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SPECIALISED PORTALS, ONLINE INFORMATION SERVICES, SCHOLARLY ONLINE NETWORKS: THE IMPACT OF E-INFRASTRUCTURES ON SCIENCE COMMUNICATION AND SCHOLARLY COMMUNITY BUILDING

Open science in the making: preliminary remarks on the putative effects of specialised online portals on scholarly collaboration and community building

Dirk Hommrich

Abstract

This commentary introduces a preliminary conceptual framework for approaching putative effects of scholarly online systems on collaboration inside and outside of academia. The first part outlines a typology of scholarly online systems (SOS), i.e., the triad of specialised portals, specialised information services and scholarly online networks which is developed on the basis of nine German examples. In its second part, the commentary argues that we know little about collaborative scholarly community building by means of SOS. The commentary closes with some remarks on further research questions regarding the putative impact of such systems on science communication and scholarly community building.

Keywords Scholarly communication; Science and media

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Digital technologies, online resources and internet communications are an integral part of electronic infrastructures for science communication and scholarly community building. In many cases "e-infrastructure" is used synonymously with "e-science" or the computational enhancement of scientific work processes. But for most common users in science and research the expression "e-infrastructure" or "cyberinfrastructure" [cf. Edwards et al., 2007] means more or less the same as "internet", "website" or "online information". Focusing on the most advanced IT-possibilities for science communication and scholarly community building, this commentary uses the generic term "e-infrastructure" to refer to digital information infrastructures that in turn are both built upon and used by (specialised) scholarly online systems (SOS).[1]

Moreover, if we speak of "specialised portals, specialised information services, scholarly networks" the team of openTA looks for similarities among these

[1] More broadly speaking, SOS offer typical functions of social media which are transformed into and designed as a surface for academics and specialists of a field of expertise.

different socio-technical arrangements. Two main features of these internet-based offerings are: 1) specialisation in one or more academic disciplines and a corresponding (inter-)disciplinary community; 2) integration of functions and multimodality. This is why we don't include single-purpose services like "simple websites" (e.g. of an expert association), library catalogues, repositories, digital document delivery, stand-alone blogs, mailing lists etc. under the heading of scientific information systems, specialised information services, scholarly networks, which manage diverse functions. The mixture of functions defines the difference we are interested in when we call these services scholarly online systems (SOS). But which kind of functions are we talking about?

On a fundamental level we might distinguish between information (messages, announcements, events calendar, new book releases), communication (two- or multi-sided, e.g. mailing lists, blogs, discussion groups), collaboration (multi-sided interaction, cooperative coordination, collective writing in the "cloud", distributed analysis of data) and transaction (two-sided in the sense of binding communicative action, e.g. the order of a publication, signing a research proposal).

Following a (stereo)typical scholarly workflow you would start by searching for publications, data, projects, partners, sponsors. Once a research project is funded you create your own publications and research data which are to be shared within a specialised (scientific) community. Workshops (and virtual seminars or streaming solutions) are also part of this research episode. It might also be useful to offer research tools, e.g. online questionnaires and survey systems or shared libraries in the social sciences. Outcomes would have to be discussed, evaluated, improved and reviewed. — And it seems that in general, almost every step in the workflows of researchers can become a product for communication and interaction [cf. Schonfeld, 2017].

Towards a socio-technical typology of scholarly online systems

It is helpful to come to terms with what we are talking about when we approach the terrain of SOS. Of course, there is more than one way to look at and classify features, challenges, functions etc. of SOS. For example, one could have a look at the interplay between participation, online networking and informational or knowledge exchange whilst recognizing that aspects of technological, media and information infrastructure might come into play when we analyse SOS. Another approach could be to differentiate types of publishing including all the complex questions about property rights, openness and licence; it could also be illuminating to focus on the personnel of SOS, their competences and attempts to improve certain skills.

Meaningful heuristics and convincing typologies should be able to account for different facets of a research issue. Because this also holds for the study of SOS, Ulrich Riehm and me wondered if it was possible to develop a classification that is able to represent the multifunctional design of those nine SOS which were represented at the 6th workshop by openTA [Riehm and Hommrich, 2018] . This is why we investigated these SOS by using the following six features in the aftermath of the workshop:

1. Stage supported within the research process and workflow,
2. Public impact,

3. Financing,
4. Variety of contents,
5. Editorial procedures,
6. Automated processing of content.

One finding is that the workshop's nine SOS do not differ essentially regarding the first three features.

In view of stage supported, which shall be enhanced by the SOS discussed at the workshop, priority is definitely given to the simplification of the search for current findings of research and their reception.

Regarding the potential public impact, the principle of (cost-)free access for all internet users dominated the workshop's SOS, community-based or private forms of communication are rare.[2]

Regarding financing, the SOS considered mainly enjoy public funding; just in one case private donations or membership fees play a significant role.[3] Remarkably, the content-related attributes of the SOS in question comprise a wide range of differences. Before addressing this observation the three features and their particular characteristics need to be explained in detail.

By speaking of a "plurality of contents", we don't address the prevailing quantity of a content type but the diversity of content as the first feature. Examples are news, dates and calls, bibliographic data, publications, i.e., full texts, blog contributions, discussion forums, comments, project information, research data, information about people, information about institutions, information about teaching and study programmes, advertisements of vacancies and cooperation offers, metrics, usage statistics, valuations, reviews, (conference) proceedings. We roughly distinguish between low, medium and high diversity.

The second content-related feature refers to the editorial i.e. intellectual preparation of content, be it the acquisition and selection of news, dates or contributions, text editing, online linking and much else. This feature both calls upon human resource requirements and the relation between intellectual activities and algorithmic operations. Again we distinguish between low, medium and high levels of manual processing.

Regarding the third content-related feature we look for (supplementary) automated processing, enrichment and cross-linking of content. This feature captures the extent to which digital linking and algorithmic processing are used. As above, we also distinguish low, medium and high levels of these ICT practices.

[2]Regarding "push media", i.e., media which deliver content automatically after an initial assignment, e.g. newsletters or mailing lists, the openTA workshop showed that these ways to communicate are still very popular. This is an important assessment which has to be included in an extended analysis.

[3]The only exception is the information platform romanistik.de which is funded by dues of professional associations and donations and supported by the commitment of individuals. This demonstrates that a durable and workable "business" model is both feasible and possible by means of "private" funding.

Table 1 shows the results for those nine SOS which have been presented at the 6th openTA Workshop.[4]

Table 1. Features of the workshop's SOS.

	Language[a]	Research process	Communi-cations	Financing	Plurality of contents	Intellectual preparation of content	Automated linking and data enrichment
EVIFA (Social and Cultural Anthropology)	German, (English)	Enquiry	Open	Public	High	Medium	Low
romanistik.de (Romance Studies)	German (FR, IT, ES, PT)	Enquiry	Open	Public	High	Medium	Low
H-Soz-Kult (History)	German, (EN)	Enquiry	Open	Public	High	High	Low
Fachportal Pädagogik (Education)	German	Enquiry	Open	Public	High	High	Medium
openTA (Technology Assessment)	German	Enquiry	Open	Public	Medium	Low	Low
Pollux (Political Science)	German, (EN)	Enquiry	Open	Public	Medium	Low	Medium
SocioHub (Sociology)	German, (EN)	Enquiry	Open and restricted	Public	Medium	Low	Medium
FID Liguistik (Linguistics)	German	Enquiry	Open	Public	Medium	High	High
FID Jüdische Studien (Jewish Studies)	German (HEB)	Enquiry	Open	Public	Low	Low	High

[a] As is to be expected, the SOS of the workshop which offer to switch to English show that the parts written in English are those which have the functions of navigation (menu), explaining the portal, of commenting on the system (metacommunication). In the case of openTA there is a similar online system, the Technology Assessment Portal (TA Portal) in English: http://www.technology-assessment.info/, last visited on 2 March 2018.

It makes sense to distinguish these nine systems regarding their different content-related characteristics.[5] We propose three bundles of such characteristics: the first group aims at *generating content*. Systems which belong to this group are the "Virtual Library of Social and Cultural Anthropology" , named "EVIFA", the open platform for Romance philology "romanistik.de", the information and communication portal for historians and historical research "H-Soz-Kult" and the specialised system for educational science, educational research and pedagogy "Fachportal Pädagogik". Unsurprisingly, these four online systems have a long development and have been online for at least 15 years. Most of them — EVIFA,

[4] The characteristics have been reviewed by the representatives of these SOS. We regarded the current state of development and disregarded future goals. If multiple features came into question (e.g. support for the preparation or the follow-up of a research process) we chose the currently most dominant and important one.

[5] An additional criterion could be the naming of the SOS: which function does it highlight?

H-Soz-Kult and the "Fachportal Pädagogik" — have emerged from library-contexts in a strict sense.

The insights of the workshop show that long-lasting specialised portals in particular offer attractive basic services like news, job advertisements, calls and comparable content which are used on a regular basis. This leads to the assumption that their search functions are used for case-related, sporadic search requests. Moreover their search services compete with powerful alternative alternatives like Google Scholar and other comprehensive (scientific and scholarly) search engines.

These systems manage a median and high level of intellectual and editorial work whereas automated processes of linking and enriching content tend to be sparsely used. This may be seen as evidence for well-established workflows, well financed facilities and/or an extraordinary commitment of their scientific community. Possibly, this commitment depends on a centrality (or even "monopoly") of the SOS's services after many years of keeping the system running: the usefulness of the system needs to be proven and anchored within the scientific community — maybe it has even had to become customary for the SOS to deliver specialised information and content for researchers and other professionals. Nevertheless it might be objectionable that these online systems disregard existing possibilities of process automation, linking and data enrichment due to e.g. missing know-how or a lack of resources. In spite of that it may of course also be the technology itself which is missing simple and successful ways of implementing them. For instance, many times even the "simple" mapping of bibliographical, standardised and widely used formats does not work without intellectual audit.

The second group *aggregates* information and comprises three SOS: openTA, the online services for political science (Pollux) and for sociology "SocioHub". They have a low or median level of content diversity and do edit their contents to a minor degree. Either automated methods to link and enrich data are not being used or — at best — are of a median importance. What are the factors which might explain this low editorial effort? Compared to the first group it seems that that their median or low degree of content diversity might be one reason.

At openTA the low intensity of intellectual and editorial effort is part of the mission: it is essential for us that the cooperating institutions of the Network Technology Assessment (NTA) excercise their editorial responsibility for quite diverse contents (news, calendar, publications). OpenTA then aggregates the information by the cooperating institutions on a common portal surface. That is why in most cases the portal's functions are markedly more complex than the functions of the respective websites of the data sources [Hommrich et al., 2018] . For Pollux and SocioHub scientific publications are central for their services. Normally publication data come from external professional databases before Pollux and SocioHub aggregate already well-kept data automatically in a user-friendly environment, so editorial preparation is not necessary.

The third group *(inter)links content*: the information portal Linguistics (FID Linguistik) and the FID for Jewish Studies. The group's outstanding feature is the comprehensive automated processing of data for the purposes of the enrichment and (inter)linking. The possibilities to use these methods are very specific and depend on their respective discipline and sphere of knowledge.

The central research material of contemporary linguistics are textual corpuses which are already machine-readable. This is the main reason why the conditions for further automated processing, especially the linking and enrichment of research material, are much better than with still unstructured information like text-based content.

For instance the FID for Jewish studies has to cope with the challenge that the metadata of Hebrew texts come from several library catalogues which use different rules of transliteration. Therefore the essential problem is how to aggregate and enrich metadata in order to make them accessible to a search engine "beyond" different library catalogues. The transliterations become unified by means of an automated or at least semi-automatic method which integrates library-centered data structures. Building on standardised data, linked open data and specialised data sources such as online encyclopaedias help to contextualise and enrich the available metadata.

Informal communication amongst scholars serves two ends: the production of formalised[6] scientific insights on the one hand and social cohesion within a communicative group of scientists on the other [Lüthje, 2017, p. 112] . The first part of my commentary focused on SOS and how these systems try to lay the ground for and enhance the production of formalised scientific knowledge, i.e. publications. In its second part, my commentary will try to come to terms with the production of a more or less "closed" scientific community.

Remarks on collaborative scholarly community building

"Open Science" as a political agenda obviously addresses comprehensive images of science, technology and society in future [cf. Riehm and Nentwich, 2017] whereas in contrast, contemporary advanced SOS follow a pragmatic stance: in most cases SOS which conduct a non-profit mission[7] promote their digitally enhanced services for the scholar's workflows, they claim tangible usefulness and fluid interaction as well as "openness" to scientists and the public.[8]

For those who run such sociotechnical online communication systems under conditions of (cost) efficiency and effectiveness, (digitally enhanced) collaboration can be of special interest. Like every technology, hardware or software, SOS — no matter if commercial or communitarian — need the support of their community and they need users. In other words, if SOS-teams try to run their systems

[6] Following Taubert [2017a, p. 125], formal scholarly communication fulfills four functions: 1. registration of a reviewable point in time when validity claims are being made; 2. certification and peer review which recognises a scientific contribution; 3. dissemination within a scientific community, and 4. archiving to save the specialised knowledge continuously.

[7] It is only by including other systems, particularly profit-oriented ones, that other stages of research processes — ResearchGate's stage of publication and economic utilisation — could come into play. Nonetheless, it is clear that library-oriented or simply informative applications continue to prevail against cooperative functions supporting research processes and publication directly.

[8] If one looks beyond information supply and information retrieval in the context of the digitisation of scholarly communication, there are several emphatic "promises" of "openness". Cf. Lüthje [2017, p. 118] wrt. images of "small science", "democratisation", "reinforced networking and communication". Contrary to that, critics of digitally driven open science ask how to reform it in a way "working towards a type of scholarship which is about learning from each other, not about surveillance and gatekeeping." [Ernesto Priego, interviewed by Tennant, 2017] — Keeping this in mind, one could ask how to build and use SOS to refurbish academia and its scientific communities regarding a commons-oriented shared ethic.

non-commercially, the connective and affective, mobilizing power of informal scholarly online *and* offline communication and social networking may be a central need to keep things going and to motivate people (innovators, promoters, contributors) to commit themselves to the respective SOS and dedicate a part of their time and energy to support the portal and to identify professionally with it and/or the respective scientific "scene".[9]Hence, if specialised online portals are to succeed as open access or semi-commercialized academic information and communication services, operators need knowledge about how to improve collaboration and dedication both within their reference community and between communities.[10]

When we speak of collaboration we think of complex types of coordinated action, either online or offline.[11] "Collaboration" thus means any kind of coordinated (group-oriented) action which demands a) communicative "networking" as a prerequisite, and b) solidarity- and community-based attitudes of actors (that exclude corporatisation as a goal of the project). We analytically distinguish three degrees or types of collaborative action: 1. *simple collaboration* which might rely on shared algorithms, shared data, shared articles etc., 2. *advanced collaboration* which relies on more complex *online and offline* interaction, 3. *sophisticated collaboration* that additionally aims at cooperation agreements or contracts which are based on common middle- and long-term plans or interests of individuals, groups or institutions (white papers as well as treaties). Goals of collaboration can be scientific insight (disciplinary/interdisciplinary knowledge production and debate) and/or social and professional cohesion among the participants (intensified knowledge exchange, trustworthy and highly reliable transactions between actors, "team spirit").

In the case of openTA we have experiences for at least six years since the system was launched, but we have no systematic knowledge about the impact of our digitally enhanced infrastructure work on the (German-speaking users of) the scientific community of technology assessment yet. Of course, it is already a tremendous challenge to gain broad attention (especially for the the portal itself) and reach as many researchers of the TA community as possible.[12] And since coordination, cooperation and collaboration are worthwhile purposes of scholarly communication because they (re-)produce scientific communality, the team of

[9]In its brand new position paper (as of 15 March 2018) "Förderung von Informationsinfrastrukturen für die Wissenschaft" the German Research Foundation (DFG) stresses the need for cooperation and coordination amongst scienctific communities and academic desiciplines; self-organisation is seen as a prerequisite both for the development, the establishment and the (public) funding of information infrastructures [cf. DFG, 2018, pp. 14–17].

[10]"Due to the origin of its financial means, the [communitarian, D.H.] regime is comparatively vulnerable to the priorities and fashions of science policies. In many cases, the transition of project-linked funding of a structure into one permanent operation is problematic. This may lead to ruptures or crises when funding ends and it is uncertain who finances forthe necessary resources. Examples in which a continuation of services turned out to be problematic can be found among open access journals which rely on project-oriented finance." [Taubert, 2017b, p. 37, my translation, D. H.].

[11]Of course there are a lot of tools for e-collaboration. What we are interested in is — in the best case — the interplay and complementary relationship of online *and* offline interaction for a maybe vague but common group identity i.e. self-understanding. From the point of view of technology assessment only such a comprehensive understanding of the "impact" of e-infrastructures and SOS on science communication and scholarly community building makes sense.

[12]For the general task to reach a relevant number of users in the "audience" cf. Bubela et al. [2009, p. 517].

openTA started to investigate today's knowledge and empirical evidence in the matter of collaboration with the following questions in mind:

- How to foster collaboration within the community of technology assessment and within the Network Technology Assessment (NTA)?
- How do we get people not only to use but also to support openTA?
- Is collaboration between TA researchers still something that is established by meeting face to face, by phone or via emails?
- Is blogging (and commenting) at openTA something that can bring about an "atmosphere" within our "scene", thereby raising the chance for a collaboration-friendly practice?
- If it is correct to assume that the majority of today's scientists still remains passive and does not engage as actors, i.e., active users of social media and SOS: which role do "push media" play with regard to the "closed" group of a scientific community?
- Is mediated communality and collectivity (still) a matter of "push media" like mailing lists or newsletters?
- Compared to other SOS: to what extent is it plausible and justifiable to claim that our specialised portal is *the* advanced e-infrastructure of TA which has the potential to strengthen our scientific community?
- How about *institutional* collaboration and cooperation?

When you search for literature on empirical studies you can find lucid analyses [Bader, Fritz and Gloning, 2012], quite plausible classifications [Pansegrau, Taubert and Weingart, 2011; Schmidt, 2016] and normatively oriented assessment for political advice [acatech, 2017, pp. 36–57]. But few studies are dealing with the tangible effects of SOS on collaborative practices.[13] In other words, the result of our enquiry was that there is plenty of literature on informational and communicative functions of social media within science. You can find many different approaches (qualitative and quantitative, plus using metrics or not) of how to assess user's needs in different disciplines and interdisciplinary fields. But when it comes to questions of coordinative, cooperative and collaborative practices, it still seems that we know little about the impact of SOS on scholarly collaboration.

For instance, take a look at an article in *Nature* by Van Noorden [2014] on "Online collaboration: Scientists and the social network". The author reports about a survey by *Nature* regarding scientist's use of interactive services of social media like Twitter, Facebook, LinkedIn, ResearchGate, Academia.eu, Mendeley, Google Scholar, ORCID, Microsoft Academic Search etc.: "In *Nature*'s survey, a subset of scholars who said they 'regulary visited social media sites were quizzed in detail

[13] A frequently favoured example are wikis, especially Wikipedia [cf. Schmidt, 2016, pp. 25–26], which sometimes is introduced as some kind of "communist idea" [Fuchs, 2017, pp. 317–324] or expression of solidarity and altruism [cf. Nov, 2007] giving birth to anti-capitalist, commons-based collaborative knowledge production. There are numerous studies on wikis and Wikipedia. But there are more collaborative online tools than that. Therefore König and Nentwich [2016, pp. 179–180] deliver an interim systematisation of social media for scholarly "collaborative knowledge production" but assume a dormant potential of SOS without referring to a sound empirical basis.

about their activities'." The survey used categories for different but simple types of (inter)action, as "curiosity only", "in case contacted", "track metrics", "discover jobs", "discover peers", "contact peers, "post (work) content", "share links to authored content", "actively discuss research", "comment on research" and "follow discussions". Van Noorden is aware that such items are not very convincing and that "[d]espite the excitement and investment, it is far from clear how much of the activity on these sites involves productive engagement, and how much is just passing curiosity — or a desire to access papers shared by other users that they might otherwise have to pay for." [Van Noorden, 2014, p. 126]. In a similar way, Ortega [2016] assessed scholarly collaboration networks (SCN) like BibSonomy, CiteULike, Zotero or Mendeley with the result "that most register to use them for egoist motives rather than for collaborative purposes"[14] whereas Rapple [2017b] contends that "it is a commonly held belief that SCNs have become more focused on content sharing than other kinds of collaboration between researchers, but evidence to support this assertion has been limited. (...) Ortega's interpretation of over 1 million records from scholarly collaboration networks was that SCNs are being used, not primarily, for collaboration, but for posting and accessing work; however, the most recent large survey, *Nature*'s 2014 study of 'online collaboration: scientists and the social network', showed only 35% of ResearchGate users (for example) selecting 'post content' as one of the activities carried out on site, with 33% using it to discover content — whereas 68% were on the site for a much more passive purpose, 'in case contacted'." [See also Rapple, 2017a].

To conclude, these findings are examples for why we presume that it is far from overstated to say that there is a lack of evidence concerning SOS and their impact on (and usage of) scholarly and institutional collaborative (inter)action. What Brossard and Scheufele [2013] stated regarding science communication to the public via online media seems to also hold for research on new online media for scholarly communication, collaboration and community building: "Scientists and social scientists must explore outcomes of online interactions about science in much greater detail. This work will have to be based on rigorous empirical social science rather than guesswork and anecdotal evidence about how to communicate complex and sometimes controversial science in these new information environments." Assessing the (possible) impact of SOS on collaboration could provide a basis for successful scholarly and digitally enhanced scientific community building.[15] This is why it is worthwhile to make the next step from merely putative effects and guesswork to the empirically analysed impact of scholarly online systems that were introduced as specialised portals, specialised information services and scholarly online networks.

[14] Franzen, for instance, holds that it is quite uncommon to use the communicative and collaborative functions of scholarly online networks (SON); rather SON are used to provide one's own pre-prints and papers and to become visible in terms of self-marketing [Franzen, 2015, p. 228].

[15] Although we already have different types of e-collaboration and scientific workflow systems at our disposal, we are still called upon to realise that the available samples indicate a lack of findings and research about collaboration through scholarly or academic online portals.

References

acatech (2017). Social Media und digitale Wissenschaftskommunikation. Analyse und Empfehlungen zum Umgang mit Chancen und Risiken in der Demokratie. Munich, Germany: Nationale Akademie der Wissenschaften Leopoldina, acatech - Deutsche Akademie der Technikwissenschaften, Union der deutschen Akademien der Wissenschaften.
URL: http://www.leopoldina.org/de/publikationen/detailansicht/publication/social-media-und-digitale-wissenschaftskommunikation-2017/ (visited on 11th January 2018).

Bader, A., Fritz, G. and Gloning, T. (2012). Digitale Wissenschaftskommunikation 2010–2011. Eine Online-Befragung. Gießen.
URL: http://geb.uni-giessen.de/geb/volltexte/2012/8539/index.html (visited on 2nd March 2018).

Brossard, D. and Scheufele, D. A. (2013). 'Science, New Media and The Public'. *Science* 339 (6115), pp. 40–41. https://doi.org/10.1126/science.1232329.

Bubela, T., Nisbet, M. C., Borchelt, R., Brunger, F., Critchley, C., Einsiedel, E., Geller, G., Gupta, A., Hampel, J., Hyde-lay, R., Jandciu, E. W., Jones, S. A., Kolopack, P., Lane, S., Lougheed, T., Nerlich, B., Ogbogu, U., O'riordan, K., Ouellette, C., Spear, M., Strauss, S., Thavaratnam, T., Willemse, L. and Caulfield, T. (2009). 'Science communication reconsidered'. *Nature Biotechnology* 27 (6), pp. 514–518. https://doi.org/10.1038/nbt0609-514.

DFG (2018). Förderung von Informationsinfrastrukturen für die Wissenschaft. Ein Positionspapier der Deutschen Forschungsgemeinschaft. Bonn, Germany: Deutsche Forschungsgemeinschaft.
URL: http://www.dfg.de/download/pdf/foerderung/programme/lis/positionspapier_informationsinfrastrukturen.pdf (visited on 16th March 2018).

Edwards, P. N., Jackson, S. J., Bowker, G. C. and Knobel, C. P. (2007). Understanding Infrastructure: Dynamics, Tensions, and Design. Michigan, U.S.A.: School of Information, University of Michigan.
URL: https://deepblue.lib.umich.edu/handle/2027.42/49353 (visited on 3rd March 2018).

Franzen, M. (2015). 'Der Impact Faktor war gestern'. *Soziale Welt* 66 (2), pp. 225–242. https://doi.org/10.5771/0038-6073-2015-2-225.

Fuchs, C. (2017). Social Media. A Critical Introduction. Los Angeles/London/New Delhi/Singapore/Washington DC/Melbourne: SAGE.

Hommrich, D., Pasucha, B., Razum, M. and Riehm, U. (2018). 'Normdaten und Datenanreicherung beim Fachportal openTA'. *Der Bibliotheksdienst* 52 (3–4), pp. 248–265. https://doi.org/10.1515/bd-2018-0031.

König, R. and Nentwich, M. (2016). 'Soziale Medien in der Wissenschaft'. In: Handbuch Soziale Medien. Ed. by J.-H. Schmidt and M. Taddicken. Wiesbaden, Germany: Springer Fachmedien, pp. 169–188. https://doi.org/10.1007/978-3-658-03895-3_10-1.

Lüthje, C. (2017). 'Interne informelle Wissenschaftskommunikation'. In: Forschungsfeld Wissenschaftskommunikation. Ed. by H. Bonfadelli, B. Fähnrich, C. Lüthje, J. Milde, M. Rhomberg and M. Schäfer. Wiesbaden, Germany: Springer Fachmedien, pp. 109–124. https://doi.org/10.1007/978-3-658-12898-2_6.

Nov, O. (2007). 'What motivates Wikipedians?' *Communications of the ACM* 50 (11), pp. 60–64. https://doi.org/10.1145/1297797.1297798.

Ortega, J. L. (8th December 2016). 'Academic Social Networks: Collaborative Environments or Diogenes Clubs?' *The Scholarly Kitchen*. URL: https://scholarlykitchen.sspnet.org/2016/12/08/guest-post-jose-luis-ortega-academic-social-networks-collaborative-environments-or-diogenes-clubs/ (visited on 9th January 2018).

Pansegrau, P., Taubert, N. and Weingart, P. (2011). *Wissenschaftskommunikation in Deutschland. Ergebnisse einer Onlinebefragung. Ergebnisse einer Onlinebefragung*. URL: https://www.dfjv.de/documents/10180/178294/DFJV_Studie_Wissenschaftskommunikation_in_Deutschland.pdf (visited on 21st March 2018).

Rapple, C. (4th April 2017a). 'Survey shows author sharing via scholarly collaboration networks is widespread, despite strong support for copyright'. *Kudos*. URL: https://blog.growkudos.com/2017/04/04/author-sharing-survey/ (visited on 3rd March 2018).

— (7th April 2017b). 'Updated Figures on the Scale and Nature of Researchers' Use of Scholarly Collaboration Networks'. *The Scholarly Kitchen*. URL: https://scholarlykitchen.sspnet.org/2017/04/07/updated-figures-scale-nature-researchers-use-scholarly-collaboration-networks/ (visited on 3rd March 2018).

Riehm, U. and Hommrich, D. (2018). 'Zur Einführung: Fachportale, Fachinformationsdienste, Wissenschaftsnetzwerke — Merkmale webbasierter, wissenschaftlicher Informations- und Kommunikationssysteme'. *Der Bibliotheksdienst* 52 (3–4), pp. 170–184. https://doi.org/10.1515/bd-2018-0025.

Riehm, U. and Nentwich, M. (2017). 'Open Science aus Perspektive der Technikfolgenabschätzung'. *TATuP Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis* 26 (1–2), pp. 11–17. https://doi.org/10.14512/tatup.26.1-2.11.

Schmidt, J.-H. (2016). *Soziale Medien als Intermediäre in der Wissenschaftskommunikation*. URL: http://www.schmidtmitdete.de/pdf/Expertise_Schmidt_Soziale_Medien_Wissenschaftskommunikation_Entwurf.pdf (visited on 14th March 2018).

Schonfeld, R. C. (9th February 2017). 'When is a Publisher not a Publisher? Cobbling Together the Pieces to Build a Workflow Business'. *The Scholarly Kitchen*. URL: https://scholarlykitchen.sspnet.org/2017/02/09/cobbling-together-workflow-businesses/ (visited on 26th January 2018).

Taubert, N. (2017a). 'Formale wissenschaftliche Kommunikation'. In: Forschungsfeld Wissenschaftskommunikation. Ed. by H. Bonfadelli, B. Fähnrich, C. Lüthje, J. Milde, M. Rhomberg and M. Schäfer. Wiesbaden, Germany: Springer Fachmedien, pp. 125–139. https://doi.org/10.1007/978-3-658-12898-2_7.

— (2017b). 'Kommunitaristische und kommerzielle Trägerschaft digitaler Informationsinfrastruktur in der Wissenschaft'. *die hochschule* 26 (1), pp. 29–39.

Tennant, J. (29th September 2017). 'Open Science Stars: Ernesto Priego. Open Science Interviews'. *ScienceOpen*. URL: http://blog.scienceopen.com/2016/04/open-science-stars-ernesto-priego/ (visited on 3rd March 2018).

Van Noorden, R. (2014). 'Online collaboration: Scientists and the social network'. *Nature* 512 (7513), pp. 126–129. https://doi.org/10.1038/512126a.

Author

Dirk Hommrich is senior researcher at the Institute for Technology Assessment and Systems Analysis at the Karlsruhe Institute of Technology and board member of the Institute for the Study of Culture Heidelberg. He has been fellow of the postgraduate program "Topology of Technology" at TU Darmstadt and lecturer at the Faculty of Humanities and Social Sciences at the HSU, Hamburg, Germany. His publications focus on science communication and scholarly communication as well as on pop science and visual culture. E-mail: dirk.hommrich@kit.edu.

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