Open Science: digging deeper into the assumptions that underpin openness and Web 2.0

blogs.lse.ac.uk/impactofsocialsciences/2013/06/20/open-science-new-perspectives-for-scholarly-communication/

6/20/2013

Benedikt Fecher *and* **Sascha Friesike** *take a closer look at the assumptions that underpin perspectives on scholarly communication and the benefits of communicating more openly with non-experts.*
Ultimately, the use of novel communication tools depends on quite a few variables and challenges remain on how best to adapt to more open practices.

For the purpose of an empirical study on open science, we conducted an in-depth literature analysis on the topic. After reading and analyzing about 50 peer-reviewed papers and a selected sample of blog entries and monographs (a list of the literature can be found here), we came to the, maybe unsurprising, conclusion that open science is an umbrella term that encompasses a multitude of different assumptions about the future of knowledge creation and dissemination; an umbrella term however that comprises five more or less distinct schools of thought with different assumptions about what exact aspect of research should be 'open' and 'open' to whom (see table 1). In the present article we will focus on one of these five schools, the 'public school' and draw on perspectives of openness in research for scholarly communication to a wider non-expert audience. The underlying paper for this article—including descriptions of all five schools—can be found here.

Table 1: Open Science: One Term, Five Schools of Thought

School of thought	Central assumption	Involved groups	Central Aim	Tools & Methods
Democratic	*The access to knowledge is unequally distributed.*	*Scientists, politicians, citizens*	*Making scholarly knowledge freely available for everyone.*	*Open access, intellectual property rights, Open data, Open code*
Pragmatic	*Knowledge-creation could be more efficient if scientists worked together.*	*Scientists*	*Opening up the process of knowledge creation.*	*Wisdom of the crowds, network effects, Open Data, Open Code*
Infrastructure	*Efficient research depends on the available tools and applications.*	*Scientists & platform providers*	*Creating openly available platforms, tools and services for scientists.*	*Collaboration platforms and tools*
Public	***Science needs to be made accessible to the public.***	***Scientists & citizens***	***Making science accessible for citizens.***	***Citizen Science, Science PR, Science Blogging***
Measurement	*Scientific contributions today need alternative impact measurements.*	*Scientists & politicians*	*Developing an alternative metric system for scientific impact.*	*Altmetrics, peer review, citation, impact factors*

The Public School: Opening Science for a Wider Audience

In a nutshell, advocates of the public school argue that science needs to be more accessible for a non-expert audience. The basic assumption herein is that the social web and Web 2.0 technologies allow and urge scientists on the one hand to open up their research processes and on the other hand to prepare research products for interested non-experts. We recognized two sub-streams within the public school: The first one is concerned with the accessibility of the research process (one could say the production); the second with the comprehensibility of the

research results (the product). Table 2 comprises quotes from our literature sample that underline this inference.

Table 2: Public School: an overview on literature (a Zotero list of the literature below)

Author (Year) ***Type of Publication***	**Title**	**Content**
Puschmann (2012) *Book chapter*	*(Micro)blogging Science? Notes on Potentials and Constraints of New Forms of Scholarly Communication*	Scientists today need to make their research accessible to a wider audience by using (micro)blogs. *"Scientists must be able to explain what they do to a broader public to garner political support and funding for endeavors whose outcomes are unclear at best and dangerous at worst, a difficulty that is magnified by the complexity of scientific issues." (P. XX)*
Cribb & Sari (2010) *Monograph*	*Open Science—Sharing Knowledge in the digital age*	The accessibility of scientific knowledge is a matter of its presentation. *"Science is by nature complicated, making it all the more important that good science writing should be simple, clean and clear." (p. 15)*
Grand et al. (2012) *Journal Article*	*Open Science: A New "Trust Technology"?*	Scientists can raise public trust by using Web 2.0 tools *"As mainstream science—and comment on science— follows the pioneers into the realm of Web 2.0, to be able to navigate the currents of the information flow in this relatively unmapped territory, scientists and members of the public will all need reliable and robust tools." (p. 685)*
Morris & Mietchen (2010) *Conference proceedings*	*Collaborative Structuring of Knowledge by Experts and the Public*	Using Web 2.0 tools to make knowledge production accessible for the public. *"(...) there is still plenty of opportunities for reinventing and experimenting with new ways to render and collaborate on knowledge production and to see if we can build a more stable, sustainable and collegial atmosphere (...) for experts and the public to work together." (p. 32)*
Tacke (2012) *Blog entry*	*Raus aus dem Elfenbeinturm: Open Science*	The Web 2.0 gives scientists new opportunities to spread scientific knowledge to a wider public. *"Im einfachsten Fall können Wissenschaftler etwa in Blogs über Themen aus ihrem Fachgebiet berichten und Fragen von Interessierten dazu beantworten." (p. 2)*
Irwin (2006) *Monograph*	*The politics of talk*	Due to modern technology, citizens can participate in scientific knowledge creation. *"(...) this book is committed both to an improved understanding of 'science, technology and citizenship' and to better social practice in this area (...)" (p. 8)*
Hand (2010) *Article*	*Citizen science: People power*	Citizens possess valuable knowledge from which science can benefit. *"By harnessing human brains for problem solving, Foldit takes BOINC's distributed-computing concept to a whole new level." (p. 2)*
Ebner & Maurer (2009) *Article*	*Can microblogs and weblogs change traditional scientific writing?*	Blogs can contribute to make research more accessible to the public. Yet they cannot replace articles and essays in scholarly communication.

		"Weblogs and microblogs can enhance lectures by bringing the resources of the World Wide Web to the course and making them discussable. Both new technologies, however, cannot replace writing essays and articles, because of their different nature."
Catlin-Groves (2012) *Review article*	*The Citizen Science Landscape: From Volunteers to Citizen Sensors and Beyond*	Citizens can help monitoring on a large scale. *"The areas in which it [citizen science] has, and most probably will continue to have, the greatest impact and potential are that of monitoring ecology or biodiversity at large geographic scales"*
Powell & Colin (2009) *Article*	*Participatory paradoxes: Facilitating citizen engagement in science and technology from the Top-Down?*	Citizen science projects are often short-lived *"Most participatory exercises do not engage citizens beyond an event or a few weeks/months, and they do not build citizens' participatory skills in ways that would help them engage with scientists or policy makers independently."* (p. 327)

Though both sub-streams of the public school involve a novel relationship between scientists and the public, the first one depicts rather an active involvement of non-experts in the research process (e.g., citizen science projects). The latter in contrast is particularly of interest for scholarly communication. It regards openness as a form of devotion to a wider and non-expert audience, often by using novel Web 2.0 communication tools—an ideal that is still a long distance off as empirical studies show.

Procter et al. (2010), for instance, in a study among researchers in the UK about the application of social media for scholarly communication, found out that only 13 % of the respondents frequently use Web 2.0 tools for scholarly communication (which include: writing a blog, adding comments to others' blogs, contributing to a wiki etc.) [1]. 39 % of the researchers are non-users and 45 % occasional users. The authors infer that the UK research community's use of Web 2.0 in novel forms of scholarly communication is currently rather low. However, their study further reveals that the use of Web 2.0 positively correlates with the researcher's organization's degree of cooperation with other organizations and the informal use of Web 2.0 technologies among the colleagues. In the same study, many researchers expressed the view that novel forms of scholarly communications brought no benefits and were even a 'waste of time'.

It seems that the use of novel communication tools for scholarly communication is one that depends on quite a few variables, all of which can be attributed to forms of functionality: What is the benefit of communicating more openly with non-experts? What are novel communication formats good for? The authors and papers we scrutinized suggest a number of ways …

Simplifying scholarly communication. Regarding the comprehensibility of research products the credo of the public school is quite simple: Scientific knowledge needs to be processed for non-expert audiences and today's communication technologies offer a great way to do so.One way to meet this aim is to simplify the scientific writing style or as Cribb and Sari (2010, p. 15) phrase it: "Science is by nature complicated, making it all the more important that good science writing should be simple, clean and clear" [2] . The authors' opinion is that when the audience becomes broader and the topics more specific, the academic dissemination of knowledge needs to adapt. In their book 'Open Science: Sharing Knowledge in the Global Century', Cribb and Shari later dwell on writing techniques and the adaptation of content and tonality for specific audiences (a short summary can be found here). Although the authors raise briefly the subject of social media for scholarly communication, they do not specifically describe how new tools can be used for different purposes in the scientific workflow.

Using new communication tools. On a more applied level, numerous authors suggest Web 2.0 tools for science communication. Puschmann and Weller (2011) for instance, describe the microblogging service Twitter as a suitable tool to direct followers to relevant literature [3]. Grand et al. argue that by using Web 2.0 tools and committing to public interaction, a researcher can become a public figure and honest broker of his or her information [4]. Priem and Light Costello, in an empirical study, found out that Twitter is also used as a communication platform among

scientists and a potential source for alternative metrics due to indirect citations [5]. While researchers already focus on the new tools and formats of science communication and the audience's expectations, there is still a need for research on the changing role of a researcher in a digital society. That is for instance the dealings with a new form of public pressure, the need for instant communication and the ability to format one's research for the public. A tenable question is therefore also whether a researcher—who is often also teacher and administrative worker in personal union—can actually meet this challenge: On the one hand, doing research on complex issues and, on the other hand, preparing these in digestible bits of information for novel media formats. Or is there rather an emerging market for brokers and mediators of academic knowledge?

Visualization of research results. With the recent focus on open data and big data, data visualization is becoming an important cornerstone in making research results better comprehensible for non-experts. In general good visualizations are easier to understand than tables and texts. They often comprise vast amounts of information still they are easy to read, to understand and to share with others. Social news websites like reddit.com or social networks make the sharing of these visualizations easy. (Here is Miriah Meyer's talk on data visualization.

Narrative presentations of research. With the success of websites such as TED we see that narrative presentations of research are a popular form for non-experts to gain access to research results. It is also an important format for researchers to raise awareness for their respective research fields. Research institutions like the German Helmholz-Gemeinschaft offer their own podcasts, where professional interviewers talk to the institutions' researchers and have them explain their work.

Do we need new brokers for scientific research?

A scientist today is not only expected to conduct innovative research, he or she should also be a skilled broker for his or her expert knowledge. At the same time, as Procter et al.'s study showed, do researchers not necessarily feel a benefit from using novel tools for scholarly communication – a dilemma. There is a mismatch between the societal expectation (scientists writing for non-experts) and the individual benefit (Web 2.0 is a waste of time) – an assessment that may mean that scholarly communication will not move cohesively toward Web 2.0. Sure, academic communication might change anyways once the digital natives push into shopworn institutions and inter-institutional cooperation increases even more. Still the question remains if a scientists can actually carry the additional burden of being present in a constantly changing media environment and communicating to changing audiences. Or if the specialization tendencies in the academic world and the changing media environment do not rather demand professional brokers for academic knowledge in the social web.

Note: This article gives the views of the author, and not the position of the Impact of Social Science blog, nor of the London School of Economics.

About the Authors

Benedikt Fecher *of the German Institute for Economic Research (DIW Berlin), is a doctoral researcher at the Humboldt Institute for Internet and Society. The focus of his dissertation is the participation in Open Science Projects.*

Dr. Sascha Friesike *is a Postdoc at the Humboldt Insitute for Internet and Society in the research area internet-enabled innovation. He holds a PhD in Technology and Innovation Management from the University of St. Gallen. Before he studied engineering economics at the TU Berlin.*