

# On the Situation and Development of Academic Libraries

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Together with publishers, academic libraries are the main institutional actors in the scientific publication system; therefore it is relevant to provide a description of how libraries perceive the current situation. Here, it can be assumed that there are differences in this perception according to size and financial resources among the different libraries. For this reason, it was attempted to gain a broad spectrum of opinions by inviting representatives of several libraries, from universities, research institutions as well as the renowned Bodleian Library.<sup>1</sup>

The following text summarises the statements made by these representatives. With few exceptions, we have refrained from attributing individual positions to persons or their institutions. Only at certain points is additional information provided in footnotes. We therefore do not want to be understood as representing a position of our own but merely as editing the transcript.

The discussion focuses on four areas:

1. the financial situation;
2. digital strategies;
3. future functions; and
4. outlook.

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<sup>1</sup> The interview with representatives of libraries took place on 15 April 2013 in the Berlin-Brandenburg Academy of Sciences and Humanities. Participants included Norbert Lossau (Niedersächsische Staats- und Universitätsbibliothek Göttingen; part member of the interdisciplinary working group); Klaus-Rainer Brintzinger (UB LMU München); Christoph Bruch (Helmholtz Open Access Koordinationsbüro); Petra Hätscher (UB Konstanz); Wolfram Horstmann (Bodleian Library, University of Oxford); Anne Lipp (DFG and leader of the Scientific Literature and Information Systems group); Frank Sander (Max Planck Digital Library); Peter Schirnbacher (Director, Computer and Media Service, Humboldt University).

## 1 The financial situation of libraries

First of all, the central question whether the imbalance between the size of the libraries' budgets and the prices demanded by publishers is the result of insufficient financial resources made available to libraries or of excessive prices on the side of the publishers, cannot be answered fully. Indeed, large publishing companies have pursued an aggressive policy regarding prices which has provided them with high profits. The financial means of the libraries, however, have not increased accordingly. As a result, the current (financial) situation of libraries is thus considered critical. Some libraries have resisted especially Elsevier's pricing policy by cancelling all contracts (as the University of Konstanz did). The University of Göttingen also cancelled contracts with Elsevier a few years ago after the publisher wanted to increase prices by two-digit percentage points due to a new business model (Web Editions). Together with the Committee for Development and Financial Planning of the Senate, it was agreed that in such cases of price increase, an automatic cancellation would be implemented. Other institutions of the university were free to decide whether to keep subscriptions and pay for them themselves, which was ultimately done by the Department of Medicine.

Financial restrictions can have dramatic consequences for so-called 'single-layered libraries' (such as at the universities of Konstanz and Bielefeld, where there are no separate libraries for institutes or departments, but only one central library). If cancelled journals or books are no longer available, there are no other opportunities for scientists. As a consequence, countermeasures have to be taken early on, for example, in the form of initiatives in the delivery of documents and 'just-in-time' provision of literature via individual sales of articles in the most convenient way. In the life sciences, the natural sciences and medicine, alternative ways of obtaining literature have emerged. Articles are deposited on working group servers, the existence of which nobody officially knows about, or colleagues who have access to them pass them on to the respective groups.

Financial limitations have led libraries to introduce stricter control, which, in turn, resulted in competition among the disciplines due to different costs and demands. The costs can be calculated per access due to lists indicating the costs of journal and accesses.

At the University of Göttingen, the representative of the library, a scholar of medicine, ordered that everything costing more than € 15 per access is to be cancelled. The natural and life sciences pay far less than 50%. Especially in medicine, funds are allocated according to performance-oriented funding. This policy, however, can only be pushed through to the detriment of the humanities and social sciences.

The financial crisis of university libraries becomes obvious in view of the monetary appropriations. According to the Deutsche Bibliotheksstatistik, the overall expenses for acquisitions of academic libraries were around € 300 million in 2011.<sup>2</sup> The proportion for the acquisition of digital media was 38%. The budget for literature as part of the appropriation of the state of Lower Saxony (and thus the budget of the Göttingen library as such), for example, has not been increased for the last approximately seven years. At the University of Göttingen, the budget for literature was capped at around € 3.6 million.

The Max Planck Digital Library (MPDL) receives part of its money from the research budget of the institute to spend on literature. As a result, it was able to negotiate with publishers and to make so-called 'big deals' at reduced costs, something smaller libraries are not able to do. Already in 1999, the budgets of all institutes were combined, so that the Max Planck Society (MPG) receives a large part of its digital access in a central manner through the MPDL. This is approximately 80% of what the Max Planck Society cites. About 10% of this is open access, while about 10% is acquired by the libraries of the institutes.

The financial crisis of libraries is determined by three major factors:

- the pricing policy of the (large) publishers, which have obtained an oligopoly status;
- the mechanisms of receiving and attributing reputation (branding) within science; and
- the resulting competition between scientists, universities and research institutions and between disciplines (prices of journals in different fields of research differ significantly).

The interaction of these factors leads to the helplessness of libraries with regard to the pricing policy of the publishers. This is discussed next.

One problem is the fragmentation of libraries as negotiating partner of the publishers as well as the latter's lack of transparency regarding contractual design. The overall volume of turnover of the three largest STM (science, technology and medicine) publishing companies in Germany, for example, is unknown. For Elsevier alone, it is estimated to be around € 30–50 million. Companies like Elsevier negotiate contracts with confidentiality clauses.<sup>3</sup> A large number of contracts are not made public. In part, universities ignore this confidentiality agreement by referring to the accountability obligation towards parliament and the respective ministry,<sup>4</sup> which is then also not

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2 See [https://www.hbz-nrw.de/dokumentencenter/produkte/dbs/archiv/auswertungen/wb\\_gesamt\\_11.pdf](https://www.hbz-nrw.de/dokumentencenter/produkte/dbs/archiv/auswertungen/wb_gesamt_11.pdf).

3 See Pampel (2014) and Gutknecht (2014).

4 This obligation is de facto fulfilled towards the audit courts.

contested by the publishers. German library statistics nonetheless provide the opportunity to record the costs for electronic media, at least for the large full universities, where most of the funds are spent on publications in the fields of medicine and life sciences. (The government of Baden-Württemberg has meanwhile developed an e-science strategy, which is supposed to make costs for subscription contracts transparent.)<sup>5</sup> There is consensus that such a publicity obligation should be implemented.<sup>6</sup>

The attribution of reputation and gaining of reputation within science are based on the practice of publishing, i.e. on the specialised journals and their functional equivalents (monographs and anthologies). As a result, scientists are inherently dependent on the publishing companies. This dependency has even increased due to the introduction of performance measures that are based on publications. In recent years, the significance of evaluation has increased dramatically. For example, the journal impact factor (JIF) frequently serves as a performance measure, i.e. articles are weighed according to the JIF of the journal in which they appear, and this is then attributed to the author. For scholars from the humanities and social sciences, the same holds true with regard to publishing companies. A publication is thus evaluated based on the reputation of the publisher. Both measures have become indicators of quality that are supposed to replace existing qualitative performance measurement from 'outside', i.e. without actual reading of the publications.

This connection between the reputation system internal to science, politically promoted performance measurement and the commercial publishing landscape needs to be seen as very problematic. Publishers are interested in the development and marketing of their 'brands', that is, the JIFs, are attributed to the individual journals. This assumption occurs primarily from commercial and not scientific points of view. A publisher is interested in how many journals it has with high JIFs, or in which disciplines it has a renowned brand. The more journals with high JIFs are concentrated in one company, the stronger the position of that company in negotiations with libraries. The creation of brands is, however, not the result of the concentration of publishing companies but derives from science itself since scientists (and politics) need an instrument of evaluation. It is thus not clear whether the dependence on the creation of brands, which characterises the area of the subscription model, will not be perpetuated in an open access (OA) world.

From the perspective of the libraries, it is assumed that scientists are interested in a continuation of the situation. (This may be due to the fact that

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5 E-science: Wissenschaft unter neuen Rahmenbedingungen [Fachkonzept zur Weiterentwicklung der wissenschaftlichen Infrastruktur in Baden-Württemberg].

6 This demand is also included in the Amsterdam Call, see <http://www.eu2016.nl/documenten/rapporten/2016/04/04/amsterdam-call-for-action-on-open-science>.

they are pressured to publish at certain locations and therefore fear changes that would impair their opportunities in publishing in conformity with the system. A restructuring of the evaluation system would perhaps also lead to changes in this position.) Accordingly, the scientist pays for everything, they negotiate everything in their employment interviews, they know exactly what they cost and what their research costs. They just do not know what scientific publications cost and to what extent they are a burden. In contrast to librarians, to heads of universities and also to funding organisations, the scientist has an influence on these costs.<sup>7</sup> The scientist submits their papers for publication but the costs do not reach them or their budget. (Exceptions are those disciplines – social sciences and humanities – where scientists earn money through the publication. In the natural sciences, however, only editors, not authors, earn money.) From the perspective of the scientists, only adequate framework conditions for research are necessary because these are decisive for obtaining reputation. The latter is the basis for competition among scientists. It is extremely dependent on time, and the introduction of performance measures has even increased this time pressure. This hardly leaves room for a long-term, strategically reflected and critical position towards the application of performance measures and alternative models of publication.

The same logic can be found for universities. They are in competition with each other, and the intensity of competition has increased with the growing number of evaluations. Rankings are the decisive measure. Ranks decide about the possibilities of hiring the best scientists and being able to choose students, etc. It is extremely difficult and thus unlikely to bundle the resulting interests, so that universities can confront the publishing companies, who almost have a monopoly, with a respective market power. Since it is about securing and stipulating the status quo, it is not possible to organise the system in such a way that all scientists and the public as well as the enterprises have information at their disposal from which they can benefit. This has significant disadvantages for science, the economy, the state of information of citizens and thus for democracy.

The current and future situation of the libraries also has to be seen against the background of the particularities of the publication market, i.e. the traditional subscription market and its recent changes.

In competition theory, the concept of the relevant market plays an important role. The relevant market is not the market for services in general. In scientific publishing, this category refers to individual publication. The respective

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7 It remains unmentioned that libraries do not have to keep subscriptions but can cancel them. Funding agencies can enact guidelines for publishing of supported publications as the American National Institutes of Health (NIH) have done, and university administrations can back their libraries and issue OA policies like Harvard University, for example.

publication is generally not substitutable, except for the literature it cites. The economy of publishing in general was, until 15 years ago, driven by the costs of publication, which were of a physical as well as organisational nature. Through digitisation, however, the dissemination of publications has become nearly free of costs. This is not true of the processing of publications though. It is economically interesting that in the case of an electronic publication, there is no rivalry with regard to consumption: the consumption by one individual does not exclude consumption by another individual. This is different in the case of a printed book or a printed newspaper, which can only be read by one person at a time. If the publications do not appear open access, they compete but individuals are still excluded from using them. Economists then speak of 'club goods'. These are usually inefficient from a welfare economy perspective since it would be possible that a large part of consumers use this good without there being any kind of wear or additional costs.<sup>8</sup>

Perhaps this explains the tendency of large publishers towards abandoning the traditional model of publication (this is, for example, indicated by the acquisition of the software programs PURE and Mendeley by Elsevier). For some years now, it can be observed that publishers directly negotiate with the heads of universities instead of libraries. They create new channels of communication to university leaderships and offer them tools for research evaluation in which they increasingly invest. In principle, all large publishers have already strategically placed their bets on these so-called 'value-added services' with which they want to involve scientists and research institutions more strongly. The establishment of publication management and research information systems at universities and research institutions once again increases scientists' dependency since it requires obtaining literature from the large publishers' platforms. The chief executive officers of Elsevier openly say that, at least in the STM disciplines, the subscription model will disappear and all publications will be open access. This will, however, only be the case in a basic format. The value-added services, i.e. the data generated with the publications, will remain under the control of the publishers and will stay part of their platforms in order to be sold at high prices. Elsevier's refusal to release the 'text mining' rights and rights to evaluate reference lists has far-reaching implications. On the one hand, the data are needed for the control of the network between the publications in order to understand how publications are connected. More specialised criteria of evaluation can be developed from this. The entire bibliometrics depends on these data. On the other hand, the

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8 This argument depends on several factors. Open access provides a public good without the property of a commons. The digital publication, which is subscribed to by libraries, is a club good without competing consumption. The printed publication, which is bought by libraries, is a club good with competing consumption.

development that the reading of texts will increasingly occur with the help of machines can be derived from this. This, too, will then be controlled by the publishers. In 10 years – at the most – the business model of Elsevier will be the dissemination of these data. Data from data banks like SCOPUS or Web of Science will be released in raw format. They can be used as tools in order to retrieve them but libraries are de facto forced to buy the licensed data back from them.

Libraries increasingly depend on systems like Alma, Exlibris or OCLC. Consequently, they later have to buy back their own catalogue data. Libraries licence the raw data themselves but the conditions under which they are licensed indicate that the relevant publishers are preparing to be in control of this strategic asset. What this means for future science and copyright is unclear.

One resulting imminent danger is in the feedback effect between the generation of data that are used as tools for research evaluation, and the commercial interests of the quasi monopolist Elsevier.<sup>9</sup> It makes it possible in principle that data, such as the JIF, can be steered. Representatives of large universities point out that they depend on the cooperation with large publishing companies in the development of these systems because their data are the ‘currency’ without which they cannot do. Although they deem it necessary to react, they do not yet know what a reaction could look like. The interest in the JIF, which is shared by scientists, university leaderships and science policy, stabilises the current system due to a lack of alternatives.

## 2 Digital strategies of libraries

The digital strategy of libraries includes the creation of repositories for digital secondary publication (and connection with research data) as well as the different pathways of first publication.

### 2.1 Repositories (green open access)

Repositories are data storage platforms that serve to make publications (unpublished and published) as well as research data available via the Internet to all interested (the so-called green open access). Repositories are therefore mainly operated by universities and research institutions. The institutional repository has established itself entirely, albeit to different degrees. Almost every university meanwhile has one in one form or another. The success of

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<sup>9</sup> Note: A distinction needs to be made between citation and other bibliometric data that serve the construction of indicators for performance measurement and evaluation, and metadata which merely describe the publication.

a repository depends on how deeply rooted it is in the respective institution, for example, to what extent the members of the institution deposit their contributions in it. For a long time, universities did not know how many publications emerged per year within their own walls. Repositories are used as tools, as hub, as statistical tool for their own publications and for sustainable value-added services, and they also serve one's own monitoring.

Disciplinary repositories need to be distinguished from institutional repositories but should not be seen as an exclusive alternative. There are disciplinary repositories (such as ArXiv in physics) that are indispensable. Gaps remain within these disciplinary repositories, however, and it is unclear who is responsible for closing these gaps.

The leadership of the respective institution needs to make sure that publications are deposited in the institutional repository. This is best achieved if all internal research proposals and the like are only processed via links on the respective database. Another location should serve to receive research data. First of all, it is about securing one's own output. This, however, does not yet ensure the provision of information to third parties. One legitimation of the institutional repository or comparable databases for research data thus lies in securing one's own output. This is followed by the question how science organises the exchange of information across individual institutions. Disciplinary repositories and repositories for research data could take on such a provisional role but this does not necessarily have to be so. In this connection, we speak of a global information provision. Thus, a certain amount of professionalism is needed, which, in turn, requires a certain amount of staff with regard to the individual database. A further issue lies in how it can be tested what is being made accessible to third parties and when. According to many representatives of libraries, accessibility to the outside is viewed by many as a problem.

Another problem from the perspective of libraries is seen in the contextualisation of the frequently discussed amount of data. This means that the central task of libraries is the organisation of the environment of research data, and the integration of the information received by libraries into the working environment of the scientists. This includes the integration of information flows that are acquired or made available through open access. This also goes for the information that is licensed and made available again. The task is to integrate this information into the self-designed working environment of the scientist so that it is permanent and complete, which is a complex challenge. In this context, the question also arises as to why there is no 'German academic cloud'. Scientists rely on online storage such as Dropbox, even though they are being warned by information technology experts and librarians that this is an extremely unreliable platform. The interest in these services shows, however, that there is a demand.



## 2.2 Digital first publications (gold open access)

With regard to the digital strategy, special attention should be paid to making open access a reality. There is broad consensus within science on open access, albeit not to the same extent in every discipline. As soon as the debate concerns the implementation of the next steps, however, there is a broad heterogeneity of opinions among scientists, so that no consensus can develop to form an effective strategy. A positive example is the geosciences. Geoscientists were able to formulate a clear strategy within the society of their discipline, the European Geosciences Union, when defending their profile against their American counterparts. The Union agreed to create new OA journals with an innovative peer review model – a pre-print server where discussions are possible – which then provides clear pathways of publication, i.e. academic journals. This quickly led to high quality and anchoring within the community, partly because Nobel Prize laureates were willing to serve as members of the editorial board in order to concentrate reputation in these journals. In this case, it was confirmed that reputation eventually lies in science, not with the publishers. This way the large publishers were kept at bay, and with a very small publisher something was developed the way the society wanted it. The European Geosciences Union thus achieved a functioning countermodel in a very short time. It established top-quality journals with high impact factors, which have cost relations that are very different from those of commercial journals. The largest benefit of open access may lie in the fact that open access displays more transparency with regard to costs, something that is often criticised as lacking in subscription prices. The example of *The Economic Journal*, which switched from Elsevier to Wiley, shows that it is possible to change the publisher without losing reputation. The journal, which belongs to the Royal Economic Society, has become much cheaper, i.e. the cost-benefit relationship for science has improved.

Another side of the problem is to have a balance between quality and open access. A journal that appears open access should not be of lower quality or should be just as good a brand as one that is published by a large company and for which subscription fees are being paid. Many reservations towards open access are based on scepticism regarding the quality of OA journals. It is surprising that a mechanism such as the choice of renowned editors in the natural sciences tends to be forgotten. In the humanities, it is still present and may be one of the reasons why the JIF is not needed there. The editor offers his/her name as a 'brand', which guarantees that what is published within a volume has a certain quality. Nobel Prize laureates and/or an accordingly renowned editorial board fulfil this function. If these conditions are not stated, the JIF takes on the role of a surrogate indicator.

Other specialised societies do not show such a development. They may agree that open access is desirable but there is no broad consensus on how it can be achieved. Thus, these societies remain in the subscription model and do not even take the step towards hybrid formats such as Springer open access. Libraries can help in this situation but they cannot provide strategic guidance. This has to be done by the society itself. The different options are the creation of archives, the model of the geosciences, or the classic open access journal. It is decisive that there is agreement on a format in which one is able to act for three to five years.

One decisive factor for the strategies of libraries is the expectations of the scientists. They want to have everything online first, but then it should also be made available in other forms (e.g. printed monographs or anthologies). For scientists, it is a huge step to abandon a certain expectation towards libraries. Especially in universities mainly oriented towards the humanities, for example, this results in costs that need to be covered. Attitude and expectations on behalf of the scientists can also be understood as differences between authors and recipients. Bringing these two roles, which every scientist plays, into alignment would be a significant step as the conflicts of interest would then have to be discussed internally, namely to have easy electronic access as early as possible (at least in disciplines in which writing plays a major role, thus in most humanities), but to have the printed book or article on the bookshelf, even though one is aware of the fact that most scientists would prefer to make use of these in electronic form. The societies of respective disciplines are called upon to discuss intensively how these attitudes and behaviours could be aligned.

Indeed, the proportion of OA publications in relation to the subscription business is increasing. For many years, the latter has been decreasing. Looking at the overall output of science, the increase of the publication cloud lies with OA publications. This means that the change is already under way. Still, there is consensus that the transition from a common subscription economy to the OA world is not without difficulty. However, different pathways are taken, which entail different costs. In Great Britain, for example, it was assumed that a push was needed and that costs of transformation would emerge, which would then be paid by politics.<sup>10</sup> Some believe this is the right way to implement a temporary programme, which should serve to complete transition from subscription to the OA world. Other solutions also have their advantages. The solution of the German Research Council (DFG), for example, is to introduce a cap on the costs and to enable a strong institutional influence by establishing a grant proposal procedure. This is in contrast to Great Britain where the funds

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<sup>10</sup> Here it is about paying the article processing charges via public publication funds.

are allocated according to a bibliometric indicator. The German approach is to reallocate funds from subscriptions to gold open access.<sup>11</sup> One question then is how the budgets for article processing charges (APCs) should be administrated. Here, the state level is considered appropriate because competition, aside from efficiency, is considered important. The complaints concern the high costs. Ideally, costs should be lowered.

For example, in 2003, the MPG combined budgets with the advent of gold open access, so that it now has *one* budget from which subscriptions and APCs are paid. Moreover, the same budget also pays membership fees. This is done intentionally because it allows a deeper entry in contractual negotiations. It is then a judicial question whether a membership fee is paid per publication or per access. If the budget for the publication fund lies in the department or the faculty and the subscription budget is with the library, then a conflict that cannot be solved and which a commercial publisher will readily exploit to demand a constant growth for both budgets is apparent. Therefore, it seems important to combine them.

Pressure can be exerted on publishers via the publication fund, which, from the perspective of the publishers, is a new fund. If the publisher makes a new offer, the focus should not only be on what is offered directly with regard to gold publication, but OA fees should also be paid to publishers who have a reasonable green policy. This would be an important part of a digital strategy.

The funding of scholarly journals is in most disciplines done via the library budget. (This statement, however, disguises the proportion which often comes from other budgets in the form of page or colour charges. With that, information about how APCs should be financed in the future can be obscured.)

At large universities, these library budgets are large central funds. From the perspective of the individual actors, it is indeed rational to use them largely for oneself. Even where quotas have been introduced, these funds are not constructed to remain stable with regard to prices. If that were the case, then the life sciences would not have had money for funding for a long time. If no quotas are applied, regular ownership rights to these funds are missing. Economists then speak of common pool resources, which are goods that are basically in competition but where the principle of exclusivity is not realised.

The central question is what happens during the transition to the OA world. In a pure OA world, there are two possibilities. One is that there is a large university or even better a national budget to which everybody has access. The

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<sup>11</sup> This pre-empts the development insofar as it is being discussed but has not been decided. See Schimmer et al. (2015). CC-BY 4.0, <http://creativecommons.org/licenses/by/4.0/> (31.05.2016). Evidently, there is a divergence of interests between local libraries and national actors (MPDL, DFG). The pooling of publication funds would concentrate negotiating power. On the other hand, this is a counter to the interests of local libraries that want to retain their budgetary sovereignty.

second possibility is that an attempt be made to combine the responsibility for the reception of scientific publications and the responsibility for support, i.e. for resources that fell apart in the subscription world. This would mean that the individual scientist – or in most natural sciences the individual working group, the institute, the clinic – once again is responsible to finance the contribution to a publication from their own money.

In recent years, the APCs have increased significantly.<sup>12</sup> In order to stop this trend, there needs to be a common effort instead of leaving the responsibility of gathering funds to the individual scientists. In view of the development of the APCs, it is feared that, after the establishment of large central budgets for OA financing, the same will happen as did previously in the subscription world, namely that the journal crisis is followed by an article crisis, and the explosion of journal prices is followed by an explosion of APCs. This will also be due to institutional reasons since large budgets will be created and the responsibility will be taken away from the scientists. OA funds can play a useful role as an incentive during a transitional period. This, however, is only the case if they entail a transformation strategy from the beginning, which cannot reside in the central budgets. Therefore, the DFG programme seems to be the right way.

The transition to a complete OA world implies three basic distribution effects.

- First, an international distribution effect, i.e. allocation from countries with low research output to countries with high research output. In the extreme case, this means relief for developing countries and a burden on industrial nations.
- Second, there is relief for applied research and a burden for basic research. This especially concerns applied research in chemistry, materials science and similar areas which have brought money into the system but which will bring less money to an OA world because they will conduct less research and take on a more recipient role.
- Third, and this is decisive, there are vertical effects between the research institutions and especially between universities. This needs to be emphasised because it will be very controversial. Relief will be on the side of less research-oriented institutions, and the burden on the side of top-quality research.

Regarding a nation such as Germany, this means that the different institutions need to distinguish themselves even more. Top-quality institutes would then

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<sup>12</sup> There are efforts to track the use of funds from publication funds. Cf. <https://njahn82.github.io/unibiAPC/>.

receive more money while those conducting less research (for example, up to the application-oriented institutions) will be relieved but will receive less money as well.

It can be said that management on the one hand lowers the costs significantly. On the other, if the same processes can be used systematically, the number of personnel can be reduced. Tools have yet to be found to process APCs more efficiently. There is consensus that an institutional publication management is needed. The institution needs to know what scientists have published, where the publications are eventually deposited – whether in a journal, a special or institutional repository – as well as their number. Multiple deposits should not be seen as a contradiction but as a complementary approach. A publication is primarily assigned to a discipline because it belongs to the communication of that discipline. Thus, the respective scientific community should decide about the procedure. For example, in physics, a pre-print version is deposited on ArXiv before the article is published in a journal. Each scientist, however, is assigned to an institution that is interested in conducting its own publication management. In this regard, open access is the best paradigm. If the publication, including the metadata, is free, it is also easier to support such processes via automated interfaces.

Questions remain:

- First, what does the plurality of journals, which develop in the realm of open access, but which are not yet established with respect to their reputation and editorial boards, mean in practice if, on the one hand, it should be avoided that they disappear again, but, on the other hand, misuse should be prevented?
- Second, what are the experiences with overheads, i.e. what size are the burdens for the overall financial system if the model of APCs based on individual article costs is successful in a broad sense?
- Third: A science policy question is why the DFG does not advocate a secondary publication in a green model. In the usage guidelines of the DFG, there is a passage which states that the DFG expects availability of results from DFG-funded projects in open access. This, however, is only an expectation, not an obligation, as in the National Institutes of Health. Making it an obligation is not possible due to the freedom of science (which includes the freedom of publication), as stipulated in the constitution. Thus, it is a special situation in Germany.

It is also a 'good old DFG tradition' that rules hold true for all disciplines. There seems to be a slow change in thought in this context. The 'one-size-fits-all' view is no longer appropriate. Therefore, a broader discussion needs to be

initiated to achieve different speeds in the fulfilment of obligations according to disciplines, maybe also types of research, in other words empirical or heuristic disciplines.

### 3 Future function of libraries

The change in the function of libraries is manifested in the collaboration between libraries and data centres. At the library of the Humboldt University, for example, this collaboration started in 2003 with the founding of a working group, which has conducted a number of projects on the infrastructure of information since then.<sup>13</sup> Information infrastructure is a kind of service just like the service publishers provide to science, and it should eventually be led and dominated by science. There is, however, an imbalance because publishers in the STM field define themselves as infrastructure to a certain degree. The division of labour, in which scientists can expect that publishers take care of publication, could change insofar that, for example, libraries or university publishing companies become involved in initial publication.<sup>14</sup> DINI, the German Initiative for Network Information, has defined a number of points in the DINI certificate,<sup>15</sup> such as the counselling of authors. This must be taken into account as a main task of service centres.

A common task of libraries and data centres is long-term archiving. Authors can hardly take responsibility for this, even though they first have to be convinced that 'Word for Windows is not suitable for this in spite of Microsoft's power'. Authors need to be taken on board, and this should be done in collaboration between libraries and data centres. Neither individual universities nor the German National Library can take care of the storage of long-term digital data. Political decisions for a decentralised system are long overdue. If they are not made, it can very well be that commercial players fill the gap and find a good field of activity. The experiences with the Mendeley program are a pertinent but also discouraging example of how a useful and appropriate service for science suddenly turns out to be part of the private sector.<sup>16</sup> In a library system, such as the Bodleian Libraries in Oxford, which

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13 See WR (2011a: 16; 2011b) and WR (2001).

14 This touches on the fundamental question whether libraries should be private, commercial or public organisations.

15 [https://dini.de/dini-zertifikat/?optout=1&no\\_cache=1](https://dini.de/dini-zertifikat/?optout=1&no_cache=1).

16 Mendeley is a program for processing data on literature which was developed by a start-up and sold to Elsevier in April 2013. Users criticised the sale decision due to the fear that Elsevier could check the PDF libraries of Mendeley users with regard to copyright violations.

consists of several sub-libraries and autonomous college libraries, tensions between the traditional functions and the new ones are particularly strong.

There are two kinds of services a library provides today: services for the author and services for the reader. This is new because there used to be only the service for the reader. But what does the library do for the author? The support in publication (insofar it exists) is new, for example, it produces publications, consults in issues of publication, i.e. in what form publications should appear, how to handle the formats, or according to which criteria providers or publishers are chosen. Furthermore, it assists in matters of open access, pointing out which providers offer open access with the desired services, etc. This also includes issues of archiving, the institutional repository, informing yearbooks, etc. These are all tasks that are new and that were not part of the library before.

On the side of the reader, which was always part of the library, things have changed as well. In general, this concerns the provision and assurance of accessibility to publications and, in particular, the legal complications that have resulted from the digitisation of licencing management. With the printed book, it was simple: if you had it in your hand, you had it in your hand. There was also the photocopy but the situation was clear.

With OA material, the classic function of libraries as place where literature can be found has changed. It is no longer sufficient to go to a library and look at the catalogue; the extensive OA material also has to be taken into account. The issue of access has also resulted from digitisation because an identification procedure to a publisher's server or other provider, such as JSTOR, has to be determined.

The new function of libraries together with data centres has also been characterised as the function of knowledge management, for publications, for research data and for any type of intellectual output. In the end, this means that every university and infrastructure is responsible for providing research, teaching and other output in a form that corresponds to certain standards, so that it can be accessed and used internationally in a network or system. A prerequisite is consensus regarding the standards. Network means a plea for a decentralised system and against a large super-institution. For this purpose, international or global communities need to be established.

In the digital sphere, libraries also maintain functions that require local knowledge, for example with regard to systems. This, for instance, goes for author identification or for information about individual departments or individual research projects. This knowledge needs to be administered in the digital system. The complete depersonalisation that resulted from digitisation needs to be turned around, and the respective knowledge needs to be returned to the library. This knowledge management has to be administered locally,

which is easy in principle. Aside from the digital realm, there is the physical one. Spaces are being provided, as has already begun. Libraries thus serve as meeting points. The rooms that are no longer used for books are transformed into rooms for learning and research.

The future of libraries will also be characterised by the development of the communication media. *PLOS ONE* shows similarities to the established communication system. Looking at the volume of communication in *PLOS ONE* and extrapolating it, and assuming further that there will not be saturation, then within three to five years, 60 to 70% of STM publications will be published in *PLOS ONE*. Another aspect concerns the trend towards atomisation of publication forms in software codes, annotations, living reviews, a continuous form of publication. It is not yet certain whether this trend towards atomisation of publications and scientific communications will not lead to the commercial system being superfluous or whether the system will take on an entirely new form. Phenomena in the commercial field such as Figshare<sup>17</sup> or a whole new series of enterprises that deal with publication of individual aspects of scientific results, all point towards even more decisive changes. In the not too distant future, there will be journals in which especially datasets and other failed experiments will be published. Those who want to know what failed know where to look. How can processes of differentiation be initiated, which then in turn allow the recipient to proceed in a selective manner?

Especially the hosting of research data is a task that is not administered by one organisation only. In order to assure professional data security, professional units are needed that have a certain size and need to be financed. Which services can be provided in-house and which outside, and which finance mechanisms are required, lead to the question about which tasks are better done by a commercial service provider and which by an internal infrastructure. In principle, academic publishers are interested in science organisations providing expensive hosting and adding metadata for research data. These infrastructures, however, are lacking or are only available in individual cases, and the financing remains unclear as well. The operators of repositories of research data do not have a clear model of long-term financing and ideas about their costs, nor do those that deposit data have an idea how much they actually have to pay. With regard to the future functions of libraries, it is an interesting question how the division of labour in publication management will develop between the libraries and the individual disciplines.

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<sup>17</sup> Figshare is a repository where users can make their research output accessible in a format that can be cited, shared and found (see <http://figshare.com/about>).



## 4 Outlook

It is important that scientists, as actors, return to the arena in a stronger way. This also corresponds to the motto of SPARC, the Scholarly Publishing Initiative, a few years ago: ‘Give scholarly communication back to scholars’ or ‘give scientific communication back to science’. What influence do scientists as producers of knowledge have on the publishing market? In the view of some representatives of libraries, open access is superior to the subscription model in terms of welfare economics because a more efficient allocation can be achieved if the budgets are used adequately. Therefore, the transformation should be pushed forward quickly.

Regarding the role of libraries, the interaction between scientists and librarians as well as all those involved in the development of research and information infrastructure becomes ever more important. The overarching goal is to make the global knowledge of science available in open access, in a format that makes it possible to gain new knowledge via scientific methods. And this is the big difference from what is currently being offered as open access by the publishing companies: only a basic format that does not allow text mining or algorithms. The term ‘open science’ was mentioned only once in the discussion. The entire process of research should be free, not only the publication. Research data are a part of this. The discussion about what all belongs to this process is still at the beginning. We do not know how to describe it, how to document it and how to prepare it for long-term archiving. It is, however, decisive in order to reach the next step after open access, which would then be the step towards open science, so that the entire process is laid open.

To realise this, it is necessary to truly perceive the market power of scientists and their institutions. In order to control the growing market power of publishers, there needs to be a closer collaboration between science and infrastructure institutions. The libraries are at the bottom of the chain; the scientists at the other end of it. Moreover, science policy needs to initiate this process and, if it takes place, scientists have to support it. Against this background, a decentralised model is favoured because it is a rapidly developing system. Experimenting with different solutions needs to be possible. Certain solutions also need to be able to fail, and this has to be accepted in the financing of different initiatives. A point where the system could derail is the question of what exactly is to be understood under ‘open access’. The publisher side currently attempts to redefine this concept. A kind of position could be introduced which evaluates – according to legal rules – whether it is open access in the sense of the community.

Another issue is that of references. Publishers position themselves as reference databases. The acquisition of Mendeley by Elsevier is probably also due to the fact that Mendeley is establishing a reference system.

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