

Cologne 21.01.2022

Recommendations on
the **Transformation of
Academic Publishing:**
Towards Open Access

IMPRINT

Recommendations on the Transformation of Academic Publishing: Towards Open Access

Publisher

Wissenschaftsrat – German Science and Humanities Council
Scheidtweilerstrasse 4
50933 Cologne

www.wissenschaftsrat.de
post@wissenschaftsrat.de

Document number: Drs. 9477-22_en

DOI: <https://doi.org/10.57674/0gtq-b603>

Licence: This publication is published under the Attribution-ShareAlike 4.0 International (CC BY-SA 4.0) licence. The full licence text can be found at <https://creativecommons.org/licenses/by-sa/4.0/legalcode.de>.



Adopted

Cologne, January 2022

CONTENTS

Preliminary remarks	5
Summary	7
A. Publishing as part of the research process	11
A.I Publication venues and forms of publication	12
A.II Functions of academic publishing	13
A.III Developments at scientific publication service providers	17
A.IV The development of the OA movement	19
A.V Financing models for OA publications	21
A.VI Data on publication figures and publication costs	23
A.VII Systematisation of OA – dimensions of openness	26
A.VIII Licensing	29
B. Objective and scope of the recommendations	31
C. Recommendations	35
C.I Products and processes	35
I.1 Further development of academic publications in their diversity	35
I.2 Further development of publications as digital objects	40
I.3 Expectations of publication services	45
I.4 Ensuring content contribution quality	47
I.5 Quality-promoting incentives	50
C.II Framework conditions	52
II.1 Tasks and interaction of the stakeholders in the research and higher education system	52
II.2 Financial flows and business models	60
II.3 Infrastructure for academic publishing	75
Appendix	81
The state of the OA transformation	81
I.1 The open access discourse since the Berlin Declaration	81
I.2 Legal framework and practice	89
I.3 Proven contract models for OA publication bodies	93

Glossary	95
List of abbreviations	98
References	103
List of figures	109
List of tables	113
Contributors	117

Preliminary remarks

Academic publishing has witnessed major changes in the context of digitalisation. Driven by the academic community, the changeover to open access (OA) for research results has greatly progressed over the last twenty years, even though it has by no means been implemented across the board. When the “transformation” of academic publishing is mentioned, this typically refers to changes in the business models driving the dissemination of academic publications, i.e. that you pay for publishing instead of for reading access. This paradigm shift is impacting the financial flows and roles of the stakeholders in the academic publishing system in a fundamental fashion.

Against this background, the German Science and Humanities Council (WR/the Council) has addressed the OA transformation of academic publishing. Its recommendations describe in more detail the goal of immediate and permanent OA to academic publications. Furthermore, the WR draws conclusions regarding the necessary institutional and financial framework conditions which must be established in order for this goal to be achieved. With its recommendations, the WR addresses researchers, scientific institutions, their management and research funding organisations, as well as libraries, whose tasks and self-concept have changed considerably as a result of the transformation. With this paper, the WR would like to contribute to the rapid progress of this transformation and improving the performance of the publication system for science and society.

In view of the continuous further development of publications as digital objects, the Council’s proposals remain committed to keeping the publication system open to further, currently unforeseeable, changes.

To prepare these recommendations, the WR set up a working group that began working together virtually in April 2020. Experts who are not members of the WR also participated in this working group. The WR is particularly grateful to these experts. The WR would also like to thank all the other experts who constructively supported the consultation process in expert discussions and provided background information. Special thanks also go to the Central Library of the Forschungszentrum Jülich and the Max Planck Digital Library for their support with data and analyses.

The WR adopted the “Recommendations on the Transformation of Academic Publishing: Towards Open Access” on 21 January 2022.

Summary

Science thrives on researchers sharing hypotheses, data, methods and results with one another as a basis for discussion. This enables others – both inside and outside of the scientific community – to critically examine these findings and build on them. This is made possible through lectures, presentations at conferences and other communication media, but above all through academic publications. **Publishing** is therefore an **integral part of the research process**, and it is in researchers' own interest to disseminate their findings quickly, widely and with quality assurance.

Today, digital distribution channels, unlike printed publications, enable additional readers to be reached at no significant extra cost. If the production costs have been covered by the time of publication, it is therefore possible to waive access restrictions, and make a publication freely available to anyone who is interested in it, via open access (OA).

In the academic system, a **changeover to OA publishing** has been discussed for more than two decades (cf. Appendix). As a co-signatory of the Berlin Declaration |¹, the German Science and Humanities Council (WR) committed itself as early as 2003 to supporting the OA transformation. The WR considers it advisable that OA publishing become part of good scientific practice as soon as a sufficient number of adequate and inclusive OA publishing opportunities have been established. This assessment is supported by the current German federal government's commitment to OA and open science in its coalition agreement. |² The UNESCO Recommendation on Open Science published in November 2021 illustrates an existing consensus at the international level. |³ Thus, the goal is for the OA transformation of academic publishing to be completed within the next few years and the open publication of scientific results to become **standard practice**.

|¹ The Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities is available at https://openaccess.mpg.de/67605/berlin_declaration_engl.pdf [accessed 29 September 2021].

|² Cf. Coalition Agreement 2021–2025 between the SPD (Social Democratic Party of Germany), BÜNDNIS 90/DIE GRÜNEN (Green Party) and the FDP (Free Democrats), pp. 21 and 24.

|³ Cf. <https://en.unesco.org/science-sustainable-future/open-science/recommendation> [accessed 30 November 2021].

Three central arguments support this transformation:

1 – Openly accessible publications can be read, reviewed and used more quickly and more widely by other researchers. This increases the **quality of research** and accelerates **scientific progress**.

2 – OA makes scientific knowledge more widely available outside of the scientific community and lowers the threshold for various **transfer activities**. This increases the social effectiveness of (publicly funded) research.

3 – Up to now, the business model of publishers has been based on rights of use. As they will no longer be granted exclusive rights under OA, publishers will become publication service providers and will compete with other providers. This may strengthen the negotiating position of scientific institutions vis-à-vis such service providers and improve the **innovative capacity, cost transparency and cost efficiency** of the publication system.

As far as the Council is concerned, the goal of the transformation is for academic publications to be made freely available immediately, permanently, at the original publication venue and in the citable, peer-reviewed and typeset version of record under an open licence (CC BY). This so-called **gold route to OA** (gold OA) is compatible with various business models. For example, publication service providers can draw income from a fee relating to the specific publication. Yet, institutional financing models for serials, journals or larger portfolios over a longer period of time have also been established successfully. |⁴ While the advantages and disadvantages of the various models are discussed in the Council's recommendations, an ideal model has yet to emerge.

The choice of a suitable publication channel for a manuscript depends on the communication practices in the respective discipline as well as the intended audience and must be the responsibility of the authors. One of the goals of the transformation is therefore to preserve the **diversity of academic publication types and media** and to promote innovation in this sector. All publication media that primarily serve the discourse within the scientific community should be transformed into OA.

For orientation in this market, the Council recommends that the Alliance of Science Organisations in Germany agree on common **requirements for quality assurance of content** (especially in terms of peer review processes) as well as for **high-quality publication services**. In the medium term, academic publications should not only be openly accessible, but also machine-readable through open, structured formats and semantic annotations. Publication on paper can occur in addition as necessary and may remain useful whenever an audience outside the

|⁴ In some cases, such models are distinguished as “diamond OA” from business models based on publication fees. In the view of the Council, however, access regimes and business models should be analytically separated. In particular, “gold OA” should not be equated with funding via article processing charges (APC).

scientific community is to be reached, for example in the case of non-fiction books, handbooks and textbooks as well as reference books.

The OA transformation of academic publishing means that scientific institutions no longer pay for access to research literature, but rather for the publication services that their members use or that they would like to offer their members. In this context, and for the sake of academic freedom, these institutions have the responsibility, as in the past, to ensure that all researchers have sufficient resources to be able to publish their results adequately and in a quality-assured manner. To this end, they must have sufficient resources. Just as publishing is part of the research process, the **remuneration of publishing services** must therefore become a **part of research funding**.

As far as the WR is concerned, the aim should be to achieve a change in financial flows in as cost-neutral a manner as possible, with all institutions already participating in the scientific publication system supporting this goal. In many cases, **consortial solutions** at the national level or below (country, organisation, discipline) may make sense.

For individual institutions, their research intensity and share of basic and project funding in their research budgets will be central parameters in the financing of the transformation. As the WR sees it, all **third-party funders are obliged to fully finance the publication costs** arising from publishing the results of the research they are funding. In addition to direct or retroactive funding of publication services on application, lump sum payments or a publication-related surcharge on funds paid to cover indirect infrastructure costs (programme or project flat rates) may also be considered and may help to increase the flexibility of scientific institutions. Scientific institutions must encourage their members to exploit these possibilities.

While the allocation of publication funds in project-funded research correlates directly with research intensity in this way, the transformation of funding in the area of **basic funding** proves more complex. In the view of the WR, university administrations in particular are called upon to assume strategic responsibility for reorganising publication funding. In the past, the academic publication system was largely financed through libraries' acquisition budgets. However, the extent to which decentralised units, such as departments, institutes or chairs, also spend funds on the acquisition of media of all kinds, including journal subscriptions, and on various publication fees, has not always been transparent. The Council therefore recommends that scientific institutions **record all components of their information budget** and balance possible savings on the acquisition side as well as possible sources of income against rising expenditure on publication services. In the Council's judgement, substantial shifts will only occur in a small number of cases. The information budgets will create transparency and form the basis of the system design beyond the transformative contracts as well as for possible compensation mechanisms.

A special case involves academic libraries that, like some state libraries, enable reading access, yet do not belong to a research institution and can expect considerable savings in the course of the OA transformation. In the view of the WR, such institutions should use the funds that will become available to actively support the transformation, for example by taking on tasks in long-term archiving, in standardisation processes or in the development and operation of tools for indexing and analysing academic literature.

A. Publishing as part of the research process

Science thrives on its participants sharing their hypotheses, data, methods and research results so that these can be put up for discussion and contribute to a cumulatively growing body of knowledge. |⁵ This is the primary purpose of academic publications and the reason why researchers' reputations are built on them. Publishing is therefore an integral part of the research process, regardless of the discipline, and it is in the researchers' own interest to disseminate their results quickly, widely and with quality assurance. The publication system and scientific information infrastructures |⁶ make up the institutional basis for these processes and enable the formal science communication system. |⁷

The publication system's design possesses far-reaching implications for the role of science in society beyond the research and higher education system itself. If access to academic publications is facilitated for stakeholders from outside the research and higher education system, or enabled in the first place, these stakeholders can take new knowledge into account in their actions and thus generate a transfer benefit. |⁸ Access to original scientific research publications can, for example, serve to further education and training, support citizens in forming their political opinions and will or facilitate evidence-based public decision-making. Being able to draw on academic publications in such contexts makes visible the nature of publicly funded research as a public good while also underpinning the legitimacy of science. Last but not least, access to academic publications can lead to publicly funded research contributing to innovation. Especially for small and medium-sized enterprises with limited research and development budgets or non-governmental organisations, the access modalities are crucial in this regard.

|⁵ Cf. Gläser 2006.

|⁶ German Council for Scientific Information Infrastructures (Rfll) (2015, p. 2) defines these as follows: "Information infrastructures comprise technically and organisationally networked services and facilities for working with data, information and inventories of knowledge significant to science."

|⁷ Cf. Taubert/Weingart 2016, pp. 3–39.

|⁸ Transfer is understood as the "dialogical communication and transmission of scientific findings to society, culture, the economy and politics" [translation WR] (cf. *Wissenschaftsrat* 2013, p. 25 f.).

Prior to digitalisation, the form of publication was strongly connected with the physical production and distribution process, which still shapes the worldwide publication system and its terminology today. Digitalisation is increasingly enabling new publication venues and forms of publication – for example, the spread of the internet has brought about real structural change in the publication system.

The differences between research practices in different disciplines manifest themselves not only in the methods used, but also in the way the research results are communicated, and characterise their respective publication cultures. Thus, **publication venues and forms of publication** vary: In the natural sciences, engineering and life sciences in particular, journal articles are the predominant type of publication. In the humanities and social sciences, on the other hand, publications in book form play a more important role. However, there are also differences in publication practices between the individual subjects classified as humanities and social sciences. For example, in those social science subjects that work empirically, periodicals play a central role. In some disciplines, such as computer science and other technical sciences, conference proceedings play an important role. |⁹

The corporate publishing landscape in Germany comprises a broad spectrum, from small publishing houses to large publishing houses with numerous imprints. In addition, non-commercial publication organs exist, and in Germany, these are operated by university presses, for example. In addition to publishing houses, professional societies and academies also function as publishing bodies for important academic publication organs. |¹⁰ In many subjects, especially in the natural, technical and life sciences, international publishers play the biggest role.

Academic journals, the dominant publication medium in the natural, life, and parts of the engineering and social sciences, typically publish shorter articles in a specific and highly specialised field. However, some also cover a broad range of research topics. As a rule, the editors are also scientists. This applies to quality assurance, too, which is also carried out by reviewers from the research and higher education system within the framework of a peer review process. In this role, the reviewers mostly carry out this work within the framework of their public employment contracts and are typically not paid, or paid very little, for it by the respective publishing houses. Scientific journal publications in tradition-

|⁹ Cf. Taubert 2019, p. 100.

|¹⁰ The role of scientific academies in the emergence of the system of academic journals was even more important in other European countries than in Germany, where it also played an important role, cf: Chapter VI “*Das Kommunikationssystem moderner Wissenschaft: Publikation und die wissenschaftliche Zeitschrift*”, p. 394 ff.

al, closed distribution are acquired, or subscribed to individually by readers, only to a small extent; acquisition, distribution and archiving are largely carried out by (academic) libraries.

The reputation of an academic journal affects the reputation gain of the researchers who are published in it, as reviewers often use the journal titles of publication lists as an evaluation criterion to reduce complexity. In certain subjects, the use of journal-based quantitative indicators such as the Journal Impact Factor (JIF) is also common. | ¹¹ Arguments against using the publication place as a proxy indicator for “quality” have been compiled in the San Francisco Declaration on Research Assessment (DORA), among others. | ¹² In general, the significance of publication-based indicators, including article-based indicators, depends strongly on the respective subject area.

Collected works often include regularly published conference proceedings on the one hand, and, on the other, event-related publications which contain academic essays by various authors, usually on a general topic. Conference proceedings vary in form depending on the type of conference and the respective subject culture as well as the editors’ quality assurance processes.

The spectrum of scholarly **books** also includes **monographs**, i.e. research papers on a single topic by one or more authors, as well as scholarly publications referred to as trade books; these are aimed at both a specialist community and a broader, interested public. In addition, there are genres of scientific literature, such as guides and reference works, which are aimed at specific professions and cannot be classified as research literature. Textbooks that are scientific in content but do not serve the purpose of communicating new research results also constitute a separate category.

A.II FUNCTIONS OF ACADEMIC PUBLISHING

Scientific communication has seen dynamic change for decades in the context of digitalisation. This change, which is currently being accelerated by the COVID-19 pandemic, affects the scientific communication system and the functions of publishing in all their facets.

| ¹¹ The use of journal-based indicators, such as the Journal Impact Factor, in the context of research evaluation is generally controversial; on the manipulability of the Impact Factor, its low statistical significance for individual publications and the problems of using quantitative criteria as the dominant evaluation criteria, see, among others, *Wissenschaftsrat* 2011 and 2015. The Hirsch Index, h-index or Hirsch Factor is another citation-based indicator that aggregates the citation frequency across the entire publication output of a scientist, regardless of the publication venue; cf. Hirsch 2005. In bibliometrics, however, the h-index is also viewed critically as an instrument for evaluating scientists. Cf. Barnes 2017.

| ¹² Cf. <https://sfedora.org/read/> [accessed 28 September 2021].

The overarching function of academic publishing is the dissemination of knowledge and thus the facilitation of scholarly discourse. Five sub-functions serve this goal: quality assurance, orientation, attribution, dissemination and archiving of scientific contributions. |¹³ Individual aspects of these functions present themselves differently for different disciplines, however.

Quality assurance procedures, typically peer reviews, firstly ensure and certify that contributions meet the scientific standards of the respective community. In the field of scientific journals, peer review procedures are considered standard procedure all around the world today. In the case of monographs and edited volumes, however, such formal procedures are rarely used in the German context at present. In contrast, they are more widely used in international, English-language publishing houses with a greater reach. Quality assurance processes lead to improvements in contributions and, thanks to serving as a filter, can prevent the publication of manuscripts which do not meet scientific standards. In this way, the academic publication system contributes significantly to building public trust in science. Secondly, it contributes to making the body of knowledge findable, classifiable, and weighted, and in this way offers **orientation** to scientists as well as students and people outside the research and higher education system. On the one hand, this happens through the system's subject-specific differentiation, as the specific disciplines and subjects (up to the level of individual working groups and authors) possess their own strategies and preferences with regard to communication channels and use specialised publication organs, which in turn address differentiated groups of readers. On the other hand, orientation arises from the fact that publication in a selective medium is equated with high quality. Thereby attention is being channelled. Thirdly, the attribution of submissions enables documentation of the time at which a research result was published by a researcher (also referred to as "registration") |¹⁴, and also proves essential for the reputation of the author. Attribution enables credit to be given to the previous work of others through citation. Fourthly, the **dissemination** of a publication within the scientific community is a prerequisite for this. To an increasing extent, publications are being made available in various forms and with supplementary functions, e.g. as (machine-readable) digital copies, annexes with additional materials, etc. Lastly, as the fifth function of the academic publication system, **archiving** ensures access to older contributions and their usability in the future, so that the body of knowledge is documented continuously.

These five functions must continue to be fulfilled in a high quality manner even after the transformation of academic publishing. In the process, it is important to bear in mind that the open access (OA) transformation is very different for

| ¹³ According to Gläser 2006 and Taubert/Weingart 2016.

| ¹⁴ Cf. Taubert/Weingart 2016, p. 6.

different disciplines. Regardless, the **digitalisation of publications** continues to open up new opportunities to realise these functions.

Since digitalisation has made it far easier to search a large number of documents for metadata or even full text, it brings with it far-reaching effects on such things as the orientation function. Structured, standardised, machine-readable metadata reveal diverse characteristics of digital objects that can be taken into account by search algorithms and combined in any way. Search functions therefore already far exceed digital catalogues (Open Public Access Catalogues, or OPACs), which have been the norm since the early 1980s. In addition, text mining can enable searches according to complex content criteria which are not reflected in the metadata and annotations. Clustering publications according to variety of measures of similarity can draw attention to connections that would have remained unrecognisable to humans. This way, knowledge is networked and interlinked in different ways. On this basis, completely new services and forms of use emerge, including the content analysis of large corpora through distant reading. |¹⁵

The possibilities and challenges of dynamic publishing and new types of structured publications also have consequences for citability and archiving. Modern forms of representation can ensure that the structure of a publication is retained in different formats without any loss and that it remains machine-readable. This enables precise citation. Being linked with objects such as research data, software, scripts, videos, etc., which are deposited in repositories, not only enables the textual description of the research results and their interpretation to be directly accessible, but also the resources with which the research can be reproduced or data/results can be used further. Long-term archiving repositories or platforms are of central importance in this regard, as they ensure openness and interoperability.

With the rise of alternative means of dissemination via the internet, options have multiplied that do not include quality assurance, thereby partially abolishing this function of the publication system. As a result, it is becoming increasingly difficult for researchers – especially from other disciplines and to an even greater extent for laypersons – to assess the quality of a contribution. Outside the quality-assured traditional publication channels, the exchange of contributions is formalised on large preprint servers such as ArXiv, BioRxiv, MedRxiv, ChemRxiv or SocArXiv. |¹⁶ In many research fields, it is common practice to only

| ¹⁵ In the distant-reading approach coined by literary scholar Franco Moretti, large amounts of text data are analysed with the help of computer-assisted procedures without the texts themselves being read (cf. Moretti 2016 as well as <https://fortext.net/ueber-fortext/glossar/distant-reading> [accessed 28 September 2021]).

| ¹⁶ For example, at MedRxiv and BioRxiv, all manuscripts undergo a basic screening for non-scientific content as well as for material that could pose a health risk, and are checked for plagiarism. ArXiv and SocArXiv are also subject to moderation (cf. <https://arxiv.org/help/moderation> and <https://socopen.org> respectively).

post manuscripts as preprints on platforms that have already gone through the peer review process, so that the filter function remains in place in these cases. |¹⁷ In addition to other preprint servers, the exchange of scientific contributions also takes place on social networking platforms such as ResearchGate or Academia. |¹⁸

At the same time, digitalisation opens up opportunities to organise the processes of selecting and acknowledging contributions differently than before. In order to make the process transparent and to document the arguments in a comprehensible way, e.g. in open peer review, the submitted manuscript as well as the reviews obtained are published directly and authors are usually given the opportunity to respond publicly to the reviews. To improve quality control, some journals have implemented post-publication review systems in which manuscripts are immediately made public as preprints, or interactive review processes are used that enable discussion and public comment not only by the reviewers but also by other members of the scientific community. |¹⁹ These options are also altering the perception of publications as static objects completed after review and publication. By documenting the process of creation as well as the discussion of research results that follows publication, it can instead be understood as a “data set of versions”.

Digital publications can be digitally archived in **repositories** and made accessible worldwide free of charge. Repositories that meet certain minimum requirements are listed in the Directory of Open Access Repositories (OpenDOAR). |²⁰ In general, a distinction can be made between institutional repositories, which are often operated by libraries, and cross-institutional, discipline-specific repositories. With the DINI Certificate for Open Access Publication Services, the German Initiative for Network Information (DINI) has created a standard for repository offerings and interfaces. The certificate is further developed and updated on a continuous basis. At the international level, the Confederation of Open

The preprint servers received attention during the COVID-19 pandemic, as new (and in part questionable) research results were disseminated in particular via BioRxiv (cf. <https://www.biorxiv.org>) and MedRxiv (cf. <https://www.medrxiv.org>) and picked up by the media.

|¹⁷ For example, according to Taubert’s findings, arxiv.org is mainly used by the astrophysical community to make manuscripts already accepted by a journal accessible before they go to print and beyond the circle of subscribers, cf. Taubert 2019, pp. 276 ff.

|¹⁸ However, sharing publications via these platforms is not considered regular OA publishing. A 2017 study found that 50 % of a sample of 500 publications on ResearchGate violated publishers’ copyright policies in the publication contracts. Cf. Jamali 2017.

|¹⁹ The journal Atmospheric Measurement Techniques uses such an interactive procedure, which includes an eight-week phase of open, interactive discussion https://www.atmospheric-measurement-techniques.net/peer_review/interactive_review_process.html [accessed 8 January 2021]).

|²⁰ The service started in 2005 as a result of a collaborative project between Nottingham University and Lund University with 78 entries and recorded 5 623 repositories in February 2021. Most repositories (16 %) are operated in the US, followed by Japan and the UK. Germany follows in fourth place with 275 repositories (cf. <https://v2.sherpa.ac.uk/opensoar/> [accessed 29 September 2021]).

Access Repositories (COAR) pursues the goal of achieving alignment and interoperability of OA repositories. The association has developed a Best Practices Framework for Repositories to help different types of repositories evaluate and improve their operations based on best practices.

Disciplinary repositories often also function as **preprint servers**, which were and continue to be used for the rapid exchange of manuscripts and later for self-archiving and so-called green OA (see below). **Publication platforms** are used both for first publications and for secondary publications via the green route. Some innovative publication platforms, such as that of F1000 Research, which are mostly funded by funding organisations, operate on the basis of the open post-publishing peer review. |²¹ So-called megajournals are a new type of publication media that emerged with the launch of PLoS ONE in 2006. |²² They are characterised by a broad range of topics and faster processing times. Another key feature is their review process, which focuses only on scientific as well as technical soundness and deliberately not on the relevance of the topic or the suitability for the specific focus of a journal. Today, megajournals are also criticised. It is claimed that they offer publication opportunities for inferior work while the lack of relevance as a criterion for inclusion deprives recipients of a meaningful filter. |²³

A.III DEVELOPMENTS AT SCIENTIFIC PUBLICATION SERVICE PROVIDERS

The services of organising the selection, editing, production and distribution of academic publications are typically carried out by companies that earn cost-covering revenues and profits in return. Yet, academic publications are a unique, non-substitutable commodity. For libraries, whose task it is to provide scholars with access to literature, this means that they are left with no alternative when prices are raised. As original research results are generally published in scientific journals, a journal title can give a publisher a non-competitive market position, as no other publisher can carry it. Through acquisitions in the area of scientific journals and imprints, a concentration process has taken place in the publishing industry in recent years, from which only a few large publishing houses have emerged. In this way, an oligopoly has evolved on the side of the providers of academic publication services. |²⁴

|²¹ The European Commission has also launched Open Research Europe, an F1000 platform on which all Horizon 2020 and Europe-funded Horizon researchers can publish: <https://open-research-europe.ec.europa.eu/> [accessed 28 September 2021] (cf. Appendix).

|²² PLoS ONE (Public Library of Science) was the first multidisciplinary, large-scale open access journal to publish peer-reviewed science without regard to novelty value (see Wakeling 2019, p. 121).

|²³ Ibid. p. 121 f.

|²⁴ Cf. Taubert/Weingart 2016, pp. 12–13.

While before World War II most scientific journals were still published by professional societies, in the mid-1990s, the share of commercial providers in the US already lay at 40 %. The sale of journal subscriptions to academic libraries in particular has enabled and continues to enable publishers to generate high and secure revenues. |²⁵ A study examining the share of academic publications in major publishers' journals and its development between 1973 and 2013 shows that the natural and medical sciences as well as the social sciences and humanities were able to continuously increase their share. The highest degree of concentration occurred in the social sciences (with 70 % of articles with the top five publishers). Over the course of digitalisation, the share of the largest publishers has continued to rise globally, due both to the successful establishment of new journals and the takeover of existing journals by these publishers. |²⁶ Currently, more than 50 % of the total German academic publication volume is published in journals belonging to the three largest academic publishing houses: Springer Nature, Elsevier and Wiley (Figure 1). |²⁷

Before the spread of OA, libraries' expenditure for supplying literature and information consisted of the costs for individual publication acquisitions and subscription fees for periodicals, with journal subscriptions in particular representing a major cost factor for academic libraries. Additional financial flows existed at that time as well: Scientists had to pay for colour charges, reprints and printing subsidies from their research budgets (see below).

Libraries select a range of subscription content for which they purchase reading access. This selection is often strongly influenced by the fact that publishers offer so-called "big deals" that cover either their entire portfolio or a quite large, thematically defined collection. |²⁸ In the print sector, too, publishers bundled multiple journals and offered them as a package even before OA. Contracts between publishers and libraries are now generally negotiated in consortia; very few are still negotiated one-by-one by individual institutions. However, there is no transparency between these consortia regarding the contractual terms, which are protected by confidentiality clauses. This lack of price transparency in subscription contracts has become a central point of criticism. |²⁹ It restricts

|²⁵ Cf. Tennant 2018, p. 13.

|²⁶ Larivière/Haustein/Mongeon 2015.

|²⁷ Figure 1 shows the aggregated shares for the years 2015–2020. The shares of the publishing houses' publications in the publication volume in Germany in 2020 are 29 % for Springer Nature, 17 % for Elsevier and 9 % for Wiley; data basis: Dimensions (Digital Science), data status: 5 August 2021, evaluation: Forschungszentrum Jülich.

|²⁸ The overview site of the nonprofit Our Research, www.unsub.org [accessed 29 September 2021], provides libraries with data on the actual value of the big deals they are offered as well as information on cancellation options.

|²⁹ In the course of the DEAL negotiations (cf. Appendix), it was determined that, with regard to payments from libraries to publishers, there were fluctuations of "up to 60 % despite almost identical research and publication profiles" [translation WR] (cf. Botz 2021, p. 33).

competition and encourages concentration in this market. This has made it easier for publishers to charge high prices for access to journals, thus limiting access to scientific knowledge. |³⁰

Functioning, competition-driven market structures do not exist due to this concentration in the case of journals. In addition to the non-substitutability of journal titles, the lack of transparency is the greatest obstacle to the development of a functioning publication market.

The **digitalisation** of the publication process enables the unlimited, almost cost-neutral reproduction of academic publications. This was a prerequisite for waiving access restrictions and thus for the **OA movement**. The changes also extended to how the processes leading up to publication are handled. Even so, the **subscription business model** was initially transferred unchanged to digital distribution. This required mechanisms enabling access restrictions to be enforced. |³¹ In addition, some publishers used digitalisation to open up new sources of revenue, such as post-termination access fees to secure access even after a contract has been terminated, or fees to make individual articles accessible in OA in so-called hybrid journals.

The market for **academic books** and the typical financing models in that market differ from those in the journal sector. In addition to the purely market-based practice in which a publisher pre-finances the production of a book and accepts the entrepreneurial risk of amortising the costs through the sales price, subsidisation by the authors or their sponsors or institutions in the form of a “printing cost subsidy” or through the purchase of a certain number of copies is also possible. This path is not infrequently chosen in the case of foreseeably small print runs of highly specialised works such as qualification publications. Since peer review procedures have not yet been established in a standardised manner everywhere when it comes to scholarly books, conflicts of interest can arise between entrepreneurial interests and the quality assurance function of academic publishing. |³²

A.IV THE DEVELOPMENT OF THE OA MOVEMENT

The “open” movement began as early as in the 1980s with initial efforts to formulate principles for software which users could use and modify freely. A few years later, the term “open source” was coined and defined in ten points by the

|³⁰ Cf. van Barneveld-Biesma et al. 2020, p. 16.

|³¹ Cf. Schimmer/Geschuhn 2017, p. 174 f.

|³² cf. Taubert/Weingart 2016, p. 26.

Open Source Initiative (OSI) founded in 1998. |³³ It focused on the entrepreneurial advantages of open source software. |³⁴ Gradually, the term was also used for “knowledge” in a broader sense. The **Open Definition** of the Open Knowledge Foundation defines open in terms of open data, open content and open knowledge as follows: “Knowledge is open if anyone is free to access, use, modify, and share it – subject, at most, to measures that preserve provenance and openness.” |³⁵

OA refers to access to full-text versions of **academic publications**. In the literature, free access to scientific data is distinguished from OA as “open data” (but may be implied if the provision of data on publications is required as supplementary material). The present recommendations refer exclusively to OA to scientific publications. |³⁶ The constitutive features of the **OA concept**, starting from the Budapest Open Access Initiative (BOAI), are components that further define the concept of “free” accessibility. In addition to financial accessibility, this also concerns legal and technical accessibility. Another (possible) component is the temporal dimension.

Along these dimensions, various forms of OA have emerged, each of which combines different attributes in varying degrees, usually also taking into account the underlying funding model. These are referred to in the scientific community by adjectives such as “gold”, “diamond”, “green” or “bronze” OA and distinguished from closed access (on the development of the proportions of the various OA types, cf. Figure 3, Figure 4, Table 5 and Table 6). |³⁷ These publication models and designations were developed within the scientific community over the course of the “Open” movement in the 1990s and were subsequently taken up in the science policy debate on OA. Differences between the various types of OA concern not only responsibility for OA, but also the time and version for which access is granted. However, there is no official, universally valid definition, so that discussions are made more difficult by the vagueness of the terms and different interpretations. In addition, the various types of OA are usually defined with reference to journals or journal articles and are not easily transferable to other types of publications.

|³³ Cf. <https://opensource.org/docs/osd> [accessed 28 September 2021].

|³⁴ On the historical development, cf. Schrape 2016, p. 23 ff.

|³⁵ Cf. <https://opendefinition.org/od/2.1/en/> [accessed 29 September 2021].

|³⁶ The term “Open Data” is also used for “Open Government Data” in addition to “Open Research Data” (cf. <https://www.bmi.bund.de/DE/themen/moderne-verwaltung/open-government/open-data/open-data-node.html> [accessed 28 September 2021]. The WR already commented on the topic of Open Data in 2020 in its position paper “Zum Wandel in den Wissenschaften durch datenintensive Forschung” (cf. WR 2020).

|³⁷ Unlike in Figure 3, Figure 4, Table 5 and Table 6 only those contributions may be counted for questions relating to the costs of publishing under DEAL (cf. Appendix), whose corresponding authors are affiliated with the institution(s) under investigation, as only these are relevant to accounting.

Statistics on OA publications refer to different definitions depending on the data source, and this must be taken into account in the following. |³⁸ The terminology on which these recommendations are based (cf. A.VII) remains independent of this.

A.V FINANCING MODELS FOR OA PUBLICATIONS

As OA is establishing itself, the financing of the publication process is witnessing a shift from acquisition and subscription costs to publication costs: instead of media carriers, licences and subscriptions, funds are needed to finance OA publishing. This is done either through fee-financed models, in which the institutions typically pay publication fees such as article processing charges (APCs) or submission fees (sometimes also used for closed access) to the publishers for the researchers they employ. |³⁹ This funding route is usually closely associated with the term gold OA. The publish-and-read fee model exists as a transformative model for the transition from the subscription and acquisition model to a pure OA model (cf. Appendix A.I.1 on transformative contracts and Projekt DEAL). |⁴⁰

In addition, models of institutional funding exist, also known as diamond OA. In such a case, a journal or other publication medium is financed by an institution or funding body over a longer period of time. Another variant is funding from a consortium organised by the publisher or a consortium management. It is estimated that up to 29 000 such journals exist worldwide. Yet, only about one third of these are listed in the Directory of Open Access Journals (DOAJ). The majority of them are small journals with a small number of articles per year as compared to APC-based journals. This number is presumably limited for cost

|³⁸ In a recent study, Heidbach et al. compare two providers of bibliographic data and show that due to different collection strategies (definitions of OA categories and document types, data selection, time of collection), the total number of publications varies greatly, and these strategies thus have a considerable influence on the data. The authors point out the need for providers to better document the crucial features of data sets; it is also important that these details be described with precision in the context of data analyses (cf. Heidbach et al. 2022, pp. 8–10).

|³⁹ The term “author-pays model” is often used for this model, suggesting that the authors themselves pay the fees (instead of the institutions). Although this is true in some cases, to avoid misunderstandings, the term is not used in this paper. Submission fees have existed independently of OA models and vary in prevalence across various disciplines. For example, they are common in economics, whereas submission fees are not usually charged in STEM subjects (mathematics, computer science, natural sciences, technology). However, Nature has taken a step forward by introducing a new type of submission fee called an “editorial assessment charge”. Under the Guided OA programme, authors submit their manuscripts and pay a non-refundable fee of 2 190 euros after an assessment of their suitability to cover the costs of an editorial assessment and the peer review process. Cf. <https://www.nature.com/nature-portfolio/open-access/guided-open-access> [accessed 28 September 2021].

|⁴⁰ The so-called publish-and-read fee (PAR-fee) is used in the transformative DEAL contracts for the transition to an OA world. The participating academic and scientific institutions pay for read access to publications still published in closed access; at the same time, the authors employed by them can publish in OA in hybrid journals or at discounted APCs in pure OA journals (see also Glossary).

reasons. Diamond OA journals are mainly found in the humanities and social sciences. |⁴¹ A large proportion of diamond OA journals are found in Latin America, the Middle East and Eastern Europe. |⁴²

The advantage of diamond OA is that the financial resources of the authors' institutions do not affect opportunities for publication. However, the central criticism of APC-based OA models is that monetary access barriers to publishing are created, especially for researchers from the Global South and from lower-income countries (or, that the barrier was shifted from reading to publishing, as the subscription fees could often not be raised either). Against this background, new models are already being tested; these plan for annual flat rates paid by institutions instead of article-based billing. |⁴³

“Hybrid journals” are journals which are not generally published in OA, but where the publisher offers the option of publishing articles in OA without an embargo period and in the journal itself. |⁴⁴ However, if the acquisition or subscription model and OA coexist as alternative models, there is a risk that the same publication service will be paid for through two channels, thus twice (double dipping). Publishers have responded to pressure from the scientific community with “offsetting” models, under which they discount subscription prices in proportion to the number of articles for which OA publication fees are paid. Nevertheless, cost control remains difficult with such models. The organisations in the OA Initiative cOAlition S only support hybrid journals if they are used for a clearly limited period of time under so-called transformative contracts. The goal is to achieve a world without hybrid journals. cOAlition S argues that the hope that the hybrid model would lead to a complete transformation on its own within a foreseeable timeframe has proven false, as the proportion of OA articles in hybrid journals is not growing fast enough. |⁴⁵

To finance OA publication fees, publication funds exist at many institutions from which authors can apply for funds to cover the costs of OA publications. These are often located at libraries.

|⁴¹ Cf. Bosman et al. 2021a, p. 36. The international overview study shows a decrease in the share of diamond OA journals since 2018, which coincides with the increase in articles in APC-based journals. According to the study, 60 % use the open-source software Open Journal System (OJS), but run on servers whose long-term survival is not guaranteed (cf. p. 98 and p. 8).

|⁴² Ibid. p. 33.

|⁴³ Cf. the PLOS Community Action Publishing (CAP) model (<https://plos.org/resources/community-action-publishing> [accessed 28 September 2021]).

|⁴⁴ Cf. Taubert 2019, p. 129 ff.

|⁴⁵ See cOAlition S statement dated 29 April 2021 at <https://www.coalition-s.org/why-hybrid-journals-do-not-lead-to-full-and-immediate-open-access> [accessed 28 September 2021]. cOAlition S member funding for these transformative agreements is time-limited and will expire at the end of 2024.

One way of describing the development of the publication process is at the level of the publication organs. A database which includes OA journals from all disciplines is the Directory of Open Access Journals (DOAJ). It is a curated directory of OA journals that currently lists over 16 000 OA journals. Although fewer than 30 % of the journals listed in the directory do not charge article-related publication fees, |⁴⁶ the proportion of articles financed via APCs was much higher. This contrast is due to the very different quantitative distribution of articles per journal between APC-based journals and diamond OA journals, which usually contain very few articles. |⁴⁷

The development of publication numbers with German (co-)authors, differentiated by OA type, as well as the price ranges of paid APCs can be found in the Open Access Monitor Germany (OAM). It records the **publication volume** of German universities in scientific journals and offers analyses of subscription and publication expenditures from various data sources. |⁴⁸ According to the OAM, 58 % of journal articles (673 383) with first authors from Germany were freely accessible in the sense of gold, green, hybrid and bronze OA in the years 2017–2021. |⁴⁹ During the period mentioned, most APCs for gold OA articles in Germany (29 %) lay between 1 600 euros and 1 799 euros; 21 % ranged between 1 400 euros and 1 599 euros and around 26 % between 1 800 euros and 1 999 euros (cf. Table 1).

Using the German Library Statistics (DBS) |⁵⁰, the **acquisition costs** for digital and non-digital publications (books, magazines and newspapers) arising for

|⁴⁶ Cf. <https://doaj.org/> [accessed 29 September 2021].

|⁴⁷ OA journals are defined as peer-reviewed scholarly journals where the rights of use have been granted under an open licence (Creative Commons or equivalent), allowing immediate free access to the work – “permitting any user to read, download, copy, distribute, print, search, or link to the full texts of articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose” (cf. <https://doaj.org/apply/guide/> [accessed 21 December 2021]). Furthermore, an additional DOAJ seal is awarded. Criteria that journals must meet include digital preservation (journal articles must be deposited in an archive), persistent identifiers such as DOI (Digital Object Identifier), regular uploading of article metadata and permission to self-archive all versions.

|⁴⁸ The Open Access Monitor (cf. <https://open-access-monitor.de> [accessed 28 September 2021]) is a project funded by the German Federal Ministry of Education and Research (BMBF) to improve the data situation on OA in Germany.

|⁴⁹ The categorisation of OA status comes from the Unpaywall data set for article-level categorisation and is done as follows: gold (if the publication is on the publisher’s website and the journal is OA), hybrid (if the article has an open licence such as CC, with free use and re-use), green (if the “best version” of the publication is in a repository), bronze (if the article does not have an open licence such as CC); everything else is closed. The status for journals was determined using DOAJ (see below) (Barbers et al. 2021, pp. 15, 21 and 29).

|⁵⁰ The German Library Statistics (DBS) covers all library sectors and is based on uniform definitions. The data is collected via questionnaires returned by the libraries. The DBS points to a high participation rate, but makes no claim to completeness, as participation is voluntary. However, non-university research institutions are not included in the statistics. In the reporting year 2019, data from 237 academic libraries was recorded.

German libraries can be determined. When the reporting years 2015 and 2020 were compared, budget shifts between physical and digital media become clear: the expenditure for non-electronic journals and newspapers decreased by 35 % to 31 million euros between 2015 and 2020. While the expenditures for electronic journal and newspaper subscriptions in the reporting year did not develop in any clear direction over the last five years, |⁵¹ total library expenditures in the “digital media of all kinds” category |⁵² amounted to around 146 million euros in 2020 and has thus more than doubled since 2015 (plus 105 %). Total expenditures on printed books (including dissertations), journals and newspapers decreased by 24 % from the amount spent in 2015.

OpenAPC can be used to estimate the average fees paid by an **institution, publisher or journal**. With regard to OA status, OpenAPC differentiates between gold and hybrid. As the data is provided on a voluntary basis by the institutions, it does not give any information on actual total volumes. Yet, trends can be identified on the basis of those figures, such as pricing patterns for different publishers. The approximate scale of APC amounts can also be identified. These should, however, be considered a lower limit. According to the figures reported by the institutions, the average APC has increased by 17 % over the past five years. In 2020, it lay at around 1 660 euros; in 2015, the average price per item lay at 1 430 euros (cf. Figure 2, Table 2 and Table 3).

The DEAL cost modelling tool provides a way of analysing and estimating the **impact and costs of the transformative contracts** under Project DEAL (for Project DEAL cf. Appendix). |⁵³ This can be done at either an institutional level, for Germany as a whole or for individual federal states. The service is mainly intended for scientific institutions, which can make use of it to calculate the development of their expenditures with publishers Wiley and Springer Nature for various scenarios and compare it with a cost development without a DEAL contract. The data preparation contains publication and financial data from before the DEAL contracts; from this starting point, growth trends are then determined and forecasts calculated for individual institutions and groups of institutions. **An increase in OA publications** can already be observed for the years before

|⁵¹ Subscription fees for e-journals and newspapers in the reporting year has fluctuated by some 90 million euros p.a. over the last five years.

|⁵² The “digital media of all kinds” category includes expenditures on e-books, article or book processing charges (APCs or BPCs), OA memberships and participation in collaborative funding projects (pledging), but not subscriptions of an electronic nature or newspapers. Expenditures on OA publications has only been reported separately by the DBS since 2018. Accordingly, libraries spent around 15.2 million euros on APCs, BPCs, OA memberships and pledging in 2020. Compared to the previous year, this is an increase of 64 %; since 2018, expenditures have more than doubled (+132 %). However, due to the change in reporting categories, incomplete coverage is to be assumed. In addition, these statistics do not include APC payments that were made outside of library budgets, so these figures are considerably lower than the actual expenditures.

|⁵³ The Excel-based tool is available at <https://deal-operations.de/das-ist-der-deal/deal-kostenmodellierungstool> [accessed 28 September 2021].

DEAL contracts. According to the data, Springer Nature recorded an annual average growth rate of 6.7 % for articles from Germany in OA journals, and of 17 % in hybrid journals. In contrast, the total number of publications from Germany increased by only 0.7 %. Wiley recorded a growth of 21.1 % for OA journals and 23.6 % for hybrid journals, while the total number increased by only 2.3 % over the same period. The larger percentage increase for Wiley is mainly due to the different initial situation, as the publisher had a significantly lower total number of OA publications compared to Springer Nature. In terms of **revenue** generated from hybrid OA articles from Germany, the data for Springer Nature shows an average annual growth of 21.5 % for the period before the DEAL contracts, and 27.4 % for Wiley. Under the DEAL contracts, a gradual shift of articles from hybrid to gold OA can be witnessed, which has a cost-dampening effect. |⁵⁴ The DEAL modelling tool shows at the aggregated level of the federal government (and for most of the federal states) that the OA transformation, related to the two DEAL contracts, can be realised with the resources already used in the publication system and that the contracts have a cost-dampening effect at this level. |⁵⁵

In terms of publication numbers and expenditure data, the year 2020 shows unusually high numbers in the publication databases compared to previous years. This is probably due to the COVID-19 pandemic (cf. also Figure 3 or Figure 4); the effect is also evident in the case of the two DEAL contracts. Whether 2020 will prove to be a special case or whether the numbers will stabilise at a higher level than before the pandemic remains to be seen.

OA publications are often attributed **greater visibility** due to their worldwide free availability. Publishers point out that in many subject areas, OA publications are accessed, downloaded and cited more frequently compared to similar non-OA titles from the same subject area. In the case of OA publications, they say, books are increasingly easier to add to the library stock or online catalogue, while the acquisition of print works is becoming less likely. |⁵⁶ Download figures show a higher rate for OA articles than for electronic publications in closed access. |⁵⁷ With regard to the **citations** indicator, bibliometric studies published

|⁵⁴ Cf. Schimmer/Dér/Campbell 2021, p. 10 f.

|⁵⁵ Ibid. p. 18.

|⁵⁶ However, a report by the European ESFRI lighthouse project OPERAS criticises the lack of a standardised search system for academic libraries in Germany. The inclusion of OA books in search systems and library catalogues largely depends on their operators; manual insertion is usually not possible due to a lack of staff. Cf. Morka/Gatti 2021, p. 28.

|⁵⁷ The publisher Wiley, for example, saw a 41 % increase in the use of research content in Germany during the first year after the DEAL agreements (cf. Drees et al. 2020: Europe's Road towards Open Science and Open Access; <https://doi.org/10.5446/50070> (video); presentation slides at https://tib.flowcenter.de/mfc/medialink/3/de7faa910b5502bd09eeddd895c39ec664cca238e6d4ec79da4a93da2af772cb6f/2020_1020_EMBL_OAweek_Herrmann_ProjektDEAL.pdf; p. 4).

between 2010 and 2015 show a majority of higher citations for OA publications. |⁵⁸ A Springer Nature study, which analysed a sample of 70 000 articles from hybrid journals, also revealed a citation advantage, which was found for all subject areas with the exception of mathematics/computer science and the social sciences and humanities. Across all subjects, OA articles recorded four times more downloads and were cited 1.6 times more frequently on average than non-OA articles. |⁵⁹ The variability of individual studies makes generalisations difficult, as results depend heavily on factors such as the selection of the journals studied (gold/hybrid/green), the comparison group and the time window. |⁶⁰ Thus, researchers point out elsewhere that guidelines are needed for evaluating future bibliometric studies. |⁶¹

A.VII SYSTEMATISATION OF OA – DIMENSIONS OF OPENNESS

The accessibility of academic publications and how they can be used depends on various factors that must be taken into consideration as openness dimensions in an OA systematisation.

The type of funding is also closely interwoven with openness of access aspects (cf. A.V). In principle, however, equivalent access regimes can be financed in different ways. While until now, the financing type has often been part of the different OA type definitions and used as an additional distinguishing feature, the business models are therefore treated separately in this paper.

The distinction between the two main strands – gold OA and green OA – is typically determined by the point in time, responsible party and specific version to which OA is granted. **Gold OA** or the “gold route” is classified as the most advantageous form of OA. It is understood as immediate, unlimited, free access to

|⁵⁸ SPARC Europe’s OpCit project has for many years maintained a list of studies that investigate whether a citation advantage exists for OA articles. Of 70 studies on “Citation Advantage”, 46 found a citation advantage (<https://sparceurope.org/what-we-do/open-access/sparc-europe-open-access-resources/open-access-citation-advantage-service-oaca/> [accessed 28 September 2021]).

|⁵⁹ Draux/Lucraft/Walker 2018; (<https://www.springernature.com/de/open-research/about/oa-effect-hybrid> [accessed 28 September 2021]).

|⁶⁰ For example, a current study that examines bibliometric data on all articles indexed in the Web of Science (WoS) database by subject area for a citation advantage between 2013 and 2015, but only refers to gold OA journals, shows an ambiguous picture (cf. Basson/Blanckenberg/Prozesky 2021). The study concludes that OA journal articles experience a citation advantage in very few of the 250 subject areas examined. In most of these subject areas, the citation advantage was only found in relation to the indicator of whether the article was cited at all. Restricting the definition of OA journal articles to “gold DOAJ” led to the exclusion of 22.8 % of all articles recorded for the years studied (p. 465). The subject areas also showed a skewed distribution with regard to OA.

|⁶¹ Cf. Langham-Putrow/Bakker/Riegelman 2021, p. 9. The overview study finds a citation advantage for 48 % of the studies examined.

the publication at the original publication venue in the original version. |⁶² In relation to individual articles, this also applies to publications in media whose business model corresponds to the “diamond” or “hybrid” path (cf. A.V).

Overview 1: Attributes of the “openness” of academic publications

Attributes	Possible manifestations			
Time of OA access	At the time of publication	After embargo		
	After peer review	Before peer review (preprint)		
Version (status/reliability)	Official “version of record”	Imitated “version of record” with same pagination	Author accepted manuscript (AAM) accepted, peer-reviewed manuscript	Manuscript (submitted) (preprint)
Availability/archiving	Permanent	Temporary		
Legal usability	No restrictions except copyright (CC BY/CC BY-SA)	Commercial use excluded (CC BY-NC)	Restriction to use of the unaltered original (CC BY-ND)	Restrictive individual contract with further restrictions
Location of OA access	Original publication venue	Repository – institutional or disciplinary		Website, social media
Technical usability	Machine-readable through open, structured formats and semantic annotations	Open formats such as html, docx, LaTeX	Searchable such as ePUB, PDF	Closed (copy protected/ scanned PDF)

■ Gold OA, ■ green OA, ■ preprint

Green OA, in contrast, describes the storage of contributions in a repository that have already been accepted elsewhere as a second publication by the authors (self-archiving) or an institution. In addition to fully digital contributions, printed works can also be scanned, digitally archived and thus made accessible via the green route. Other possible access locations include social media and a dedicated website. Green OA can refer to the version of record, which is identical to the publisher’s version, but also to the author accepted manuscript (AAM), which is identical content-wise but may differ in formatting, editing and pagination. To ensure citability, the publisher’s pagination is sometimes imitated. Embargo periods set by publishers can determine the earliest date of secondary

|⁶² By excluding funding at this point, this applies regardless of whether the publication was funded via APCs or BPCs by the authors or institution, or whether there was institutional funding or subsidisation of the publication medium, as in the model known as diamond OA. Also covered by the definition are variants in which an embargo period is used before OA, while the publication is only accessible after payment of a fee, as in the case of the models known as moving wall or bronze OA.

publication, usually 6–24 months after the first publication. This does not affect the authors' right to make the accepted manuscript of publicly funded scientific contributions to periodicals freely available after 12 months. |⁶³ Publications that have already appeared in gold OA will continue to be considered gold OA even after a second publication. In contrast, the disclosure of preprints, i.e. manuscripts which have not yet been quality-assured, primarily serves the purpose of enabling discussion in the scientific community. Deviations from the final, citable version are the rule. In this respect, communication via preprints takes place at an earlier stage and serves other purposes than publishing in genuine OA.

Also relevant to OA is the duration of the (open) availability of publications, through **archiving**. |⁶⁴ While publishers' archives are generally linked to the commercial stock of the publisher, libraries and public repositories can, in principle, achieve permanent archiving. In consortium agreements, therefore, the establishment of “dark” or “shadow archives” at a public institution is sometimes agreed on in order to ensure that the publications in question are available for an unlimited period of time.

The **legal usability** of publications is regulated by copyright law and is typically regulated by licences, by publishers possessing defined or unrestricted rights of use. The Creative Commons licences, which will be discussed in more detail in the following section, offer gradation possibilities. Limited usability also applies to articles that can be read free of charge as “bronze OA” via the publisher's website, but have not been published under an OA licence.

In addition to the **OA location** (original publication venue, repository, website, etc.), another dimension concerns openness regarding **technical usability**. The usability of closed documents, for example copy-protected or scanned texts as PDF files, is severely limited. In contrast, searchable file formats such as DOCX, LaTeX, ePUB and PDF as well as web-compatible formats such as HTML, XML and RDF offer greater benefits. Machine-readable publications thanks to open formats and semantic annotations offer the most comprehensive technical uses possible (e.g. RaSH, |⁶⁵ dokieli, |⁶⁶ ScholarMarkdown, |⁶⁷ which are directly integrated into publications and publication platforms, or the Open Research Knowledge Graph (ORKG) |⁶⁸).

|⁶³ Copyright Act of 9 September 1965 (BGBl. I p. 1273), last amended by Article 25 of the Act of 23 June 2021 (BGBl. I p. 1858), here: Section 38, paragraph 4.

|⁶⁴ In view of the “disappearance” of publications when online journals or platforms are closed, the question arises as to how the articles published there can be kept accessible (cf. Laakso/Matthias/Jahn 2021, pp. 1–14).

|⁶⁵ For Research Articles in Simplified HTML (RaSH) see <https://essepuntato.it/papers/rash-peerj2016.html> [accessed 28 September 2021].

|⁶⁶ Cf. <https://dokie.li> [accessed 28 September 2021].

|⁶⁷ Cf. <https://github.com/rubensworks/ScholarMarkdown> [accessed 28 September 2021].

|⁶⁸ Cf. <https://www.orkg.org/orkg> [accessed 28 September 2021].

In view of the different policies of journals, the Scholarly Publishing and Academic Resources Coalition (SPARC) has created guidelines regarding six basic aspects of OA – reader rights, reuse rights, copyrights, authors posting rights, automatic posting and machine readability – under the name HowOpenIsIt? Open Access Guide. |⁶⁹ Here, the types of use are differentiated even further by also taking into account automatic copies of the journals stored in third-party repositories (openness according to time relative to the publication of the article).

A.VIII LICENSING

Clarifying of rights of use is a central aspect in the context of OA: this was already made clear in the Berlin Declaration of 2003, in which the signatory research organisations, including the Council, pledged to contribute to the dissemination of OA (cf. Appendix). In addition to the right of access, the Declaration stipulates as a prerequisite for OA publication that “authors and rights holders” must allow users “to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship”. |⁷⁰

The traditional contract model, which originated from the print sector, provides for the transfer of comprehensive, usually exclusive, rights of use from the authors to the publisher. As a result, authors cannot continue to use their own publications without restriction (nowadays with the exception of the indispensable second publication right for researchers, cf. Appendix) and must first obtain permission from the publisher for uses for which the right has been transferred to the publisher. In addition, such uses may incur licence fees. As an alternative, authors can grant publishers a non-exclusive licence to publish, which allows them to continue sharing and reusing their work (granting simple rights of use). Authors thus retain the rights to use their work, for instance to reproduce, distribute, translate and publicly present it. |⁷¹

The licences provided by **Creative Commons (CC)** |⁷² set standard conditions for the use of a work by others. A large number of free licences exist; |⁷³ yet, the CC licences specifically are characterised by the fact that they have become an international standard, especially in academia, and have also been confirmed by courts. They address three levels of communication: as they are comprehensible

|⁶⁹ Available as a PDF at <https://sparcopen.org/our-work/howopenisit/> [accessed 29 September 2021].

|⁷⁰ Cf. https://openaccess.mpg.de/67605/berlin_declaration_engl.pdf, p. 2 [accessed 29 September 2021].

|⁷¹ Cf. Morrison et al. 2020, pp. 5–6.

|⁷² Creative Commons refers to a set of different licences as well as the non-profit organisation that was founded in the US in 2001 and issued the licences. Furthermore, the name stands for a movement or a worldwide network.

|⁷³ Other free licences are, for example, the Digital Peer Publishing License, Open Content License (OPL), GNU Free Documentation License (FDL), “Free Art” licence, licence for non-commercial use of content in schools and universities, Public Documentation License (PDL); cf. Klimpel 2020, p. 45.

to the general public by means of so-called “laundry symbols”, contain detailed legal licence text adjusted to different legal systems worldwide and are machine-readable. They enable rights holders to formulate legally secure terms and conditions for the use and re-use of their works that best suit their needs. There are **six modules of Creative Commons licences**, with CC BY (or CC0, a waiver of all rights) being the most open licence, which imposes no restrictions on the use of the material other than attribution, i.e. it also allows adaptations. The other modules each contain additional restrictions: SA (share alike) stipulates distribution under equal conditions, the licence type ND (non-derivative) excludes adaptations and NC (non-commercial) excludes commercial use. There are also two other modules in which the prohibition of commercial use is combined with one of the other restrictions: NC-SA and NC-ND.

However, education and awareness-raising with regard to licences with restrictions appears to be important: |⁷⁴ From a legal point of view, it is recommended that before granting a CC BY-NC licence, it should be checked whether the desired restrictions are not already obtained with one of the other sub-categories, as an NC licence is often associated with unintended restrictions on the dissemination of a publication. For example, the appropriation of content by commercial companies can already be prohibited as part of the SA licence (distribution under equal conditions). However, institutions, initiatives and projects such as knowledge databases or open-source projects, which also work to enable free access to knowledge but cannot exclude the possibility of commercial use, can no longer use content under an NC licence. |⁷⁵ cOAlition S is also critical of the NC licence and requires the use of a Creative Commons attribution (CC BY) 4.0 licence by default. The CC BY-SA and CC0 variants are also accepted; the CC BY-ND licence, on the other hand, can only be granted if the authors explicitly apply to their funder for a justified licence and the use is approved. |⁷⁶ In addition, the CC BY-NC and -ND (no editing) options also do not meet the requirements of the Open Definition. With the rights retention strategy (cf. Appendix A.I.2), cOAlition S has also pushed for strengthening authors’ rights by encouraging authors through the provisions of the funding bodies to retain their rights vis-à-vis the publisher.

|⁷⁴ Cf. the DFG’s position on the use of open licences from 2014 (https://www.dfg.de/foerderung/info_wissenschaft/2014/info_wissenschaft_14_68/ [accessed 29 September 2021]).

|⁷⁵ Cf. Klimpel 2012, pp. 15–16.

|⁷⁶ Cf. Plan S: <https://www.coalition-s.org/faq-theme/rights-licences/> [accessed 29 September 2021].

B. Objective and scope of the recommendations

The primary goal of the transformation is optimal **usability** of publications inside and outside of science. This includes strengthening research, increasing social reception and transfer and improving economic efficiency. When choosing a publication type and channel, the further use of the publication, both by people and machines, should be taken into account. Publishing on open access (OA) terms is the best way to enable barrier-free follow-up activities in the academic and non-academic fields. OA is achieved when academic publications are made freely available immediately, permanently, at the original publication venue and in the citable, peer-reviewed and typeset version (version of record) under an open licence (CC BY). The German Science and Humanities Council (WR) considers it advisable that OA publishing become part of good scientific practice as soon as a sufficient amount of adequate and inclusive OA publishing opportunities have been established. Steps in this direction are already meeting with political consensus. This consensus is exemplified by the coalition agreement of the German “traffic light” government coalition for the 20th legislative period, which states the goal of “establishing OA as a common standard” and “strengthening” OA and open science. |⁷⁷

Yet, the transformation of publishing goes beyond the change in access regimes to OA and comprises **four essential sub-transformations**: the transformation of access regimes and business models is complemented by the transformation of usage rights through changes in rights and licences, as well as the technical transformation through the development of structured and linked publication formats and an infrastructure based on them. A fourth transformation alongside this one concerns the way researchers are assessed, evaluated and recognized. Therefore, the transformation of academic publishing is not just about ensuring read access and increasing cost efficiency, but about optimising all functions of academic publishing discussed in Chapter A.II. The OA transformation must contribute to these overarching goals. This also means that every academic OA

|⁷⁷ Cf. Coalition Agreement 2021–2025 between the Social Democratic Party of Germany (SPD), Alliance 90/The Greens and the Free Democrats (FDP), p. 21 and p. 24.

publication should not only be equipped with as comprehensive a licence as possible, but must also be structured and prepared according to requirements (which must be defined). |⁷⁸ However, the goals and paths of transformation may differ depending on the type of publication.

Which publication channels researchers choose is crucial for the transformation success. This is why it remains important to close information gaps and achieve acceptance and commitment by engaging in dialogue with the members of scientific institutions.

Research achievements are often measured by indicators that do not refer to individual publications but to publication organs. This restricts the authors' freedom of choice and hinders transformation. In many countries, changing existing systems of recognition and rewards in line with the DORA Declaration and the Leiden Manifesto are being discussed. |⁷⁹ This topic has also been taken up at the European level by the EU Commission in the context of the European Research Area Policy Agenda. |⁸⁰ As the Council sees it, assessments in science should be made on the basis of published research results and findings rather than on the basis of the chosen publication organs. This is a prerequisite for making publication options substitutable and thus for enabling competition between publication service providers. At the same time, the data basis for assessments should not follow the commercial interests of publishers and data services, but be shaped sovereignly by science. Without changes in these assessment practices, it will not be possible to eliminate the quasi-monopolies of individual providers. The WR therefore supports the principles formulated in the San Francisco Declaration on Research Assessment (DORA) (cf. chapter C.I.5).

According to the WR, there are three core arguments in favour of the OA transformation as part of the overall transformation of academic publishing:

1 – Strengthening research: openly accessible publications can be read, reviewed and used more quickly and more widely by other researchers. This increases the **quality of research** and accelerates **scientific progress**.

|⁷⁸ Based on Peter Suber's terminology of gratis vs. libre (free access in the sense of free reading access as "gratis" and opening up possibilities for use beyond that as "libre"), a differentiation could be made accordingly between open to read and open to use, whereby the goal of transformation with open to read cannot yet be considered achieved (cf. Suber 2012, pp. 5–6).

|⁷⁹ <https://sfdora.org/read/> [accessed 29 September 2021]. See also the Leiden Principles of the Leiden Manifesto for research metric (<http://www.leidenmanifesto.org/> [accessed 29 September 2021]) and Wissenschaftsrat 2011. In the Netherlands, a programme has been launched to modernise the recognition of scientific achievement by the Dutch research funding organisations: Recognition & rewards programme (cf. https://www.vsnunl/en_GB/Recognition-and-rewards-of-academics.html [accessed 29 September 2021]).

|⁸⁰ A report on this topic has been published: Towards a reform of the research assessment system, cf. European Commission 2021, <https://doi.org/10.2777/707440> [accessed 18 December 2021].

2 – Increasing societal reception and transfer: OA enables better availability of scientific knowledge outside of science and lowers the threshold for various **transfer activities**. This way, the social – including the economic – effectiveness of (publicly funded) research is increased.

3 – Increasing economic efficiency: the previous business model of publishers is based on rights of use. |⁸¹ As publishers are not granted exclusive rights under OA any longer, publishers become publication service providers and enter into competition with other providers. This can strengthen the negotiating position of scientific institutions vis-à-vis such service providers and help to improve the **innovative capacity, cost transparency and cost efficiency** of the publication system.

The OA transformation of academic publishing is changing the roles of the individual stakeholders in the publication system, the incentives that affect them and the financial flows. This can also have undesirable consequences. The major academic publishers in particular have successfully integrated OA into their business strategy and, in the process, have opened up new sources of income. |⁸² Until now, the intention often associated with the OA transformation – namely to significantly reduce the costs of the scientific publication system – has yet to be fulfilled. The following maxims in particular should therefore be observed when designing future publication channels:

1 – Free choice of publication venue: In line with the right of academic freedom, scientists decide on the publication venue of their research results under their own responsibility, taking into account professional appropriateness.

2 – Equal access: All qualified authors must have access to appropriate publication opportunities and the associated reputational gains; it must be inclusive, so that it guarantees academic freedom for people in different employment situations, for low-income institutions and for researchers from low-income countries.

3 – Conservation of resources: The available research funds and personnel capacities are used efficiently.

The transformation of academic publishing will generally encompass all types of research publications and all academic fields. In this context, the particularities of the publication cultures of different disciplines, especially with regard to

|⁸¹ Leading representatives from the publishing industry also consider usage rights as the basis for their economic success. For example, the President of the International Publishers Association (IPA) stated in his opening speech in 2019 that academic publishing continues to thrive and that “the value of our industry is built on the bedrock that is copyright” (cf. <https://www.youtube.com/watch?v=MPwIHH9k9Ic>, minute 1:50 [accessed 30 September 2021]).

|⁸² Cf. Tennant 2018.

academic books, as well as the situation of small and medium-sized academic publishers must be given special consideration.

Attempts are also being undertaken for academic publications aimed at specific professional groups, such as guides, legal commentaries, manuals or medical reference works to be transformed into OA. Although these publication types also arise from academic research, they are not only part of the research process or internal communication in the research and higher education system. In law, for example, there is an interweaving of legal scholarship and legal practice, which is why edited volumes, handbooks or commentaries are often also written by practitioners. Special business models are therefore necessary for these types of publications, which cannot be taken into account within the framework of these recommendations. The same applies to educational materials and textbooks, even though many examples of Open Educational Resources (OER) publications already exist that are available under an open licence. |⁸³

|⁸³ Cf. on Open Education Resources: <https://www.unesco.de/bildung/open-educational-resources> [accessed 30 September 2021]. The WR is working on the topic of “Digitalisation in Teaching and Studies” within the context of a working group that addresses OER.

C. Recommendations

C.1 PRODUCTS AND PROCESSES

I.1 Further development of academic publications in their diversity

The transformation of scholarly journals, collected works and monographs is currently at various stages. The German Science and Humanities Council (WR) considers it the goal of the transformation to achieve as complete a transition to gold open access (OA) as possible (regardless of the business model), which can be achieved for journals immediately and for monographs in the medium or long term (with the exception of trade books); green OA should only be a first step in the transformation and be replaced by gold OA in the long run. The diversity of publication types and forms of access should be maintained and new developments supported. In addition to expanding funding and promotion, encouraging OA in book-oriented disciplines is important.

In the course of the OA transformation, the heterogeneity of the academic publishing system must be taken into account. The various disciplines with their different publication practices currently find themselves at different stages in the transformation process and will continue to develop in a non-synchronous fashion (cf. Figure 6). Different publication types and forms of access should therefore be able to coexist, be developed further and arise anew.

The aim is to support the scientific communication practices of different disciplines in the best possible way and to enable scientific follow-up actions without barriers.

OA not only facilitates communication in the scientific system, but also science transfer to society, including the business world. In the course of the ongoing COVID-19 pandemic, for example, the classification of evidence-based decisions, and thus the importance of broad access to academic publications, has received a great deal of attention. Access to contributions from the entire spectrum of scientific disciplines, especially from the humanities and social sciences, is relevant for social discourse. The follow-up actions promoted by OA should also include the further processing of research results as a “translation”, in the sense of

science communication as a transfer process. |⁸⁴ Reception by a broader public is thus made possible, if necessary through other formats as well.

In some fields and for certain communication purposes, **analogue forms of publication** will continue to coexist alongside digital forms. These create a functional added value for certain user groups as a side benefit of the digital publication process. This added value should be maintained. Successful examples demonstrate that free access to a digital version, at least after an embargo period, is compatible with analogue publication, even from an economic point of view.

When it comes to developing the publication system further, it is paramount for the **quality of academic publications to be ensured** so that the system can fulfil its functions (cf. A.II). Thus, the certification and assessment of scientific contributions within the publication process contributes to societal trust in science. With regard to quality assurance, however, different quality dimensions must be distinguished. Quality assurance of content must remain in the hands of science. In contrast, the quality of the publication processes, i.e. the technical quality of the product and the process quality, remains the responsibility of the publication service providers. Quality assurance also includes the reporting of academic misconduct on the part of the research community and the adequate handling of such misconduct on the part of publishers and publication service providers. |⁸⁵

The OA transformation of scholarly journals, collected works and monographs is associated with different challenges and opportunities in each case, which will be described in more detail below. OA is considered to be achieved for all three forms of publication if they are freely available immediately, permanently, at the original publication venue and in the citable, peer-reviewed and typeset version (version of record) under an open licence (CC BY; cf. chapter B.). It can be assumed that for the longer term, the dynamisation and linking of publications will lead to their further development as well as to the emergence of new publication types. Further existing publication types, being special cases, will not be considered here. For heuristic purposes, this paper will limit itself to the three types mentioned above as a means to describe the diversity of the challenges associated with the transformation, depending on the respective starting point. Overarching technical aspects of the transformation, which the WR considers central to the further development of academic publications and to ensuring their diversity, are addressed in the following section (cf. C.I.2).

|⁸⁴ Cf. also Wissenschaftsrat 2016.

|⁸⁵ Cf. COPE Committee on Publication Ethics (<https://publicationethics.org/about/our-organisation> [accessed 20 January 2022]).

Publishing in scientific and scholarly **journals** can and should be completely transformed into OA. In so doing, the experience gained from established publication processes should be used; however, in order to maintain the diversity of publication channels and create competition for publication services, it is also important to support new (publisher-independent) publication models (cf. A.III).

With regard to publications in scientific journals, the OA transformation discussion is particularly strongly characterised by the two routes of **gold** and **green** OA. Gold OA refers to direct, free access to the final version of the respective article at the original publication venue. The WR sees the goal of the transformation to be as complete a transfer as possible to gold OA (including diamond OA, cf. A.VII) and recommends gold OA as the preferred path.

Green OA, in contrast, refers to the secondary publication of an article, i.e. OA is granted retrospectively, usually to an author's version of an otherwise not freely accessible publication. The WR recommends using this route for articles in journals only as a fallback solution if no suitable publication medium exists for publication in gold OA. To make optimal use of publications made accessible in this way, it is considered desirable for green OA to enable citability on the one hand, by ensuring that self-archived manuscripts imitate the pagination of the version of record if possible. On the other hand, information on the version published in green OA (e.g. in a repository) is central, i.e. any changes made after the review process as well as any updates must be clearly recognisable to readers. Wherever green OA is chosen, this information on the respective version must also be contained in (machine-readable) metadata. The WR believes that established practices already existing to this end should become binding.

In the view of the WR, another argument in favour of the gold OA route (including diamond OA) is that clarification of cost coverage at the time of publication seems more likely to establish sustainable business models (cf. A.V). To do so is central to a complete transformation of academic publishing.

The market for scientific and scholarly journals has seen change in recent years due to the rise of large publication platforms and so-called mega-journals, which are characterised by, among other things, their large number of articles, wide range of topics and shorter processing times. Such platforms can be an efficient publication channel for some authors or for certain communication purposes. However, they are also associated with a reduction in the orientation function of academic publishing (cf. A.II), because their coverage of different subject areas makes it more difficult to classify and weight contributions. A valuable contribution to the orientation function can therefore be seen in **the curation of con-**

tributions. |⁸⁶ This academic activity can be performed as a remunerated service whereby a selection is made from collections of articles and is curated (e.g. in the form of so-called overlay journals), knowledge graphs are created, etc. Quality assurance and orientation are partially decoupled from each other.

I.1.b Transformation of collected works

The category of collected works includes **conference proceedings** as well as collected volumes that contain contributions by several authors for other reasons. The contributions are usually compiled by one or more editors. Conference proceedings vary in their form depending on the type of conference and the respective subject culture. For example, there are conferences that subject submitted papers to a peer review process of varying intensity, while the programme of others contains only invited papers. Conference proceedings are sometimes classified as books (e.g. by Springer Nature) and sometimes, by other publishers, as journals (e.g. by Wiley). Often they cannot be obtained from bookshops, but only from the conference organisers. In the case of regularly held conferences, they typically appear in serials, so that, in this case, they have the character of periodicals. As a rule, however, these publications are not distributed in a subscription model, as is usual for scientific journals with closed access. How contributions are published is at the discretion of the conference organisers; today, some contributions are made freely available on the internet (sometimes in parallel with print publication). |⁸⁷

Through digitalisation, contributions from collected works can be made available individually and can also stand on their own, independent of the complete work. This is facilitated if a DOI (digital object identifier) is assigned to each individual contribution. In the case of anthologies, however, a separation from the context of the volume may not make sense or may be undesirable for content-related reasons. With regard to OA, hybrid business models are also possible for anthologies, i.e. some articles are freely accessible in OA, while others can only be accessed as part (and in the context) of the complete work. As in the case of journals, these forms can be seen as a step in the transformation process; as the

|⁸⁶ So-called overlay journals can be seen as a model here, through which added value is created by compiling scattered articles as a topic-related issue of the overlay journal and, for example, by linking them to articles that have already been published in various OA journals or on platforms. Very different forms of overlay journals exist, some of which in particular list articles that have been published as preprints on platforms such as arXiv. To combat misinformation in COVID-19 research, the rapid-review overlay journal Rapid Reviews: COVID-19 (RR:C19) (cf. <https://rapidreviewscovid19.mitpress.mit.edu/pub/press-release/release/1> [accessed 30 September 2021]) was founded by MIT Press and UC Berkeley. Other examples are JMIRx, which is on preprint servers (cf. <https://jmirx.org/home> [accessed 30 September 2021]). The Open Journal of Astrophysics (cf. <https://astro.theoj.org/about> [accessed 30 September 2021]) or Logical Methods in Computer Science (cf. <https://lmcs.episciences.org/page/purpose> [accessed 30 September 2021]).

|⁸⁷ Cf. information offered by Publisso of the German National Library of Medicine (ZB MED) – Information Centre Life Sciences at <https://www.publisso.de/open-access-beraten/faqs/monografien-sammelbaende-und-konferenzbeitraege/> [accessed 30 September 2021].

WR sees it, the long-term goal will be, however, to achieve the complete OA transformation of entire collected works in the sense of free access at the original publication venue and in the citable, peer-reviewed and typeset version (version of record) under an open licence (CC BY). In addition to publication by traditional publishers, OA anthologies can also appear on platforms. |⁸⁸ The fall-back option is considered to be the secondary publication of contributions as green OA. In the case of anthologies which are not published regularly, this must be contractually agreed upon with the respective publisher in accordance with current law.

l.1.c Transformation of monographs

A significant proportion of academic publications, especially in the humanities and social sciences, appear in book form. This type of publication comprises various kinds of publications that must be considered separately. For scholarly **monographs** (with the exception of trade books, see below), as for journals and collected works, the aim is to achieve a complete OA transformation; however, this transformation is still less advanced than that of scientific journals. For a change in the publication culture to occur, sufficient funding and support, developing and expanding infrastructure and encouraging OA (author engagement) prove particularly important.

The transformation of scholarly monographs must take into account the fact that many publications address a broader audience. The target group for these so-called **trade books** also includes a non-scientific readership. This type of publication, which is used in the humanities, remains relevant to the scholarly discourse of the respective discipline. Expanding its circle of recipients offers great benefits to society. Because of the business model pursued by trade publishers, it is to be expected that initially, digitally available publications will continue to be subject to access restrictions. Immediate, free digital availability for text and data mining and other subsequent uses for publications will not always be viable. It therefore remains important to at least continue to work towards ensuring that rich **metadata** and digital abstracts, etc., become available for **finding trade books**. This way, the orientation function of the academic publications system can be developed further. The licensing situation is also more complex if, for example, translations are produced for different readerships in different countries. Yet, successful business models also exist through which a printed book is produced alongside OA publishing. Such models should be used wherever feasible to enable the widest possible scientific use.

|⁸⁸ For example, the “Open Gender Platform” project funded by the Federal Ministry of Education and Research (BMBF), which provides an umbrella for OA activities in German-language gender research, also hosts OA anthologies.

The WR believes that research projects should be guided by the FAIR principles. Core to this context is that high-quality, standardised and open metadata be available. The WR recommends using already proven identifiers and infrastructures and increasing the metadata's information content through further referencing options. Automated analysis options should always be considered alongside human reception. The WR considers it necessary that neutral search options for finding publications (if necessary, using public funds) be ensured. The registration and evaluation of usage data must be regulated for the benefit of science, clearly and in conformity with the law.

The provision and use of scientific literature has long relied on a wide range of digital tools which are subject to constant further development. These tools enable the integration of publication infrastructures into the entire research process.

However, academic publications which are disseminated as digital copies are not only used by humans, but also by machines, and can be linked, enhanced with additional functions, and analysed automatically. Thus, there is an analogy between publications and research data, and in this area, too, it makes sense to aim for an orientation along the FAIR Guiding Principles for scientific data management and stewardship. According to these principles, good data management is achieved when people and computers can find, access, link and reuse data (findability, accessibility, interoperability and reuse). |⁸⁹ As the Council sees it, there should be analogous expectations with regard to the publication of the results from research projects. This should be made sufficiently clear to users from the scientific, industrial and political sectors, as well as to publishers, professional and learned societies, etc.

1.2.a Standardised metadata

High-quality metadata are of central importance in various contexts of use. They are a prerequisite for findability as well as for manual and machine usability by recipients. In addition, analysing large amounts of metadata enables insights into the structures and development dynamics of science. Because metadata are so valuable, they must be of high quality and openly accessible. A minimal set of metadata includes data on the publication, the contributors, the relevant institutions and the references to other publications found in the document. Particular attention should be paid to established persistent identifiers such as the DOI for digital objects, ORCID for individuals and the ISSN (International Stan-

|⁸⁹ Wilkinson et al. 2016; <https://www.go-fair.org> [accessed 30 September 2021]

dard Serial Number) and ISBN (International Standard Book Number) for publication venues. |⁹⁰

These are subject to dynamic development, as is currently evident, for example in the case of organisational identifiers, where a convergence on ROR-ID seems to be emerging. |⁹¹ The so-called Openness Profile can also make valuable contributions in this context; |⁹² it also provides for persistent identifiers for approved project funding and research groups. |⁹³ Crossref has established itself as a place for the delivery of metadata for texts. |⁹⁴ The WR therefore recommends the use of these already proven and widespread identifiers and the underlying infrastructure. As far as possible, publications should also be linked with other digital objects such as data, code, workflows, etc., for which subject-specific standards should be applied.

Consistent data management is a mandatory tasks of publication service providers. Particularly when certain tasks are outsourced to external service providers or following publishing house acquisitions, standardisation measures are required to ensure that common identifiers are used and that a consolidated database is available. Furthermore, a handling of metadata in as uniform a fashion as possible among publishers is desirable. The metadata should be made available in such a way that they can be used for further processing. The Council considers it necessary for publication service providers to collect a defined set of metadata across the board and to link it to the full texts for automated evaluation of publications and to facilitate subsequent use. In particular, authors' affiliations and full-text use licences, as well as any associated embargo periods, should be recorded using publicly available standards.

Ideally, other objects mentioned in publications should also be referenced according to semantic web standards. Services such as the Open Research Knowledge Graph enable a semantic description and linking of research contributions from publications and thus new exploration and search functions. The roles of contrib-

|⁹⁰ Cf. on DOI (digital object identifier): <https://www.doi.org/>, on ORCID (Open Researcher and Contributor ID): <https://orcid.org/> [both accessed 30 September 2021].

|⁹¹ The GRID (Global Research Identifier Database) service has been discontinued to support the further development of the Research Organisation Registry (ROR) (cf. https://www.digital-science.com/press-release/grid-passes-torch-toror/?utm_source=hootsuite&utm_medium=twitter&utm_campaign=general&utm_term=grid_ac [accessed 30 September 2021]). The ROR IDs can be implemented in any system that records institutional affiliations and allows connections via persistent identifiers.

|⁹² The Openness Profile is a directory of scientists' contributions and activities, documenting contributions to open science as digital objects. These are linked to a persistent identifier; it is intended that the DOI of the contribution is linked to the ORCID iD of the contributor. The Openness Profile is intended to highlight ways in which research evaluation via open science can be improved (cf. <https://www.knowledge-exchange.info/event/openness-profile> [accessed 30 September 2021]).

|⁹³ Cf. Crossref: <https://www.crossref.org/> [accessed 30 September 2021].

|⁹⁴ The Research Activity ID (RAiD) identifier for research projects attempts to uncover relationships between institutions, infrastructures, instruments, funding and other research activities and outputs.

utors should also be described in a standardised way, e.g. using terminology from standardised task lists. Contributions which have not yet been sufficiently visible, such as research data management and data curation, will thereby become demonstrable and can receive more recognition. |⁹⁵

1.2.b Findability

In addition to standardised metadata, publication search tools are necessary to ensure that academic publications can be **found**. A fair and neutral search is essential infrastructure for science. The publication system must not be dependent on algorithms of commercial companies, which are non-transparent and subject to sudden change. For academic publications to meet their public responsibility with regard to use, they must be prepared in such a way that a fair search and further use are guaranteed. Open metadata make it possible for open search services to be established for this purpose. The WR considers it desirable to use public funds to create capacities for this and also to support the development of new tools. |⁹⁶ This also includes open citations, which can be used to improve the transparency of scientific works and their findability. However, these require access to bibliographic and citation data in machine-readable form (cf. next section). References and their DOIs should be released by all publication service providers in accordance with the goals of the Initiative for Open Citations. |⁹⁷ Since many scientific questions require the availability of several publication years, publishers should make the information available retroactively for at least ten years via Crossref. |⁹⁸

1.2.c Linkage and analysis possibilities

In view of the large stock and continuing growth in the volume of publications, new forms of automated information use, with which large amounts of text can

|⁹⁵ Contributor roles can be named with persistent identifiers using the CRediT taxonomy (Contributor Roles Taxonomy, cf. <https://casrai.org/credit/> [accessed 30 September 2021]). CRediT aims to be linked to ORCID and included in the Crossref metadata collection.

|⁹⁶ One example is Open Knowledge Maps (<https://openknowledgemaps.org> [accessed 30 September 2021]), a visual research search engine that uses the two search engines Pubmed and BASE (Bielefeld Academic Search Engine) to provide a thematic overview of search terms. This is based on the 100 most relevant documents for the search term. The BMBF is also funding two projects: OPTIMETA, which aims to strengthen OA publication systems through open citations and spatio-temporal metadata (*Technische Informationsbibliothek – TIB and Westfälische Wilhelms-Universität Münster*, cf. <https://projects.tib.eu/optimeta/> [accessed 30 September 2021] and OA-Meta, in which a tool with an open interface is being developed to import and enrich metadata from OA reference books (cf. <https://blog.scienceopen.com/2021/04/bmbf-funded-open-access-project/> [accessed 30 September 2021]).

|⁹⁷ The Initiative for Open Citations I4OC, a joint project of scholarly publishers, researchers and other stakeholders, advocates for the unrestricted availability of scholarly citation data. Its goal is to improve the availability of structured, separable and open citation data. According to its website, in August 2021 the proportion of publications with open references was 88 % of articles with references deposited with Crossref (56.1 million articles), cf. <https://i4oc.org/> [accessed 30 September 2021].

|⁹⁸ Crossref is supported by publishers, but has signed the Principles of Open Scholarly Infrastructure (cf. <https://openscholarlyinfrastructure.org/>).

be processed, are gaining in importance. With the application of **text and data mining (TDM)** as well as structured semantic analyses, computer-aided access to publications has become possible, and will play an increasingly important role in the usability and use of academic literature in the future. Thus, in the course of the transformation of academic publishing, it is important to think not only of human readership, but to actively support such analysis options. |⁹⁹ By using text and data mining, researchers can make more comprehensive use of scientific knowledge. They can examine large volumes of publications for research-relevant correlations. These methods are now used across disciplines. The Council considers an enabling copyright law in the context of OA – including the creation of legal certainty for text and data mining – to be a central legislative task and welcomes the recent steps taken by the legislator within the framework of the UrhWissG (Act on the Adaptation of Copyright Law to the Current Requirements of the Knowledge Society) and through the Act on the Adaptation of Copyright Law to the Requirements of the Digital Single Market. |¹⁰⁰ It also welcomes the continuous involvement of the Standing Conference of the Ministers of Education and Cultural Affairs of the federal states in the Federal Republic of Germany (KMK) with copyright law and with any further needs for adaptation in the area of research. In the interests of science, current permissions should be continuously adjusted and developed in the context of future reforms.

However, at present, text and data mining is still limited by analysis accuracy. In the future, more structured semantic forms of publication (e.g. RaSH, dokiel, ORKG) should be used to better organise and represent content; in this way, knowledge availability can be improved for automated processing. The appropriate method for such approaches to publications must be chosen on a case-by-case basis, based on the data.

In addition, the quality and availability of data and corpora are crucial for enabling science itself to develop tools that best meet the needs of scientists while also ensuring transparency, traceability and sustainability.

1.2.d Usage data

On the provider side, the use of scientific literature is now increasingly monitored by technical means and this also enables the identification of persons.

|⁹⁹ According to Borgman, OA to publications does not necessarily mean that this data is minable. In most cases, the user interfaces still presuppose a human as the user who reads a website, searches for content, selects elements, etc. (cf. Borgman 2020, p. 994).

|¹⁰⁰ The Act on the Adaptation of Copyright Law to the Requirements of the Digital Single Market (*Gesetz zur Anpassung des Urheberrechts an die Erfordernisse des Digitalen Binnenmarkts*) came into force on 7 June 2021. It now also contains – in addition to scientific text and data mining (Section 60d UrhG – Copyright and Related Rights Act (*Gesetz über Urheberrecht und verwandte Schutzrechte*)), which was merely adapted to the requirements of the Directive – a new provision for general text and data mining, i.e. for commercial purposes (Section 44b UrhG) (cf. https://www.bmjv.de/SharedDocs/Gesetzgebungsverfahren/Dokumente/Bgbl_UrhDaG.html;jsessionid=ED6FAA11B8F5DF22A76416FD01A40DA2.1_cid324?nn=6712350 [accessed 30 September 2021]).

Large academic publishers in particular, which are increasingly expanding their business model to include data analytics, are using tools to record, for example, page visits, length of stay, accesses and downloads – irrespective of their access model. The procedure is not much different from that used for digitally published consumer magazines, newspapers or social media. The collection of usage data and the aggregation of such data serve publishers to improve their services. Yet, their evaluation and resale increasingly represent a business field in its own right and form the basis for expanding the services offered by publishers to include the entire research life cycle. For example, researchers receive automated references to further literature from the same publishing house on the basis of their data profiles. |¹⁰¹ As a result of this development, however, large amounts of personal and research-related data are in the possession of private companies which, with the help of data analyses, not only obtain information about the state of research, but also about the researchers themselves and their activities (“scientist tracking”), and can potentially sell information about this to financially strong players. |¹⁰² Furthermore, this knowledge advantage strengthens the negotiating position of publishers, as they can use the data to determine prices and also gain a competitive advantage.

The WR considers it necessary that these new possibilities be dealt with proactively, to open up opportunities while also vigorously impeding and preventing potential misuse. The added value generated from the data can be to the benefit of science if it is made transparent and if rules are observed. In order to prevent information asymmetries and the formation of new monopolies, as well as to prevent breaches of personal data protection, public, science-driven efforts should therefore be made to develop standards and tools for the transparent handling of usage data. The transfer of data to third parties should be viewed critically for legal reasons alone. |¹⁰³ In addition, further fundamental questions arise regarding the commercial utilisation and business implications for the respective institutions, the financial aspects on the part of the funding agencies, and even the potential economic effects.

Agreements on user data in particular must be examined in the context of contract negotiations with publishers regarding the aforementioned problems, and appropriate restrictions included. This also applies to data on access to publications published in OA, but also to other products now offered by publishers in this context, such as research information systems, electronic lab books, library management systems, etc. Scientific institutions should sensitise their members

|¹⁰¹ Cf. *Deutsche Forschungsgemeinschaft (DFG) 2021*, p. 3 f.

|¹⁰² Cf. *ibid.*, p. 9 f. and also the discussion in *Gehring 2021* and *Schwartzmann/Benedikt 2021*.

|¹⁰³ Cf. e.g. Section 19 of the German Telecommunications and Telemedia Data Protection Act (TTDSG – *Gesetz über den Datenschutz und den Schutz der Privatsphäre in der Telekommunikation und bei Telemedien*).

to this issue and support them in reviewing contracts with publication service providers.

I.3 Expectations of publication services

The Council recommends that a performance comparison of publication service providers be enabled, and cost efficiency increased, by defining transparent quality standards and service levels. The attributes of openness should be among the comparison criteria. In addition, mechanisms are needed to safeguard formulated standards.

Publication services support communication in many ways within the research and higher education system; to create an incentive for developing them further, scientific quality expectations for these services must be defined. This can then serve as a basis for deciding how publication services can be implemented efficiently and at high quality.

Quality expectations concern many different sub-steps, regardless of the publication type. To make a well-founded decision in favour of an offer, a transparent system of minimum standards and performance levels must be established to ensure the comparability of services and workflows of the publication service providers. Such a system should cover the design of the various production steps such as the peer review process, editing, the work of the editors, technical checks, contract preparation, cover design, project support, press and public relations, usage analyses, etc. and define requirements in each case. Based on this system, publication service providers can be required to show their prices in a differentiated manner. This transparency enables an understanding of the service providers' specific services, as well as a basis for comparison with regard to cost efficiency, too.

Digital workflows are suitable for OA monographs and edited volumes as well as for OA journals. Yet, the workflows of publication service providers still often differ from one another depending on the type of publication. When it comes to digital workflows, unlike in print workflows, different types of structured data will have to be archived in databases, put out in a media-neutral way and made available online. |¹⁰⁴

To differentiate prices according to the services offered by the publication service providers, tiered models that also take into account attributes of openness can be a viable solution. A minimum standard would be a PDF document equipped with the basic metadata, while an OA monograph of the highest standard, for example, would be completely media-neutral and available in different formats – also in print form if desired. Open citations (cf. C I.2) should, in the view of the WR, already be part of the minimum standard. The degree of gran-

|¹⁰⁴ Cf. Eichler/Lembrecht/Werner 2021.

ularity of the content should be a further digital book production standard; gradations of standards could be reflected, for example, in DOI allocations for separate chapters as well as in support for processing according to semantic web standards.

In addition to the services mentioned, marketing services should also be included in the standards. In some disciplines, these play an important role in the dissemination of a publication and can help to achieve rapid reception in the specialist community and among other relevant addressees (cf. B.).

A system of minimum standards and performance levels should take into account the specific perspectives and knowledge of the various stakeholders in the publication process. The elaboration or definition should therefore ideally be carried out by a commission of stakeholders from the field of publication services as well as from academia, taking into account global developments and standards.

This kind of voluntary self-organisation could be set up as an Alliance activity or under Alliance chairmanship, e.g. as a forum of national and international academic publishers and libraries. The *GeSIG Netzwerk Fachinformation e. V.* (German Serials Interest Group) could serve as a potential interface, providing a platform for dialogue and information exchange between libraries, publishers and intermediaries. |¹⁰⁵

To include smaller providers in the transformation, cooperation between public research funding and private-sector publication service providers could be agreed upon in a special-purpose association. An agreement on minimum standards does not exclude offers that go beyond this and compete with each other.

Along with the development of quality standards, mechanisms are also needed to ensure that the quality standards remain binding and verifiable. Funders and operators of publication funds must be able to ascertain with reliability whether the funded publication services meet the defined standards. In order to keep the verification effort on the part of the individual scientific institution as low as possible, some sort of certificate could be created by a suitable stakeholder or a format could be developed in which the information must be published. Here, too, the Council sees the Alliance of Science Organisations in Germany as a suitable forum for developing an appropriate proposal.

The academic publishing system includes large publishing groups, small and medium-sized publishers as well as publisher-like non-profit organisations and stakeholders from the academic community which operate publication platforms. The OA transformation must be used as an opportunity to renegotiate the condi-

|¹⁰⁵ Cf. <https://gesig.org> [accessed 30 September 2021]. The GeSIG takes up topics such as the digital transformation in the field of academic subject information, role distribution of the divisions in the digital age, effects of new licensing and business models on market participants, e-books, OA, repositories and tax issues.

tions for publication services. In order to drive improvements in the usability and use of academic publications, it is not least important to create conditions in which new, innovative publication venues can emerge. If these are able to exert competitive pressure on established, commercial providers, all users will benefit from the effects. However, smaller commercial providers of publication services, especially in the monograph sector, will only be able to achieve higher levels of performance – and thus be competitive – if they can rely on new(er) technologies with regard to the workflows that must be established (cf. C.I.2). For many of them, coping with the acquisition of these technologies from a financial point of view is likely to prove a challenge. One solution for this problem could be open publication software, as already exists for journals and other text formats from providers such as Open Journal System (OJS) or ZB MED/PUBLISSO. |¹⁰⁶

Authors are not responsible for creating transparency regarding the costs of diamond journals, which are frequently operated via open-source software such as OJS, often using public or other financial resources, and are sometimes based on voluntary work. Nevertheless, it should be possible to map the service they provide in the outlined tier model of minimum standards and performance levels, so that they remain comparable as publication venues at this level.

I.4 Ensuring content contribution quality

In the view of the WR, peer review procedures should remain standard practice in the publication system as quality assurance selection mechanisms. Quality assurance must be clearly separated from the business model of publication services so as to prevent practices in which selectivity is reduced with the goal of increasing revenue. In the area of monographs and edited volumes, peer review procedures are considered a useful form of quality assurance for publications which have not already been peer-reviewed, e.g. as a doctoral thesis; their eligibility for funding should be linked to such proof of quality. The WR also recommends using the guidelines of the OAPEN Foundation on peer review procedures.

Quality assurance of manuscripts is an important step in the publication process, regardless of the OA transformation, and is central to the social function of the publication system. In the case of scientific journals, there are well-established forms with clear responsibilities in the various forms of peer review and subsequent decision-making procedures by the editorial board. This quality-assuring selection mechanism must be clearly separated from the publication service and thus from the publisher's business model. Business practices which are based on accepting a higher number of articles, thus carrying the risk of lower

|¹⁰⁶ The publication platform and web-based software PUBLISSO developed by ZB MED – Information Centre Life Sciences can be used to publish journals and other text formats for all disciplines. It is offered both as an open-source software and as a service offering including hosting and maintenance services (cf. <https://www.publisso.de/open-access-publizieren/publisso-system> [accessed 30 September 2021]).

quality, must be counteracted in this way. Editorial boards thus carry a great responsibility. In accordance with Guideline 15 on Safeguarding Good Scientific Practice of the *Deutsche Forschungsgemeinschaft* (DFG, German Research Foundation), scientists in the role of editors have a duty to carefully examine the publication organ for which they assume this task. Likewise, as authors, they are responsible for selecting high-quality publication organs, both in their own interest and that of science.

The COVID-19 pandemic has also made clear at the societal level that a quality assurance system is needed to provide clear information about the status of a publication. Central to this is the information as to whether it is an academic product that has undergone quality assurance procedures or, instead, a preliminary scientific communication for the discussion of hypotheses, methods, data or research results. Traditional certification processes that do this fulfil a filter function, provide orientation in an increasingly confusing system of scientific communication and thereby create trust. At the same time, expert opinions in peer review processes are themselves part of the scientific discourse and give cause to reconsider hypotheses and arguments and to revise manuscripts. In both functions – as a filter and as a contribution to improvement – the peer review process should be maintained as standard practice in the publication system. Presumably, it will continue to be regarded as a quality feature of publication venues in the future and the differentiation between preprints and peer-reviewed publications (starting with Author Accepted Manuscripts – AAM) |¹⁰⁷ will be maintained.

Newer forms of content quality assurance which have become possible and widespread in the context of digitalisation, such as open peer reviewing and open peer review platforms, are considered useful; they are welcomed because of their potential to increase the transparency of procedures and to speed them up. Post-publication review, as a special form of organising peer reviews, resembles the tradition of literary criticism. A corresponding offer of publication platforms to support and organise scientific discourse is welcome. In addition, post-publication review can also contribute to the analysis of use. However, such a procedure cannot serve as a substitute for a classic peer review, which also fulfils a filter function.

In the case of monographs and edited volumes, peer review procedures are also used by international, English-language publishers with a greater reach and by certain series, but otherwise, these procedures are (still) comparatively unusual in the German context. Unlike with journal articles, therefore, no criterion of quality exists for identifying publications worthy of funding. With regard to the

|¹⁰⁷ The author accepted manuscript (AAM) is the accepted version that has been reviewed but not yet typeset or edited (definition according to Crossref Publication stages, cf. <https://www.crossref.org/education/crossmark/version-control-corrections-and-retractions/> [accessed 30 September 2021]).

quality of academic contributions, review procedures are also desirable for monographs and edited volumes. In view of their sometimes-small print runs, these volumes will not always be able to have the same intensity as in the journal sector. It is therefore important, within the framework of the desiderate laid out in chapter C.I.3, to establish differentiated procedural standards for publication services with regard to monographs.

The development of a peer review model in the area of monographs and edited volumes is only necessary for those publications which have not already been peer reviewed as qualification works. In such cases, the editing service used by some publication service providers can act as an intermediary between academic reviewers and authors, if its role in quality control is designed accordingly. During the editing process, scientific advice can thus be sought out for evaluating the research design of the work or the concept of the planned publication. Furthermore, the editorial office can, for example, have text samples and excerpts reviewed and check whether or not the reviewers' instructions have been implemented. A self-commitment to recognised standards such as the COPE Ethical Guidelines for Peer Reviewers is also conceivable. |¹⁰⁸

The Council also recommends using the guidelines of the OAPEN Foundation |¹⁰⁹ which require publishers to make available descriptions of their peer review process for publication on the OAPEN website in order to achieve transparency in the peer review process and ensure and promote scientific quality standards. Complementary to this, the funding criteria of the publication funds of scientific institutions should include monographs and edited volumes as being generally eligible, yet make funding dependent on proof of academic quality.

To avoid placing additional burdens on the academic system and on the reviewing scientists, a peer review system which is as efficient as possible is desirable. Resubmissions of a manuscript after rejection by a journal can lead to multiple unnecessary reviews. From this point of view, approaches in which reviews can be re-used for resubmissions make sense. However, such models, known as “cascading peer review”, can be problematic in the context of the necessary separation of editorship and publisher, when articles are “handed down” to other (usually less competitive/selective/prestigious) journals within a publishing company. This approach carries the risk that the decision regarding acceptance for publication is indirectly influenced or even made by the publishing house itself. The WR therefore welcomes the fact that procedures for portability of reviews are being developed. A prerequisite should be the explicit consent of the authors to the forwarding of reviews, as well as full disclosure of previous submissions of

|¹⁰⁸ Cf. COPE Council 2017.

|¹⁰⁹ The OAPEN Foundation (Open Access Publishing in European Networks) is a non-profit organisation based in the Netherlands that works with publishers to build a quality-controlled collection of OA books. It provides hosting, quality assurance, dissemination and digital preservation services to publishers, libraries and research funders.

the manuscript (or parts thereof) to another journal, including any resulting revisions.

The archiving of additional materials on which a publication is based, such as data, software, etc., for further use, is of great importance (cf. C.I.2.c). Therefore, it should be the norm to include publications' archiving in the guidelines of the publication service providers and to integrate the verification of this requirement as a technical review alongside the peer review (content review) in the review process. |¹¹⁰ This approach promises a greater incentive for compliance than archiving after the publication process has been completed, as this requires libraries to follow up on it.

1.5 Quality-promoting incentives

The WR is in favour of assessing the quality of individual publications within the framework of evaluation procedures, rather than focusing on the publication venue, or indicators derived from it, as proof of quality. Services that allow a differentiated description of publications and the various roles of those involved should be used regularly, and reviewers should be supported in their use. Regardless of the form of access to publications, it must be ensured that the publicly funded publication system does not finance journals that violate standards (predatory publishing).

The choice of a publication venue for a manuscript is left up to the researchers, and it is therefore their responsibility, too. This is true regardless of the access regime, i.e. for OA as well. |¹¹¹ Quality deficiencies in academic publications, which are regarded as scientific misconduct in cases of deliberate or grossly negligent misrepresentation, are not causally related to this or any other form of access. However, a connection is often seen (in media discourse) with the fraudulent business model of predatory publishing, which is enabled by mixing the tasks of publishers and editors in publication-based business models for OA journals. Regardless of the access regime, it must be ensured that the publicly funded publication system does not finance journals which violate standards.

In view of the steadily growing number of publications and their importance for individual careers and institutional success, the Council considers it important for the focus to be put on the quality of academic publications. The widespread practice of using the publication venue to assess the quality of a publication comes with decidedly problematic effects. Scientific quality assurance is a feature of the chosen publication service. Thus, it is correct to give these publications a higher weighting than publications which have not benefitted from quality assurance. Yet, using quantitative indicators which describe publication media, such as jour-

|¹¹⁰ If publication service providers use third-party systems for this purpose, it must be ensured that these are certified.

|¹¹¹ To check the seriousness of a journal, the Directory of Open Access Journals (DOAJ) can generally be consulted as a non-commercial reference that makes the fulfilment of standards a condition for inclusion.

nal citation averages (JIFs) or data on selectivity, to evaluate individual publications, is more than simply questionable on a methodological level (cf. A.I). Practices such as these also reinforce a tendency for such media to be turned into career-defining, non-substitutable commodities, thereby consolidating the quasi-monopolistic position of certain publication service providers. The WR therefore views with concern evaluation practices that promote such processes and advocates the use of alternative criteria which are geared more to the quality of the individual publication than to the publication venue. |¹¹² In this context, it advocates following the principles of the San Francisco Declaration on Research Assessment (DORA) and recommends that scientific institutions sign the declaration (cf. Chapter B.). This can be further supported through an increased use of other publication media which can be disseminated widely with little effort through digital distribution channels, and with no artificial scarcity, thereby helping to prevent quasi-monopolies. The prerequisite for this is that the publication media should be acknowledged in evaluation procedures.

Increasing recognition and visibility of the roles of all contributors to a publication can be an effective contribution to quality-related incentives. For example, the prospect of receiving formal recognition for a contribution and being associated with it is likely to increase dedication and quality awareness. This includes, in particular, roles that have recently gained in importance, such as research data management. In the view of the WR, the documentation of all contributor roles in the metadata (cf. C.I.2) and their consideration in evaluation procedures is desirable. Technically, this can be achieved by clearly designating certain roles in the metadata of each publication using standardised vocabularies. |¹¹³

It is considered important for services to be created and used to improve research evaluation (cf. the Openness Profile reference model in C.I.2.a), combining pre-existing information with additional evidence of performance. |¹¹⁴ To be able to carry out evaluations on a reputable data basis, there is a need to have public structures or databases. |¹¹⁵

|¹¹² Cf. *Wissenschaftsrat* 2011 as well as the San Francisco Declaration on Research Assessment (DORA) (<https://sfдора.org/read/> [accessed 30 September 2021]).

|¹¹³ Cf. also C.I.2.a. Contributor roles can be named, for example, using the CRediT taxonomy (Contributor Roles Taxonomy, cf. <https://casrai.org/credit/> [accessed 30 September 2021]) with the help of persistent identifiers.

|¹¹⁴ Cf. Jones/Murphy 2021.

|¹¹⁵ The BMBF is already funding a network that is to act as a centre of excellence and is examining ways to set up a citation database.

II.1 Tasks and interaction of the stakeholders in the research and higher education system

In addition to publication service providers, the transformation of academic publishing is significantly shaped by researchers and scientists as well as journal editorial boards, scientific institutions, research funding organisations and libraries. The tasks of the individual stakeholders fall into different sub-processes in the publication process and thereby also in the transformation. Accordingly, it is important to reflect on their roles in terms of the transformation and to develop them constructively.

II.1.a The role of researchers

As writers, primary readers, reviewers and members of editorial boards of academic publications, researchers are the central individual stakeholders in the publication system. As authors, they choose suitable publication organs and can contribute to a high metadata quality in which, as the Council sees it, their individual contributions to the research being reported should also be made visible. As reviewers, they invest a considerable part of their working time in the quality assurance of publications. In their role as editors, they bear a special responsibility for the quality assurance of publication organs as well as for the demarcation from publishing tasks.

Scholars share the results of their research and also depend on gaining access to scientific discourse through publications. At the same time, they are evaluated on the basis of the research results they publish and, in this way, acquire their reputation, which is crucial for their further career. As explained earlier, the reputation and visibility of the publication organ are often seen as quality indicators in peer reviews. Since these are usually built up by journals over a long period of time, it is not a simple task for newly founded open access (OA) publishing organs to compete for authors' manuscripts. A particular challenge for editors is therefore to make the journal known and establish it in the community. Because the decision-making criteria of scholars are so central to the chances of new publication organs – and thus to diversity and competition – there is also a need to reflect on, and further develop, these reputation mechanisms (cf. also C.I.5).

Digitalisation enables a more differentiated description of publications than was possible in analogue publications and thus a further development of the reputation system. For example, scholars should use persistent identifiers in their work to enable publications to be clearly assigned to persons and institutions. Accordingly, the allocation of persistent identifiers is an important task of public and private information infrastructure providers (cf. C.II.1.d and also C.I.1). The aim here is also to ensure that the various roles performed by scholars within the

framework of a research project are appropriately acknowledged (cf. C.I.5). Although libraries, operators of publicly funded publication infrastructures and publishers of publicly funded publications have a responsibility in this regard, high quality metadata cannot be achieved without the active participation of the authors.

In project-funded research, scientists submitting proposals must in future take publication costs into account and apply for funds to cover these costs, if this is provided for. By making use of such possibilities, they can, for example, relieve the burden on central publication funds and thereby increase the flexibility of their institution (on the organisation of financial flows, cf. in detail C.II.2).

Academic journals and serials are usually dedicated to a specific subject; an academic editorial board is responsible for keeping up this thematic profile, and thus the orientation of the publication organ, through the process of article selection. In addition to this profiling function, the most important task of the editorial board is to ensure the quality of the content by organising peer review procedures and, based on this, deciding whether an article is worthy of publication. This includes espousing the quality demands of the respective scientific community, also *vis-à-vis* the publisher. The editorial board must be clearly separated from the publication service and thus from the publisher's business model. As editors, scholars or scientific associations active in this role must be aware of the changed interests that arise from OA business models. For example, in publication-based OA business models, additional publications automatically generate additional revenue. In the case of diamond journals, too, efforts to maintain the journal and cover costs can be the main focus. In both cases, it remains the central task of the editors to put quality standards first and to clearly distinguish their content-related tasks from publishing tasks.

As academics, editors also have an interest in protecting access to publications and the rights of authors. Examples demonstrate that it can make sense to detach established publication organs from their previous publisher for this purpose. |¹¹⁶ It is possible to change publishers or to publish an established journal independently if the editorial board acts in a coordinated manner in agreement with the relevant community.

II.1.b Role of the scientific institutions

In a publication system where OA is the norm, a central task of scientific institutions is to ensure access to appropriate publication opportunities for all their

|¹¹⁶ Examples of such OA journal start-ups include the journal *Quantitative Science Studies*, founded in 2019 under the aegis of the International Society for Scientometrics and Infometrics through the collective resignation of the members of the editorial board of the Elsevier *Journal of Informetrics* (cf. <https://www.issi-society.org/blog/posts/2019/january/the-international-society-for-scientometrics-and-informetrics-ends-support-for-journal-of-informetrics-launches-new-open-access-journal-quantitative-science-studies/> [accessed 30 September 2021]), and the journal start-up *Glossa*, which emerged from the Elsevier journal *Lingua* with a change of the entire editorial board.

researchers in the sense of academic freedom. Creating the right organisational and financial conditions for this must be a central element in their strategy, for which their management bears responsibility. In the context of the current transformation, the German Science and Humanities Council (WR) believes that the scientific institutions can make an important contribution by closing information gaps on the part of their members and striving for an understanding of the new processes.

Traditionally, one of the functions of scientific institutions has been to provide their members with access to scientific literature. Today, many institutions have also adopted dedicated open science strategies that include the OA transformation as a priority. For their design, implementation and acceptance, a dialogue about these goals and their significance among the members of the institution is important. Initiating and conducting this dialogue, and reliably supporting the members of the institution in implementing the agreed-upon steps, is a key strategic management task. Only if members have the opportunity to acquire information about new processes and support services can reservations be dispelled and commitment be achieved in the various places.

Today, scientific institutions are responsible both for enabling access to academic publications as well as for providing financial and infrastructural support for publication activities. In doing so, both access and publication opportunities must be ensured in a manner consistent with academic freedom. The WR believes that in this context, institutions should support good scientific practice by opening up ways for researchers to publish in accordance with the DFG Code. |¹¹⁷ This requires wise governance to ensure that publication funds are used efficiently, while at the same time preserving freedom of publication (cf. C.II.2.a). It is therefore important that the distribution of publication resources be organised in such a way that all members of an institution have access to high-quality publication opportunities. Publication opportunities must not be made dependent on the content profiles of the institutions, but it can be legitimate to agree on expected value for money and encourage researchers to use low-cost publication organs (cf. C.I.3). Corresponding regulations must be widely discussed within the framework of the self-governing bodies and, if possible, agreed upon consensually.

In the context of the transformation, financial flows within the institution are also subject to change. The further development of an information budget described in more detail in the following chapter (C.II.2) is contingent on good internal communication and cooperation between various departments such as the budget department, individual institutes and the library. Decentralised universities and scientific institutions are faced with particular challenges in this

|¹¹⁷ Cf. DFG 2019.

area. |¹¹⁸ On the part of the management levels, an awareness must be created regarding the importance of strengthening information exchange and cooperation as a strategic task and it is necessary for them to support this process.

With regard to the reputation system, the Council is of the opinion that it is also incumbent on the scientific institutions to reflect upon, and regulate the recourse to publication achievements within the framework of selection processes (cf. C.I.5).

II.1.c Role of research funders

The WR recommends that research funding organisations support the OA transformation with their own instruments and, if possible, consider including OA mandates in the funding guidelines with justified exceptions or regulatory bases. It also requests that the DFG consider including OA publishing in the Guidelines for Safeguarding Good Research Practice. In the view of the WR, all research funders should fully finance publication costs arising from the publication of the results of the research they fund.

Research funding organisations are shaping the way science is conducted through their funding opportunities and conditions. Their funding regulations and regulatory frameworks, as well as specific measures aimed at the publication process, enable them to help shape and support the OA transformation. In this context, OA mandates with justified exceptions are an important building block. Against this background, the WR welcomes the practice of project funding by the German Federal Ministry of Education and Research (BMBF) and the European Union (cf. Appendix). It also requests that the DFG consider including OA publishing in the guidelines for ensuring good scientific practice.

In addition, taking over publication costs is the most important lever with which research funders can support the transformation. These costs must be treated as **part of the research costs**. Their reimbursement must follow clearly defined quality standards, and there must be a process by which funders can ensure that the publication service they are funding meets the defined standards.

The WR welcomes the fact that the DFG and other research funding agencies already use various models to cover publication costs. In addition to direct or retroactive funding of publication services on application, publication lump sums or a publication-related surcharge on funds paid to cover indirect infrastructure costs (programme or project lump sums) can also be considered and may help to increase the flexibility of scientific institutions. In the view of the

|¹¹⁸ At the same time, decentralised institutions can also benefit in a special way from the flexibility offered by a publication fund, as the example of the MPG made clear. When subscriptions were still common practice, the predecessor of the Max Planck Digital Library (MPDL) was founded at the level of the general administration and the library budgets of the individual Max Planck Institutes were put into a fund; the MPDL has a “mandate to design the ‘basic service’” (cf. <https://www.mpd.l.mpg.de/ueber-uns/historie.html> [accessed 30 September 2021]).

Council, the fact that publication services and bodies are infrastructural in nature within the field of science speaks in favour of a solution based on programme or project lump sums. In order to anchor the OA transformation institutionally, funding programmes can and should support institutions in pooling funds for the central commissioning of publication services, as is done, for example, by the DFG “Open Access Publication Funding” funding programme and its predecessor (cf. Appendix). | ¹¹⁹

In addition to covering publication costs, funders should provide funds to set up publication funds or quality-assured platforms and promote initiatives to further develop publication services. | ¹²⁰ They should also help to ensure the archiving of data, code, etc. by including corresponding requirements in their guidelines. In addition, they should require conditions from the chosen repository. | ¹²¹

Funding organisations also play an important role in clarifying usage rights and strengthening the negotiating position of authors. An example of this is the Plan S “rights retention strategy”, which is intended to ensure that all academic publications funded by the funding organisations of the cOAlition S are available in OA without delay. Scholars will be obliged by the funding conditions to claim the necessary rights, even for publications in subscription journals, so as to make their publication openly accessible with a CC BY licence right at the time of publication, at least in the accepted manuscript version. In the view of the WR, the adoption of such a mandatory regulation in the German context is questionable. Yet, German funders could at least make a strong recommendation to grantees in this regard, to strengthen the rights of authors.

II.1.d The role of libraries

Libraries possess extensive knowledge and often capacities to actively support researchers in their publication activities, too. In the future, this will be a central task for them. They also play a central role in the implementation of transparent information budgets and the centralisation of funds and long-term archiving. Libraries should also provide advice and infrastructure on issues with regard to establishing new OA publishing bodies. As far as the allocation of public funds for publishing activities is concerned, they could be involved in decisions on eligibility for funding.

| ¹¹⁹ The DFG programme also aims to ensure that funds “result in the formation and development of adequate structures at the institutions receiving funding”; funding guidelines include, for example, the requirement that funded institutions take measures which enable them to obtain an overview of decentralised funding for publications (Cf. https://www.dfg.de/en/research_funding/programmes/infrastructure/lis/funding_opportunities/open_access_publication_funding/index.html [accessed 30 September 2021]).

| ¹²⁰ Cf. the DFG programme “Infrastructures for Scholarly Publishing”, in which one focus is on “open access infrastructures” (https://www.dfg.de/en/research_funding/programmes/infrastructure/lis/funding_opportunities/infrastructures_publishing/index.html [accessed 30 September 2021]).

| ¹²¹ Cf. Science Europe 2021, here: Criteria for the Selection of Trustworthy Repositories, p. 11 ff.

The transformation has already brought about changes for libraries and other information infrastructures and will bring about further changes. Through digitalisation, their role has already changed over past decades from owner to access provider, which amounted to a first paradigm shift. In the course of the OA transformation, libraries are taking on more and more tasks when it comes to organising publishing and disseminating information. This also involves a change in perspective from satisfying a local academic information need to making locally generated research results visible and accessible worldwide. The market knowledge and competencies that have developed from experience with licensing negotiations, among other things, are useful in this regard. The changes make it necessary to redefine and redistribute tasks and, in some cases, to build up new competencies; more recent tasks include, for example, contract negotiations for consortia which jointly sponsor OA journals or for the publication of monographs. In this context, it is important to ensure that publishers have no incentive to burden libraries with work that can and should be provided as part of their publication service.

Due to their experience and expertise, the implementation of a **transparent information budget** (see C.II.2.b), which includes expenditures on subscription and procurement, publication-related fees such as APCs, and infrastructure costs, and is based on the continuous monitoring of publications, also falls within the remit of libraries. In most cases, the **centralisation** of funds for information provision, including funds for publication activities within universities, would also entail expanding the libraries' scope of responsibility. To this end, the libraries would have to cooperate with the budget departments.

Cost transparency is central to the OA transformation, although the effort required on the part of institutions to meet this goal will be considerable. The complete recording of all fees that libraries and institutions must pay for information services, and where appropriate, the bundling of decentralised billing workflows and individual fees, may help to relieve the burden on research and teaching units in this context. Through this sort of bundling, they can also build up and apply their negotiating experience, thereby improving their negotiating position.

Exchange and strategic cooperation among libraries based on the division of labour are further strengthening their position. When purchasing publication services, the proven formation of consortia plays a central role. |¹²² For example,

|¹²² One example is the Centre of Competence for the Licensing of Electronic Resources project, which is carried out under the direction of the Göttingen State and University Library together with the *Bayerische Staatsbibliothek* [Bavarian State Library in Munich] and the Berlin State Library – Prussian Cultural Heritage. The competence centre acts as a central service provider for the negotiation, licensing and supra-regional provision of digital media and also manages the meta and content data acquired with the licences

collaboration opportunities can arise among libraries whose universities have a special interest in a particular topic. In addition to public library activities of this kind |¹²³ the company Knowledge Unlatched also follows this path, transferring monographs and journals from various disciplines to OA via its platform. |¹²⁴

Supporting researchers in the publication process is already an important task of libraries in many subject areas and will become even more important in the future. This includes, among other things, providing advice on the choice of publication medium. In particular, libraries can support researchers in assessing the quality of publication services and thus provide better orientation and informed decisions for individual researchers. In addition, systematically using the knowledge and competencies pooled in the library can have a beneficial effect on the visibility of the institution's research performance and on the controlling of the information budget. |¹²⁵ Another advisory task of libraries, which is gaining in importance in an OA world, is the provision of information and advice on legal issues. |¹²⁶ This includes, in particular, copyright and licencing questions. |¹²⁷ For the majority of libraries, however, it will still be necessary to build up and expand the corresponding competencies.

Libraries possess extensive experience in ensuring the findability and indexing of documents. These competences predestine them to ensure these publication functions under OA conditions, too. For example, libraries are important partners in developing and operating new tools for searching for and analysing aca-

(<https://www.sub.uni-goettingen.de/en/projects-research/project-details/projekt/centre-of-competence-for-the-licensing-of-electronic-resources/> [accessed 30 September 2021]).

|¹²³ In addition to initiatives such as the Open Library of Humanities, the BMBF-funded KOALA – *Konsortiale Open-Access-Lösungen aufbauen* [Building Consortia Open Access Solutions] project, which is being carried out by the TIB and the University of Konstanz, is an example of publicly funded consortia-building activities (cf. <https://projects.tib.eu/koala> [accessed 30 September 2021]), as is the SCOAP³-DH consortium, which organises the financial participation of German universities in the international consortium SCOAP³ (cf. <https://www.scoap3.de/scoap3-dh/> [accessed 30 September 2021]).

|¹²⁴ Knowledge Unlatched has assumed an organisational role by bringing together libraries and institutions worldwide. Libraries share the cost of funding OA publication packages, as the collaborative approach is more cost-effective than each library purchasing individual publications. Since 2020, Knowledge Unlatched has offered thematic collections and in 2021, introduced packages on topical issues such as climate change, known as Focus Collections (see Knowledge Unlatched brochure, <https://knowledgeunlatched.org/wp-content/uploads/2021/05/KU-Brochure-2021.pdf> [accessed 30 September 2021]). In December 2021, the company was bought by Wiley (cf. <https://knowledgeunlatched.org/2021/12/wiley-acquires-oa-innovator-ku> [accessed 7 December 2021]).

|¹²⁵ The role described here corresponds with the image of the future outlined by the *Kommission für forschungsnahе Dienste des VDB* [Commission for Research-Related Services of the German Library Association VDB] in its current position paper on research support at libraries: “Libraries see themselves as modern and self-confident, customer-oriented digital information brokers and, in constructive coordination with computer centres and other research-supporting infrastructure facilities of their own research institution and beyond, develop a service portfolio in the area of research-related services oriented towards the target groups” [translation WR] (cf. Stille et al. 2021, p. 18).

|¹²⁶ The BMBF has published a handout on this which is also aimed at libraries (cf. BMBF 2019).

|¹²⁷ Respective offers from the individual scientific institutions can be supplemented by specialised, supra-regional offers, or advisory structures can be networked. Cf. also WR 2020.

demographic literature (cf. C.I.2.b). In addition, they can promote the visibility of their institution's publications by supporting authors in structuring documents and indexing them. To enable in-depth access to publications, these documents must be marked up with metadata using standardised vocabularies. Developments in the field of persistent identifiers must be continuously monitored and the consistent use of established identifiers ensured. This also requires collaboration between researchers and libraries.

As already explained in chapter C.I, libraries also ensure the storage of publications through the operation of repositories and, by being connected with systems for long-term digital archiving, permanent archiving. In this way, they guarantee the "permanence" of publications included in OA. Through contributions published via the right of secondary publication, libraries contribute to redundant storage. When it comes to the expansion of open science, the barrier-free availability of preprints and data publications will also become increasingly important. In this regard, tasks in which university computer centres play an important role, such as coordinating the storage and management of research data, must be networked with the respective area of responsibility at libraries.

Considering the changing role of libraries in the context of the OA transformation and due to their existing experience and competences, it seems obvious that tasks arising in connection with long-term archiving be put in the hands of a network of central specialised and state libraries as well as the German National Library (DNB) (cf. C.II.3.a). |¹²⁸ The WR assumes that especially those institutions which are achieving cost savings due to the transformation will assume responsibility here.

In the area of quality assurance of publication services, tasks will also arise that require specialised knowledge which is available in libraries or can be built up, e.g. for discipline-specific requirements. Thus, the institutions concerned could contribute to ensuring bindingness and verifiability. This would require a mechanism for monitoring whether publication services meet the defined standards (cf. C.I.3).

The Council advocates that libraries provide comprehensive support for the development and operation of science-driven publication services. Many libraries already operate non-commercial publication infrastructures, besides repositories, such as university presses. |¹²⁹ These are particularly well positioned to

|¹²⁸ The DNB's previous archiving obligation relates to publications published in Germany as well as to those published abroad in German. In addition, it covers translations of German-language works into other languages and foreign-language works about Germany. (Cf. Law on the German National Library (DNBG) Section 2).

|¹²⁹ The term university press is not protected; very different publication service providers, some without university affiliation, therefore call themselves university press. The *Arbeitsgemeinschaft der*

respond to the needs of their researchers and are often involved in OA or see themselves as OA stakeholders with the objective to disseminate the results of the research conducted at their institution in the best possible way. |¹³⁰ Building on existing competencies such as providing advice on and producing individual publications, consulting services and (process) support should also be offered with regard to questions of founding new OA publication organs such as journals or serials. Particularly when it comes to public funding, a quality-assured allocation of funds must also be ensured; equivalently to an editorial board, a science-led body should decide on the eligibility of new publication organs for funding.

II.2 Financial flows and business models

The development of costs and financial flows in the academic publication system depends on the various funding models of OA publication media, the transparency of internal processes at institutions and the design of financial flows between funding bodies and institutions. In the view of the WR, these financial flows should be designed to create more competition in the area of publication services and stronger incentives for innovation. In this way, the functionality, quality and cost efficiency of the academic publication system can be improved. In terms of taxation, the WR believes that the VAT treatment of publication services should be adapted to the reduced tax rate for books and (digital) publications with some urgency.

The goal of the OA transformation is a academic publishing system that ensures free access to, and optimal use of, publications, while safeguarding the scholarly and formal quality of publications and being cost-efficient at the same time. In the course of the OA transformation, digitalisation in the area of publication services must therefore be prevented from creating or stabilising quasi-monopolies which lower the pressure towards cost efficiency. It is already becoming evident that the unequal negotiating positions of providers and customers lead to a lack of cost transparency. However, as long as certain publication options are considered non-substitutable among researchers due to reputation effects, fee increases by publishers cannot be ruled out for the long term. In order to mitigate the conditions for price increases, cost transparency should be ensured and, at the same time, an ecosystem with various financing options be created or maintained. However, this ecosystem will continue to contain segments – albeit increasingly smaller ones – which are access-restricted or based on the trading-in of access rights.

Universitätsverlage [Association of University Presses] is a group of publishers who mainly publish academic publications from their own institutions (cf. <https://ag-univerlage.de> [accessed 30 September 2021]).

| ¹³⁰ Göttingen University Press, for example, offers targeted book-oriented disciplines and their faculties low-cost OA publishing opportunities (cf. Bargheer/Pabst 2016).

In OA, a financing model must be found which ensures that the publication provider's costs are covered independently of the publication's reception. The starting positions and financing models of monographs and edited volumes differ from those of journals and periodicals, as in the previous system (with exceptions) there were and continue to be no regularly recurring payments for scholarly books equivalent to subscription fees, which could be shifted for OA publishing.

In addition to following the maxims of free choice regarding the publication venue, equal access and conservation of resources already mentioned in chapter B, the funding system must be designed in such a way as to enable competition in the area of publication services. In this context, the establishment of new publication venues and the switching between publication service providers is supported so as to avoid the formation or stabilisation of dominant market positions. Furthermore, innovation incentives must be set to help improve the quality of services and increase cost efficiency by developing new or improved products, processes and technologies.

German VAT law distinguishes between the standard rate of 19 % and the reduced rate of 7 %, which applies to books, among other things. Pursuant to Section 12, paragraph 2, no. 14, sentence 1 of the German Value Added Tax Act (UstG), it also applies to electronic publications and to “the provision of access to databases containing a large number of electronic books, newspapers or magazines or parts thereof” [own translation of the legal text]. |¹³¹ However, for publication services, as for other services, the full tax rate is due. As a result, the tax burden for the research and higher education system will be higher once the OA transformation is complete. The German Library Association (dbv) also points out that taxation leads to misguided incentives and creates “bureaucratic obstacles, e.g. with regard to how DEAL contracts are handled” [translation WR]. |¹³² The WR therefore believes that it is desirable for the VAT treatment of publication services to be adapted to that of digital publications.

II.2.a Funding models for OA publishing services

Publication-based funding models are economically viable and adaptable to different circumstances; yet, as with subscription models, the risk of increased costs cannot be excluded. The WR appeals to the respective institutions, especially libraries, to continue to apply their experience from consortium negotiations at different levels so as to achieve long-term cost-effective access to publication opportunities in OA. With regard to the transformative contracts under

|¹³¹ Cf. http://www.gesetze-im-internet.de/ustg_1980/__12.html [accessed 1 December 2021].

|¹³² Cf. statement of the dbv of 30 October 2021, available at https://dbv-cs.e-fork.net/sites/default/files/2021-11/2021_10_dbv_Stellungnahme_Umsatzsteuersatz_final.pdf [accessed 30 November 2021]. Due to the PAR fee, the reduced tax rate currently applies to the read portion of the fee, but not to the publish portion.

DEAL, the WR believes that the implementation of the intended transformation to a pure pay-to-publish model must be ensured. For scientists, the individual right to publish must be preserved, regardless of their institutional role and endowment. Publication venues that are financed through a **media-based model** and offer fee-free publication opportunities (“diamond OA”) can contribute to the diversity of the system and put pressure on the providers of fee-financed publication organs. However, in order to expand this segment, sustainable funding models must be established for diamond journals and serials.

In principle, the funding models for OA publications can be divided into two categories: “publication-related” and “media-related”. At present, it is not yet possible to foresee which of these models will prove to be most suitable, especially as new varieties are currently being tested at close intervals with the aim of further developing article or book processing charges (APCs or BPCs) or replacing them with new approaches such as flat-rate models. |¹³³ In the view of the Council, such alternative (partly publicly or collaboratively financed) models can contribute to exerting innovation and cost pressure on the (large) profit-oriented publishers. Therefore, different models should currently be supported and developments further monitored.

Publication-related funding models

In public discourse, OA is often equated with the fee-based funding of articles in academic journals; |¹³⁴ the range of publication-related funding models as the most common form is usually referred to as APCs, although this designation may be too narrow and thereby misleading. While with APCs, funds only flow once a publication has been accepted for publication, submission fees become due immediately when a manuscript is submitted and serve publication service providers by counter-financing editorial tasks and peer reviewing. They already existed before OA models and are used to varying degrees depending on the subject area.

The level of APCs differs considerably between the various publication venues. In addition to the cost of the publication service itself, the extent of editorial content (editorials, etc.) and the publisher’s profit margin, the APC amount is influenced by the fact that the processing costs of rejected contributions are also financed by the fees for accepted contributions. Therefore, the APC level is related to the rejection rate of a publication organ(s) of a provider. In addition, in

|¹³³ The Public Library of Science (PLOS), which was one of the pioneers in introducing OA via APC, has launched such a model with Community Action Publishing (CAP), which is promoted as a more equitable and inclusive approach. It shifts the cost of publishing OA articles to institutions by charging them an annual flat rate; researchers at that institution can then publish in participating PLOS journals at no additional cost. The fee is based, among other things, on how many articles members of all institutions have published in the journal in recent years, either as corresponding or contributing authors (cf. <https://plos.org/resources/community-action-publishing/> [accessed 30 September 2021]).

|¹³⁴ Cf. Weisweiler 2021, p. 172.

publication-related business models, page charges, colour charges and other charges for optional partial services, adapted from the print world, are still levied in some cases (cf. also A.III). Financing models on the part of the institutions do not usually include these components.

To achieve more transparency and a better negotiating position, libraries established consortia of different sizes – some subject-based, some region-based – well before the start of the OA transformation, and licence agreements were and continue to be negotiated and concluded through such consortia. Other institutions are subsequently offered the opportunity to join the negotiated agreements in so-called opt-in procedures. Discounts and other advantageous conditions, which have been agreed upon in contracts between publishers and scientific institutions, such as bundling journals, often enable scientific institutions to gain broader, cost-efficient access to information for their scientists through such consortial (in rarer cases also individual) negotiations. Experiences from such consortial negotiations should now also be applied when negotiating with publication service providers so as to obtain favourable access to publication opportunities in OA. In this way, changes in cost structures can be cushioned and a smooth transition can be ensured.

Particular leverage is to be expected from so-called **transformative contracts**, through which hitherto closed publication organ are gradually transformed into OA bodies and funds redirected from subscription fees to publication fees. |¹³⁵ Consortia support the transformation in this way; by coming together at different levels of negotiation, they help to maintain the diversity of the publication system. Because of this diversity, the WR considers it most effective to intensify such collaborative action, in which science as a whole can participate.

Negotiations have been initiated at the federal level under the “DEAL” project name. These have led to transformative contracts with two major publishers so far. The transformative element consists of the publication-related publish-and-read fee model, which, as a hybrid model, is intended to facilitate the transition to an OA world by initially also charging for read access (cf. Appendix). The WR considers the envisaged goal of the DEAL contracts, replacing the PAR fee in the medium term with a pure publication fee and ensuring the transition to a pure pay-to-publish model, extremely important for transformation progress. The WR recommends reviewing the progress of the transformation in the negotiations on follow-up contracts during this process, by empirically looking at how

| ¹³⁵ In the context of Plan S, criteria for transformative journals have been developed, cf. <https://www.coalition-s.org/faq/what-is-a-transformative-agreement/> [accessed 30 September 2021]. The definition of transformative contracts is taken from the ESAC Initiative (<https://esac-initiative.org/about/transformative-agreements/> [accessed 30 September 2021]). These are defined as “agreements negotiated between institutions (libraries, national and regional consortia) and publishers in which former subscription expenditures are repurposed to support OA publishing, thus transforming the business model underlying scholarly journal publishing, gradually and definitively shifting from one based on toll access (subscription) to one in which publishers are remunerated a fair price for their OA publishing services.”

the transition has progressed up to this point. Suitable parameters in this area could be, for example, the proportion of hybrid journals converted to gold OA journals, the status of establishing information budgets and the inclusion of funds from previous subscription budgets. They could also include indicators of cost efficiency. In this context, institutional participation in the DEAL contracts should also be used as an indication of the broad commitment of science as a benchmark. In addition, the Alliance of Science Organisations in Germany should ensure that the transformation is also pushed beyond the participation of the major publishers.

Publication-based funding models highlight the goal of ensuring the inclusivity of the system as a particular challenge of the OA transformation. Researchers should be able to base their publication decisions on professional criteria and quality of service rather than be restricted in their publication options for cost reasons. On the part of the authors, the employment situation and professional position, as well as access to third-party funding, may influence access to funds for publication-related fees, which must be compensated for (cf. C.II.2.b). Most OA publishers therefore reserve a budget (about 5 % of their total budget |¹³⁶) to reduce or fully waive publication-related fees for those authors who cannot cover them themselves |¹³⁷ and award vouchers for review services rendered. To prevent publication-related financing models from excluding authors from low-income countries, such arrangements should become standard practice on the part of publication service providers. Building on the expectations on publication service providers outlined in C.I.3, the reimbursement of costs or inclusion in directories such as the DOAJ could be linked to the fulfilment of this criterion. According to a recent study, such conditionally free access to publication opportunities in such journals for researchers from the so-called least developed countries (LDCs) would be possible without major revenue losses on the part of publishers or with comparatively low financial expenditure for research funders or consortia in Europe. |¹³⁸ Moreover, researchers who are not affiliated with any institution but, for example, receive a fellowship or are retired and therefore cannot apply for APC reimbursement from an institution, should also be considered. Their publication costs should, in the case of fellows, usually be covered by the fellowship providers. For retired researchers, the above-mentioned

|¹³⁶ In the case of Copernicus Publishing, for example, the budget for discounts and waivers is 6.8 % (cf. https://publications.copernicus.org/apc_information.html [accessed 30 September 2021]).

|¹³⁷ In addition to special conditions that depend on the location of the author's institution, there are also, in some cases, opportunities to apply to the publisher for a "voluntary waiver" (discretionary waiver).

|¹³⁸ In their bibliometric study, Taubert et al. also show that the topical categories of the publications indicate publications of high social relevance for the least developed countries studied, so that waiving APCs could also mean a contribution to development in these countries. The authors also point out that by waiving APCs for LDCs, publishers could improve their reputation within the scientific community, which could be an incentive (cf. Taubert et al. 2021).

systems, including vouchers for review services rendered or waivers, are already being tested.

In the context of the OA transformation of monographs and edited volumes, Book Processing Charges (BPC) are a funding option that is already being practised and that could be further developed. |¹³⁹ Although the models established for journals cannot be directly transferred to the book sector due to its heterogeneity, they can be adapted accordingly. The goal must be for funding institutions to treat these publication types the same as journal articles when it comes to funding opportunities. The WR believes that, as with articles, publication formats and conditions should be standardised at the institutional level, e.g. by means of consortial negotiations on framework agreements and on the publishers' own initiative, so that transparency with regard to pricing and development can also be guaranteed in this field.

Innovations developed and offered by individual service providers must be designed in such a way that researchers can take them up and try them out. To ensure that there is an incentive for innovation and quality improvement on the part of the service providers, funding opportunities should be sought out that comply with subsidy and public procurement law and are not limited to the provision of services according to minimum standards or strictly linked to the price-performance ratio. With regard to award procedures, the inclusion of further decision-making parameters in the service specifications upon which the selection of the best provider is based, should be examined.

The Council believes that if publication-based funding models are to continue to cover a substantial part of the publication market in the future, while at the same time fulfilling the central promises of the OA transformation, the following three core problems must be solved, over and above the safeguarding of individual freedom of publication:

- _ Publication-based funding models lead to total costs growing linearly with increasing publication numbers. Cost-containment models, on the one hand, and the removal of incentives for too many individual publications through a genuine reform of the evaluation of researchers and academic institutions, on the other, can at least mitigate the problem.
- _ With regard to quality assurance, problematic incentives can arise for publication service providers, as additional publications automatically generate additional revenue. In this context, the so-called cascading peer review (cf. C.I.4) must be regarded as problematic.
- _ From the point of view of researchers, publication services of certain publication venues cannot be substituted for, as publications in renowned journal

|¹³⁹ See also Godel et al. 2020, p. 11.

titles have reputation effects; this results in the current rigid (non-price-elastic) demand. Contractually agreed-upon cost reductions will not be enforceable for the long term if scientists, in their role as customers, are not willing to switch to an alternative publication service.

Media-related financing models

An alternative to publication-related business models, OA publication media can also be financed on an institutional basis, i.e. without a contribution from the publishing persons or institutions for any individual publication. Such OA publishing options without publication fees are often referred to as “diamond OA”. They can be further subdivided into models that are financed by contributions from the scientific institutions or their libraries and different varieties of institutional funding. When publication venues are funded by institutions such as membership-fee-funded professional societies, authors may be indirectly involved in the funding. Institution-owned publication venues, such as platforms or university-owned publishers, finance the costs of providing content and, where appropriate, also assume responsibility for the publication process.

In this model, journals function according to the same standards as APC-based OA journals. Because the costs are borne by the publishing institutions, this route is particularly attractive for disciplines in which there are hardly any funding options for publication-based payments so far, as well as for institutions from the global South with limited financial resources. However, this route also prevents the above-mentioned core problems of publication-based funding models and are therefore an important benefit for the publication landscape.

To avoid undesirable concentration processes, new foundations of media-related journal business models are considered particularly helpful, as this strengthens the diversity within the system. Furthermore, support structures and networking opportunities can make it easier in individual cases to set up and (continue to) operate scientific journals independently of a publisher, e.g. if an active community in a particular field or nationally and internationally recognised professional societies identify a relevant need due to market failure.

Despite the merits of media-based business models, article quantities |¹⁴⁰ indicate that diamond journals have scaled less well so far, and only a few communities seem to have succeeded in placing journals published in the diamond OA as top titles in the reputation hierarchy. When it comes to strengthening media-related funding models, a study indicates that technical support needs to be improved, capacity built and efficiency increased. One of the prerequisites for building up a standing and weight in the respective community as a publication

| ¹⁴⁰ Although the majority of journals in the Directory of Open Access Journals (DOAJ) are not APC-based, they publish significantly fewer articles in total than the comparatively few APC-funded titles.

venue is to ensure the continued existence of a journal over a longer period of time. With long-term funding from institutional resources, journals can plan ahead better. |¹⁴¹ The current funding approach for diamond journals of the German Federal Ministry of Education and Research (BMBF) is to further develop the overall system; |¹⁴² it aims to establish publication models and workflows which can also be used by other journals. Furthermore, the WR believes that there is a need for permanently sustainable funding models to help prevent journals, once established, from not being able to maintain operations after the end of project funding and therefore having to be dissolved. The WR considers it conceivable that publication services could be put out to tender by the editorial board for specific periods of time, thus incorporating the diamond-OA publishing expertise in a competitive manner. This would enable competition for high-quality, cost-effective publication services independent of the reputation of an editorial board.

Previously published recommendations for supporting diamond journals |¹⁴³ include investing in lighthouse projects which develop shared services or infrastructure, supporting journals in meeting standards and providing funding to develop peer review management, for example.

The Council considers it particularly useful to expand consortial models in which the cost burden is shared among several scientific institutions. In this context, it may also be possible to draw on experience from the DEAL and SCOAP³ projects (cf. Appendix), whose contracts for the participating institutions follow the principle of diamond journals: Through a joint effort, scientists are enabled to publish their research results without having to deal with funding issues. Furthermore, by involving several institutions, a close connection to the user communities and their needs can be ensured. The Open Library of Humanities, which is funded by an international consortium of libraries and which states that it has built a sustainable business model with its partner libraries, can be seen as a further model. It supports academic journals from all the humanities disciplines and also runs its own multidisciplinary journal. |¹⁴⁴

|¹⁴¹ Cf. Bosman et al. 2021a. The need for sustainable funding is also emphasised in *The Principles of Open Scholarly Infrastructure: To create a central publicly funded publication infrastructure that can withstand external disruptive influences, sustainable funding must go beyond the immediate operating costs* (cf. Bilder/Lin/Neylon 2020).

|¹⁴² The new BMBF-funded CODRIA project at Bielefeld University explores the role of diamond journals in Germany's OA landscape as well as their performance, efficiency and mode of operation in greater detail (cf. <https://www.bildung-forschung.digital/de/projektstart-20-ideen-fuer-die-transformation-zu-open-access-3660.html> [accessed 30 September 2021]).

|¹⁴³ Cf. Becerril et al. 2021, p. 35.

|¹⁴⁴ Cf. website of the Open Library of Humanities (<https://www.openlibhums.org> [accessed 30 September 2021]).

A model for a community-driven approach to monographs and edited volumes can be seen in the British initiative COPIM (Community-led Open Publication Infrastructures for Monographs), which is developing infrastructure and business models to support publishers and authors in making their research results openly accessible without paying BPCs. The aim is to create a not-for-profit, open-source ecosystem for publishing OA books, aimed in particular at the humanities and social sciences. |¹⁴⁵

II.2.b Internal processes of scientific institutions

A **transparent information budget** is central to the cost control and strategic capability of the institutions. The strategic responsibility for implementing this budget rests with the management of the respective institution. The WR is also in favour of merging budgets into publication funds. In addition to the usual basic funds, these would be filled up, for instance, through shares of a programme allowance of third-party funded projects, extended by publication costs. In this way, all researchers would achieve access to publication funds, which must be regulated by a transparent distribution procedure.

It is estimated that only an average of 1–2 % of an institution's total research budget is spent on literature and information provision and publishing. |¹⁴⁶ Nevertheless, the use and distribution of these funds plays an important role in the OA transition and also means altering financial flows within the institutions. This is the case particularly if, during the transformation, publication-based funding models are predominant, i.e. funds must flow for each individual publication. Institutions are thus no longer (only) faced with the task of enabling academic staff to access restricted information; they must also enable them to publish and carry the respective costs. In this sense, the guiding principle that publishing is part of the research process means that, in future, publication costs will be incurred on a regular basis wherever research is carried out.

A transparent information budget is therefore essential for the cost control and strategic capability of the institutions. In view of the large number of centrally

|¹⁴⁵ Cf. <https://copim.pubpub.org/> [accessed 30 September 2021].

|¹⁴⁶ For example, the Wellcome Trust arrived at an estimate of this sort (cf. <https://web.archive.org/web/20090821073435/http://www.biomedcentral.com/openaccess/archive/?page=features&issue=18>, [accessed 30 September 2021]). A rough global estimate can also be made using data from the STM Report (International Association of Scientific, Technical and Medical Publishers) and OECD data: Annual STM publishing revenues are estimated at 13.3 billion dollars in 2017. Within this, annual revenues from the publication of English-language STM journals are estimated at around 10 billion dollars; the STM book market has annual revenues of around 3.3 billion dollars. This contrasts with global spending on research and development. In that area, the OECD records higher education expenditures on R&D (HERD) and government expenditures on R&D (GOVERD) for OECD countries and seven other countries, including China. In 2017, this expenditure totalled around 487.5 billion PPP (purchasing power parity) dollars. Since this figure only includes the expenditures of the states mentioned and does not include expenditures from the private sector, it is very likely to be significantly lower than the actual value of global research expenditures. If it is, however, put in relation to the income from publications in the STM sector, a share of 2.7 % can be regarded as an upper limit (cf. Johnson/Watkinson/Mabe 2018 as well as OECD database, https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB [accessed 29 September 2021]).

and decentrally acquired licences and publication services, only few institutions are currently in a position to provide comprehensive information on individual budget items. In particular, the payments of publication fees from project funds, which, until now, have often been decentralised, are rarely recorded in full. A comprehensive and honest accounting of the historically incurred costs for acquisition, licences and publication opportunities, as well as the funds used for these, is indispensable for classifying and quantifying the actual net shifts due to the OA transformation. At the same time, this could help identify untapped potential, e.g. if the reimbursement of publication costs by third-party funders has not yet been consistently used.

Greater transparency could also encourage stakeholders from the research and higher education system to become more cost-conscious. Although this will not fundamentally shatter the rigidity of demand for publication opportunities in reputable journals, raising awareness among stakeholders could help to exert some competitive pressure on publication service providers. On the one hand, this means that better information for researchers is necessary. On the other, it makes clear the changing role of libraries described in C.II.1.d. A professionalisation and bundling of know-how by commissioning publication services centrally in consultation with researchers and by building up or expanding competencies at a suitable location, such as the libraries, would improve the market power and the negotiating position of scientific institutions.

The DFG also anticipates positive effects of greater transparency of internal financial flows, which is why the “Open Access Publication Funding” programme is linked to the expectation that institutions will establish, or further develop, structures for the automated recording of OA publications and associated fees. Voluntary reporting of publication fee payments to the OpenAPC database can strengthen its information value and improve its benefit as a monitoring tool. In line with these assumptions, the WR recommends that scientific institutions create reporting processes that enable a comprehensive overview. In this context, more centrally and more decentrally organised institutions with one or two-tier libraries respectively, have to deal with different conditions. Particularly in the case of such two-tier organisations, which in addition to a central library possess several independent institute libraries as strong decentralised units, it will only be possible to implement a virtual information budget at the institution level.

Due to the fact that relevant funds are anchored in many different places in the internal system of each institution, **communication processes** will play an essential role even when setting up a purely virtual information budget. These will have to occur at different levels and from different sides if an understanding and acceptance is to be gained for the fact that an additional effort must be made to record comparatively small amounts. In addition to the **university** or **institution heads**, the **libraries** and **administration** or budget department, the indivi-

dual **institutes** must also be involved (insofar as they manage their own project funds). In the view of the WR, the strategic responsibility for this must rest with the management of the respective institution and, within universities, could rest with the research prorectorate, for example. To establish this in a binding manner, which would also increase the acceptance of the stakeholders, the financial flows in the institution will need to be presented transparently by a **fixed point in time**, i.e. the inventory will have to be completed by that point in time. The WR considers it desirable for the institutions to obtain an overview of the financial flows in a timely manner so that they may discuss the design of the financial flows in a pure OA world after the transformative treaties by 2025 at the latest. |¹⁴⁷

In the interest of transparency, every OA publication should also clearly state who or which organisation has funded it.

For many institutions, the (lack of) knowledge regarding the number of their own publications is an added challenge alongside the (lack of) overview of publication-related expenditures. More specifically, not all institutions are aware that publication costs are only incurred where a member of the respective institution acts as corresponding author for a publication. To support the institutions, the Council therefore recommends that the Commission for Research Information in Germany (KFiD) should define the attributes “open access (type)”, “corresponding author” |¹⁴⁸ and “ORCID-ID” in the core data set for research (KDSF). Since the DOIs of the publications and the publication venue can subsequently be used to determine and allocate costs, if necessary, this can also contribute to a complete (virtual) information budget.

At many institutions, publication funds are not only budgeted virtually, but are also pooled centrally in the form of OA publication funds. |¹⁴⁹ These are typically administered by the library and serve to finance the publication fees of the institution’s researchers. Usually, such funds are an additional title for financing publication services which exists alongside the literature title, from which all acquisitions, |¹⁵⁰ subscription fees, expenses for consortium contracts (e.g. DEAL

|¹⁴⁷ A similar timeframe is given by COAlition S with regard to transformative contracts: “[...] where cOAlition S members provide funding to support publication fees of journals covered by such arrangements, this funding will cease on the 31 December 2024”, cf. <https://www.coalition-s.org/addendum-to-the-coalition-s-guidance-on-the-implementation-of-plan-s/principles-and-implementation> [accessed 13 December 2021].

|¹⁴⁸ It should be noted that the role of the person primarily responsible for the publication, who is called the corresponding author, is not always identical with the first author.

|¹⁴⁹ Cf. Pampel/Tullney 2017.

|¹⁵⁰ Procurement and rights acquisition will continue to occur, and be financed to a certain extent in the overall system, from various funding streams, so that part of the budget will continue to be used for the acquisition of media and licences.

contracts), pledging, memberships, etc. are paid. |¹⁵¹ With regard to the centralization of funds, libraries must also ensure that this does not occur at the expense of cost efficiency. Moreover, it must be ensured that centralisation does not lead to a cost consciousness on the part of researchers, which, while desirable in principle, also restricts their freedom to choose where to publish, e.g. if they are allocated a fixed budget.

A more comprehensive centralisation of funds can also mean that parts of the research budget, especially publication lump sums or publication-related portions of general programme and project lump sums of third-party funding, and the information budget of an institution are combined in such one fund. In the view of the WR, it would be well justifiable to pay portions of the programme lump sums of third-party funded projects extended by publication costs into such funds, as publication opportunities – especially those financed according to media-related models – are research-related infrastructure services and thus indirect project costs.

The pooling of funds would allow institutions to permanently finance their own publication services from such a fund or to participate in collaborative projects (pledging) beyond publication-related individual funding. This way, they would become strategically capable players that could implement more far-reaching open science strategies. If ways can be found in which third-party funding can flow proportionally into such a fund, the size of the fund would increase proportionally to the third-party-funded research intensity of an institution. This must be demonstrated to the funding organisations in a transparent fashion and compliance with funding law must be clarified.

To ensure that pooling all publication-related funding in one fund does not lead to injustice, a transparent distribution procedure is needed to regulate how decisions are made regarding the use of these funds. It is therefore important to ensure that all researchers at the respective institution are given access to the publication fund or publication resources. To make certain that as many researchers as possible can benefit from the fund, the amounts which can be reimbursed via the fund are, in some cases, capped; |¹⁵² in these cases, an author's share remains. This must be covered through other sources, e.g. institute budgets or third-party funding. |¹⁵³ Thus, access to third-party funding also becomes

|¹⁵¹ In connection with transformative contracts, where publishing and read access are charged via a publish and read fee (PAR fee), some institutions make a split entry on the literature title and the OA publication fund due to the currently still higher VAT rate of 19 % on OA publishing, so as to realistically reflect that the publication process is (also) financed.

|¹⁵² As part of the BMBF-funded Options4OA project, data on OA in academic institutions in Germany was collected in 2018. According to the study, 57.35 % (n = 78) of scientific institutions apply a cap on the payment of publication fees via their publication fund (cf. Pampel 2019).

|¹⁵³ Through its "Open Access Publishing" funding programme, the DFG financed OA publications until the end of 2020 with minimum criteria such as a price cap and a fixed author's share; this price cap was not continued in the "Open Access Publication Funding" successor programme. Publication funds operate sometimes through percentage shares with maximum reimbursement.

relevant when additional funds are needed to finance fees. For subjects whose research is fully or predominantly financed by basic funds, a need for additional cost coverage arises. At the same time, it is important to ensure that, if third-party funding is centralised, sufficient publication funds are made available to those who have raised the funds and their respective projects (cf. Appendix).

II.2.c Public research funding and compensation mechanisms

There are three different ways, in principle, to cover the costs of publishing as part of the research process from public research funds. Depending on the respective institutional framework, each of these three approaches can cover a different proportion of the total costs. Publications can be financed as direct or indirect project costs from third-party funds; at the system level, this can contribute to a balanced distribution of funds that is proportional to the research intensity. In addition, publication costs can be reimbursed on the basis of a separate application related to a publication volume or specific publication services. The third type of funding refers to mechanisms for covering publication-related costs from basic funds.

The three above-mentioned ways of covering publication costs within the framework of research funding differ in terms of their prerequisites and effects. For each case, indications for their design are provided in the following. None of the three mechanisms individually can ensure the balanced funding of academic publishing.

Publication funding within the framework of project funding

The larger project funders in Germany now generally count OA publication costs among the reimbursable costs of research projects; reimbursement can usually be applied for as material resources in the context of the funding plan. As a retroactive variety, reimbursement is also possible upon separate application (see subsequent section). When applying within the framework of the project proposal, there are different specifications when it comes to publication organs, cost ceilings as well as the reimbursement of additional fees such as colour charges, etc. In addition to the reimbursement of actual costs, a lump-sum payment is also conceivable, e.g. based on the total volume of a project, which may give the institution greater freedom to decide how to use the publication funds.

Due to the connection between the strength of research and thus also publication strength and the acquisition of third-party funding in many fields, project-based publication funding contributes to a balanced distribution of funds according to research intensity. If all publications that arise in connection with externally funded projects are counter-financed from project funding, this makes a significant contribution with regard to an appropriate distribution of costs among the institutions.

In the case of project-related publication funding, the funding recipients are made aware of the previously described tension between the free choice of the publication venue on the one hand and an efficient use of funds on the other. This tension cannot be completely resolved (cf. C.II.1.b). Pooling funds within institutions can help to reduce it, though, and also has the potential to exert a certain competitive pressure on publication service providers if orders are placed centrally by the library or another body and costs are transparent.

Research funders can influence the emerging market for publication services with their programmes through the way they design funding application conditions. The funders provide orientation without anticipating decisions with regard to individual cases. The WR considers it desirable for funding bodies to declare publishing in OA media as a rule, in the sense of a target requirement (OA mandates for justified exceptions, see C.II.1.c). In addition, minimum standards for publication services and review processes for their implementation should be developed (cf. C.I.3). It should also be ensured that OA publications can still be funded after a project formally ends, as it is not always possible to complete publications in the context of a project before the end of its term. It should therefore be possible to retrieve publication funds which have not been used up by the end of a third-party funded project, even after the end of the project term.

Considering the great importance of third-party funded research for the entire research and higher education system, it would be desirable to also find ways to co-finance **media-related models within** the framework of project funding. Proportionate cost coverage should also be possible in cases where publications in diamond journals (co-)funded by the institution were applied for as part of a project. Alternatively, diamond journals could also be co-financed indirectly from programme allowances.

Application-related reimbursement of OA publication costs

For several years now, the DFG has offered eligible institutions from Germany opportunities to raise funds to cover OA publication costs. The currently valid application conditions also allow for the reimbursement of publication costs which do not arise in the context of DFG-funded projects. These conditions are explicitly only valid for a transitional phase of three years; as things stand at present, this extended funding opportunity will end in 2024.

Submission fees are rarely paid from OA funds and can also not be applied for in the DFG programme “Open Access Publication Funding” (cf. Appendix). Although they are seen as a parameter for regulating APCs and can help to limit the burden on the peer review system, there is no connection to OA, which is

why, as the Council sees it, submission fees and variants such as the editorial assessment charge |¹⁵⁴ should not be classified as OA fees either.

With regard to publications in media-related funding models, another possibility is the direct proportional funding of journals.

Since the publication system is in a state of flux and new developments can also be expected in the broader context of open science as digitalisation advances, it remains important to develop **models for promoting innovation in the publication system** as before. This can be done, for example, by co-financing pilot tests and new ideas for publication infrastructure. Through its guideline for funding projects to accelerate the OA transformation, the BMBF already supports “the implementation of innovative projects that sustainably advance OA as a new standard for academic publishing” [translation WR]. |¹⁵⁵

OA publication funding as part of institutional funding

If academic publishing is seen as part of the research process, it can be deduced that the costs of academic publishing must be covered by basic funds at least to the same extent as research is financed by basic funds. As the proportion of OA increases, the costs of acquiring media and licences must decrease. It makes sense to increasingly use these funds stemming from the acquisition and subscription budgets of the libraries to finance academic publishing in the future.

Due to the heterogeneity of the scientific institutions in Germany, which have very different research intensities, the OA transformation alters cost distribution in the system, as became apparent in the course of the so-called “True-up” in the DEAL project (cf. Appendix). It can be observed that cost shifts are primarily taking place within the higher education sector and the non-university research sector respectively (cf. Table 4). From the point of view of the WR, the effects on the cost distribution in the higher education sector should be examined first and foremost. As soon as a realistic information basis on distribution effects through internal information budgets is obtained, it will become clear whether compensation is needed for particularly research-intensive universities. The WR recommends that all institutions and financiers involved in the subscription model be included in any compensation mechanisms so as to enable a transformation which is as cost-neutral as possible.

Due to the distribution of responsibilities in the federal system, additional and reduced costs in the higher education sector could in principle be offset by readjusting basic funding on the part of the states (Länder), for example in the

|¹⁵⁴ This form of submission fee was introduced by Springer Nature in the Guided Open Access programme (cf. <https://www.nature.com/nature-portfolio/open-access/guided-open-access> [accessed 30 September 2021]).

|¹⁵⁵ Cf. <https://www.bildung-forschung.digital/de/projektstart-20-ideen-fuer-die-transformation-zu-open-access-3660.html> [accessed 30 September 2021].

context of performance-oriented funding (LOM). However, considering the small volumes of funds which would be shifted and the effort involved in introducing an OA publication indicator into the LOM system, this would not be very efficient. It is conceivable, however, that consortial negotiations – possibly involving research-strong institutions and institutions geared at readers rather than researchers – at various levels (cf. C.II.1) could be combined with the formation of publication funds, which would have a mitigating effect on the cost shifts caused by the OA transformation.

II.3 Infrastructure for academic publishing

The OA transformation can only succeed if public infrastructures are expanded beyond publication service providers. With a view to long-term archiving and redundancy of storage, the WR recommends that a network of German institutions be commissioned with the complete storage of all openly available academic publications worldwide. It would be desirable for publishers to be involved in this. To conclude contracts with other, even smaller, publishers beyond DEAL, the scientific institutions can draw on the negotiation structures and experience of Project DEAL. The WR also welcomes an expansion of this approach to publishers with slightly smaller market shares and recommends the formation of consortia for smaller and medium-sized publishers as well so as to simplify the negotiation situation.

In addition to the framework conditions and funding models, the **institutional foundations** of OA publishing are of crucial importance for the progress of the transformation. To secure them, a reorganisation of role distribution between stakeholders is necessary, especially between publication service providers and scientific institutions and their libraries. Publication-related services such as **long-term archiving** and **monitoring** (publications and costs) must be seen in this context as basic infrastructures for academic publishing. Considering their importance for the sovereignty of the research and higher education system, it is of public interest to secure these tasks organisationally and financially for an unlimited period of time. In order to distribute newly added tasks in a fair manner, and to control and retain a good balance regarding the financial burden, a negotiation mechanism is necessary in which all relevant stakeholders participate.

As a forum for the negotiations mentioned here, the commission recommended in C.I.3, consisting of national and international academic publishers along with academia and libraries, possibly with the involvement of the Ge-SIG, is conceivable.

II.3.a Long-term archiving

To ensure the long-term usability of publications over a potentially unlimited period of time, regulated long-term archiving is needed. Long-term archives must preserve documents, data and metadata in such a way that their usability

is guaranteed in the future and is not threatened by technical change (storage media, operating systems, file formats, etc.) or disasters. Long-term archiving is also important with regard to the “disappearance” of publication venues due to the closure of online journals or platforms. It includes both the provision of technical infrastructure and organisational measures as well as the establishment of workflows and standards.

Against the background of global uncertainties, multiple **redundancy** in long-term archiving is desirable and, for resources published under free licences, also legally unproblematic. The volume of data should not be seen as a limiting factor for the published texts and images and the associated metadata, as long as supplementary materials such as research data are archived separately. Institutions geared at readers rather than researchers can save costs thanks to the transformation and can potentially contribute to the financing of the technical infrastructure in this field (cf. C.II.1.d). The WR believes that it would be a worthwhile and realistic goal to commission a network of German institutions with the complete storage of all openly available academic publications worldwide, thus contributing to the storage of humanity’s knowledge repository. Also, to avoid the need to set up new structures, the WR recommends using the existing structures of central specialist and state libraries and the **German National Library (DNB)** as independent and neutral institutions for storing digital knowledge. At the same time, this task should be linked with the DFG project NatHosting for the national hosting of electronic resources. If possible, a strong network should be formed with neighbouring European countries.

Even if storing the entire stock of academic publications is a task for the common good which can only be assumed by the public sector, it would be desirable for **publishers** to also assume responsibility for archiving. Thus, publication contracts should also include a provision for long-term archiving. |¹⁵⁶ Publishers themselves, however, cannot be seen as part of the redundancy, since the risk of a company going out of business can never be ruled out. For this reason, storage by the public sector in particular should be based on the principle of NatHosting, i.e. by stipulating shadow-archive solutions in the contract. In the event of a publisher going bankrupt, this type of agreement is also used in DEAL contracts. |¹⁵⁷ Such a provision should be included in publishing contracts as a matter of principle. In addition, publishers should be encouraged to join a parallel long-term archiving system such as Portico, which provides protection should the publisher no longer be able to make content available.

|¹⁵⁶ Publishers already do this via the long-term archiving system Portico (<https://www.portico.org> [accessed 30 September 2021]), an American non-profit service provider that is also used in the NatHosting project. It is financed by contributions from publishers and participating libraries.

|¹⁵⁷ On Dark Archive in the Wiley contract, cf. Sander et al. 2019, p. 69.

Repositories are a central infrastructure for the green route to OA, which, in the view of the Council, functions as a transitional model as well as an alternative option for publications which, for various reasons, cannot be published openly via the gold route. They fulfil several functions and, in addition to providing access and enabling dissemination, they also ensure the “permanence” of publications included in OA on a more limited scale, often including preprints, reviews and other supplementary material. When the accepted manuscript version of articles is deposited under the second publication right, the institution at which they are located, and which can guarantee the permanent availability of the publications, contributes to the redundancy of protection. Automated procedures can be used to facilitate and accelerate the inclusion of full texts and metadata of academic publications in repositories. |¹⁵⁸ Minimum requirements and a corresponding quality awareness amongst scientists should be established on a broad basis, for which the DINI certificate or the Confederation of Open Access Repositories (COAR) provide starting points (cf. C.I.2). For German institutions, the WR recommends the use of the DINI certificate, which, with a defined validity period and concrete measurable criteria, offers the possibility of having quality confirmed.

A separate archiving solution must be found for supplementary materials, as their storage requires greater capacities and special curation processes. In principle, **research data**, **source code** and **workflows** can be archived in online repositories and published through them. **Data repositories** should be seen as best practice for ensuring the long-term existence of links. Providers offering this service with a long-term guarantee are, for example, Radar, |¹⁵⁹ Zenodo |¹⁶⁰ as well as institution-specific and subject-specific repositories. Since such repositories allow the complete retrieval of data sets, there are also shadow archives in this field which ensure data redundancy. The WR welcomes the fact that through the NFDI (German National Research Data Infrastructure) a structure for sustainable processes for securing research data has been created.

|¹⁵⁸ The Deep Green project aims to ensure that full texts and metadata are delivered to institutional and subject-specific OA repositories via an interface provided by publishers, instead of being entered manually by libraries or authors (cf. <https://deepgreen.kobv.de/de/deepgreen/projektziele/> [accessed 30 September 2021]).

|¹⁵⁹ RADAR (Research Data Repository, cf. <https://www.radar-service.eu> [accessed 30 September 2021]) was developed by several institutions as part of a DFG project and has been operated since 2017 as a research data repository under the leadership of FIZ Karlsruhe - Leibniz Institute for Information Infrastructure together with other partners.

|¹⁶⁰ The online storage service Zenodo (cf. <https://zenodo.org/> [accessed 30 September 2021]) has been operated by CERN (Conseil Européen pour la Recherche Nucléaire) and OpenAIRE since 2013 and funded through them by the European Commission.

Metadata infrastructures such as directories and standards organisations are another type of infrastructure essential to digital publishing. Since the OA transformation also includes free access to, and reusability of, high-quality metadata, metadata-related organisations and infrastructures must also be openly accessible and secured. These include directories such as the DOAJ (Directory of Open Access Journals), certification organisations such as Crossref, identifiers such as ORCID (Open Researcher and Contributor ID) and ROR (Research Organisation Registry), aggregators such as OpenAire (Open Access Infrastructure for Research in Europe), as well as non-monetary recognition systems and platforms that guarantee transparent peer review processes (reviewer recognition platforms or reviewer credit systems). Citation networks for open citations are also included (cf. C.I.2).

Furthermore, **infrastructures** which collect and aggregate **information on APC payments** are of high strategic value for the OA transformation as a basis for greater cost transparency.

A large proportion of these infrastructures are **international non-profit organisations** whose governance structures and associated interests or weighting may need to be taken into account. When designing publication-related infrastructures and innovations to improve the usability of publications, non-profit providers are given the opportunity, unlike commercial providers, to focus on the contribution of publishing to the scientific research process when developing their service. Securing the operation of these infrastructures is of such central importance to the German research and higher education system that the Council considers an appropriate participation of German funding agencies and scientific institutions in the financing of these global infrastructures to be indispensable. At the same time, the reporting practice for securing metadata is also of great importance. The publication service providers must assume responsibility for the delivery of complete and quality-assured data.

II.3.d Negotiation and settlement infrastructures

The two contracts concluded with major publishers within the framework of the DEAL project serve as a strong signal (cf. Appendix and C.II.2); thanks to the structures created by DEAL Operations and MPDL Services GmbH, experience was also gained with regard to negotiations and interaction with publishers, and legal as well as billing and collection competences were built up. In addition, DEAL has made a valuable contribution to increasing transparency, especially with regard to the costs of publication services.

Academic institutions can draw on this experience to conclude contracts with other publishers, including smaller ones. It would be conceivable to further develop the DEAL Operations offer in such a way that it may become more service-oriented in character beyond follow-up contracts in the DEAL framework in the future. DEAL Operations would contribute to the professionalisation of negotia-

tions on publication services. For example, it could support national, regional or subject-specific consortia in negotiating uniform conditions in the area of book publications as well. Negotiating at a lower level than the national level and being able to draw on experiences from DEAL and other projects increases flexibility.

One argument in favour of negotiations on further publish-and-read agreements (or later pure-publish agreements) at the national level is that central negotiations also have a relieving effect on publishers. In principle, negotiations at the European level would also be attractive, but this would increase coordination issues, making a successful conclusion more difficult to achieve. In the view of the WR, tried and tested ways of transnational collaboration, such as through GASCO (German, Austrian and Swiss Consortia Organisation), should continue to be used and, if necessary, expanded or supplemented by similar cooperation with other countries.

With the paradigm shift that paying for publishing instead of reading access represents, the negotiating position of the scientific community has improved and negotiations on an equal footing have become possible. In order to expand the circle of participants in transformative contracts, it is necessary to find ways of negotiating that enable consensus regarding the expectations on publication services. Particularly where smaller and medium-sized publishers are concerned, the formation of consortia on the publisher side could be an interesting option which would simplify the negotiation situation. It would be conceivable, for example, to offer publication services in packages to meet certain standards in a staggered manner (cf. C.I.3). Scientific organisations could, for example, design calls for proposals in such a way that consortia could also apply, and therefore be able to purchase publication opportunities for their own researchers, e.g. for books in the humanities and social sciences. The system could also benefit from making sample contracts available. The aim of the effort should be to arrive at a collective purchase of publication services through coordinated procedures, as has long been the case in the library system, through which bargaining power is accumulated on the demand side.

The WR welcomes existing efforts to conclude contracts with additional medium-sized publishers. Even with a relatively small number of publishers, a further significant portion of the publishing sector could be covered (Forum 13+ initiative). Small and medium-sized publishers should also be included in developing new business models. An independent report on the development of OA contracts by universities, libraries and smaller independent publishers, among others, commissioned by cOAlition S and the Association of Learned & Professional Society Publishers (ALPSP), has ascertained that, among other things, libraries and consortia often underestimate the amount of work involved in im-

plementing OA contracts. |¹⁶¹ For contracts with small publishers, a certain degree of standardisation can help to reduce this workload and to relieve the stakeholders on both sides. This applies both to model OA contracts between consortia and publishers as well as to model contracts with regard to individual publications.

Since the publication system, and smaller publishers in particular, are currently still in a transition phase, it is not yet possible to make a statement about which contract models are best suited for which types of publication service providers for ensuring an efficient sustainable provision of high-quality services. For smaller publishers, the acquisition and operation of new technologies, as well as the acquisition of technological know-how, represent considerable hurdles that must also be overcome from a financial viewpoint. In principle, the evaluation of new models should, in the view of the WR, follow the following three maxims:

- 1 – The model includes incentives to provide high-quality publication services at low cost, with full transparency of costs and services.
- 2 – A complete and irreversible conversion to OA is contractually anchored and thus ensured.
- 3 – The model contains no entry thresholds and is open to new partners, i.e. joining agreements are possible at any time.

The Council believes that if these maxims are followed, the market for publication services can be successfully shaped in such a way that innovative capacity, cost transparency and cost efficiency can be increased over the course of the OA transformation. Thus, academic publishing will also increasingly contribute to the other transformation goals mentioned in chapter B.: to improve communication within the scientific community and to increase the social effectiveness of research.

|¹⁶¹ Cf. Estelle/Jago/Wise 2021, p. 11.

Appendix

THE STATE OF THE OA TRANSFORMATION

I.1 The open access discourse since the Berlin Declaration

The origins of the open access (OA) movement go back to the founding of the preprint archive arXiv.org in 1991 by US physicist Paul Ginsparg. Since then, a broad political consensus has arisen, marked by various milestones. In 2002, numerous scientists and relevant organisations positioned themselves in favour of OA within the framework of the **Budapest Open Access Initiative (BOAI)**. |¹⁶² In 2003, following a meeting of researchers, the so-called **Bethesda Statement on Open Access Publishing** |¹⁶³ was published, which refers to the field of biomedical sciences in particular. A few months later, the **Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities** was signed at an OA conference of the Max Planck Society by various American and European research organisations, including the German Science and Humanities Council (WR), pledging to contribute to the dissemination of OA.

Since then, there have been political postulates for OA at the international and European level (OECD, Science Europe, European Commission, UNESCO) as well as at the federal and state level. For example, 10 of the 16 German states have committed themselves to OA with strategies of their own, and the Joint Science Conference (GWK) has underpinned the importance of OA to academic publications in various resolutions.

On the part of the research funding organisations, the DFG “Open Access Publishing” programme supported the establishment of OA publication funds at German universities between 2010 and 2020. As part of the funding, institutions have established the necessary workflows for cost absorption as well as structures to record and track their publication figures. |¹⁶⁴

| ¹⁶² Cf. <https://www.budapestopenaccessinitiative.org> [accessed 28 September 2021].

| ¹⁶³ The Bethesda Statement on Open Access Publishing is available at <http://legacy.earlham.edu/~peters/fos/bethesda.htm>, [accessed 28 September 2021].

| ¹⁶⁴ An empirical evaluation of the funding programme, based on a bibliometric analysis by Forschungszentrum Jülich and on surveys, was published in April 2020: Ploder et al. 2020.

Currently, the DFG funds OA publications, including monographs, under the “Open Access Publication Funding” programme by generally subsidising the costs of proven, quality-assured OA publications by any institution upon request. In its second funding phase, 2024–2027, funding is to be limited to publications resulting from DFG-funded projects. |¹⁶⁵ In addition, the DFG supports the transformation on a structural level through its “Infrastructures for Scholarly Publishing” programme, which is intended, among other things, to achieve the standardisation of contracts and financial flows and to contribute to the development and establishment of supraregional publication platforms. |¹⁶⁶

In 2014, **Project DEAL** was founded to conclude nationwide contracts on behalf of the Alliance of Science Organisations in Germany |¹⁶⁷ benefitting all scientific institutions. |¹⁶⁸ Its objective was to conclude licensing agreements for the entire portfolio of digital journals from the major scientific publishers, thus changing the dynamics in the business relationships with the major publishers in favour of science and establishing a transparent pricing model. In 2016, contract negotiations were initiated with the three largest publishers: Wiley, Springer Nature and Elsevier. A contract for a three-year licence was concluded with the publisher Wiley in January 2019, and was renewed in 2021 for the subsequent year under the same conditions. The participating academic and scientific institutions pay a so-called PAR fee (publish-and-read fee); in return, the authors employed by them can publish in hybrid journals or at discounted APCs in pure OA journals. They can also access articles from these journals which are not freely available. |¹⁶⁹ A transformation agreement was also signed with Springer Nature in the following year; it is considered to be the most comprehensive agreement

|¹⁶⁵ For the funding offer, see https://www.dfg.de/en/research_funding/programmes/infrastructure/lis/funding_opportunities/open_access_publication_funding/index.html [accessed 28 September 2021].

|¹⁶⁶ A third focus is on projects for the further development of digital publishing. For more information on the “Infrastructures for Scholarly Publishing” funding programme, see https://www.dfg.de/en/research_funding/programmes/infrastructure/lis/funding_opportunities/infrastructures_publishing/ [accessed 28 September 2021].

|¹⁶⁷ The Alliance of Science Organisations in Germany is an association of German science and research organisations. Its members are the Alexander von Humboldt Foundation (AvH), the German National Academy of Sciences Leopoldina, the German Academic Exchange Service (DAAD), the German Research Foundation (DFG), the Fraunhofer-Gesellschaft (FhG), the Helmholtz Association (HGF), the German Rectors’ Conference (HRK), the Leibniz Association (LG), the Max Planck Society (MPG) and the German Science and Humanities Council (WR) (<https://www.hrk.de/hrk/allianz-der-wissenschaftsorganisationen> [accessed 28 September 2021]).

|¹⁶⁸ The name DEAL originally stands for “**D**eutsche **A**llianz **L**izenzen” [German Alliance Licences]. As early as 2004, the DFG was funding the acquisition of national licences for electronic media as part of the “Supra-regional Literature Supply and National Licences” programme. Since 2009, an OA component has also been part of the profile of the national licences. After the establishment of the “Digital Information” priority initiative of the Alliance of Science Organisations in Germany, the DFG-funded national licences were further developed as “Alliance Licences”. Their licensing and financing model is based on a consortial structure and provides for a financial contribution by the libraries themselves (cf. <https://www.nationallizenzen.de/ueber-nationallizenzen> [accessed 28 September 2021]).

|¹⁶⁹ Cf. press release of from German Rectors’s Conference of 15 January 2019 at <https://www.hrk.de/presse/pressemitteilungen/pressemitteilung/meldung/wiley-und-projekt-deal-unterzeichnen-einigung-4493> and <https://www.projekt-deal.de/aktuelles-blog-start/weitere-informationen>, [accessed 28 September 2021].

of its kind worldwide to date. |¹⁷⁰ An analogous agreement with Elsevier has not yet been concluded. |¹⁷¹ MPDL Services GmbH (or DEAL Operations since 2021), founded in 2018, acts as a contractual partner vis-à-vis publishers. |¹⁷²

The DEAL agreements represent a turning point for the German publication system: instead of the previous system of individual agreements and institutional and regional consortia, nationwide negotiations were held with the largest academic publishers and eventually, nationwide publish-and-read agreements were concluded with publishers. As transformative agreements, they are intended to drive the transition to as pure an OA publishing system as possible. Based on the previous costs of literature supply in the subscription model, the DEAL agreements have switched the financial flows to a publication-based billing model. |¹⁷³ The subscription fees paid by institutions have been converted into publish-and-read (PAR) fees, which cover the charges for publishing and access to closed literature in a fixed amount per published article. The institutions pay contributions in advance based on their previous expenses and, as part of a so-called true-up, receive a list of their publications in the publishers' subscription journals, as well as a comparison of the costs and advance payments made. Additional payments or repayments result from a higher or lower number of publications. In Germany as a whole, the fixed PAR fees in the DEAL contracts result in a cost cap, provided that the number of published articles does not grow disproportionately to the usual annual increase in subscription fees. At less aggregated levels (federal state or institution level), however, this is not always the case. For example, research-intensive and thus publication-intensive institutions sometimes experience a cost increase which is not covered by the existing library budget. However, the DFG is offering compensation in the years 2021 to 2023 through the possibility of applying for funding for all openly published works in the "Open Access Publication Funding" programme. Authors may choose to opt out of publishing in OA, but this option does not bring with it any savings. |¹⁷⁴

Besides, and sometimes even before DEAL, the following stakeholders and initiatives prove(d) to be important at the national and international level:

|¹⁷⁰ Cf. press release of the German Rectors' Conference from 9 January 2020 at <https://www.hrk.de/press/press-releases/press-releases/announcement/springer-nature-and-project-deal-sign-world's-most-extensive-open-access-transformationsv> [accessed 28 September 2021].

|¹⁷¹ In October 2016, both sides broke off negotiations. To improve the negotiating position of the scientific side, a large number of scientific institutions did not renew their contracts with Elsevier; scientists terminated their editorships of Elsevier journals. Access was initially kept open by Elsevier, and finally closed in July 2018 for institutions without a current contract (cf. overview on the DEAL website: <https://www.projekt-deal.de/aktuelles-zu-elsevier> [accessed 28 September 2021]).

|¹⁷² It now also runs an information service for libraries, authors and university administrators via the website <https://deal-operations.de>, [accessed 28 September 2021].

|¹⁷³ An estimate of these previous costs, which has received much attention, had been made by the MPDL in 2015 (cf. Schimmer/Geschuhn/Vogler 2015).

|¹⁷⁴ Cf. Botz 2021, pp. 33–34. While the share of those who opted out was still 9.8 % in 2019, it declined to 7.4 % in 2020 (ibid. p. 34).

- _ The University of Konstanz’s **competence and networking platform open-access.network** works with the project partners – the Berlin Open Access Office, the Helmholtz Open Science Office, the TIB – Leibniz Information Centre for Technology and Natural Sciences and the libraries of the Universities of Bielefeld and Göttingen – to network existing initiatives on a supra-regional level and provides information on the central terms and forms of OA as well as legal, organisational and technical framework conditions. In doing so, the structure of the platform enables theme-based, discipline-specific or target-group-oriented access to the topic.
- _ The **OA 2020 network** is a global initiative founded by the Max Planck Society in 2015. Its goal is to accelerate the OA transformation by transferring scientific journals to OA via a redistribution of subscription spending. The Alliance of Science Organisations in Germany has supported the establishment of the **National Open Access Contact Point OA2020.DE**, which serves as a central contact point for scientific institutions and is dedicated to publication and cost data analyses as well as the development of financial and business models.
- _ Within the framework of the “Digital Information” priority initiative of the Alliance of Science Organisations in Germany |¹⁷⁵ founded in 2008, the academic publication system and the OA transformation are supported as a field of action. Based on the work of the priority initiative, various statements and policy papers have been published. |¹⁷⁶
- _ The Competence Centre for Bibliometrics, which is jointly supported by seven German institutions with bibliometric expertise and funded by the Federal Ministry of Education and Research (BMBF), provides adjusted data on German publication volumes for various analytical purposes. Its data infrastructure was used, among other things, for preliminary calculations of the DEAL project and also forms the basis of the Open Access Monitor Germany (OAM) (cf. A.VI).
- _ In 2010, the *Bundestag* set up an Enquete Commission on the Internet and Digital Society, which was tasked with taking stock and making recommendations for action to improve the framework conditions of the information society in Germany, including in the areas of education and research. With reference to the recommendations of the Budapest Open Access Initiative, the report of the Enquete Commission names five parameters on which the federal government should focus. It advised that the OA principle be promoted in German research funding policy and in the German higher education landscape through the joint development of a sustainable OA strategy. Following corresponding regulations abroad and at the European level, it recommended that the allocation

| ¹⁷⁵ Cf. <https://www.allianzinitiative.de/> [accessed 28 September 2021].

| ¹⁷⁶ For example, the OA gold ad hoc working group published recommendations on OA transformation (Bruch et al. 2016) as well as a position paper for the creation of an OA publication market (Bruch et al. 2015).

of public funds for research projects be linked to the legally binding condition that the resulting quality-assured publications be made freely accessible directly upon initial publication. |¹⁷⁷

– Accordingly, in the course of its Open Access Strategy 2016, the BMBF introduced an OA clause for all BMBF-funded projects. It stipulates that contributions from funded projects should be published in scientific journals in such a way that free electronic access is possible. If no OA publication is made in an individual case, the article should be made accessible in electronic form free of charge – if necessary, after a maximum of twelve months. Researchers remain free to choose whether and in which journal they wish to publish. The BMBF also supports idea competitions and an OA competence and networking centre. Since February 2021, the BMBF has been funding 20 projects as part of a guideline for the funding of projects to accelerate the OA transformation. The goal is to further advance the OA transformation. |¹⁷⁸

– cOAlition S was founded in 2018 with the support of the European Commission and the European Research Council and comprises 18 national funding organisations (as of April 2021). The association carries the **Plan S** initiative, which aims to accelerate the transformation towards full OA. Plan S states that from 2021 onwards, scientific and scholarly publications in which research results are published and which have been funded by national, regional or international research funders should be published in OA journals or on OA platforms or made accessible via repositories without an embargo period. The Plan S Principles set out 10 principles to which members commit, and first and foremost is the condition that authors retain the rights to their publications and that all publications must be published under an open licence. The requirements for a publication body to be Plan S-compliant also include technical conditions such as the use of persistent identifiers and extensive metadata as well as machine readability of the OA status and licences.

– In 2013, the umbrella organisation of European research funding and research support organisations, **Science Europe**, established and adopted a set of common principles to enable the transition from the subscription model to OA. Science Europe has also been instrumental in the development and promotion of Plan S and is involved in publications on OA.

– **The European Union** supports the issue of OA in multiple ways. The European Research Council (ERC) sees OA as the most effective way to ensure that the

|¹⁷⁷ Cf. Report of the Enquete Commission “Internet and Digital Society” of 19 March 2013, p. 111 (<https://dserver.bundestag.de/btd/17/125/1712542.pdf>) and Sixth Interim Report of the Enquete Commission “Internet and Digital Society” – Education and Research of 08 January 2013, p. 94 ff. (<https://dserver.bundestag.de/btd/17/120/1712029.pdf> [both accessed 29 September 2021]).

|¹⁷⁸ An overview of all projects is available on the BMBF website: <https://www.bildung-forschung.digital/de/projektstart-20-ideen-fuer-die-transformation-zu-open-access-3660.html> [accessed 29 September 2021].

results of the research it funds are accessible, and can be read and used as a basis for further research. |¹⁷⁹

_ The European Council commits itself to open science in its conclusions of 27 May 2016. |¹⁸⁰

_ After a pilot test within the 7th EU Research Framework Programme, an OA policy as a partial aspect of open science became part of the general objectives of the European Union's research funding from the 8th Framework Programme, Horizon Europe, onwards. Since 2014, OA has become mandatory for publications from funded projects; with Horizon Europe, embargo periods are no longer accepted (immediate OA). For the humanities and social sciences, the extension of the OA mandate to books is important.

_ Through the Horizon Europe programme, the European Commission has also made available the OA publication platform **Open Research Europe**, through which publications of research results from Horizon 2020 funding are published for all subject areas. Use is not obligatory, but ensures compliance with the OA requirements of the EU Research Framework Programme.

_ UNESCO published an Open Access Policy at the World Science Conference in 1999 and has been committed to OA and open science ever since. Most recently, the UNESCO Recommendation on Open Science was developed in a worldwide consultation process and adopted by all member states in 2021. The term "open scientific knowledge" is subsumed in the document as free access to academic publications, research data, metadata, Open Educational Resources (OER), software, source code and hardware. The prerequisite is that they be under an open licence which, in addition to access, also guarantees "re-use, repurpose, adaptation and distribution under specific conditions" and be made available to all users immediately or as quickly as possible and free of charge. |¹⁸¹

In Europe, the **Netherlands** plays a pioneering role in OA. As early as in 2013, the goal of achieving 100 % OA within 10 years was announced. The funding guidelines of the Dutch funding agency NWO (*Nederlandse Organisatie voor Wetenschappelijk Onderzoek*) have included OA as a condition since 2015, and in 2017, a national plan for open science was presented by the science organisations |¹⁸²

|¹⁷⁹ Cf. <https://erc.europa.eu/funding-and-grants/managing-project/open-access> [accessed 29 September 2021].

|¹⁸⁰ Cf. <https://data.consilium.europa.eu/doc/document/ST-9526-2016-INIT/de/pdf> [accessed 29 September 2021].

|¹⁸¹ Cf. UNESCO Recommendation on Open Science, p. 9, <https://en.unesco.org/science-sustainable-future/open-science/recommendation> [accessed 30 November 2021].

|¹⁸² The document is available (also in English): <https://doi.org/10.4233/uuid:9e9fa82e-06c1-4d0d-9e20-5620259a6c65> [accessed 21 December 2021].

and contracts were concluded with major science publishers. |¹⁸³ The country overview of the ESAC initiative |¹⁸⁴ shows that by now only around 20 % of articles by authors affiliated with a Dutch institution were published in non-OA in hybrid or closed journals. The remaining articles appeared in journals for which transformative contracts were concluded (around 62 %) or which are available as “fully open access” (18 %). The Netherlands is followed in this regard by Finland and Sweden, |¹⁸⁵ where 22 % and 24 % of scientific journal articles, respectively, are still published in hybrid or restricted access journals (closed access). In Austria, this proportion is 29 %, |¹⁸⁶ in Switzerland, 39 %, and in the United Kingdom, 46 %, while in Germany it is still about 50 %. In France, with 83 % non-OA articles, still comparatively few journal articles are published in OA (cf. also Figure 5). |¹⁸⁷

In China (76 %) and the US (84 %), the proportion of articles which appeared in non-OA in hybrid or restricted access journals is also significantly higher. In those countries, however, OA has advanced over the last decade, too. In 2018, China, at 21 %, had the largest share of peer-reviewed journal articles and conference proceedings in science and engineering globally followed by the US at 17 %. |¹⁸⁸ The National Science Library of the Chinese Academy of Sciences (CAS) and the Natural Science Foundation of China (NSFC), which funds basic research, are among the signatories of the Berlin Declaration and issued an OA policy for publicly funded research in 2014. The NSFC requires that all publications

|¹⁸³ On the history of Dutch OA policy, cf. Bosman et al. 2021b, p. 2 ff.

|¹⁸⁴ The ESAC initiative (Efficiency and Standards for Article Charges) aggregates data to better assess the development of the OA transformation and maintains a Transformative Agreement Registry (cf. <https://esac-initiative.org/market-watch/> [accessed 29 September 2021]). The country overview is based on the publishers’ publication shares of the respective country output based on the OA2020 dataset (<https://github.com/subugoe/oa2020cadata/> [accessed 29 September 2021]) and they refer to the year 2018. To show the coverage of the transformative agreements, the figures reported in the Transformative Agreement Registry on the contractually covered publications of the current year (2021) per publisher and country are compared with the data of the OA2020 dataset.

|¹⁸⁵ In Sweden, the National Library of Sweden (NLS) was mandated by the government in 2017 to act as the national coordinating body for the OA transformation of scholarly publications. Licensing agreements are negotiated through the Bibsam consortium, which is run by the National Library. Bibsam aims to enable institutions to transition to a pay-to-publish model by combining subscription fees and APCs for OA in the same contracts. Cf. National Library of Sweden website <https://www.kb.se/samverkan-och-utveckling/oppentillgang-och-bibsamkonsortiet/open-access-and-bibsam-consortium.html> [accessed 29 September 2021]. On the challenges with these transformative contracts between academic publishers and the Bibsam consortium: Lundén 2020, <https://doi.org/10.5281/zenodo.4031350> [accessed 29 September 2021].

|¹⁸⁶ The Austrian Science Fund (FWF) obliges and supports all project leaders and project staff in making their peer-reviewed research results freely available in OA; it developed an OA policy in 2004 and has stipulated OA for academic publications since 2008. In 2019, 89 % of around 7 000 peer-reviewed publications were available in OA (cf. FWF Op Access Compliance Monitoring 2019 at https://www.fwf.ac.at/fileadmin/files/Dokumente/Ueber_den_FWF/Publikationen/FWF-Selbstevaluation/FWF_OA-Monitoring_Report_2019.xlsx [accessed 29 September 2021]).

|¹⁸⁷ Cf. ESAC initiative.

|¹⁸⁸ Cf. NSF – National Science Foundation, Science and Engineering Indicators, <https://nces.nsf.gov/pubs/nsb20206/publication-output-by-region-country-or-economy> [accessed 29 September 2021].

resulting from research projects it funds be deposited as post-peer-review drafts in its Basic Research Repository (BRR). The CAS policy states that all publications arising from publicly funded research should be deposited in their institutional repositories as author accepted manuscripts. Both policies accept 12-month embargoes. |¹⁸⁹ In 2017, CAS joined the global OA2020 initiative. In 2018, it became mandatory for the research results of the projects they fund to be made publicly available within 12 months of publication. According to a case study, |¹⁹⁰ the discourse on OA is less about cost and access and more about transparency and quality. The Chinese academic publishing market is described as fragmented; publishers are not dependent on subscription income or revenue, but on their eligibility for government funding.

In the US, publications resulting from publicly funded research have had to be made available in OA since 2013 after a one-year embargo period. As a result, the individual government departments and research funding agencies have drawn up their own implementation plans for accessing and finding peer-reviewed publications as well as digital scientific data and the corresponding data management (e.g. via repositories), which must be taken into account when a funding is applied for. |¹⁹¹

Scientists in the US have greater budget autonomy, which also affects OA publishing. In the case of transformative contracts, it is the researchers themselves, rather than the institutions, who must be convinced to contribute from their research budgets. Among American academic institutions, the **University of California** is a pioneer in using its own purchasing power or subscription power to reach publishing agreements via transformative agreements. A crucial element of the transformation is the engagement of faculty members. By involving and informing them early on and comprehensively, faculty leaders can promote the transformation among their colleagues and, if necessary, engage in mediation. As research-intensive institutions face declining budgets, there is considerable resistance from the large, research-intensive consortia in the US. An example of a university whose publication costs are roughly in line with subscription budgets is **Iowa State University**, which ranges in a middle position on a research intensity scale. Iowa State University has begun aggressively entering into a number of contracts with publishers individually, i.e. not as part of a consortium. |¹⁹²

In **Latin America**, two-thirds of funding for OA initiatives and for research and development (R&D) comes directly or indirectly from public funds and international cooperation. National OA regulations in many countries require the deposit of publicly funded research results in OA repositories; corresponding laws

| ¹⁸⁹ Cf. <https://www.openaire.eu/chinese-academy-of-sciences-national-natural-science-foundation-issue-open-access-policies-2> [accessed 29 September 2021].

| ¹⁹⁰ Montgomery/Ren 2018.

| ¹⁹¹ Cf. <https://www.science.gov/publicAccess.html> [accessed 29 September 2021].

| ¹⁹² Cf. <https://open.lib.iastate.edu/about/strategies> [accessed 29 September 2021].

were passed in Argentina and Peru in 2013 and in Mexico in 2014, although Mexican law, unlike Argentinean and Peruvian law, does not include a general OA obligation. In Colombia and Ecuador, such an obligation can be derived from transparency laws and the right to free access to public information. In Brazil, various OA laws and regulations have been in place for 10 years already; with a manifesto for free access to research data, a further step towards establishing open science practices was taken in 2016. |¹⁹³ With the creation of SciELO (Scientific Electronic Library Online), a cross-national publication platform for OA journals, Brazil took on a pioneering role and while also creating a globally respected example of a state-funded academic publication infrastructure. |¹⁹⁴

1.2 Legal framework and practice

The Act on Copyright and Related Rights (UrhG) in Germany regulates the relationship of the author to their work. In this context, the concept of a work is of crucial importance for obtaining copyright protection. Section 2 paragraph 2 of the Act limits the term work to “personal intellectual creations”, thus stipulating that it must be a human creation with an individual character. In Section 4, the Act distinguishes between the moral right and the right of exploitation. The former refers to the author’s right “to determine if and work is to be published” (Section 12) and “to have their authorship of the work acknowledged” (Section 13) [own translation of the legal text]. This part of the copyright law is designed in such a way that it cannot be alienated. The exploitation right, on the other hand, concerns the right to exploit the work commercially. If the exclusive or sole right of use is granted, the rights holder may prohibit other persons from using the work, as could otherwise only be determined by the author. If simple rights of use are granted, the author retains the right to permit third parties to use the work. |¹⁹⁵

In 2014, an amendment to the Copyright Act came into force which, in accordance with the above-mentioned recommendations of the Enquete Commission of the German Bundestag of 2013, created, among other things, an indispensable **right of secondary publication** for the author of scientific contributions. It is laid down in Section 38 (4) UrhG:

“The author of a scientific contribution which has been created in the context of a research activity publicly funded by at least 50 % and which has appeared in a collection published periodically, but at least twice a year, shall have the right to make the contribution publicly available in the accepted manuscript

|¹⁹³ Cf. Müller 2020, p. 374 ff., and UNESCO Global Open Access Portal, <http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/access-by-region/latin-america-and-the-caribbean> [accessed 29 September 2021].

|¹⁹⁴ Cf. <https://www.scielo.br/> [accessed 29 September 2021].

|¹⁹⁵ Mönch/Nödler 2006, pp. 22–23 and 36–37, and <https://open-access.network/informieren/rechtsfragen/rechtsfragen-in-deutschland> [accessed 29 September 2021].

version after 12 months from the date of its first publication, provided that this does not serve any commercial purpose. This applies even if the author has granted the publisher or editor an exclusive right of use. The source of the first publication must be stated. Any deviating agreement to the detriment of the author is ineffective” [own translation of the legal text].

Works from publicly funded research which appear in periodicals can therefore be openly republished in manuscript form even if this is not provided for in the publication contract for the first publication or if it is contractually prohibited. The academic right of secondary publication cannot be contractually excluded. This corresponds to the green route to OA (with an embargo period, in manuscript form, not at the original publication venue).

The Bundesrat called for a more far-reaching regulation and stated during the legislative procedure that, if interpreted that it complies with the constitution, the regulation should also be applied to employed academic staff. |¹⁹⁶

Since the beginning of the last decade, the Alliance of Science Organisations in Germany as well as the *Bundesrat* have been calling for a so-called “general education and science barrier” with far-reaching copyright exceptions for the research and education sector. The Act on the Adaptation of Copyright Law to the Current Requirements of the Knowledge Society (UrhWissG), which came into force in 2018 and whose validity was initially limited until 2023, was de-funded in the course of the implementation of the Directive on Copyright in the Digital Single Market (EU) 2019/790 (DSM-RL) to establish legal certainty for research and educational institutions. The UrhWissG regulates the use of works protected by copyright for education and research. The DSM Directive harmonises some of the statutory permissions to account for new technologies and changed conditions due to digitalisation, e.g. with regard to text and data mining or in the context of research and education and at the European level, to establish regulations that are open to technology and uniform across Europe. The law permits certain forms of use, such as providing electronic excerpts of key texts for teaching purposes or the distribution of articles and essays by libraries for a flat fee without the permission of the author or other rights holders. |¹⁹⁷

Compared to German and continental European copyright law, **copyright** in the Anglo-American world prioritises economic aspects, in that the work is regarded as an economic good and reproduction rights take priority. It is evident that this

|¹⁹⁶ Cf. [https://www.bundesrat.de/SharedDocs/drucksachen/2013/0601-0700/643-13\(B\).pdf?__blob=publicationFile&v=3](https://www.bundesrat.de/SharedDocs/drucksachen/2013/0601-0700/643-13(B).pdf?__blob=publicationFile&v=3) [accessed 29 September 2021].

|¹⁹⁷ https://www.bmjv.de/SharedDocs/Gesetzgebungsverfahren/DE/Gesetz_Anpassung-Urheberrecht-dig-Binnenmarkt.html [accessed 29 September 2021]; BMBF communication on the UrhWissG 2018 (<https://www.bmbf.de/bmbf/shareddocs/kurzmeldungen/de/neues-urheberrechtsgesetz-fuer-die-wissenschaft.html> [accessed 29 September 2021]).

approach has influenced the German Copyright Act, for example, in exploitation rights granted to employers in certain cases; in general, however, an increasing convergence of US copyright law with the continental European system has been observed since the mid-1990s. |¹⁹⁸

German copyright law – like other legal fields – is shaped by EU directives and in many parts has now been harmonised at the European level. The most recent DSM Directive, already mentioned above, is intended to adjust copyright law to digital opportunities and challenges in particular and to make the legislation viable for the future to prevent technological developments from being impeded. Germany has already implemented this directive in an elaborate and controversial legislative process. With the implementation of the Directive, the legal permissions (exceptions) in the area of research were also adjusted. In addition, a research clause was integrated into the new Copyright Service Providers Act (UrhDaG), which serves to implement Art. 17 DSM-RL, giving researchers a right of access to certain data in the platform environment. |¹⁹⁹

More recently, the European Commission has also put issues of rights preservation and open licensing with regard to academic publications on its agenda. For example, in its communication from 30 September 2020, A New ERA for Research and Innovation, the goal was formulated under Action 9 to carry out an analysis of “authors’ rights to enable sharing of publicly funded peer-reviewed articles without restriction” in addition to setting up the Open Research Europe publication platform. |²⁰⁰

The cOAlition S initiative also relies on options based on regulations such as the second publication right. The rights retention strategy is intended to enable researchers who are funded by a cOAlition S organisation to submit their manuscripts to any journal (including subscription journals) and still remain Plan S-compliant. The funding conditions of the organisations should be changed so that a Creative Commons Attribution Licence (CC BY, cf. A.VIII) must be used for the final version in the same way as for the author’s manuscript if the research is new. To make the publication openly accessible, authors must inform the publisher that a CC BY licence has been applied for for the author manuscript on which the publication is based. cOAlition S implements the rights management

|¹⁹⁸ Cf. Wandtke 2019, p. 34 f.; cf. also Directive on copyright and related rights in the Digital Single Market (<https://eur-lex.europa.eu/eli/dir/2019/790/oj> [accessed 29 September 2021]).

|¹⁹⁹ Cf. Bundesgesetzblatt Jahrgang 2021 Part I No. 27 (https://www.bmjv.de/SharedDocs/Gesetzgebungsverfahren/Dokumente/Bgbl_UrhDaG.pdf [accessed 29 September 2021]); Wandtke 2019, p. 202 f.

|²⁰⁰ European Commission 2020: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A new ERA for Research and Innovation, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:628:FIN> [accessed 29 September 2021]. Another remedy used by the European Commission to support copyright and OA is the 2018 Commission Recommendation on access to, and preservation of, scientific information, <https://eur-lex.europa.eu/eli/dir/2019/790/oj> [accessed 29 September 2021].

strategy by updating the funding terms and conditions and by providing templates for authors to include in submission letters, etc. |²⁰¹

In Dutch copyright law, Article 25a (Taverne Amendment) allows short scientific works, such as articles or book chapters, to be shared independently of any restrictive guidelines in publication contracts. Based on the Taverne Amendment, publishing versions of short scientific works can be made available through university repositories after only six months. The prerequisite is that the author explicitly requests this and that the publication was financed in whole or in part from Dutch public funds. Since 1 January 2020, the Association of Universities in the Netherlands (VSNU) has largely implemented the use of the Taverne Amendment within the universities in the network. |²⁰² A change in the law is also being discussed with the Ministry of Justice and the Ministry of Education so that an embargo period can be excluded in the future and publications with open licences shared. In the event of legal action on the part of publishers, which has not yet occurred, there is an agreement to share the costs among the universities.

In the North American context, the Scholarly Publishing and Academic Resources Coalition (SPARC) provides material to help authors make informed decisions about which publishers to submit their work to, and to educate them about how to exercise their author rights. A legally tested standard clause (author addendum) to supplement user agreements with publishers is intended to help them secure their rights even in the case of closed publications. |²⁰³

With regard to monographs, the AuROA – *Autor:innen und Rechtssicherheit für Open Access* project [Author and Legal Certainty for OA], a collaborative project led by the Duisburg-Essen University Library and funded under the BMBF *Zur Beschleunigung der Transformation zu Open Access* funding line [On accelerating the OA transformation], is dedicated to the task of standardising and simplifying publication processes for OA books. One aim is to develop modular model contracts to create legal certainty. |²⁰⁴

|²⁰¹ Cf. <https://www.coalition-s.org/rights-retention-strategy/> [accessed 29 September 2021]. One criticism from publishers is that by offering an immediate free replacement for the original article, publishers are deprived of financial viability and it undermines support for OA journals. Cf. <https://www.stm-assoc.org/rightsretentionstrategy/> [accessed 29 September 2021].

|²⁰² With the “You share, we take care!” pilot project, Dutch universities support scientists in making use of their Taverne right. Cf. <https://www.openaccess.nl/en/in-the-netherlands/you-share-we-take-care> [accessed 29 September 2021]. On the Dutch experience with the Taverne Amendment, cf. Sondervan et al. (2021).

|²⁰³ Cf. <https://sparcopen.org/our-work/author-rights/> [accessed 29 September 2021].

|²⁰⁴ Cf. press release of the University of Duisburg-Essen (UDE) <https://www.uni-due.de/2021-03-11-open-access-verbundprojekt> [accessed 29 September 2021].

A variety of **OA contract models** exist under different names; in recent years in particular, such models have developed in a highly dynamic way. However, this development also poses challenges for both libraries and publishers. These challenges demonstrate a need for standardisation. |²⁰⁵ The various models can be systematised or different types defined, some of which overlap. |²⁰⁶ Contracts that offset funds spent on APCs against subscription fees are often referred to as offsetting models. They are intended as transitional models to pave the way to a full OA funding model based on the pay-to-publish principle. The read-and-publish model, in which the number of publications is fixed in advance, and the publish-and-read model, which goes one step further in terms of OA and places publishing at its centre, represent gradations. In addition to DEAL, such models are also used in other agreements between consortia and publishers |²⁰⁷ and are sometimes supplemented by other elements. For example, the contract between the Dutch science organisations and Elsevier, a capped read-and-publish agreement, is referred to as an open science Partnership because it includes an agreement to jointly develop open science services to support Dutch research. |²⁰⁸

Other approaches by publishers and consortia build on the subscription model; in a way, these forms of contract represent **publication service-provider-based financing**. They include, for example, the redistribution of costs based on tiered models, |²⁰⁹ flat rate models in which subscription spending is redirected, models that tie in with the subscribe-to-open (S2O) approach, |²¹⁰ and models of sub-

|²⁰⁵ See also Bruch et al. 2016 and Estelle/Jago/Wise 2021, p. 11. The report defines smaller independent publishers as society publishers without a major publishing partner, university publishers, library publishers and small independent commercial publishers which form the long tail of scholarly publishing. With reference to the report, Plan S has published a statement calling for collaboration between research funding organisations, publishers, and scientific institutions with their libraries and library consortia to enable smaller publishers to transform to OA publishing models. (<https://www.coalition-s.org/enabling-smaller-independent-publishers-to-participate-in-open-access-transformative-arrangements-a-commitment-from-key-stakeholders/> [accessed 29 September 2021]).

|²⁰⁶ Cf. Estelle/Jago/Wise 2021, pp. 27–30, and Pampel 2021, p. 79 f.

|²⁰⁷ The earlier contracts with Springer Verlag (Springer Compact) can be cited as an example.

|²⁰⁸ The contract was negotiated by the Association of Dutch Universities (VSNU), the Federation of University Hospitals (NFU – *Nederlandse Federatie van Universitair Medische Centra*) and the Dutch Research Foundation NWO with Elsevier (cf. https://www.vsnu.nl/en_GB/news-items/nieuwsbericht/597-dutch-research-institutions-and-elsevier-initiate-world-s-first-national-open-science-partnership.html [accessed 30 September 2021]).

|²⁰⁹ The Association for Computing and Machinery (ACM) model is based on a publisher analysis of the user base of its journals. Redistribution is based on a tiered model, whereby some top subscribers pay a higher amount overall while the long tail of subscribers pay less over time. After a transition period, all articles will be published in OA and no APCs will be applied. Tiering is based on the average number of publications (cf. <https://libraries.acm.org/subscriptions-access/acmopen#model> [accessed 30 September 2021]).

|²¹⁰ The subscribe-to-open (S2O) approach to transforming subscription journals was developed by the publisher Annual Review and taken up by others. Libraries collectively continue their subscription even after the content is available in OA. When subscription revenues fall, access to new publications is closed again or limited to subscribing institutions. The National Open Access Contact Point OA2020-DE assesses the model as double-edged: while it is an advantage that existing workflows can be built upon and journals converted to

ject consortia formation based on the principle of SCOAP³, in which contracts are concluded for the transformation of subscription journals and which the Open Library of Humanities also follows. |²¹¹ Business models of this kind are also used for books, e.g. by basing contracts on membership models such as subscribe-to-open. |²¹² This diversity of approaches proves productive for a full OA transformation of academic publishing, as it enables various conditions and publication cultures to be met.

OA at no additional cost, remaining in the old system, however, prevents a transparent presentation of costs if there is no publication-based billing (https://oa2020-de.org/blog/2019/05/27/S2O_OAtransformation_Zeitschriften/ [accessed 30 September 2021]).

|²¹¹ With SCOAP³ (Sponsoring Consortium for Open Access Publishing in Particle Physics), the most important journals in the field of high-energy physics were transformed to OA, with CERN (*Conseil Européen pour la Recherche Nucléaire*) playing a mediating role and 3 000 scientific institutions and their libraries from 44 countries as well as intergovernmental organisations participating (cf. <https://scoap3.org/participating-countries/> [accessed 30 September 2021]; cf. also Pampel 2021, p. 80).

|²¹² In the case of the Opening the Future model from Central European University Press, members pay a small annual fee to access a selection of the CEU Press Backlist. The income from membership is used to produce new OA monographs (cf. <https://ceup.openingthefuture.net/> [accessed 30 September 2021]).

Article processing charges (APC)	Publication fees charged by publishers for articles published in OA. As a rule, they are paid after the article has been reviewed and accepted by the author's institution.
Author accepted manuscript (AAM)	The accepted version of an article that has been peer-reviewed but not yet typeset or edited (definition according to Crossref Publication stages, cf. https://www.crossref.org/education/crossmark/version-control-corrections-and-retractions/).
Creative Commons Licence/ CC BY Licence	Free copyright licence consisting of several elements that can be combined with each other. BY stands for "by attribution" and means that the name of the author must be mentioned when using the work. Further restrictions are possible by adding additional elements.
Diamond OA	Common term for OA publication organs which do not charge publication fees or Article Processing Charges (APC). Equivalent to combining the golden path with a media-related business model.
DOI	A digital object identifier (DOI) is an identifier consisting of letters and digits which allows a publication or other object to be permanently referenced/cited. See also Persistent identifiers
FAIR principles	The FAIR guiding principles for scientific data management and stewardship define that research data must be findable, accessible, interoperable and re-usable.
Golden path/ Gold OA	Immediate, open-ended accessibility of the version of record at the original publication venue under an open licence. Cf. A.VII.
Green path/ Green OA	Indefinitely freely accessible secondary publication in an institutional or subject-specific repository, sometimes after an embargo period, as an author accepted manuscript or in the version of record, under an open licence. Cf. A.VII.

Hybrid journal	A subscription journal in which individual articles can be published in OA for payment of a publication charge (APC) to the publisher. In relation to these articles, the criteria of the Golden path to OA are usually fulfilled. Subscription fees continue to apply for access to the other content.
Imprint	Secondary brands with which publishers divide their programme into segments and which are presented to the outside world as independent publishers.
Information budget	Literature and information supply as well as funds for publication costs.
Information infrastructures	“Information infrastructures comprise technically and organisationally networked services and facilities for working with data, information and inventories of knowledge significant to science.” (German Council for Scientific Information Infrastructures 2015, p. 2).
Interoperability	Interoperability is an element of the FAIR principles which states that systems are able to interact or data can be exchanged. To ensure this, metadata, for example, must be assigned on the basis of standardised vocabularies.
Open-access mandate	A policy used by a research institution, research funder or government that encourages or requires researchers or funded individuals and institutions to make their publications OA.
PAR fee or publish-and-read fee/contracts	Fee model underlying DEAL contracts. Subscription fees are thereby converted into publish-and-read fees (PAR fees). These include the fees for publishing in hybrid journals and access to closed literature in a fixed amount per published article.
Persistent identifiers	“Persistent identification is the process of assigning a permanent, digital identifier consisting of numbers and/or alphanumerical characters to a data set (or any other digital object).” ²¹³ PIDs enable publications and other objects to be uniquely referenced and assigned to persons and institutions.

Pledging	Community funding projects in which the (temporary) OA activation of publications is financed from pledged contributions from scientific institutions or their libraries.
Repository	Repositories are servers operated at universities or scientific institutions for storing and archiving scientific objects that are made accessible worldwide free of charge.
Transformative contract	Transformative contracts or transformative agreements are concluded for the transition from the subscription and acquisition model to a pure OA model, in order to gradually convert previously closed publication bodies to OA. The funds used for subscription fees are earmarked for publication fees (see also PAR fee).
Version of record	The citable, peer-reviewed and typeset version of an article.

AAM	Author accepted manuscript
ACM	Association for Computing and Machinery
ALPSP	Association of Learned and Professional Society Publishers
APC	Article Processing Charges
AvH	Alexander von Humboldt Foundation
BASE	Bielefeld Academic Search Engine
BMBF	Federal Ministry of Education and Research
BOAI	Budapest Open Access Initiative
BPC	Book processing charges
BRR	Basic Research Repository
BY	Attribution obligation (in CC BY)
CAP	Community Action Publishing
CAS	Chinese Academy of Sciences
CC	Creative Commons
CERN	<i>Conseil Européen pour la Recherche Nucléaire</i>
COAR	Confederation of Open Access Repositories
COPE	Committee on Publication Ethics
COPIM	Community-led Open Publication Infrastructures for Monographs
CRedit	Contributor Roles Taxonomy
DAAD	German Academic Exchange Service
DBS	<i>Deutsche Bibliotheksstatistik</i> [German Library Statistics]
dbv	German Library Association
DEAL	<i>Deutsche Allianz Lizenzen</i> [Nationwide Licensing in Germany]
DFG	German Research Foundation

DINI	<i>Deutsche Initiative für Netzwerkinformation</i> [German Initiative for Network Information]
DNB	German National Library
DOAJ	Directory of Open Access Journals
DOI	Digital object identifier
DORA	San Francisco Declaration on Research Assessment
DSM-RL	Directive on Copyright in the Digital Single Market (EU) 2019/790
ERA	European Research Area
ERC	European Research Council
ESAC	Efficiency and Standards for Article Charges
EU	European Union
FAIR	Findability, accessibility, interoperability and reuse
FhG	<i>Fraunhofer-Gesellschaft</i>
R&D	Research and development
FWF	Austrian Science Fund
GASCO	German, Austrian and Swiss Consortia Organisation
GeSIG	German Serials Interest Group
GRID	Global Research Identifier Database
GWK	Joint Science Conference
HGF	<i>Hermann von Helmholtz-Gemeinschaft Deutscher Forschungszentren e. V.</i> [Helmholtz Association]
HRK	German Rectors' Conference
IPA	International Publishers Association
ISBN	International Standard Book Number
ISSN	International Standard Serial Number
JIF	Journal Impact Factor
KDSF	<i>Kerndatensatz Forschung – Standard für Forschungsin- formationen in Deutschland</i> [Core Data Set Research – Standard for Research Information in Germany]

KFiD	<i>Kommission für Forschungsinformationen in Deutschland</i> [Commission for Research Information in Germany]
KMK	The Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany
LDC	Least developed countries
LG	Leibniz Association
LOM	<i>Leistungsorientierte Mittelvergabe</i> [Performance-oriented allocation of funds]
MPDL	Max Planck Digital Library
MPG	Max Planck Society
NC	Non-commercial
ND	No derivatives
NFDI	German National Research Data Infrastructure
NFU	<i>Nederlandse Federatie van Universitair Medische Centra</i>
NLS	National Library of Sweden
NSFC	Natural Science Foundation of China
NWO	<i>Nederlandse Organisatie voor Wetenschappelijk Onderzoek</i>
OA	Open access
OAM	Open Access Monitor Germany
OAPEN	Open Access Publishing in European Networks
OECD	Organisation for Economic Cooperation and Development
OER	Open Educational Resources
OJS	Open Journal System
OpenAIRE	Open Access Infrastructure for Research in Europe
ORCID	Open Researcher and Contributor ID
ORKG	Open Research Knowledge Graph
OSI	Open Source Initiative
PAR	Publish and read

PLOS	Public Library of Science
PPP	Purchasing power parity dollar
RADAR	Research Data Repository
RAiD	Research Activity ID
RaSH	Research Articles in Simplified HTML
ROR	Research Organization Registry
SA	Share Alike
SciELO	Scientific Electronic Library Online
SCOAP ³	Sponsoring Consortium for Open Access Publishing in Particle Physics
SPARC	Scholarly Publishing and Academic Resources Coalition
STM	International Association of Scientific, Technical and Medical Publishers
TDM	Text and data mining
TIB	TIB – Leibniz Information Centre for Science and Technology and University Library
TTDSG	Act regulating data protection and privacy in telecommunications and telemedia
UDE	University of Duisburg-Essen
UNESCO	United Nations Educational, Scientific and Cultural Organization
UrhDaG	German Copyright Service Provider Act
UrhG	German Act on Copyright and Related Rights
UrhWissG	German Act on the Adaptation of Copyright Law to the Current Requirements of the Knowledge Society
US	United States
USA	United States of America
UStG	German Value Added Tax Act
VSNU	<i>Vereniging van Universiteiten, formerly Vereniging van Samenwerkende Nederlandse Universiteiten</i>

102

WR

Wissenschaftsrat – German Science and
Humanities Council

ZB MED

ZB MED – Information Centre for Life Sciences
(formerly: German National Library of Medicine)

- Barbers, I. et al. (2021): *SynOA Synergien für Open Access – Open Access Monitoring Schlussbericht. Berichte des Forschungszentrums Jülich*, 4428, II, Jülich, <http://hdl.handle.net/2128/27226>, accessed 30 September 2021.
- Bargheer, M.; Pabst, J. (2016): ‘Being small is not a fault’: Making sense of the newer generation of German-language university presses, in: *Learned Publishing*, 29 (S1), p. 335–341, <https://doi.org/10.1002/leap.1053>.
- Barnes, C. (2017): The h-index Debate: An Introduction for Librarians, in: *The Journal of Academic Librarianship*, 43 (6), p. 487–494, <https://doi.org/10.1016/j.acalib.2017.08.013>.
- Basson, I.; Blanckenberg, J. P.; Prozesky, H. (2021): Do open access journal articles experience a citation advantage? Results and methodological reflections of an application of multiple measures to an analysis by WoS subject areas, in: *Scientometrics* 126 (1), p. 459–484, <https://doi.org/10.1007/s11192-020-03734-9>.
- Becerril, A. et al. (2021): OA Diamond Journals Study. Part 2: Recommendations, <https://doi.org/10.5281/zenodo.4562790>.
- Bilder, G.; Lin, J.; Neylon, C. (2020): The Principles of Open Scholarly Infrastructure, <https://doi.org/10.24343/C34W2H>.
- Borgman, C. L. (2020): Whose text, whose mining, and to whose benefit?, in: *Quantitative Science Studies* 1 (3), p. 993–1000, https://doi.org/10.1162/qss_a_00053.
- Bosman, J. et al. (2021a): Advancing open access in the Netherlands after 2020: from quantity to quality, in: *Insights*, 34 (1), p. 1–15, <https://doi.org/10.1629/uksg.545>.
- Bosman, J. et al. (2021b): The OA Diamond Journals Study, Exploring collaborative community-driven publishing models for Open Access. Part 1: Findings, <https://doi.org/10.5281/zenodo.4558704>.
- Botz, G. (2021): Ein Deal für die Wissenschaft, in: *Physik Journal* 20 (7), p. 32–34, <https://www.pro-physik.de/restricted-files/154834>, accessed 01 Oktober 2021.
- Bruch, C. et al. (2015): *Positionen zur Schaffung eines wissenschaftsadäquaten Open-Access-Publikationsmarktes. Positionspapier der Ad-hoc-AG Open-Access-Gold im Rahmen der Schwerpunktinitiative „Digitale Information“ der Allianz der deutschen Wissenschaftsorganisationen*, <https://doi.org/10.2312/allianzoha.008>.
- Bruch, C. et al. (2016): *Empfehlungen zur Open-Access-Transformation. Strategische und praktische Verankerung von Open Access in der Informationsversorgung wissenschaftlicher Einrichtungen*, edited by Ad-hoc-Arbeitsgruppe Open-Access-Gold der Schwerpunktinitia-

tive „Digitale Information“ der Allianz der deutschen Wissenschaftsorganisationen, <https://doi.org/10.3249/allianz0a.011>.

Bundesministerium für Bildung und Forschung (BMBF) (2019): *Urheberrecht in der Wissenschaft. Ein Überblick für Forschung, Lehre und Bibliotheken*, <https://www.bmbf.de/SharedDocs/Publikationen/de/bmbf/pdf/urheberrecht-in-der-wissenschaft.pdf>, accessed 30 September 2021.

COPE Council (2017): COPE Ethical guidelines for peer reviewers (English), <https://doi.org/10.24318/cope.2019.1.9>.

Deutsche Forschungsgemeinschaft (DFG) (2019): Guidelines for Safeguarding Good Research Practice. Code of Conduct, https://www.dfg.de/download/pdf/foerderung/rechtliche_rahmenbedingungen/gute_wissenschaftliche_praxis/kodex_gwp_en.pdf, accessed 30 September 2021.

Deutsche Forschungsgemeinschaft (DFG) (2021): Data tracking in research: aggregation and use or sale of usage data by academic publishers, https://www.dfg.de/download/pdf/foerderung/programme/lis/datentracking_papier_en.pdf, accessed 30 September 2021.

Draux, H.; Lucraft, M.; Walker, J. (2018): Assessing the open access effect for hybrid journals. Springer Nature Whitepaper, <https://doi.org/10.6084/m9.figshare.6396290>.

Drees, B. et al. (2020): Europe's Road towards Open Science and Open Access, <https://doi.org/10.5446/50070#t=00:00,06:01> (Video), Vortragsfolien unter https://tib.flowcenter.de/mfc/medialink/3/de7faa910b5502bd09eeddd895c39ec664cca238e6d4ec79da4a93da2af772cb6f/20201020_EMBL_OAweek_Herrmann_ProjektDEAL.pdf, accessed 01 Oktober 2021.

Eichler, J.; Lembrecht, C.; Werner, K. (2021): *Leistungen und Kostenrahmen für zeitgemäße Open-Access-Publikationen in den Geistes- und Sozialwissenschaften: Vorschlag für eine Differenzierung von Open-Access-Gebühren verlagstypischen Leistungen entsprechend*, Bielefeld, <https://doi.org/10.21241/ssoar.72649>.

Estelle, L.; Jago, D.; Wise, A. (2021): How to enable smaller independent publishers to participate in OA agreements, <https://doi.org/10.6084/m9.figshare.14731308.v1>.

Europäische Kommission (2021): Towards a reform of the research assessment system. Scoping report. Publications Office of the European Union, Luxembourg, <https://doi.org/10.2777/707440>.

Gehring, P. (2021): *Wissenschaftlertracking. Das Schicksal von Open Science steht auf dem Spiel*, in: *Forschung & Lehre* 28, H. 8/2021, p. 638–640.

German Council for Scientific Information Infrastructures (2015): Opening Declaration, Göttingen June 2015, <https://rfii.de/?p=1929>, accessed 28 September 2021.

Gläser, J. (2006): *Wissenschaftliche Produktionsgemeinschaften*, Frankfurt/M.

Godel, R. et al. (2020): *Förderung wissenschaftlicher Buchpublikationen im Open Access (Open-Access-Bücher). Standards und Richtlinien für die Gestaltung infrastruktureller Rahmenbedingungen und die Vergabe von Fördermitteln durch wissenschaftliche Einrichtungen. Handreichung der AG Wissenschaftliches Publikationssystem im Rahmen der Schwerpunktinitiative „Digitale Information“ der Allianz der deutschen Wissenschaftsorganisationen*, <https://doi.org/10.3249/allianz0a.014>.

Heidbach, K. et al. (2022): Long term global trends in open access. A data paper, doi.org/10.17617/2.3361428.

Hirsch, J. E. (2005): An index to quantify an individual's scientific research output, in: PNAS, 102 (46), p. 16569–16572, <https://doi.org/10.1073/pnas.0507655102>.

Jamali, H. R. (2017): Copyright compliance and infringement in ResearchGate full-text journal articles, in: *Scientometrics* 112, p. 241–254, <https://doi.org/10.1007/s11192-017-2291-4>.

Johnson, R.; Watkinson, A.; Mabe, M. (2018): The STM Report. An overview of scientific and scholarly publishing, fifth edition, https://www.stm-assoc.org/2018_10_04_STM_Report_2018.pdf, accessed 30 September 2021.

Jones, P.; Murphy, F. (2021): Openness Profile: Modelling research evaluation for open scholarship, <http://doi.org/10.5281/zenodo.4581490>.

Klimpel, P. (2012): *Freies Wissen Dank Creative-Commons-Lizenzen, Folgen, Risiken und Nebenwirkungen der Bedingung „nicht kommerziell – NC“*, https://irights.info/wp-content/uploads/userfiles/CC-NC_Leitfaden_web.pdf, accessed 29 September 2021.

Klimpel, P. (2020): *Kulturelles Erbe digital, Eine kleine Rechtsfibel*, Berlin, <https://doi.org/10.12752/2.0.004.0>.

Koalitionsvertrag 2021–2025 zwischen der Sozialdemokratischen Partei Deutschlands (SPD), BÜNDNIS 90/DIE GRÜNEN und den Freien Demokraten (FDP): Mehr Fortschritt wagen Bündnis für Freiheit, Gerechtigkeit und Nachhaltigkeit.

Laakso, M.; Matthias, L.; Jahn, N. (2021): Open is not forever. A study of vanished open access journals, in: *Journal of the Association for Information Science and Technology*, 72 (9), <https://doi.org/10.1002/asi.24460>.

Langham-Putrow, A.; Bakker, C.; Riegelman, A. (2021): Is the open access citation advantage real? A systematic review of the citation of open access and subscription-based articles, in: *PLoS ONE*, 16 (6): e0253129, <https://doi.org/10.1371/journal.pone.0253129>.

Larivière, V.; Haustein, S.; Mongeon, P. (2015): The Oligopoly of Academic Publishers in the Digital Era, in: *PloS ONE*, 10 (6): e0127502, <https://doi.org/10.1371/journal.pone.0127502>.

Lundén, A. (2020): *Transformative Agreements: Swedish Strategy*. 15 September 2020, <https://doi.org/10.5281/zenodo.4031350>.

- Mönch, M.; Nödler, J. M. (2006): *Hochschulen und Urheberrecht – Schutz wissenschaftlicher Werke*, in: Spindler, G. (ed.): *Rechtliche Rahmenbedingungen von Open Access-Publikationen*, Göttingen, p. 21–54.
- Montgomery, L.; Ren, X. (2018): *Understanding Open Knowledge in China: A Chinese Approach to Openness?*, in: *Cultural Science Journal*, 10 (1), p. 17–26, <https://sciendo.com/article/10.5334/csci.106>, accessed 11 January 2022.
- Moretti, F. (2016): *Distant Reading*, Konstanz.
- Morka, A.; Gatti, R. (2021): *Academic Libraries and Open Access Books in Europe. A Landscape Study*, <https://doi.org/10.5281/zenodo.4483773>.
- Morrison C. et al. (2020): *Open Access: An Analysis of Publisher Copyright and Licensing Policies in Europe, 2020*, <https://doi.org/10.5281/zenodo.4046624>.
- Müller, C. (2020): *Elektronisches Publizieren und Open Access: Die Perspektive Lateinamerikas*, in: *B.i.t. Online*, 23 (4), p. 374–380, <https://www.b-i-t-online.de/heft/2020-04-fachbeitrag-mueller.pdf>, accessed 01 Oktober 2021.
- Pampel, H. (2019): *Open Access an wissenschaftlichen Einrichtungen in Deutschland, Ergebnisse einer Erhebung im Jahr 2018, Bericht*, <https://doi.org/10.2312/os.helmholtz.005>.
- Pampel, H. (2021): *Strategische und operative Handlungsoptionen für wissenschaftliche Einrichtungen zur Gestaltung der Open-Access-Transformation*, Berlin, <https://doi.org/10.18452/22946>.
- Pampel, H.; Tullney, M. (2017): *3b Open-Access-Publikationsfonds*, in: Söllner, K.; Mittermaier, B. (eds.): *Praxishandbuch Open Access*, Berlin/Boston, p. 162–172, <https://doi.org/10.1515/9783110494068-019>.
- Ploder, M. et al. (2020): *DFG Funding Programme Open Access Publishing – Report about the Funding (1.0)*. *Deutsche Forschungsgemeinschaft*, <https://doi.org/10.5281/zenodo.4486411>.
- Sander, F. et al. (2019): *Projekt DEAL – John Wiley & Son Publish and Read Agreement*, <https://doi.org/10.17617/2.3027595>.
- Schimmer, R.; Geschuhn, K. (2017): *3c Open-Access-Transformation: Die Ablösung des Subskriptionswesens durch Open-Access-Geschäftsmodelle*, in: Söllner, K.; Mittermaier, B. (eds.): *Praxishandbuch Open Access*, Berlin/Boston, p. 174–180, <https://doi.org/10.1515/9783110494068-020>.
- Schimmer, R.; Dér, Á.; Campbell, C. (2021): *The DEAL Cost Modeling Tool – A practical contribution for evaluating the impact and costs of transformative open access publishing agreements*, <https://doi.org/10.17617/2.3331716>.
- Schimmer, R.; Geschuhn, K.; Vogler, A. (2015): *Disrupting the subscription journals' business model for the necessary large-scale transformation to open access*, <http://dx.doi.org/10.17617/1.3>.

Schrape, J.-F. (2016): *Open-Source-Projekte als Utopie, Methode und Innovationsstrategie: Historische Entwicklung – sozioökonomische Kontexte – Typologie*, Glückstadt, <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-460026>, accessed 30 September 2021.

Schwartmann R.; Benedikt, K. (2021): *Gehackte Forschung. Wissenschaftlertracking als Risiko für die Datensicherheit*, in: *Forschung & Lehre* 28, issue 8/2021, p. 642 f.

Science Europe (2021): *Practical Guide to the International Alignment of Research Data Management – Extended Edition*, Brüssel, <https://doi.org/10.5281/zenodo.4915861>.

Sondervan, J. et al. (2021): *Sharing published short academic works in institutional repositories after six months*, in: *LIBER* 31 (1), p. 1–17, <https://doi.org/10.53377/lq.10915>.

Stichweh, R. (1984): *Zur Entstehung des modernen Systems wissenschaftlicher Disziplinen*, Frankfurt/M.

Stille, W. et al. (2021): *Forschungsunterstützung an Bibliotheken. Positionspapier der Kommission für forschungsnaher Dienste des VDB*, in: *O-Bib. Das Offene Bibliotheksjournal* 8 (2), p. 1–19, <https://doi.org/10.5282/o-bib/5718>.

Suber, P. (2012): *Open Access*, Cambridge, Mass.

Taubert, N. (2019): *Fremde Galaxien und abstrakte Welten. Open Access in Astronomie und Mathematik. Soziologische Perspektiven*, Bielefeld, <https://pub.uni-bielefeld.de/download/2915035/2935334/oa9783839443576.pdf>, accessed 30 September 2021.

Taubert, N.; Weingart, P. (2016): *Wandel des wissenschaftlichen Publizierens – eine Heuristik zur Analyse rezenter Wandlungsprozesse*, in: Taubert, N.; Weingart, P. (ed.): *Wissenschaftliches Publizieren. Zwischen Digitalisierung, Leistungsmessung, Ökonomisierung und medialer Beobachtung*, Berlin/Boston, p. 3–38, https://pub.uni-bielefeld.de/download/2904656/2904679/2-NielsTaubert%2C%20Peter%20Weingart_freigegeben-nt.pdf, accessed 30 September 2021.

Taubert, N. et al. (2021): *Waiving article processing charges for least developed countries. A keystone of a large-scale open access transformation*, in: *Insights* 34 (1), <https://doi.org/10.1629/uksg.526>.

Tennant, J. (2018): *Democratising Knowledge: a report on the scholarly publisher*, Elsevier, Brüssel, https://issuu.com/educationinternational/docs/2018_eiresearch_elsevier_final_en, accessed 29 September 2021.

van Barneveld-Biesma, A. et al. (2020): *Read & Publish contracts in the context of a dynamic scholarly publishing system. A study on future scenarios for the scholarly publishing system*, <https://eua.eu/resources/publications/932:read-publish-agreements.html>, accessed 29 September 2021.

Wakeling, S. et al. (2019): Academic communities. The role of journals and open-access mega-journals in scholarly communication, in: *Journal of Documentation*, 75 (1), p. 120–139, <https://doi.org/10.1108/JD-05-2018-0067>.

Wandtke, A.-A. (2019): *Urheberrecht*, 7. Aufl., Berlin.

Weisweiler, N. L. (2021): *Im Spannungsfeld zwischen Zweckrationalität und Idealismus – Eine Analyse des Fachdiskurses zu Projekt DEAL mit Fokus auf den Begriff „Open Access“*, in: *Bibliothek Forschung und Praxis* 45 (1), p. 163–183, <https://doi.org/10.1515/bfp-2020-0116>.

Wilkinson, M. D. et al. (2016): The FAIR Guiding Principles for scientific data management and stewardship, in: *Scientific Data*, 3 (1), <https://doi.org/10.1038/sdata.2016.18>.

Wissenschaftsrat (2011): *Empfehlungen zur Bewertung und Steuerung von Forschungsleistung (Drs. 1656-11)*, Halle 2011, <https://www.wissenschaftsrat.de/download/archiv/1656-11.pdf>, accessed 11 January 2022.

Wissenschaftsrat (2013): *Perspektiven des deutschen Wissenschaftssystems (Drs. 3228-13)*, Braunschweig, <https://www.wissenschaftsrat.de/download/archiv/3228-13.pdf>, accessed 11 January 2022.

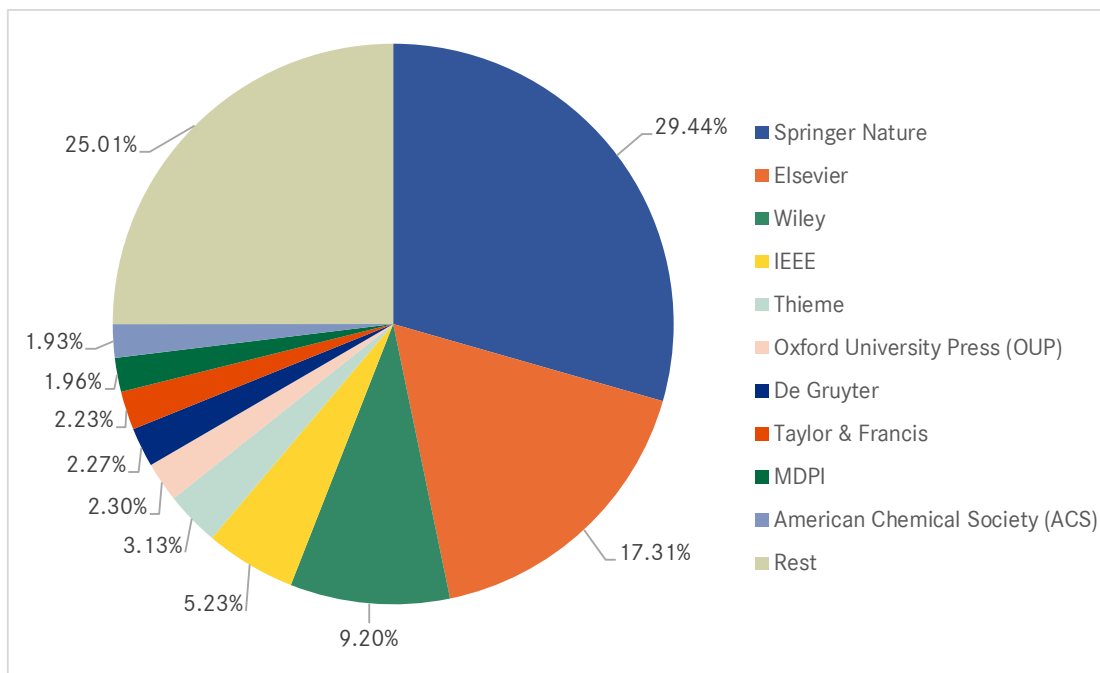
Wissenschaftsrat (2015): *Empfehlungen zu wissenschaftlicher Integrität | Positionspapier (Drs. 4609-15)*, Stuttgart April, <https://www.wissenschaftsrat.de/download/archiv/4609-15.pdf>, accessed 11 January 2022.

Wissenschaftsrat (2016): *Wissens- und Technologietransfer als Gegenstand institutioneller Strategien | Positionspapier (Drs. 5665-16)*, Weimar Oktober, <https://www.wissenschaftsrat.de/download/archiv/5665-16.pdf>, accessed 11 January 2022.

Wissenschaftsrat (2020): *Zum Wandel in den Wissenschaften durch datenintensive Forschung | Positionspapier (Drs. 8667-20)*, Cologne Oktober, <https://www.wissenschaftsrat.de/download/2020/8667-20.pdf>, accessed 11 January 2022.

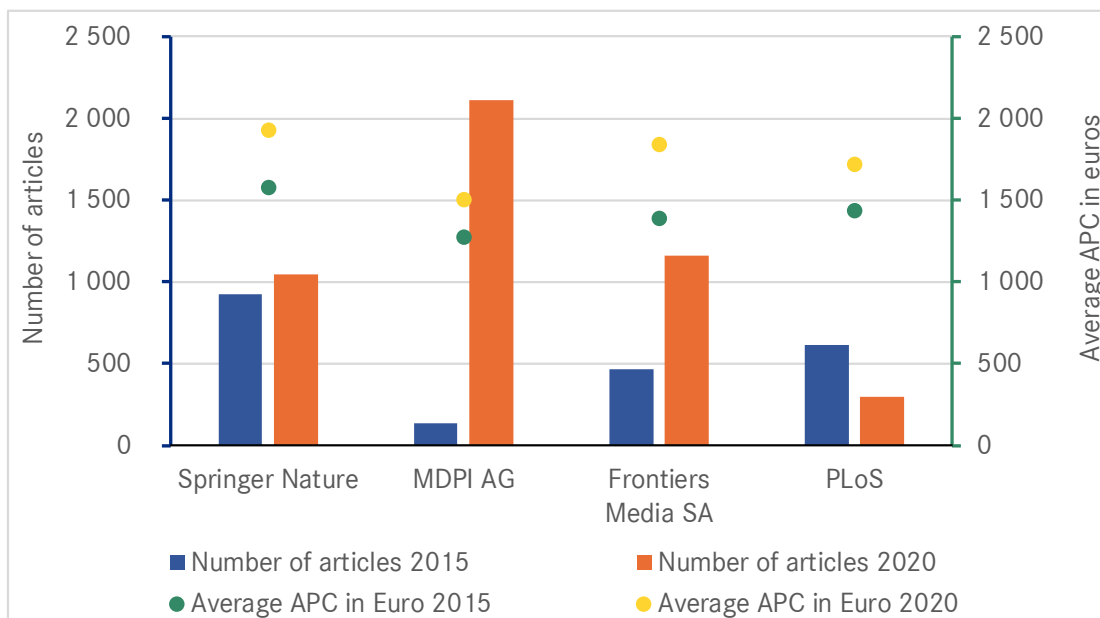
Figure 1	Shares of the 10 publishing houses with the highest number of publications in Germany in the years 2015 to 2020, in percent	110
Figure 2	Development of the reported number of articles and average APC at the leading publishers in 2015 and 2020	110
Figure 3	Development of the number of publications by OA type in Germany between 2011 and 2020	111
Figure 4:	Development of the number of publications by OA type worldwide between 2011 and 2020	111
Figure 5:	Number of articles agreed upon via transformative contracts in different countries, 2015 to 2021	112
Figure 6	OA shares of German publications in the disciplines in 2020, in percent	112

Figure 1 Shares of the 10 publishing houses with the highest number of publications in Germany in the years 2015 to 2020, in percent



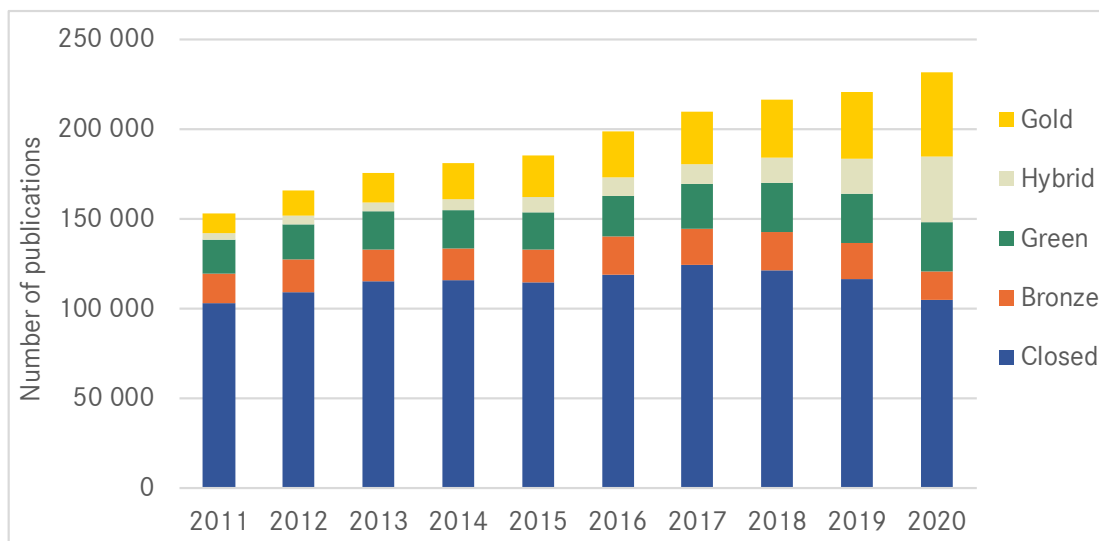
Sources: Data basis: Dimensions (Digital Science), data status: 5 August 2021, evaluation: *Forschungszentrum Jülich*; own representation.

Figure 2 Development of the reported number of articles and average APC at the leading publishers in 2015 and 2020



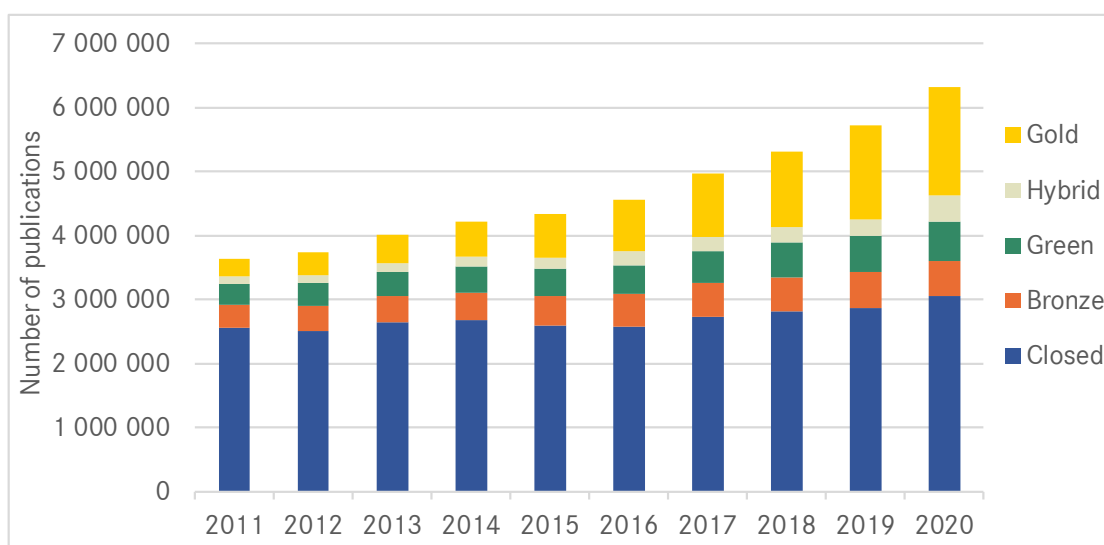
Sources: OpenAPC (<https://treemaps.openapc.net/apcdata/openapc/> [accessed 2 September 2021]); own representation. See also Table 3.

Figure 3 Development of the number of publications by OA type in Germany between 2011 and 2020



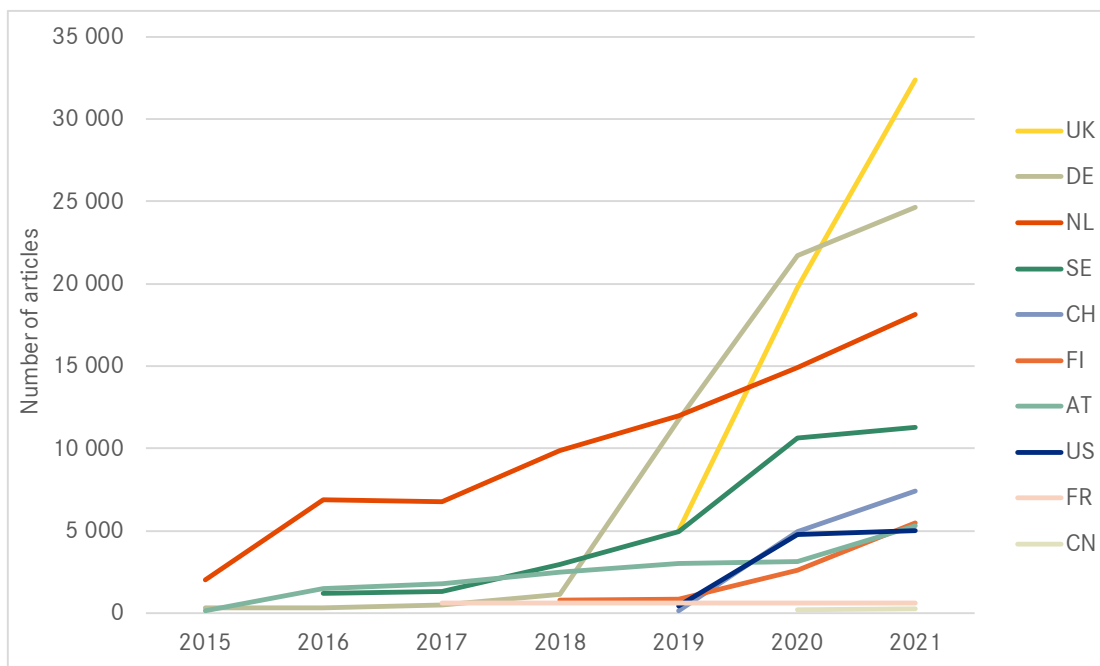
Sources: Data basis: Dimensions, data set: 5 August 2021, evaluation: *Forschungszentrum Jülich*; own representation. See also Table 5. All articles with at least one author address in Germany were included. Each publication was counted only once and assigned to only one OA type. Publications known as „Diamond-OA“ are subsumed in „Gold“.

Figure 4: Development of the number of publications by OA type worldwide between 2011 and 2020



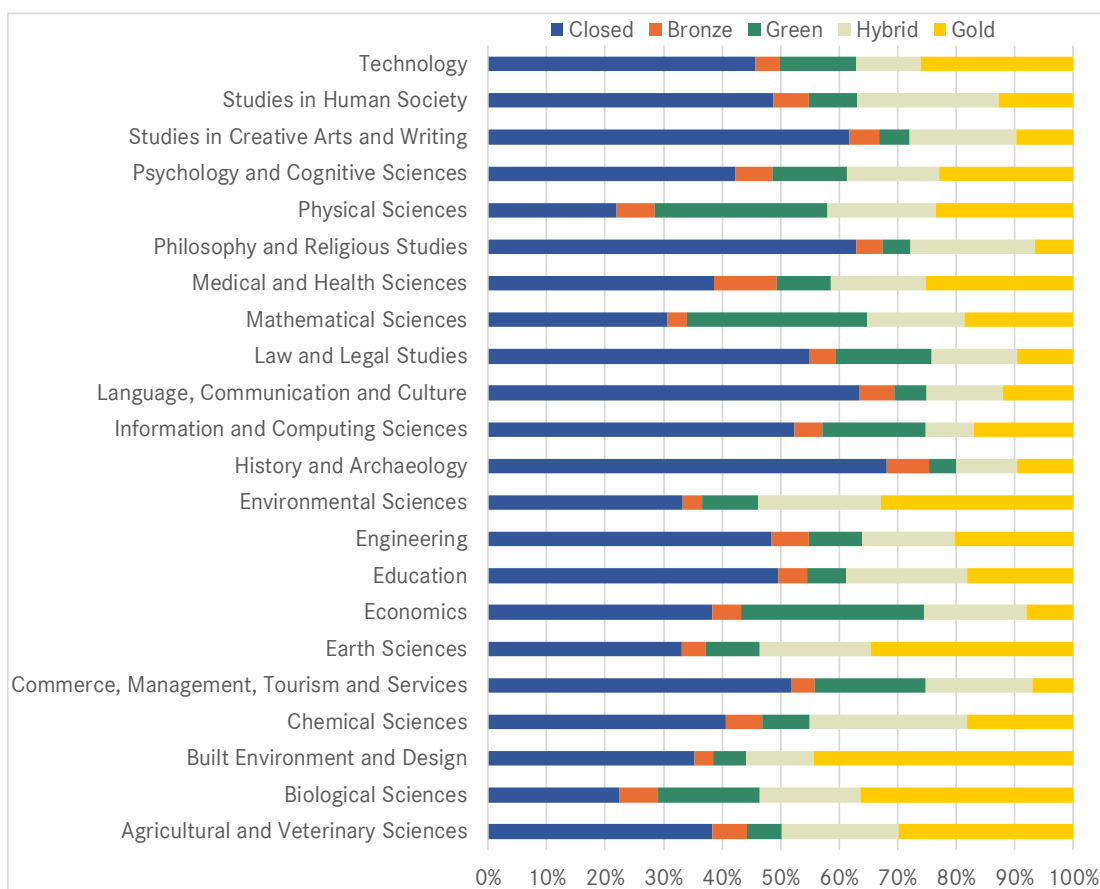
Sources: Data basis: Dimensions, data set: 5 August 2021, evaluation: *Forschungszentrum Jülich*; own representation. Each publication was counted only once and assigned to only one OA type. See also Table 6.

Figure 5: Number of articles agreed upon via transformative contracts in different countries, 2015 to 2021



Sources: <https://esac-initiative.org/market-watch/> [accessed 3 September 2021]); own representation.

Figure 6 OA shares of German publications in the disciplines in 2020, in percent



Sources: Data basis: Dimensions, data set: 5 August 2021, evaluation: *Forschungszentrum Jülich*; own representation. Publications known as „Diamond-OA“ are subsumed in „Gold“.

Table 1	APC for OA articles published in gold in Germany between 2017 and 2021	114
Table 2:	Development of reported APC sales by German first authors in 2015 and 2020	114
Table 3:	Development of the reported number of articles and APCs of leading publishers in 2015 and 2020	114
Table 4:	Projected total expenditures under status quo assumptions and costs under DEAL by the two publishers in 2019 and 2020, in euros	115
Table 5	Development of publication numbers by OA type in Germany between 2011 to 2020	116
Table 6	Development of publication numbers by OA type worldwide between 2011 to 2020	116

Table 1 APC for OA articles published in gold in Germany between 2017 and 2021

APC span	Percentage (total number)
Under 1 400 euros	8 % (1 295)
1 400 – 1 599 euros	21 % (3 609)
1 600 – 1 799 euros	29 % (4 931)
1 800 – 1 999 euros	26 % (4 471)
Over 2 000 euros	16 % (2 691)

Sources: OAM (<https://open-access-monitor.de/#/home> [accessed 26 August 2021]); own calculation.

Table 2: Development of reported APC sales by German first authors in 2015 and 2020

	2015	2020 (increase)
Total revenue	4 394 836 euros	10 948 646 euros (+149 %)
Quantity of articles	3 071	6 564 (+114 %)
Average APCs	1 431 euros	1 668 euros (+ 17 %)
Standard deviation	543 euros	594 euros

Sources: OpenAPC (<https://treemaps.openapc.net/apcdata/openapc/> [accessed 2 September 2021]); own representation.

Table 3: Development of the reported number of articles and APCs of leading publishers in 2015 and 2020

	Quantity of articles		Average APCs in euros	
	2015	2020	2015	2020
Springer Nature	927	1 044	1 577	1 932
MDPI AG	138	2 110	1 275	1 506
Frontiers Media SA	469	1 159	1 391	1 843
Public Library of Science (PLoS)	614	300	1 437	1 721

Sources: OpenAPC (<https://treemaps.openapc.net/apcdata/openapc/> [accessed 2 September 2021]); own representation. See also Figure 2

Table 4: Projected total expenditures under status quo assumptions and costs under DEAL by the two publishers in 2019 and 2020, in euros

	Wiley		Springer Nature
	2019	2020	2020
Universities*			
Projected expenditures	18 928 173	20 637 195	22 857 589
DEAL reference	19 651 347	22 537 020	25 648 539
Universities of Applied Sciences**			
Projected expenditures	750 518	792 318	1 330 626
DEAL reference	398 972	454 940	806 506
Non-university research institutes***			
Projected expenditures	6 470 179	6 968 010	8 025 922
DEAL reference	4 458 151	5 153 301	4 021 988

* All German state universities including TU9 (incl. KIT – Karlsruhe Institute of Technology; excl. Leibniz University Hannover) and U15, excl. university hospitals, excl. colleges of art and music.

** These are all German state universities of applied sciences or HAW (*Hochschulen für Angewandte Wissenschaften*) without the right to award doctorates.

*** Combined categories: Fraunhofer Society (FhG), Helmholtz Association of German Research Centers (HGF) without KIT, Leibniz Association (LG) excluding associated institutes, Max Planck Society (MPG) excl. the four institutions of *Ernst Strüngmann Institut gGmbH* (ESI), *Forschungszentrum caesar*, Max Planck Florida Institute for Neuro-Science and Max Planck Institute Luxembourg for International European and Regulatory Procedural Law. The difference in the non-university research institutes is considerably driven by the changes in the subject libraries of the LG.

Sources: Separate version of the DEAL cost modelling tool by MPDL Services GmbH provided for the WR; |²¹⁴ own representation. All eligible institutions were considered.

|²¹⁴ The projected total expenditure includes subscription costs and APC expenditure in the “status quo scenario” of the DEAL cost modelling tool, which illustrates the cost development “under the ‘business as usual’ conditions [of an unbroken subscription system], in which institutions pay for subscriptions and authors pay APCs for OA publishing” (DEAL Cost Modelling Tool, methodological information (excel file), https://pure.mpg.de/rest/items/item_3331716_4/component/file_3332955/content?download=true [accessed 03 September 2021]). The DEAL reference represents the costs under the terms of the nationwide DEAL agreement, which includes OA publication of all articles by authors from Germany and read access to the publisher’s entire portfolio. The starting point is the actual total PAR charges for articles published in hybrid journals and the discounted APCs for articles published in OA-only journals in 2019 and 2020. (<https://deal-operations.de/das-ist-der-deal/deal-kostenmodellierungstool> [accessed 3 September 2021]).

Table 5 Development of publication numbers by OA type in Germany between 2011 to 2020

	Closed	Bronze	Green	Hybrid	Gold	Total
2011	103 137	16 130	19 135	3 792	10 494	152 688
2012	108 786	18 277	20 000	4 415	14 103	165 581
2013	114 946	18 025	21 214	4 903	16 162	175 250
2014	115 590	17 747	21 216	6 412	20 035	181 000
2015	114 203	18 317	21 193	8 309	23 450	185 472
2016	118 918	21 009	22 758	10 315	25 770	198 770
2017	124 014	20 623	24 845	10 658	29 212	209 352
2018	121 296	21 324	27 570	13 952	31 959	216 101
2019	116 560	19 929	27 691	19 521	36 661	220 362
2020	104 925	15 655	27 625	36 152	47 102	231 459

Sources: Data basis: Dimensions,, data set: 5 August 2021, evaluation: *Forschungszentrum Jülich*; own representation. All articles with at least one author address in Germany were included. Each publication was counted only once and assigned to only one OA type. See also Figure 3.

Table 6 Development of publication numbers by OA type worldwide between 2011 to 2020

	Closed	Bronze	Green	Hybrid	Gold	Total
2011	2 559 453	354 102	337 459	104 183	285 521	3 640 718
2012	2 503 911	392 957	359 487	121 683	360 002	3 738 040
2013	2 638 546	411 326	389 663	134 504	436 540	4 010 579
2014	2 687 332	425 463	405 044	154 057	539 753	4 211 649
2015	2 598 974	456 849	420 859	178 440	686 793	4 341 915
2016	2 584 991	501 508	456 305	209 213	807 660	4 559 677
2017	2 737 570	524 588	496 136	221 158	986 039	4 965 491
2018	2 810 258	529 812	546 169	238 143	1 189 361	5 313 743
2019	2 867 902	561 527	573 998	255 548	1 468 820	5 727 795
2020	3 060 479	537 518	625 251	413 272	1 687 014	6 323 534

Sources: Data basis: Dimensions, data set: 5 August 2021, evaluation: *Forschungszentrum Jülich*; own representation. Each publication was counted only once and assigned to only one OA type. See also Figure 4.

Contributors

The following is a list of people involved in the deliberations of the German Science and Humanities Council, in the “Transformation of Academic Publishing: Towards Open Access” working group and the staff of the Head Office involved in the development process.

In the one-step procedures, the drafts prepared by working groups and committees are discussed in the commissions of the WR and can also be changed if necessary. As a result, the WR is considered the author of the published recommendations, statements and position papers.

Chair

Professor Dr Dorothea Wagner
Karlsruhe Institute of Technology (KIT)

Secretary General

Thomas May
WR Head Office

Scientific Commission of the WR

Professor Dr Julia Arlinghaus
IAF Otto von Guericke University Magdeburg /
Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg

Dr Ulrich A. K. Betz
Merck KGaA

Professor Dr Anja Katrin Boßerhoff
Friedrich-Alexander-Universität Erlangen-Nürnberg
Chairperson of the Scientific Commission

Professor Dr Nina Dethloff
University of Bonn
Käte Hamburger Center for Advanced Study in the Humanities “Law as
Culture”

Dr Cord Dohrmann
Evotec SE

Professor Dr Beate Escher
University of Tübingen / Helmholtz Centre for Environmental Research – UFZ,
Leipzig

Professor Dr Christian Facchi Technical
University of Ingolstadt

Marco R. Fuchs
OHB SE, Bremen

Professor Dr Uta Gaidys
Hamburg University of Applied Sciences

Alexandra Gerlach
Princess zur Lippe
Journalist

Professor Dr Rebekka Habermas
University of Göttingen

Dr.-Ing. Frank Heinrich
SCHOTT AG

Professor Dr Jürgen Heinze
University of Regensburg

Petra Herz
Joachim Herz Foundation

Professor Dr Denise Hilfiker-Kleiner
Philipps-Universität Marburg

Professor Dr Karin Jacobs
Saarland University

Professor Dr Gudrun Krämer
Freie Universität Berlin

Dr Claudia Lücking-Michel
AGIAMONDO / Central Committee of German Catholics

Professor Dr Sabine Maasen
University of Hamburg

Professor Dr Gerard J. M. Meijer
Fritz Haber Institute of the Max Planck Society, Berlin

Professor Dr Marina Münkler
Technical University of Dresden
Deputy Chair of the Scientific Commission

Dr.-Ing. Peter Post
Festo AG & Co. KG / Esslingen University of Applied Sciences

Professor Dr Michael Roden
Heinrich Heine University Düsseldorf (HHU) / Clinic for Endocrinology and
Diabetology at the University Hospital Düsseldorf / German Diabetes Centre,
Leibniz Centre for Diabetes Research, Heinrich Heine University Düsseldorf

Professor Dr Jan-Michael Rost
Max Planck Institute for the Physics of Complex Systems, Dresden

Professor Dr Heike Solga
Freie Universität Berlin/Social Science Research Center Berlin (WZB)

Professor Dr Thomas S. Spengler
Technical University of Braunschweig

Professor Dr.-Ing. Martin Sternberg
Bochum University of Applied Sciences / Graduate Institute (for Applied
Research of the Universities of Applied Sciences in) NRW

Professor Manfred Strecker, PhD
University of Potsdam

Professor Dr Margit Szöllösi-Janze
Ludwig-Maximilians-Universität Munich

Professor Dr.-Ing. Cameron Tropea
Technical University Darmstadt

Professor Dr Dorothea Wagner
Karlsruhe Institute of Technology (KIT)
Chairwoman of the WR

Professor Dr Wolfgang Wick
University Hospital Heidelberg / German Cancer Research Center (DKFZ)

Administrative Commission (as of January 2022)

Members delegated by the Federal Government

Kornelia Haugg
State Secretary, Federal Ministry of Education and Research
Chairman of the Administrative Commission

Judith Pirscher
State Secretary at the Federal Ministry of Education and Research

N/A
State Secretary at the Federal Ministry of Finance

N/A
State Secretary in the Federal Ministry of the Interior and Community

N/A
State Secretary at the Federal Ministry of Food and Agriculture

N/A
State Secretary at the Federal Ministry for Economic Affairs and Climate
Action

Baden-Württemberg

Theresia Bauer
Minister for Science, Research and the Arts

Bavaria

Bernd Sibler
State Minister for Science and the Arts
Chairman of the Administrative Commission

Berlin

Ulrike Grote
Senator for Higher Education and Research, Health, Long-Term Care and
Gender Equality

Brandenburg

Dr Manja Schüle
Minister for Science, Research and Culture

Bremen

Dr Claudia Schilling
Senator for Science and Ports, Justice and Constitution

Hamburg

Dr Andreas Dressel
President of the Finance Authority

Hesse

Angela Dorn-Rancke
State Minister for Science and the Arts

Mecklenburg-Western Pomerania

Bettina Martin
Minister for Education, Science and Culture

Lower Saxony

Björn Thümler
Minister for Science and Culture

North Rhine-Westphalia

Isabel Pfeiffer-Poensgen
Minister for Culture and Science

Rhineland-Palatinate

Clemens Hoch
Minister for Science and Health

Saarland

Minister President Tobias Hans
State Chancellery of the Saarland

Saxony

Sebastian Gemkow
Minister of State for Science at the State Ministry for Science,
Culture and Tourism

Saxony-Anhalt

Professor Dr Armin Willingmann
Minister for Science, Energy, Climate Protection and the Environment
Deputy Chairman of the Administrative Commission

Schleswig-Holstein

Karin Prien
Minister for Education, Science and Culture

Thuringia

Wolfgang Tiefensee
Minister for Economic Affairs, Science and Digital Society

Professor Dr Gerard J. M. Meijer
Fritz Haber Institute of the Max Planck Society, Berlin
Chairman of the working group

Professor Dr Sören Auer
TIB – Leibniz Information Centre for Technology and Natural Sciences, Hanover

Professor Dr Jutta Gampe
Max Planck Institute for Demographic Research, Rostock

Petra Hätscher
Communication, Information and Media Centre (KIM) of the University of
Konstanz

Professor Dr Denise Hilfiker-Kleiner
Philipps-Universität Marburg

Dr Hans de Jonge
Dutch Research Council (NWO), The Hague, The Netherlands

Deputy head of central office/policy Johannes Kode
Baden-Württemberg Ministry of Science, Research and the Arts

Brigitte Kromp
University Library, Vienna, Austria

Professor Dr Marina Münkler
Technical University of Dresden

Deputy Head of Directorate-General 1 Dr Dietrich Nelle
Federal Ministry of Education and Research

PD Dr Niels Taubert
University of Bielefeld

Professor Dr.-Ing. Cameron Tropea
Technical University Darmstadt

Head of Department Dr Ronald Werner
Saxon State Ministry for Science, Culture and Tourism

Gudrun Hilles (administrative officer)

Dr Julia Hillmann (scientific officer)

Dr Rainer Lange (head of research policy department)

Britta Philippsen (team assistant)

Leila Young (administrative officer)