Expanding Perspectives on Open Science: Communities, Cultures and Diversity in Concepts and Practices
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New Toolkits on the Block: Peer Review Alternatives in Scholarly Communication

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Abstract. Peer review continues to play a central role in scholarly communication processes, however, over the last decade the concept has branched out in terms of methods, platforms and stakeholders involved. The paper demonstrates how alternative peer review tools and methods are instrumental in further shaping the communication of scholarly results towards Open Science. The analysis is based on the examination of various *review methods* (peer commentary, post-publication peer review, decoupled review, portable or cascading review) and review tools and services (publishing platforms, repository-based, and independent reviews). Besides the differences in operation and functionality, these new workflows and services combine common features of network-based solutions and collaborative research applications with varying degrees of openness (e.g. regarding participation, identities and/or reports). They, therefore, represent good examples of Open Science, in terms of transparency and networking among researchers.

Keywords. open science, open peer review, OpenUP, review alternatives

1. Introduction

Open access has by now become a core strategy for European research, aiming at wide knowledge circulation and fostering innovation. Embedded into a broader discourse about open science this represents a transformative approach to research, based on digital technologies and methods as well as new collaborative tools. There are still several challenges which have to be addressed – e.g. interoperability of infrastructures and services, intellectual property rights and quality assessment – and these in turn have an impact on all facets of the scholarly communication process.

The growing dissatisfaction with the traditional scholarly communication process and publishing practices has triggered a proliferation of alternative dissemination and assessment methods. In particular, scientific papers are increasingly publicly scrutinized by peers and several of these cases pointed out significant scientific flaws or even outright misconduct which has led to retractions of papers [1]. Considering the growing diversity of platforms and channels by which these comments and reviews are communicated, there is an urgency to assess the current status and gather best practices which can further guide developments in this field.

The EU-funded OpenUP project [2] addresses key aspects and challenges of the currently transforming research landscape and aspires to come up with a cohesive

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framework for the review-disseminate-assess phases of the research life cycle that is fit to support and promote Open Science. The primary objectives of the project are (1) to identify ground-breaking mechanisms, processes and tools for peer-review for all types of research results (e.g., publications, data, software), (2) to explore innovative dissemination mechanisms with an outreach aim towards businesses and industry, education, and society as a whole, and (3) to analyze a set of novel indicators that assess the impact of research results and correlate them to channels of dissemination. The project employs a user-centered, evidence-based approach, engaging all stakeholders (researchers, publishers, funders, institutions, industry, and the general public) in an open dialogue through a series of workshops, conferences and training, while validating all interim results in a set of seven pilots involving communities from four research disciplines: life sciences, social sciences, arts & humanities, and energy.

Discourse on alternative dissemination and evaluation methods increases transparency, opens up the scholarly communication process, but most of all, encourages researchers to discuss research practices and share their results

2. Alternative Takes on Peer Review Processes

Peer review in the context of scholarly communication is a *concept* and not a narrowly defined *methodology*. As such it can be unbounded from the journal paper and applied to any research product [3]. In addition, peer review is very versatile: it can be employed for e.g. evaluating scientific results, research data, research proposals and the performance of projects. It is used in teaching to assess portfolio information about the teaching of an instructor, in pedagogy to enhance students´ critical skills, in medicine, as the process by which a committee of physicians examines the work of a peer and determines whether the physician under review has met accepted standards of care. In all these case, the common theme is the scrutiny of one's work by fellow workers/peers. However, although the primary goal is the same, the methods for putting peer review into practice vary across journals and disciplines [4].

In the age of the Internet and proliferation of communication channels, the printed and peer reviewed journals and books are no longer the principle vehicles by which research is disseminated [5]. The new tools, platforms and services enrich the academic publishing scene, and provide functionalities to continuously revisit and re-evaluate the process and the outcomes of the scholarly discourse. The publishing scene has come to include open access e-journals, independent publishing platforms, overlay journals based on repository content, blogs and journal clubs. As dissemination methods diversify the scholarly communication scene, the related review processes have become varied. Depending on the dissemination channel they are connected to, we can find review tools and methods from open peer review, revealing the reviewer's identity and/or the review report, through post-publication review, cascading or decoupled review to collaborative review and community based commenting. If we situate these methods of dissemination and evaluation on a scale, they show a definite move away from the traditional closed peer review process to a more open and transparent methodology with varying openness in identity, documentation, participation, and time. The new, innovative tools incorporate the basic principles of open science by employing open, collaborative and network-based publishing and review methodology.

In the following we will examine how the alternative peer review tools and methods shape the communication of scholarly results and how they contribute to the

strengthening discourse of open science. The analysis is based on the examination of various *review methods* (peer commentary, post-publication peer review, de-coupled review, portable or cascading review) and the employed *communication tools* (commenting, annotation/tagging, reports, evaluation templates). Besides the differences in operation and functionality, these new workflows and services carry the common features of network-based solutions, employment of digital technologies and collaborative research applications.

3. Defining Open Peer Review

The concept of "open peer review" is rather controversial, because presently it is being used for several fairly different models of peer review. In most cases, open peer review refers to the review process in which the identity of the reviewers is disclosed (examples) or the review itself is accessible for the public [6]. However, there are studies which go beyond such simplified interpretations and include other attributes of the review process in the definition. The present analysis relies on the definition of Open Peer Review as it has been proposed by OpenAIRE [7]. Open Peer Review is considered as an umbrella term which comes in different flavors, where the traditional process is opened up by modifying one or more aspect to make it more inclusive, transparent and/or accountable. Based on a literature review seven distinct traits could be identified (Ibid.).

- **Open identities:** Authors and reviewers are aware of each other's identity.
- **Open reports:** Review reports are published alongside the relevant article.
- **Open participation:** The wider community to able to contribute to the review process.
- **Open interaction:** Direct reciprocal discussion between author(s) and reviewers, and/or between reviewers, is allowed and encouraged.
- **Open pre-review manuscripts:** Manuscripts are made immediately available (e.g., via pre-print servers like arXiv) in advance of any formal peer review procedures.
- **Open final-version commenting:** Review or commenting on final "version of record" publications
- **Open platforms:** Review is de-coupled from publishing in that it is facilitated by a different organizational entity than the venue of publication.

The possession of at least one of the first three traits is considered sufficient for qualifying as Open Peer Review (basically due to the fact that this covers all but one of 122 definitions considered in the literature review) (Ibid.). Based on a survey conducted by OpenAIRE it turns out that a majority of respondents provided support for opening up the discussion between authors and reviewers, to publish review reports and to allow open comments on final papers [8]. Over a third was reluctant to make papers available online before peer review and nearly every second respondent opposed against revealing reviewers' identities (Ibid.).

When it comes to peer review methods or processes there are further options to consider. We outline the ones which are relevant for our discussion:

- **Peer commentary** refers to the feature that other interested parties are explicitly invited and/or generally be enabled to provide comments at some stage in the publication process. This functionality may be offered based on the pre-publication and/or the final published version. Typically, peer commentary is considered as a *supplement* to peer review, but not as a *substitute* for it [9]. Examples include e.g. the 2-stage publication process as offered by Copernicus Publications [10] and peer-reviewed papers published by the journal PeerJ (peerj.com) (the functionality is not enabled for preprints).
- **Post-publication peer review** is based on the published version and can take the form of rather lightweight peer commentary or a more serious review report. However, such a process is not necessarily moderated and then merely takes place based on intrinsic motivations of the individual reviewer. Examples include e.g. the F1000 Research (f1000research.com) publishing platform where papers which pass an in-house quality check are published immediately. These publications are then subject to formal peer review and referees' reports are published on the site and all referees are named. Authors then have the opportunity to respondent to these reviews and are encouraged to revise their papers [11].
- **De-coupled review** refers to unbundling the review service from the publishing service [12]. In this case a paper may first be deposited in a disciplinary or institutional repository, then be subject to a review by an independent review service, followed by formal publishing in a scholarly journal. Examples for this model are e.g. Rubriq (www.rubriq.com) and Peerage of Science (www.peerageofscience.org). Typically these services partner with journals which after the completion of the review and revision process can make an offer to the authors to publish their paper.
- **Portable or cascading review** treats review reports (and revisions) as essential context information for submitted manuscripts which are then moved together through the whole peer review process. Examples of this model have e.g. been introduced by mega-journals which started to reuse reviews from journals which have rejected the manuscript in question [13].
- **Journal clubs** are a post-publication collective review exercise in which participating individuals come together to critique and keep-up-to-date with relevant literature. However, there is no standard process of conducting an effective journal club (for a systematic review cf. [14]). Today, publishing platforms have emerged which facilitate the publication of review papers which may have been emerged based on journal clubs (e.g. The Winnower (thewinnower.com)).

4. Evaluating Review Tools

Alternative review methods and services provide innovative ways for researchers to communicate their scientific results at smaller, communal level or at a wider, global level, and to evaluate each other's work. By assessing the problems and criticism which the peer review system faces, review tools and services can be categorized and evaluated on the basis of their functionality and sustainability within the current

scholarly communication system. Overall, open peer review services and tools can be grouped in four categories: 1) publisher-based platforms or journals, 2) independent peer review services with openness functionalities, 3) repository-based solutions and 4) commentary/annotation tools.

4.1. Journal Editors and Publishers

Journal editors and publishers have been major drivers in introducing alternative peer review methods. Some moved away from the traditional method of reviewing by shortening the publication time and by making the review process partially or entirely transparent. The openness of the review process is ensured by publishing reports alongside articles and by strongly urging, but not necessarily mandating the disclosure of the identity of reviewers.

Another feature of open peer review is also incorporated in the operation of the majority of these publishers. The review process is turned into a collaborative effort either through the communication among editors and authors, or through initiating discussion within research communities. This starts early on from supplementing the traditional peer review process by peer invited commentary: S. Harnad coined the term "open peer commentary" in the 1970s and introduced commentary from a group of peers on selected articles in Behavioral and Brain Sciences [15]. The first journal to introduce open peer review was the British Medical Journal which requires reviewers to sign their report and publishes the papers together with review reports and reviewers' names [16]. Several publishers followed in the early 2000s, introducing a range of pre- and post-publication open peer review workflows. They employ different degrees of collaboration: while eLife (elifesciences.org) ensures the discussion of the editor and the reviewers about the submitted manuscript, Frontiers (frontiersin.org) established a "Collaborative Review Forum," which unites authors, reviewers and the Associate Editor [17]. Copernicus Publications allows the widest collaboration by involving the research community early on in the review process. Their "Interactive Peer Review" supplements the evaluation of the reviewers with the comments from the scientific community [18].

4.2. Independent Peer Review Services

Independent peer review services decouple the review process from the publishing platform(s). The review service is not affiliated with a journal or publishing house, thus the evaluation is not skewed by the standards of the respective publisher. The process allows different degrees of openness and involvement from authors and reviewers. Some of these platforms offer opt-in functionalities to publish review reports and/or disclose reviewer names in relation to publications (pre and post-publication). Some publishers provide reviewers with an actionable link which enables direct reporting of reviewer activity to such platforms (e.g. Publons (publons.com)). These services also allow for author-directed workflows, ranging from authors setting the time frame for the evaluation (Peerage of Science), through contacting reviewers to participate in the process (SciOR (science-open-reviewed.com)), to deciding the degree of openness they are comfortable with (PubPeer (pubpeer.com), Publons). These platforms, in general, advocate a network-based approach where collaboration between authors, editors and reviewers is strongly encouraged in order to improve the paper and the overall review

experience. Community interaction can further step up the quality of scientific research by enabling innovative approaches [19].

As the quality of the review process, including both the quality control function of the review in regard to the materials passing through the system, and the quality of reports prepared by the reviewers, has become a major concern in the established review system, independent review services introduce various tools to contest this problem. Standardized evaluation forms (Rubriq Score card) guide the reviewers in their evaluation urging them to tackle major points of relevance and quality in their review report. Furthermore, evaluation of the reviewers (Peerage of Science: Peerage Essay Quality scores) by fellow reviewers provides a clearer picture about the researchers involved in the process. In some cases, anonymity of the author is requested (PubPeer, Publons, Peerage of Science) in order to keep the process bias-free. There is a service specializing on the quality control of the review process, offering journals an evaluation of the transparency and integrity of their review process: the Peer Review Evaluation (PRE) review services created a seal of approval in the form of a PRE badge which ensures quality publishing in regard to both the articles being peer reviewed, and to the publishers authors can choose from [20].

Although these review platforms operate independently from publishers, they may be connected to a chosen set of journals. The journals, the platforms are working with, accept articles for publishing based on the recommendations of the review platforms. Thus, besides the primary function of managing the review process for scientific outputs, the review services evaluate the fit of the paper to a variety of journals. The match between the article and the journal can be made even if the review service is not connected to the author's preference of publisher; the author is free to submit his/her peer-reviewed work to any journal with a link to the completed process (Peerage of Science).

Peer review platforms carry several benefits for reviewers. They employ a range of methods to recognize and reward review work. At Publons the peer review and post publication activity factors into the paper's Altmetric scores (new silver line in the Altmetric donut). Furthermore, the researcher's review activity is automatically exported to their ORCID ID adding a permanent record in their research history. Rubriq goes one step further and provides besides the academic reward forms, a financial compensation for the review work, alternatively they offer a contribution to the reviewer's organization fund or a donation to a charity in the research community. Thus, the methods and tools may vary in rewarding review work, but it is a common feature at these review services that the work and time of the researchers is acknowledged.

4.3. Repository-Based Solutions

Repository-based solutions are gaining momentum in the publishing discourse. The Internet facilitates immediate communication and dissemination of (preliminary) research results. In particular, uploading to and making preprints available in disciplinary and/or institutional repositories facilitate a rapid distribution of research findings. The pioneering and successful example of the arXiv which covers preprints in the field of physics, mathematics and further quantitative disciplines (launched in August 1991) found followers in other fields, in some only 20 years later. Due to more receptive audiences, bioRxiv, which is an arXiv-licensed but independent preprint server provided by CSHL Press for the life sciences, launched in 2012, was soon

followed by AgriXiv in agriculture and allied sciences; engrXiv for engineering, and SocArxiv in social science [21], and by the most recent addition of paleorxiv, soon to be launched in 2017.

Preprints are increasingly being recognized by the publishing industry. Numerous journals and publishers exempt preprints from copyright restrictions allowing deposit of and access through repositories, institutional and/or personal websites (SHERPA/RoMEO database (www.sherpa.ac.uk)). However, in regard to open science and the re-use of open access materials, the free availability of these manuscripts does not necessarily imply a free re-use option. "Recent data show that authors uploading their work to bioRxiv choose the most restrictive license on offer – retaining full copyright – for their work," most probably to ensure full control over their work [22], Some publishers, like eLife, even allow the deposition of manuscripts on a preprint server while they are still under review. Even DOIs are issued for preprints by Crossref from late 2016 [21],

Funders also acknowledge the growing presence of preprint publishing in their policies: the Wellcome Trust allows researchers to cite preprints in their grant applications [23], and they are cooperating with an international group of research funders to explore the value and feasibility of establishing a Central Service for Preprints, which would set out to aggregate content from multiple sources and provide new ways for researchers and machines to search, access and reuse the content of preprint servers [24].

In order to facilitate a wide scientific discussion about preprint materials, a variety of forums and platforms were created which channel communication related to the uploaded materials. This way this body of literature gets more accepted and used as evaluated scientific content. The repository-based dissemination and review forums can take a variety of forms. There are platforms, such as PaperRater (www.paperrater.com) or SciRate (scirate.com), which are repository specific discussion forums, allowing for commenting on preprints in arXiv. ScienceOpen provides peer review to arXiv content by building collections where an editor or group of editors can group together articles that they find interesting, and open up all articles to post-publication peer review decoupling peer review and the communication of research from the formal publishing process [25]. Preprint servers facilitate communication on research results on a wider scale than traditional channels of dissemination and evaluation allowed for. Some platforms, like, biorXiv or PeerJ Pre-prints have a built-in commenting or peer review function on the platform. Others allow for crowd-sourced discussion on preprints in a specific field of study (Haldanes Sieve (haldanessieve.org)), or function as a multidisciplinary repository for articles and preprints (Self-Journals of Science (www.sjscience.org)). In addition, the overlay journal format allows managing preprints as journal content (episciences (www.episciences.org)), and there is a forum dedicated entirely to reviews on preprints (Academic Karma (academickarma.org)).

Repositories can also offer peer review functionalities. By turning repositories into evaluation platforms, the quality control aspect of the scholarly communication process is given back to the research communities. The open-source review plug-in, the Open Peer Review Module for repositories, developed by Open Scholar in association with OpenAIRE, adds overlay peer review functionalities to repositories using the DSpace software. OPRM on an institutional or other open access repository will enable the formal review of any digital repository content, including data, software code and monographs, by an unlimited number of peers. The review process is open and transparent, thus the full text of the reviews is available and the identity of

the reviewers is disclosed. The system allows all interested peers to submit a review after creating a reviewer account and providing credentials certifying their qualification as peers. In addition to reviewing research objects, reviewers are also asked to evaluate previous reviews of each object they review. The OPRM includes a reviewer reputation system based on the assessment of reviews themselves where the reputation of the reviewer weighs on the importance of each review on the overall assessment of a research work. The primary objective of this system is to create reliable reputation metrics for research works, authors, reviews and reviewers. OPRM builds on the existing infrastructure offered by open access repositories. Besides providing novel metrics for the quantitative assessment of research quality, it promotes the use of relevant content that has been validated by reviewers using tags and advanced search filters. It advances an open and transparent dialogue about reliable and reviewed research material [26].

Preprint platforms typically do not employ much editorial functions beyond a check by moderators if content fits thematically and is scientifically sound. Additional value is added by overlay services which enable the management of a pool of reviewers. However, they all advocate open dissemination and enable open peer review (while not necessarily on the same platform): open identity of the reviewers, open report/commentary, and open participation from all research communities and public readers, as well.

4.4. Commenting Applications and Tools

Commenting applications and tools are not identified as peer review methods per se, however, they aim to provide complementary assessment of scientific content. They function as an application providing a layer of customized features on top of repository or journal content (PaperHive (paperhive.org)), or on materials disseminated through academic social networks (Research Gate OPR (www.researchgate.net/publicliterature.OpenReviewInfo.html)). These tools contribute to the network-based and collaborative aspect of research by opening up the discussion on published scientific results. In this way, they can be viewed as (light-weight) post-publication review tools.

Some tools allow sentence-level critique (Hypothes.is (hypothes.is), PaperHive) leading to contextual in-depth analysis of the content. Their operative features are based on annotation standards for digital documents (W3C Web Annotation standards): a new area of developments in digital content management [27]. These tools and platforms prepare for the next generation of read-write web application (Hypothes.is). TrueReview (www.theme-junkie.com) is an open-source tool with the motivation to provide reviews and evaluations. It organizes papers in venues, allowing different scientific communities to set their own submission and review policies. This tool offers benefits to the reviewers by ranking that can be prominently displayed alongside papers in the various disciplines, and provides reward to the authors of the most significant papers, both via an explicit paper ranking, and via increased visibility in search [28].

Table 1. Alternative review tools and services described on the basis of the attributes of Open Peer Review (defined by OpenAIRE)

	Platform	**Identity:** *reviewer's identity is published*	**Report:** *reviews and comments are published (alongside the relevant article)*	**Participation:** *by invitation and/or open to wider community to able to contribute to the review process*	**Interaction:** *specified discussion between authors and reviewers, and/or public, open interaction is allowed*	**Time:** *Open pre-review manuscripts/pre-publication review/ post-publication review or commenting*
F1000 Research	publishing platform	open	open	invited reviewers and open for commenting after registration	open	post-publication
The Winnower	publishing platform	open	open	invited reviewers and open commenting	open	open pre-review manuscripts
Science Open	publishing platform	open	open	reviewer: ORCID with 5 publications, comment: ORCID with 1 publication	open	post-publication
Frontiers	OA publisher	open	closed	invited reviewers	discussion of authors and reviewers	pre-publication
Copernicus Publications	OA publisher	opt in/out to sign	open	invited reviewers and research community commenting	closed	pre-publication
PeerJ	OA journal	opt in/out to sign	authors opt in/out to publish	invited reviewers	closed	pre-publication
eLife	OA journal	opt in/out to sign	authors opt in/out to publish decision letter	invited reviewers	discussion of editors and reviewers	pre-publication
Peerage of Science	standalone peer review platform	opt in/out to sign	opt in/out to publish review	registered, invited peers	closed	pre-publication
Publons	standalone peer review platform	opt in/out to sign	opt in/out to publish review	open	open	any point in the publication process
Rubrique	standalone peer review platform	double blind review	closed	closed	closed	pre-publication
SciOR	standalone review platform	open	open	open to registered authors and editors	discussions of authors and reviewers	pre-publication

PubPeer	standalone peer review platform/journal club	opt in/out to sign	open	open	open	post-publication
SciRate	scitation and commenting tool on arxiv content	open	open	open to registered users	open	open preprint manuscript
Self-Journals of Science	repository and evaluation system	open	open	open to authenticated scholars	open	open preprint manuscript
episciences	overlay journal platform to preprint servers	opt in/out to sign	closed	closed	discussion of author and copy editors	open preprint manuscript
Academic Karma	online peer review network	opt in/out to sign	opt in/out to publish	ORCID ID is needed to review	open	open preprint manuscript
Haldane`s Sieve	preprint commentary	open	open	open	open	open preprint manuscript
Hypothes.is	annotation /commentary tool	open	open	open	open	any point in the publication process
Research Gate OPR	review tool	open	open	open	open	post-publication
PaperHIVE	interactive platform	open	open	open	open	post-publication

Open pre-review manuscripts: Manuscripts are made immediately available in advance of any formal peer review procedures.
Pre-publication: review takes place before the publication of the final version of the manuscript is published.
Post-publication review: Review or commenting on publicly available version of the manuscript (revisions are allowed) or on published final-version manuscript.

The alternative review tools and services as discussed above offer various methods for review, such as open review, pre-publication or post-publication review, collaborative or decoupled review, and different degrees of openness in identity, participation and interaction among stakeholders. They might differ in their solutions, but they all carry several common features:

(1) they move away from the established publishing and review system by finding solutions to the problematic aspects of the traditional single/double blind review process (lack of transparency, potential bias, quality of review, etc.),
(2) the review process becomes more transparent either by opening up certain aspect of the process, or by providing detailed review policies,
(3) they urge a more conscious, collaborative participation from stakeholders either through invitation and dialogue within small circles between authors, editors and reviewers, or through crowdsourcing the process and allowing the public to add comments and reviews

These tools and services described on the basis of the seven attributes of Open Peer Review (defined in Table 1 by OpenAIRE), identify the main issues where intervention is needed in the traditional review system. The solutions they offer invigorate conversation among researchers about the functionalities of the review, their role and responsibilities in the process. Such dialogue, which is continuously reshaped by the exchange of ideas, new perspectives (Open Science approach) and tools (ORCID review tracking functionality) and emerging frameworks (pre-registration of research, uploading preprints for grant application), promises a more scholar-centric approach.

5. Conclusion

Several of the severe quality and transparency issues of scholarly communication can prospectively solved by a more active participation of researchers, reviewers and editors in the discussion on the opportunities and barriers, as well as the lessons-learned from existing and emerging services and experiments. As formal and informal knowledge sharing forums gain increasing significance within academic communities and their research activities, it is important to examine and discuss these alternatives to move towards a more structured and moderated dialogue about the underlying issues of research dissemination and evaluation.

Projects, such as OpenUP, set out to facilitate this discourse on scientific dissemination, peer review and assessment by mapping out the current scholarly environment and unraveling the underlying processes. The alternative peer review methods as discussed above contribute to a more democratic, transparent and community-based knowledge discovery and dissemination. However, as with many emerging new options of communication further evaluation of user roles and perceptions in open peer review settings is essential, including their change over time (based on good and bad experiences).

Recent surveys (OpenAIRE, 2016 [29], OpenUP, 2017) investigate some of these perceptions. In particular, researchers seem to be reluctant to fully embrace openness in the review process, but definitely see advantages of a transparent, collaborative review process. In order to make researchers less vulnerable to share their work and make their research open for comments, these alternative tools and services would benefit from further standardization and integration into the research cycle [30]. However, the formal acknowledgement of the viability and validity of these alternatives, such as independent review services, or review solutions for repositories and preprint servers, presupposes discussion on their sustainability, long-term availability, and their uptake by the researchers. Furthermore, as soon as review reports become a separate publication type and the reviewer's work is acknowledged as an academic activity on its own right, issues of authorship and copyright need to be taken into account (e.g. COPE) [31].

These and other practical challenges need to be considered when stepping up awareness and education efforts. In collaboration with other initiatives, OpenUP will set up a range of experiments which offer opportunities for further exploration and evaluation. Through the engagement with research communities, best practices, the most fitting methodologies and settings can be identified in different research areas (arts & humanities, social sciences, energy, life sciences). The concrete results from these experiments and pilot studies will provide insights into transforming research

practices as well as challenges that need further investigation. The goal is to broaden the discourse and ultimately accelerate the uptake of Open Science solutions in the scholarly communication practices across all research disciplines.

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