap for cultural change” (LERU 2018). Already in title, the paradigmatic role of the change is emphasized in defining this as a cultural change that needs several actions to be accomplished.

Cultural change means implementing a total new point-of-view how the research is conducted at the universities. This gives for the first a new landscape to be researched and, in addition, new types of services to be created and implemented in practice both at the universities and at their libraries.

For the library and information education this means a rapid renewal of the current curricula. There is a great need for new type of specialists at the academic libraries. But this is not enough, all the current library staff need updating training to have the skills and knowledge needed to be able to act in a sound manner in the changing operational environment.

The LERU paper gives nine specified areas that need actions to be implemented at the universities. They are (LERU 2018, 26 – 27):

- Cultural change
- The future of scholarly communication
- FAIR data
- The EOSC (European open science cloud)
- Education and skills

- Recognition and rewards
- Next-generation metrics
- Research integrity
- Citizen science

So first, there is a need to manage and lead the change within the academic community. This needs qualifications e.g. in the academic work, what the open science means for the research and how to motivate the change towards openness in an environment where the *modus operandi* still favor the traditional ways of conduction and publishing one's scientific results.

Secondly there is a need for library specialists in almost all the above-mentioned areas: e.g. open access publishing, open data and next-generation metrics all require specific know-how and services on how to implement these new types of actions and services.

And finally, there is a great need for staff members that can educate and counsel the academic community, the public and the library colleagues in the new skills and requirements set by the openness of the academic work.

In addition, LERU defines (2018, 9) four high-level recommendations for universities to embrace Open Science:

1. Appoint a senior manager to lead Open Science approaches across all eight pillars of the Open Science debate identified by the European Commission.
2. Develop a programme of cultural change, which is necessary to support the changes in principle and practice which Open Science brings.
3. Establish advocacy programmes, which should identify the benefits of Open Science approaches, whilst being realistic about the challenges.
4. Draw up a communication strategy, which enables the whole university body to become familiar with Open Science practices.

These all give a good opportunity for the academic library community to interact and integrate to the strategic process of the parent organization and educate and inform the academics about the open science and its requirements.

It can already be argued that the libraries must be in the heart of the open science movement, especially since quite a lot of its actions are to develop the basic functions of the scientific publishing and research data management, evaluation and dissemination.

4. Conclusions

At the present, it seems that the resource allocation for the academic institutions and especially to the libraries is challenging. We have seen several economic downturns during the past decades where the budget cutbacks have influenced the collection policies. In practice, this has meant resource re-allocation from the (collection) premises towards other uses (Juntunen & Muhonen & Nygrén & Saarti 2013).

The biggest challenge for the libraries is the emerging e-science and the resource allocation for this. This means new types of services for the academic community and even might mean a change of the role, or at least severe identity rebuilding work for the academic libraries. The emerging digitally perceptive generation of students and academics can already utilize digital tools in disseminating their papers, making their reference databases, and creating metadata for their work, i.e. they have started to act like librarians in managing their academic work.

For the libraries, this can either be a great possibility to start to educate and implement the long tradition of library practices and philosophies to the academic actors; or the library community can complain about the amateurs who are not acting properly and should stay on their own deck. The latter, of course, would mean the end of the academic librarianship or at least it would change the institution to a museum.

The post-digital world of academic work, and academic librarianship, is about networking and use of social digital technologies. This environment changes rapidly, is about making and creating innovation together. This environment breaks down hierarchies, and it values knowledge, ability, and expertise.

But it also needs leadership, because it is quite short-sighted. The core values of academic librarianship, preserving the past knowledge for the future and opening science and its achievements to the public, are becoming even more important than ever in our society that differentiates and where people are becoming unsocial despite the networking technologies available. The libraries have been acting throughout the history as creators of civic societies, this task has not disappeared.

The most invigorating aspect of the recent development of the e-science are the possibilities it is creating in opening science and its result to all humankind; and the new possibilities it is offering for conducting the research when artificial intelligence can be combined with the human intelligence in making new discoveries and managing the great challenges facing the human kind soon. Academic libraries, their collections and their expertise must be part of this evolution.

This also sets a requirement for a rapid renewal of the library and information education and curricula to educate and give updating training to the already working staff members. And finally: this new operational environment and ongoing cultural change gives a lot to be researched and new services to be developed within our field of expertise.

References

- Archambault, Éric & al. (2014). Proportion of Open Access Papers Published in Peer-Reviewed Journals at the European and World Levels—1996–2013: RTD-B6-PP-2011-2: Study to develop a set of indicators to measure open access. Bruxelles, European Union. Retrieved from: http://science-metrix.com/sites/default/files/science-metrix/publications/d_1.8_sm_ec_dg-rtd_proportion_oa_1996-2013_v11p.pdf
- Ilva, Jyrki & Laitinen, Markku & Saarti, Jarmo (2016). The Costs of Open and Closed Access: Using the Finnish Research Output as an Example. *LIBER Quarterly* 26(1). DOI: <http://doi.org/10.18352/lq.10137>.
- Juntunen & Muhonen & Nygrén & Saarti (2013). Reinventing the Academic Library and Its Mission: Service Design in Three Merged Finnish Libraries. In: *Mergers and Alliances: the Wider View: Advances in Librarianship*, vol. 36:225 – 246. Ed. by Anne Woodsworth & W. David Penniman. Bingley, Emerald.
- LERU (2018). Open Science and its role in universities: a roadmap for cultural change. S.l.: LERU. Retrieved from: <https://www.leru.org/files/LERU-AP24-Open-Science-full-paper.pdf>
- Muhonen, Ari & Saarti, Jarmo (2016). The changing paradigm of document delivery – exploring researchers’ peer to peer practices. *Interlending & Document Supply* 44(2):66-71.
- Pontika, Nancy; Knoth, Petr; Cancellieri, Matteo and Pearce, Samuel (2015). Fostering Open Science to Research using a Taxonomy and an eLearning Portal. In: *iKnow: 15th International Conference on Knowledge Technologies and Data Driven Business*, 21-22 Oct 2015, Graz, Austria. Retrieved from: <https://doi.org/10.1145/2809563.2809571>
- Saarti, Jarmo (2018). Collection policies for the post-digital era of academic publishing – future scenarios for the academic libraries. In: *Repositories for Print: Strategies for Access, Preservation and Democracy*, ed. by Vattulainen, Pentti & O’Connor, Steve. Berlin: De Gruyter Saur. Pp. 103 – 112. <https://doi.org/10.1515/9783110535372-010>
- Saarti, Jarmo & Laitinen, Markku & Vattulainen, Pentti (2017). Effects of the digitization to the printed collection policies: the digital knowledge economy and the Finnish academic libraries. *Library management* 38(2/3):167 – 174. <http://dx.doi.org/10.1108/LM-01-2017-0004>
- Saarti, J. & Tuominen, K. (2017). From paper-based towards post-digital scholarly publishing: an analysis of an ideological dilemma and its consequences *Information*

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Research, 22(3), paper 769. Retrieved from <http://InformationR.net/ir/22-3/paper769.html> (Archived by WebCite® at <http://www.webcitation.org/6tTS6isg7>)