RISE working group on Open Science
advising Carlos Moedas, the European Commissioner
for Research, Science and Innovation

Scholarly publishing and peer-reviewing in open access

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'Partager nos créativités pour servir nos humanités'
'Share our creativity to serve our humanity'
Miguel, Le Panier, Marseille

A website complements this report
http://openscience.ens.fr

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Introduction

Knowledge, like language, is not a merchandise to be traded, it is an *intellectual commons* to be shared with everyone, everywhere, and preserved for generations to come. Indeed, when a researcher gives an idea to a colleague, she does not lose it. Quite on the contrary, she wins someone with whom she can exchange, and make her idea evolve, in clarifying it, modifying it if necessary, and finding applications she did not think of. This type of mutual exchange lies at the heart of peer-reviewing, the purpose of which is fundamentally to verify, correct and improve the content of articles before disseminating them. It would, indeed, be too damaging to the academic community that errors be circulated in the open and reused assuming they are exact. Peer-reviewing articles written by colleagues is an integral part of a researcher's duty, together with giving seminars and writing articles. This is why researchers, in most cases, do not request any extra payment or advantages to referee an article, be member of the editorial board of a peer-reviewed journal. Peer-reviewing should deserve more recognition (*e.g.*, for career evaluation) because, if done seriously, it is time consuming, requires a highly specialised expertise and sustained attention to details. Peer-reviewing is the backbone of the present research system since it guarantees the quality and the originality of the articles published in scholarly journals of all disciplines.

Publicly funded research is financed by everyone's taxes, therefore articles presenting the results obtained in this context should belong to everyone (or not belong to anyone, as is the case in the public domain). In practice, this means that they should be freely accessible the moment they are published. This is far from being the default case nowadays. Today, when an article succeeds to pass peer-reviewing and is accepted for publication by the journal's editorial board, the journal's publisher requires the author to give him the intellectual property of her article for free, namely its text, figures, codes and data (those presented in the article and those deposited on the journal's website). The publisher thus owns, until seventy years after the author's death, the exclusive copyrights for all that. If the author refuses to give her copyrights away, her article is not published (see examples of copyright transfer forms on http://openscience.ens.fr/COPYRIGHTS_AND_LICENSES/). Thus publishers can sell back peer-reviewed articles to academic libraries at prices they fix themselves. Obviously, the point of all this is not to ensure an optimal dialogue among researchers; it certainly is not to ensure intellectual property rights to the creators of new knowledge; it is simply to ensure property rights to publishing firms which, through a profit-making conceit, manage to trump the importance of knowledge creation with a relentless quest for increased revenues. Thanks to the transfer of intellectual property rights, publishers can decide under what conditions, mainly financial but not exclusively, the research results in the form of articles can now be accessed, exploited, and re-used. Since a few years the objective of publishers is to link articles to databases. The day such a move will be fully achieved, transferring the copyrights to publishers will also give them rights on research data (*e.g.*, measures, satellite images, results of numerical simulations, source codes, …). This will open the way to transforming data into merchandise, which will be counter-productive for research and contrary to the academic tradition of data sharing. Data, like ideas, have to stay outside the market since the collaboration between researchers relies on free and multilateral exchange. Publishers are trying to interfere with this process to draw a profit from this shared wealth, at the expense of researchers and taxpayers.

In this report I will use the definition of *open access* published by the *European Commission* on July 17th 2012 (*Towards better access to scientific information: Boosting the benefits of public investments in research*, COM(2012) 401 final, page 5, see http://openscience.ens.fr/DECLARATIONS/ 2012_07_17_European_Commission_Towards_better_access_to_scientific_information.pdf) : '*Open access, a model which provides access, use and re-use free of cost to readers on the Internet. Two basic models exist: "Gold" open access (open access publishing): payment of publication costs is shifted from readers (via subscriptions) to authors.*

These costs are usually borne by the university or research institute to which the researcher is affiliated, or by the funding agency supporting the research. "Green" open access (self-archiving): the published article or the final peer-reviewed manuscript is archived by the researcher in an online repository before, after or alongside its publication. Access to this article is often delayed ("embargo period") at the request of the publisher so that subscribers retain an added benefit'. Note also that, when I write 'publishers', I only mean the major ones (*i.e.*, few commercial companies as well as few non-for-profit societies) who dominate and control the market. Since the advent of electronic publishing those have acquired an oligopolistic position by competing with smaller publishers, that they either swallow or push out of the market. When I write 'articles' I only consider peer-reviewed article written by researchers to present their results to other specialists of the same discipline. By 'researchers' I mean scholars employed by universities or research institutions whose research activity is fully, or partially, funded on public budget. The arguments I will develop are made from the point of view of a researcher who peer-reviews (as editor and referee) and publishes in mathematics and physics. Indee, those practices significantly vary depending on the discipline and the scale of the schlolarly exchanges. I will not address questions related to data in general, but limit myself to the data which are linked to peer-reviewed articles (*i.e.*, which are published on the journal's website in order referees and readers could better understand and check the article's content).

Documents in appendix

Several definitions of *open access,* those of the *Budapest Declaration of 2002*, the *Berlin Declaration of 2003* and given by Peter Suber in 2006, are available in Appendix 1.

Recommendations

•   The *European Commission* should sign the *Berlin Declaration of 2003,* which is precise and concrete, and together with the 566 institutions which have already signed work towards achieving its goals, at both European (within the research institutions it supports) and global scale (by participating in international collaborations, *e.g.*, the *Research Data Alliance* RDA, https://rd-alliance.org/ and http://europe.rd-alliance.org/). This should attract public attention and make researchers and citizens more aware of the challenges and opportunities of *open access.*

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1. How to improve the quality and reproducibility of the scholarly published results

1.1   Peer-reviewing articles should not be done by editors employed by publishers

The reproducibility of scientific results is the backbone of scientific research. Science is based on the objectivity principle which states that scientific laws are the same whatever the different observers' viewpoints. Scientists present new theories and new experimental results in their articles, which are written in such a way as to be complete and detailed enough to allow other scientists to verify their content and be able to reproduce their results. Unfortunately today many journals, especially those having high impact factors, publish too short papers, whose content is not sufficient to allow for checking of the presented results, and *a fortiori* to reproduce them.

The development of science being a constructive and collective process, it is essential to guarantee the validity of the published results in order that other scientists can rely on them to develop their own contributions. This is the function of peer-reviewing, which is a sophisticated task, requiring a lot of time and concentration. Researchers consider it as an integral part of their academic duty and therefore do not ask any extra money for doing it (anyway their expertise is so rare that publishers could not afford to pay the price). In general the peer-reviewing process lasts several months, or even years, since one, two or more revisions might be necessary before an article could be

accepted for publication. In order to check the validity of the submitted results, editors and referees are entitled to ask the authors to reproduce some experiments, perform news ones, verify computations considering the same set of parameters or a new one, together with any additional verification they will consider necessary to assess the results. For the sake of article's readability, referees can also require that authors rewrite, develop or discard one or several paragraphs, and add references to other related articles.

Peer-reviewing can only be adequately performed for complete and detailed articles, submitted to disciplinary journals providing well-recognized researchers acting as editors, able to find highly qualified referees (at least two) specialists of the topics addressed in the submitted article and who are still doing research. Refereeing implies finding errors, checking the originality of the presented results or methods, proposing references to be quoted, detecting plagiarism, and finally deciding if the article is interesting enough for the journal's readers. The main goal of peer-reviewing is to improve the quality of all submitted articles (*e.g.*, by correcting errors, even for those not yet good enough to be accepted) and guarantee the originality of all published articles. Unfortunately there is now a profusion of multidisciplinary journals (having high impact factors since they cover many disciplines, *e.g.*, *Nature* or *Science*) where the editors in charge of peer-reviewing are not 'peers', since they are not active researchers but employees of the publisher (called 'staff-editor' or sometimes 'resident-editor'). Those multidisciplinary journals should remain on the market, and even develop more, since the results of research should be disseminated across disciplines and able to reach any interested public (*e.g.*, general audience, students, science enthusiasts whatever their age,...). But multidisciplinary journals should not be confused with disciplinary journals. Indeed, one should use a different terminology to distinguish them from disciplinary journals. Moreover, the usage of multidisciplinary journals should be measured by specific bibliometrics indicators, distinct from the bibliometrics indicators of disciplinary journals.

Recommendations

• Clarify the terminology concerning the reviewing process to distinguish if it is performed by peers (*i.e.*, a researcher in activity) or not. I propose three categories for the different types of reviewers :
- *independent peer-reviewer* for an editor or a referee who is a peer
    (*i.e.*, a researcher in activity specialist of the topic presented in the article),
    and who is not paid or compensated by the publisher,
- *non independent peer-reviewer* for an editor or a referee who is a peer,
    but who is paid or compensated by the publisher
    (*i.e.*, in the form of gifts, invitations to conferences, travels, payments of services…),
- *non-peer reviewer* for a person acting as an editor or as a referee who is not a peer
    but an employee of the publisher.
    Scholarly publication should only correspond to *peer-reviewed* articles and journals.

• Clarify the terminology concerning the content of a publication, in order to know if it provides enough information for one to be able to check its content and reproduce its results. I propose three categories for the different types of scholarly publications :
- *disciplinary article* for a publication which addresses a highly specialised topic of a given discipline, which is written using the appropriate specialised terminology, and whose presentation is as complete and detailed as necessary for its content to be checked by referees and the results reproduced by other researchers,
- *disciplinary communication* for a publication which announces in a concise way new results obtained on a highly specialised topic of a given discipline, written using the appropriate specialised terminology to understand the presented results, but without providing enough information to check the presented results and be able to reproduce them,
- *multidisciplinary communication* for a publication which is as clear and easy to read as possible, using a non specialised terminology (or when necessary after redefining the technical words and acronyms that

are used) to inform scientists from all disciplines and public at large about new results, but without providing enough information to check the presented results and be able to reproduce them.
- Scholarly publication only correspond to *disciplinary* articles and communications.

• Clarify the terminology of the different versions of a scholarly article, in order for the reader to be informed that its content has been peer-reviewed, and if it is the published version. This has become crucial with the development of *open repositories* where most of publishers do not allow researchers to deposit the published version of their article. I propose six categories to distinguish the different versions of an article:
- *preprint* (also called *personal version* or *author's original*)
for the version whose content and layout are as set out by the author before the article has been peer-reviewed,
- *postprint* (also called *accepted manuscript*)
for the version typeset by the authors and modified according to the requirements of the referees after the article has been peer-reviewed and accepted for publication,
- *proof*
for the version typeset and copy-edited by the publisher that the authors should correct before the article can be published,
- *published version* (also called *version of record*)
for the version typeset, declared published and distributed by the publisher,
- *reprint* (also *called offprint*)
for the version typeset by the publisher for the authors to distribute the article themselves (before *Internet* publishers were asking authors to distribute themselves for free as many reprints as possible since it was the best way to advertise for the journal where the article was published),
- *corrected version* (also called *corrected version of record*)
for the new published version where author errors, publisher errors or other processing errors have been corrected.

Scholarly publication should only correspond to the *published version*, since it is the *version of record* for which there is no ambiguity to quote it (*i.e.*, a sentence is indexed by the page number where it appears, a figure caption by its number, and an equation too). It is important that the metadata distinguishing those different versions should be machine readable. Indeed, electronic publishing allows to experiment new ways of publishing where a peer-reviewed article might be able to evolve in time (*e.g.*, as already experimented with *Living Reviews* (http://www.livingreviews.org/), or as *open source* codes do too). A standardized terminology, such as proposed here, will be useful to track the history of the different versions of an article (*e.g.*, as *Wikipedia* is doing with its history button).

1.2   Publishers should not automate and own the peer-reviewing process

Some publishers seek to minimise the time spent on peer-reviewing in order to publish more articles in a shorter time. With this goal in mind, they have developed electronic platforms to automatically manage peer-reviewing and editing (*e.g.*, *Elsevier Editorial System EES*). They use electronic robots to find referees which ask, to those who accept, to comply with ever shorter delays for sending their report and send them automatic emails if they are late. As result more and more scientists today refuse to referee papers, since they are not respected but treated as cash-cows, and those who accept are then enforced to check articles superficially, often without taking the time to read them in full detail. Today most publishers enforce editors, referees and authors to use their platforms in order to gather quantitative data about the way peer-reviewing is performed. As a result, they are now able to measure scientists' productivity (as author, referee or editor) in order to design new methods to increase it and automate it still further. For instance, they use those data to design expert systems which look for referees by sending emails generated by robots. Therefore researchers receive formal demands for peer-reviewing articles but there is no more a journal's secretary or an editor with whom they could discuss with. It also happened that robots asked authors to

refer their own article. Some authors refused to do this but the robot automatically asked them again, since there were no human to read their answer. Other authors refereed their own paper, but this were then denounced and several publishers had thus to withdraw many published papers (*e.g.*, *Elsevier* in 2013 and *Springer* in 2015) which have been peer-reviewed by one of their authors (see http://openscience.ens.fr/OTHER/PEER-REVIEWING). Publishers present those cases as fraud while it is their expert system which generates the conditions for this to happen by automatically asking some authors to peer-review their own paper.

Another trick some publishers use to increase their revenues is to create series of journals of decreasing quality, for which the peer-reviewing process is only done once (*e.g.*, *Physics Review Letters* and the series of *Physical Review*, or *Nature* and its satellite journals *Nature Physics, Nature Immunology, Nature Plants, Nature Communications, Nature Scientific Reports*…). Their goal is that any article, whatever its quality, should be published. Therefore if the article is refused it cascades down with its referee report(s) to a less prestigious journal belonging to the same publisher, until finally one journal accepts to publish it. The overall cost is very low since the same referee report(s), often only one or two, are used while the article visits this series of journals. Sometimes this reassignment of a paper to another journal is performed by the publisher based on a few keywords and the journal editor does not even know about it. On August 30th 2016 *Elsevier* has obtained a patent for 'online peer-reviewing', where this cascading process is explained in detail (see http://openscience.ens.fr/OTHER/PEER-REVIEWING). This is very surprising that such a patent has been accepted since the method is not an innovation and other publishers have developed it before. Some publishers also artificially increase the impact factor of their journals by requiring that the authors add in their article several references to some recent papers published in their journal (*e.g.*, see http://openscience.ens.fr/OTHER/PUBLISHERS/ELSEVIER/2012_Elsevier_Bad_Practices.pdf). Another practice to be deprecated concerns journals where authors act as editors and choose the referees of their paper (*e.g.*, the members of the *National Academy of Sciences of the United States* select the referees of their papers submitted to the proceedings of that academy, the journal PNAS, see http://www.pnas.org/site/misc/reviewprocess.pdf). Usually authors are allowed to suggest referees but only the editor decides, and in this case she cannot.

The present tendency towards the spread of *gold open access*, as publishers lobby to impose this model only, leads to the emergence of a multitude of new journals of very poor quality, and even of fake journals called 'predatory journals'. The reason for this is very simple: since the authors have to pay *article processing charges* when they submit their article to a *gold open access* journal, the publisher's interest is to publish more and more articles per journal and to create many new journals. The system they use for this is quite similar to spams : they send automatic emails to a very large number of researchers inviting them to be editors and, since most of them are not well informed of those new methods and are proud to become editors, they accept. Today researchers get such offers by email at least once a month. They also sometimes found their name listed as member of a new journal editorial board without having given their consent, or after having refused to do so. Another reason for the development of such predatory journals is the present fierce competition for academic positions and research contracts, whose award depends on the number of articles and the journals where researchers publish, but not on their content. Even worse, some institutions in different countries (*e.g.*, Chile, Brazil or China, but also United States) correlate the salary of their researchers with the number of their publications. This leads *de facto* to 'buy' to publish, and predatory journals accept all submitted papers by performing very light or automatic peer-reviewing, while fake journals do not even publish the article but only send a letter to the authors confirming their paper has been accepted, which is often a sufficient proof for their employer.

Recommendations

• Some publishers enhance the productivity of their business by manipulating the peer-review process (*e.g.*, their expert system automatically chooses referees or recommend them to the editors, then at the stage of proof checking authors are required to add references to articles published in journals their own in order to artificially increase their impact factor…). Actually those practices should be detected and exposed, since they harm the quality of peer-

reviewing and therefore of scholarly publications themselves. The *European Commission* should encourage researchers to denounce such bad practices and provide them a platform to do so (*e.g.*, as a new service of *OpenAIRE*).

• Researchers acting as editor or referee should be respected while performing this sophisticated task, requiring expertise, time and concentration. Presently it is rarely the case, which explains why more and more researchers nowadays refuse to do it, or do not spend enough time to do peer-reviewing carefully enough. The *European Commission* should undertake a survey asking researchers to describe their experience with peer-reviewing (as author, referee and/or editor), if they are satisfied by the present practices, if not what should be modified and how. Editors should also state whether they have a contract with the publisher of the journal, if they are paid for peer-reviewing and, if so, how much. Such a survey would be important to assess how different are the peer-reviewing practices depending on the discipline, the type of journal and its reputation (from my own experience I have not noticed a significant correlation between the reputation of a journal and the quality of its peer-reviewing).

• Electronic editorial systems should be designed with and for the members of editorial boards in charge of peer-reviewing and remain under their control. The data gathered by such publishing platforms should belong to the editorial board of the journal and no longer to its publisher.

1.3 Publishers should not have the monopoly of bibliometric and research evaluation software

The bibliometric system was designed by librarians to try to optimise the choice of journals they subscribe to. It has then been diverted from its objectives by publishers (*e.g.*, *Scopus* belongs to *Elsevier*) for the sake of strengthening their business, using marketing methods such as pricing proportionally to the *journal impact factor* and bundling, also called 'big deal', where price is reduced under the condition of buying a large collection of the publisher's journals (*e.g.*, *Elsevier*'s *Freedom Collection*). Two major commercial companies are computing such bibliometric indices (*i.e.*, *Thomson-Reuters* with *Web of Science* and *Elsevier* with *Scopus*) that they sell at high prices to research institutions and funding agencies all over the world. For this they pretend to apply scientific method to evaluate the production of researchers, as stated by Thomson-Reuters: *'Counting, measuring, comparing quantities, analysing measurements: quantitative analysis is perhaps the main tool of science. Bibliometrics (sometimes called Scientometrics) turns the main tool of science, quantitative analysis, on itself'* (see http://wokinfo.com/media/mtrp/UsingBibliometricsinEval_WP.pdf). The flaw is that they do not provide the data nor the algorithms they use to compute them, and thus cannot pretend to use scientific methods as they falsely advertise.

One should realise that the *journal impact factor* is a non sense since it is strongly biased by mixing different types of articles, as it is the case with multidisciplinary journals, and it pretends to be precise up to three decimals! It is also gamed by some publishers who require that authors add citation to articles published the last two years in their journals in order to artificially increase the impact factors of their journals (*e.g.*, http://openscience.ens.fr/OTHER/PUBLISHERS/ELSEVIER/2012_Elsevier_Bad_Practices.pdf). Actually the *journal impact factor* has often be denounced in the past, but unfortunately it is used more and more today. The *DORA declaration* made on December 16th 2012, during the *Annual Meeting of The American Society for Cell Biology* (ASCB) in San Francisco, explained that: *'The Journal Impact Factor is frequently used as the primary parameter with which to compare the scientific output of individuals and institutions. The Journal Impact Factor, as calculated by Thomson Reuters, was originally created as a tool to help librarians identify journals to purchase, not as a measure of the scientific quality of research in an article. With that in mind, it is critical to understand that the Journal Impact Factor has a number of well-documented deficiencies as a tool for research assessment. These limitations include: A) citation distributions within journals are highly skewed; B) the properties of the Journal Impact Factor are field-specific: it is a composite of multiple, highly diverse article types, including primary research papers and reviews; C) Journal Impact Factors can be manipulated (or "gamed") by editorial policy; and D) data used to calculate the Journal Impact Factors are neither*

transparent nor openly available to the public' (see http://openscience.ens.fr/DECLARATIONS_ON_OPEN_ACCESS/ 2012_12_16_San_Francisco_Declaration_on_Research_Assessment.pdf*).* The *article impact factor* (also called *article-level metrics* ALM) might seem to make more sense but it cannot be considered reliable, since an article potentially increases its *impact factor* by containing errors, which will be detected and cited in subsequent articles.

Bibliometric indicators are nowadays increasingly used to evaluate researchers' work and career, which therefore distorts their publication practice (*e.g.*, disciplinary articles are submitted to multidisciplinary journals which obviously have higher impact factors than disciplinary journals, a long article is split into several smaller ones, the same idea is published in different journals without referees are able to detect the lack of originality). There are even institutions (*e.g.*, some universities in United States, Chile or China) where the career advancement, and even the salary, of their researchers is indexed on the number of articles they publish per year and on the impact factor of the journals where they publish. This abuse of bibliometrics is developing very fast and publishers are now selling to science managers new tools to evaluate research productivity which are based on their bibliometric indicators (*e.g.*, *SciVal* from *Elsevier* and *InCites* from *Thomson-Reuters*). Therefore it is urgent to develop new bibliometric indicators and evaluation software designed independently of publishers, for instance by funding agencies as help to decision making.

It is crucial that disciplinary journals (based on peer-reviewing and aimed at reproducible science) should be distinguished from multidisciplinary journals (based on popularisation of science and aimed at advertising new results), and their bibliometric indicators should also be separately computed. Moreover, a disciplinary journal should be owned by the researchers who are taking the responsibility of peer-reviewing the submitted articles, namely the editorial board of the journal. An multidisciplinary journal should be owned by the publisher who hires scientific journalists to survey what is published in different disciplinary journals. Their role is to detect the most interesting articles whose results deserve to be known outside their discipline. For this they write another article, shorter and easier to read than the original disciplinary articles. There is actually a new and highly promising business that publishers should develop as media between researchers (writing and peer-reviewing disciplinary articles) and society, where citizens would like to be informed of scientific advances thanks to those multidisciplinary articles (written by scientific journalists). Existing multidisciplinary journals (*e.g.*, *Nature*, *Science* or the proceedings of different academies of sciences such as the American *Proceedings of the National Academy of Sciences* PNAS) constitute the germs of such journals that will play the important role of science criticism, on the model of literary, music or film criticism that are essential tools of mediation between creators and citizens.

Such science criticism will also naturally develop among researchers as soon as new platforms and software (*e.g.*, *Open Science 2.0* tools) will allow them to curate articles themselves, namely recommend those they prefer to their colleagues, students, and also amateur scientists. It is important that such curation will be made, or at least controlled by researchers themselves, since those review papers should be well written and explain difficult concepts in a plain intelligible style, while at the same time remaining scientifically accurate. In an exchange I had with Tim Gowers on his blog in 2007 I explained that how I saw such a curation : *'you write reviews only about papers you like, to share your enthusiasm with others. If you do not like a paper, you should not waste your time explaining why you don't like it. As a result, there will be no negative review and, since dull papers will not be reviewed, they will fade away without any action being needed. Concerning papers where you find some mistake, the gentleman's practice is to contact the author(s) and keep the debate private.The burden today is the huge number of papers which are published and that no one (or few) takes the time to read (besides the referees who are bound to do so). Developing the practice of review at large scale and in an open way is certainly an excellent direction where we should go. This practice has a long history in arts and literature, known as 'la critique littéraire' (literary criticism). The beauty of the present proposal is that, instead of being critical, it is supportive. Let us call it 'la recommandation mathématique' ('the mathematical recommendation' may be an appropriate translation). It is time to take this very seriously: the number of publications increases while the time available to sit quietly and read them (without being interrupted) decreases, therefore we will soon reach a point where the time spent for reading the papers published in our field will tend*

towards a set of measure zero. The practice of the 'mathematical recommendation' may be a way to overcome this obstruction, and I do not see any objection for not trying to work it out' (see http://openscience.ens.fr/OPEN_ACCESS_MODELS/ALTERNATIVE_MODELS/2007_09_15_Tim_Gowers_Marie_Farge.pdf).

Documents on http://openscience.ens.fr

To understand how *Elsevier* and *Thomson-Reuters* sell to research managers and funding agencies the tools they develop to evaluate the productivity of researchers, called *Scival* based on *Scopus* and *InCites* based on *Web of Science,* see http://openscience.ens.fr/MARIE_FARGE_ON_OPEN_ACCESS/2014_CONFERENCES_ON_OPEN_ACCESS/2014_12_02_BIBLIOMETRIE_ET_EVALUATION_DE_LA_RECHERCHE_ABDU_PARIS/

Recommendations

• The *European Commission* should sign the *DORA Declaration on Research Assessment of 2012* and join the 825 institutions which have done so by August 2016 (see http://www.ascb.org/dora/).

• Disciplinary and multidisciplinary journals are complementary and their bibliometrics indicators should no longer be compared.

• The *European Commission* should help librarians to redesign *bibliometrics* or *scientometrics* in an open and reproducible way by funding projects, where librarians will collaborate with statisticians and data analysts to propose more reproducible indicators.

• The *European Commission* should recommend to the *European Investment Bank* EIB and to the EU member states to retain funds, through for instance their national public investment banks (such as the *Banque Publique d'Investissement* BPI in France), to be able to bid the offers of major publishers trying to keep control of bibliometrics and *open access* publishing.

• *Thomson Reuters* announced on July 11th 2016 that it sells its intellectual-property and science division, which includes *Web of Science* and J*ournal Citation Reports*, for 3.55 billion $ to a private equity funds affiliated with *Onex* and *Baring Private Equity Asia*. The new owners will very probably break up the division and resell its parts for a profit. Most probably the *Web of Science*, the most used bibliometric platform, will be bought by *Elsevier* or *Springer Nature,* unless a public agency or a consortium of several public agencies, together with the help of sponsors (*e.g.*, George Soros, Gordon Moore or James Simons), succeeds to buy it. The *European Commission* should participate to such a consortium whose role would be to acquire *Web of Science* and open its data for offering them to all researchers, librarians and funding agencies as a *Knowledge Commons*.

• The *Higher Education Funding Council for England (EFCE)* has proposed a new methodology, the *Research Excellence Framework* (REF), to asset the quality of research made in higher education institutions in *United Kingdom* which might be an example to follow since it does not consider the number of published articles and the impact factor of the journals, but only the four best articles or books a researcher has published during the last six years and referees should evaluate them qualitatively (Research Excellence Framework, http://www.ref.ac.uk/). I recommend that the *European Commission* tests such non-quantitative procedure and, if it gives satisfaction, uses it for evaluate applications to its programs and advises UE member states to use it too. If research evaluation no longer blindly relies on bibliometric indicators but on assessing the quality of only the few best articles, this will give incentives to researchers to write less articles whose content will be more consistent, which will thus improve the reproducibility of the results they present.

2. How to control the *gold open access* model developed by publishers

2.1 Researchers should be informed of the peer-reviewed publication system and of its cost

It is important to assess the overall publishing process, by describing how it works (*i.e.*, who performs each task, who pays for it, …), analysing the legal situation of all assets (i.e., articles, journals, referee reports, …), and estimating all the involved costs. For this, one should take into account the complete chain from authors to readers (*i.e.*, authors, staff-editors, peer-editors, referees, negotiators, librarians, lawyers, …), together with the subscription fees, the *article processing charges*, the clearance system insuring that they are not paid twice (or more), the cost of measuring the number of downloads, and the salary of librarians checking if researchers share their passwords for downloading articles and enforcing them to respect the publishers' embargo periods. The publishing system is the same worldwide since it is dominated by few major publishers, who *de facto* impose their business model to all other publishers, who are then obliged to follow it if they want to maintain their profit margins. In contrast, the peer-reviewing and publishing practices differ sensibly from one discipline to the other, therefore it is also important to assess those differences (*e.g.*, computer scientists prefer to publish peer-reviewed articles in proceedings rather than journals, in physics and mathematics many journals allow authors to deposit the published version of an article on an open repository without any embargo period).

The *Berlin Declaration of 2013*, issued for the 10th anniversary of the *Berlin Declaration of 2003* (see Appendix 1), stated that: *'It is time to return control of scholarly publishing to the scholars.'* Unfortunately researchers are not informed of the major mutations affecting scholarly publication and its business model. In particular they are unaware of the cost of the journals they use since they do not participate to the negociations with publishers. Moreover, subscriptions are paid on the library budget, not on the research budget, and librarians are not authorised to disclose the subscription contracts, neither to inform researchers about the negotiations. For the last twenty years some librarians have disclosed their contracts but they were then sued by publishers. Since 2000 Ted Bergstrom, professor of economics at *University of California at Santa Barbara* (UCSB), has appealed to the *Freedom of Information Act* and managed to estimate the cost of subscriptions paid by several american universities (see, http://openscience.ens.fr/MARIE_FARGE_ON_OPEN_ACCESS/2011_AVIS_POUR_LE_COMITE_D_ETHIQUE_DU_CNRS/BIBLIO_AVIS/2001_Theodor_Bergstrom.pdf and http://openscience.ens.fr/ABOUT_OPEN_ACCESS/ARTICLES/2014_05_21_Proc_National_Academy_of_Sciences.pdf). In 2014 Tim Gowers, professor of mathematics at *Cambridge University* has managed to do so in the *United Kingdom* (see, http://openscience.ens.fr/ABOUT_OPEN_ACCESS/BLOGS/2014_04_24_Tim_Gowers.pdf).

Unfortunately the current competition for excellence stresses researchers and lead them to behave selfishly. Therefore most of them prefer not to get involved with common interest issues, that they consider political rather than academic. This behaviour is induced by the *'publish or perish'* diktat, which is amplified by the bibliometrics indicators promoted by publishers (*e.g.*, the journal impact factor, or the *h-index* which allows to rank researchers by reducing to one integer their whole article production). Indeed, for their career's advancement researchers are pushed to publish more and more, faster and faster, articles that most of them have no time to read… In order the few major publishers, owning the main peer-reviewed journals, maintain their exceptional profit margins (*e.g.*, 39% for *Elsevier* in 2013), it is critical that researchers do not ask to be paid for peer-reviewing or to be editors, which is only possible as long as they are unaware of the publishers' business model and profits. This is why it is essential to inform them of the cost of both subscriptions and *article processing charges*. It is also important that some researchers, especially those whose are members of editorial boards, be involved in negotiating the contracts between academic institutions and publishers.

Recommendations

• The *European Commission* should modify the exception to the *public market law* which authorises subscription contracts to be non disclosable, in order to protect intellectual property rights. This exception should not apply in the case of peer-reviewed journals since researchers are enforced to give their intellectual property for free to publishers, although they perform peer-reviewing without being paid by publishers.

• The *European Commission* should mandate an audit of the overall publishing process and all its induced costs.

• The *European Commission* should create a website (*e.g.*, on the European platform *OpenAIRE*, http://openaire.org) to provide links to the best tools (*e.g.*, seminars, tutorials, webinars, workshops, posters…) describing the current publishing system and estimating its overall cost. Its role could also be to reveal bad practices and recommend good ones.

2.2 Publishers should no longer own the peer-rewieved publication system but service it

After ten years of lobbying against *open access*, the major publishers are ready to cope with. Their goal is now to take control of the whole electronic publication system by imposing the *gold open access* model as soon as possible. They want to ensure that no alternative model could emerge and challenge their present market dominance. Up to now this strategy has been very successful since, for the majority of researchers, *open access* means *gold open access* ! There already exist several alternative models but researchers are not aware of them. Indeed, due to the very efficient lobbying of publishers for *gold open access*, this model is on the way to take over in Northern Europe since UK, Germany, Austria, Netherlands, Sweden, Finland and Norway have adopted national policies to encourage it. The problem is that *gold open access* allows publishers to continue fixing themselves the price of subscription fees, but also fix the price of *article processing charges*). A crucial strategy for publishers is to ensure that researchers remain unaware of the cost of subcription, and now of the cost of *article processing charges*. Indeed, their business model relies on the fact that researchers volunteer their time to write articles and peer-review them, without disputing them the validity of owning their articles and academic journals.

The only room left to institutions for negotiating with publishers is to refuse the *hybrid* model, also called *double dipping*, that publishers impose upon them in order to earn both subscription fees and *article processing charges*. Unfortunately, in proceeding so scientists will forever remain ignorant of the cost of publication and continue to work for free, as authors, editors and referees, in the sole interest of publishers. In October 2015 the *Max Planck Digital Library* (MPDL) published a survey showing that the *Max Planck Gesellschaft* (MPG) is wealthy enough to pay *article processing charges*, as long as their negotiators refuse the *hybrid* model. This idea has been tested at CERN (*Centre Européen pour la Recherche Nucléaire*) since 2014 with the program *SCOAP3 (Sponsoring Consortium for Open Access Publishing in Nuclear Physics)*, where the payment of subscription plus *article processing charges*, of the *Hybrid model,* has been converted into the payment of subscription or *article processing charges*. This opens a dangerous path because, as long as publishers decide the price of *article processing charges*, they keep controlling the overall publishing system. This business model was acceptable when they were printing houses and Internet did not exist, but no longer makes sense economically for electronic publishing. Indeed, despite the present technical revolution (transition from printing to online publishing), they have succeeded in keeping their old business model to

maintain and even increase their profit margin. As a result, our institutions still waste time and money negotiating non disclosable contracts for huge fees (the only difference being that *article processing charges* now replace subscriptions). As long as publishers retain the ownership of scholarly journals and of the peer-reviewing process (carried out by researchers who are paid by their institution, not by the publisher, but who use the publisher's platform for that), nothing will change. Public money dedicated to produce scientific results will still be wasted for buying back to publishers articles written and evaluated by researchers to disseminate the results they obtain. This might be as dangerous as, at the end of Middle-age, letting copyists control the development of printing, in order to stop printers challenging the copysts' business model when it became obsolete. The blooming of the European Renaissance would have never happened, or at least been delayed... Maintaining publishers as content owners (of articles, journals, data and metadata) is an archaism, inherited from the printing era. Such a political choice, resulting from lobbying, is dangerously counter-productive in the electronic publishing era. Publishers should, as soon as possible, become service providers and no longer content-owner, as is still the case today. If they refuse, research institutions should develop innovative electronic publishing models without them, with the help of open source code developers and librarians (who are specialists of information management).

It is important to stress the advantages of having *open access* as the standard model for scholarly publishing:
- researchers would keep their *copyright* and thus be able to reuse the figures and data tables contained in their articles (*e.g.*, they might be relevant for another article, or for comparing results obtained with different methods) and also keep the right to access for free the databases where they store their results (*e.g.*, from observations, laboratory measures or numerical experiments),
- since there will no longer be subscription contracts, librarians would not have to pay subscriptions, neither manage the restrictive access conditions to journals behind paywalls, nor comply to the non-disclosure conditions of the current subscription contracts,
- private research institutes linked to industries would be the first to take advantage of *free open access* to peer-reviewed articles as, most of the time, they are too small to afford buying very expensive subscriptions to the large number of scientific journals they need. Therefore generalising *open access* would directly benefit to industry.

Documents on http://openscience.ens.fr
The different steps from submission to publication of an article, together with the *Copyright Transfer Form* that publishers ask authors in order to publish their articles, are illustrated by taking as example a paper I submitted in May 2015 to *Journal of Plasma Physics*, deposited in the open archives *arXiv* in August 2015, and that finally *Cambridge University Press* published in December 2015, see http://openscience.ens.fr/ ARTICLE_FROM_SUBMISSION_TO_PUBLICATION/. Note that the Copyright Transfer Form is particularly unfair since I give all my copyrights away but I am also required to '*warrant that all statements purporting to be facts are true and that any recipe, formula, instruction or equivalent published in the Journal will not, if followed accurately, cause any injury or damage to the user*'!

Recommendations

• The European platform *OpenAIRE* (http://openaire.org) and its open repository *Zenodo* (http://zenodo.org) should be included in the *Open Science Cloud* which is proposed by the *European Commission* (http://ec.europa.eu/ research/openscience/index.cfm?pg=open-science-cloud).

• The *European Commission* should support a project to assess the overall publishing process, by describing and analysing the ownership of all assets (*i.e.,* articles, journal title, peer-reviewing documents, editorial platform, journal's website, metadata, bibliometric data, download data...). It is also important to assess how those practices vary depending on the different disciplines. The *Open Access Infrastructure for Research in Europe* OpenAIRE (https:// www.openaire.eu/ and Appendix 3) might be the platform to openly publish those cost estimates.

• The *European Commission* should also support lawyers able to assess the overall publishing process and analyse the legal conditions of ownership (*e.g.*, of journals, articles, articles' metadata, peer-review reports and mails exchanged via the journal's platform, the data harvested during peer-reviewing, the data harvested during articles' downloading, …) and contracts signed between publishers, authors, editors, librarians and funding agencies (*e.g.*, for creating a journal, selling a journal to another publisher, hiring an editor, negotiating a subscription to a journal or a bundle of journals, transferring *copyrights*, owning supplementary data that authors put on the journal's website, …).

2.3 Researchers should recover control of the peer-reviewed publication system

We need to ensure a smooth transition from *toll access* to *open access* to peer-reviewed scientific publications. The *toll access* model, where journals are kept behind paywalls, was initiated when publishers were printing houses, which owned the journals and the articles they printed and sold by subscription. Today there are about 30,000 peer-reviewed scholarly journals that different academic communities covering a wide range of disciplines have created and maintained, some for more than three centuries. Researchers want to preserve most of existing peer-reviewed journals since they constitute the backbone of the present system for sharing research results. Journals and peer-reviewed articles *de facto* constitute the *knowledge commons* (cf. *Charlotte Hess and Elinor Ostrom, Understanding Knowledge as a Commons, MIT Press, 2006*) that researchers use to produce, share and assess the academic knowledge they produce. For the last twenty years the most renowned peer-reviewed journals have gradually been bought by few major publishers, whose exceptional profits rely on the work researchers and public funding agencies offer them for free.

Few years before the advent of the third millennium *open access* became technically possible, thanks to word processing, electronic publishing, Internet and the Web. Publishers then took advantage of those new digital means to reduce their costs, whilst maintaining their ancient business model, designed for printing, which relies on *toll access* and the exclusive property of peer-reviewed journals and articles. Under the pressure of funding agencies, such as the *National Institute of Health* (NIH) in United States and the signatories of the *Berlin Declaration* in Europe, publishers realised that *open access* will become mandatory, sooner or later. Actually, for more than a decade they strongly opposed the bills that NIH proposed to the *American Congress* to ensure *open access* to all publications derived from researches financed by the federal budget. In 2012, on *Tim Gowers'* initiative, we launched with 33 mathematicians from seven countries the movement *The Cost of knowledge* (http://thecostofknowledge.com) to oppose the *Research Works Act*, a bill proposed by two congressmen as the result of the lobbying pressure of *Elsevier*. We publicly denounced the practices of *Elsevier* (*i.e.*, the exorbitant price of their subscriptions and their bundling practice, they name 'big deals') and called our colleagues to boycott this publisher, *i.e.*, refuse to work (submit article, be referee or editor) for any of the 2000 journals owned by *Elsevier*, that is followed in 2016 by more than 16,000 scientists from all disciplines. As a result, Elsevier announced in February 2012 (*i.e.*, less than one month after the beginning of our boycott) that they no longer support the *Research Works Act,* thus the bill was dropped. *Elsevier*, with the help of other publishers (*e.g.*, the *International Association of STM Publishers* http://www.stm-assoc.org/), then redirected their lobbying towards the British government and the *Wellcome Trust,* which led to the *Finch report* published in June 2012. It recommended to have *gold open access* mandatory for their researchers they fund and the British government adopted this policy in July 2012.

Since the creation in 1991 by *Paul Ginsparg* at the *Los Alamos National Laboratory* of the *open repository arXiv* (https://arxiv.org/), many researchers all around the world consider that the *green open access model* is the best solution to disseminate their articles. Indeed, today most publishers allow authors who publish in *toll access* journals to deposit their articles in institutional or disciplinary repositories after a certain embargo period (whose duration publishers decide at their convenience). Since embargoes reduce and distort the dissemination of peer-reviewed articles, several countries (*e.g.*, Germany and France) are presently changing their *copyright* laws to forbid

them, or minimise their duration. Today researchers can easily find the abstracts of most papers electronically available via *Internet* but not their full texts due to embargoes. As a result, they often cite papers for which they have only read the abstract, which is not professional since this generates confusion and errors. Anyway it is possible to overcome the publisher's embargo by providing an *open access button (*also called *request button*, *request-a-eprint* or *Harnad's button)* which, if an article is still under publisher's embargo, automatically sends an email to the authors asking them to kindly provide the full text of their article *(e.g.*, as does the *open repository* HAL, https://hal.archives-ouvertes.fr/). Thanks to *open repositories* with *open access button*, we have now the *green immediate open access* model. It complies with the policy proposed by Carlos Moedas, the *European Commissioner for Research, Innovation and Science*, to have *immediate open access* to all scientific publications by 2020, which was accepted on May 27th 2016 by the *Council of the European Union* (see the point 12 of the *Council* conclusions on the transition towards an *open science* system in http://openscience.ens.fr/DECLARATIONS_ON_OPEN_ACCESS 2016_05_27_European_Union_Council_on_the_Transition_towards_Open_Science.pdf). We think that the *green immediate open access* model is the best solution for smoothly accompanying the transition from *toll access* to *open access*. Indeed, and in contrast to *gold open access*, it preserves the chance for new innovative models to emerge. Indeed, one needs time to design, test proptotypes and implement new innovative models at large scale, before being able to demonstrate their viability and adopt the most appropriate *open access* models.

Documents in appendix
Several examples of *open repositories* for *green open access* are given in Appendix 3: *OpenAIRE*, *Zenodo, HAL, arXiv*, *RePEC* and *EconStor*.

Documents on http://openscience.ens.fr
Documents concerning the new law that has been submitted to the French Parliament which will restrict the publisher's embargo to six months for science, technology and medicine and to twelve months for social sciences and humanities , see http://openscience.ens.fr/COPYRIGHTS_AND_LICENSES/LAWS/LOIS_FRANCAISES/ 2015-2016_LOI_POUR_UNE_REPUBLIQUE_NUMERIQUE/

Recommendations

•   *Green open access mode*l is the best solution to guarantee a smooth transition from *toll access* to *open access*, leaving room to innovation and fair competition for designing new alternative models. Therefore, the *European Commission* should facilitate, and eventually support, the development of a variety of *open repositories* of different sizes, offering new services that researchers might adopt or not (*e.g.*, *Zenodo*, the *open repository* of *OpenAIRE* which is supported by the *European Commission,* http://zenodo.org, https://www.openaire.eu/ and Appendix 3). Many solutions should be tried before choosing the most appropriate ones.

•   It is important that the *European Commission* remains partner of the *Research Data Alliance* RDA (https://rd-alliance.org/ and http://europe.rd-alliance.org/) to actively participate to the definition of international metadata standards (*e.g. Dublin Core* http://dublincore.org/ and *NISO* norms http://www.niso.org) which ensure the quality and interoperability of *open repositories* at international scale.

•   The *European Commission* should support a platform which will establish and maintain the list of publicly-owned *open repositories* used all over the world for *green open access*, describing how they are run, which software they use, how they handle metadata, what is their legal status and how they are funded. The *Directory of Open Access Journals* DOAJ (https://doaj.org/ and Appendix 2), the *Registry of Open Access Repositories* DOAR (http:// roar.eprints.org/ and Appendix 2), or the *Open Access Infrastructure for Research in Europe* OpenAIRE (https:// www.openaire.eu/ and Appendix 3) might be appropriate instances to do this.

•   The *European Commission* should support the development and proper documentation of *open source* software

to design *open repositories*, test them on existing platforms such as *Zenodo* (http://zenodo.org and Appendix 3) which is part of the *Open Access Infrastructure for Research in Europe* OpenAIRE (https://www.openaire.eu/ and Appendix 3), and to advertise those which have succeeded to gather a large community of users and developers collaborating together to create new services thanks to those *open source* software.

•   To ensure that all peer-reviewed articles be available in *open access* as soon as they are published, the *European Commission* should suggest that *open repositories* provide an *open access button* which automatically sends an email to the author of an article under a publisher's embargo, asking her to send a version of her article to the reader looking for it.

•   For evaluating a proposal the European programs (*e.g.*, *Horizon2020*), or the European institutions (*e.g.*, the *European Research Council* ERC) should also take into account articles which have been submitted to a peer-reviewed journal, but not yet accepted, for which a version has already been made public on an *open repository*. For anteriority an article thus freely available in *green open access* should be considered to be as relevant as its version published in *toll access* or *gold open access*. Indeed, the *preprint* made accessible on an *open repository* before the peer-reviewing process has been completed should be recognized as the first report of a new result.

•   The *European Commission*, together with UNESCO, OCDE, different public funding agencies and academies all over the world, should lead a reflection to define and design, technically and legally, the *Commons of Knowledge* that *Elinor Ostrom* (*Nobel Prize of Economy* in 2009) proposed many years ago. Indeed, all peer-reviewed scholarly articles should be protected and held in trust as cultural heritage of humanity.

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3. How to develop the *diamond* and *green open access* models proposed by researchers

3.1 Researchers should own the peer-reviewed journals they create

Today the large majority of peer-reviewed articles are still published with the toll access model, where institutions pay subscription to publishers in order their researchers can read sccholarly journals. However, the few publishers who dominate the market are imposing the *gold open access* model where, in order to publish, authors or their institutions have to pay article processing charges, whose amount is fixed by the journal's publisher. The *Hybrid* model which is presently the usual way for publishers to propose *open access* is an even better deal for them, since in this case both readers and authors have to pay them both subscriptions and article processing charges.

The group of mathematicians who called *Elsevier*'s boycott (http://thecostofknowledge.com/) felt it is their duty to propose alternative publishing models to recover control of their articles and of the peer-reviewed journals they create and need. In June 2012 they proposed the *diamond open access* model (a terminology inspired from the *Diamond Sutra*, treasure of the British Library that was printed in 868 in China). This model is characterised by the fact that neither readers nor authors have to pay to read or publish articles, and it is based on three principles:
– authors keep their *copyrights* and attach to their article a *Creative Commons* license CC-BY (only requiring the attribution of the paper to its authors, while allowing everyone to publish their article, together with any derivative products such as a translation, and even earn money for doing so),
– the editorial board is the legal entity which owns the journal (*i.e.*, its title and all its assets), whose members are active researchers (*i.e.*, peers) who take responsibility of peer-reviewing, that they perform without being paid (since it is part of their academic duty for which they get a salary),
- the publisher is no longer the journal's owner but becomes a service provider under contract with the editorial board, whose members can thus choose the publisher they prefer, or look for another one if they are not satisfied by the

delivered services.

For more details you can download the mails exchanged while designing the *diamond open access* model from http://openscience.ens.fr/OPEN_ACCES_MODELS/DIAMOND_OPEN_ACCESS/.

There already exist many journals which are published in *diamond open access* for which authors or their institutions do not have to pay *article processing charges* (*e.g.*, *Image Processing On Line,* IPOL, http://www.ipol.im/ and Appendix 4). In order to limit as much as possible the journal's cost, the peer-reviewing and publishing processes are automated using appropriate software, as commercial publishers do for the journals they own. But there is an essential difference with the *diamond open access* model, since the software used to help editors for peer-reviewing and publishing their journal are *free open source* software developed by the community of researchers to match their needs (*e.g.*, *Open Journal System* developed by the *Public Knowledge Project* funded by the American *National Science Foundation,* the *Canadian Foundation for Innovation, Stanford University,* https://pkp.sfu.ca/). Consequently all stakeholders (*i.e.*, authors, referees and editors) are confident that they are no longer spied by publishers trying to control the peer-reviewing process, which has become one of their practices to improve the journal's productivity (*i.e.*, more articles per issue and less time deserved for peer-reviewing) but not its quality. Indeed, commercial publishers have first to satisfy their shareholders who consider academic journals as very profitable commodities, without caring about the intellectual value of peer-reviewing since they do not pay for it. Unfortunately some academic publishers, although their are non-profit societies, have adopted the same practices to face the fierce competition of major commercial publishers and try to remain on the scholarly publication market.

Another way to publish in *diamond open access* is to rely on the *open repositories* developed for *green open access*. This leads to the concept of *overlay journals*, where authors first deposit their article in an *open repository* to be peer-reviewed. The authors have then two possibilities, either they mention the journal where they would like to submit their article, or they let different editorial boards find their article (which is already in *open access*) and propose them to peer-review it. An *overlay journal* is simply a set of links to the articles which have been peer-reviewed and accepted by its editorial board (*e.g.*, *Discrete Analysis* whose articles are in *arXiv* and which uses the software *scholastica* for managing the peer-review process*,* http://discreteanalysisjournal.com/ and Appendix 4). All articles are thus in *open access* as soon as they have been deposited by their authors in an *open repository*. Moreover, all articles can be copied from there, which guarantees that the most useful ones will always remain available. The prestige of journal should only depend on the expertise of the members of its editorial board and the quality of the peer-reviewing process they perform. The *journal impact factor* is a non sensical bibliometric indicator which has been gamed by publishers and proved to be counter-productive in terms of academic quality. It should be abandoned and replaced by author-based or article-based criteria (*e.g.*, *article-level metrics* ALM or *altmetrics).*

When alternative *open access* models will have proven to be effective (*i.e.*, for the quality of the articles they publish, the efficiency of their dissemination practices and their financial viability), editorial boards could try to emancipate existing journals if they are not satisfied by the publisher they deal with. Indeed, it is important for a given disciplinary community to resume control of the best, and often oldest, journals they use to publish their results. Emancipating a journal means that the ownership of its intellectual property is transferred from the publisher to the editorial board, the publisher being now paid as service provider (*e.g.*, see the scenario proposed in 2012 by the *International Mathematical Union*, http://openscience.ens.fr/ABOUT_OPEN_ACCESS/BLOGS/ 2012_10_22_Ingrid_Daubechies.pdf). Such a negotiation is complex and requires good lawyers to help the editorial board to recover control of the journal, arguing that its reputation is rather based on the quality of the peer-reviewing of its editorial board, rather than on the quality of the type-setting and printing of its publisher. Actually emancipating a journal is a better solution than creating a new one. Indeed, if an editorial board resigns and creates a new journal, the publisher keeps the title of the original one and has only to ask other researchers to accept to form a new editorial board. In contrast, the new journal should get a different title and compete with the other journal which keeps its original title. Although the chances of survival are quite low for the new journal, some have succeeded to do so (*e.g.*, in December 2006 the editorial board of *Topology* published by *Elsevier* resigned and launched the *Journal of*

Topology, which is published since 2007 by *Oxford University Press*, and in 2009 *Elsevier* had to stop the publication of *Topology*). There are quite many journals, from a very wide range of disciplines, which have managed since 1989 to emancipate from their publisher and launch a new journal (see http://oad.simmons.edu/oadwiki/Journal_declarations_of_independence).

Documents in appendix
Examples of disciplinary journals published in *diamond open access* are given in Appendix 4 : *Image Processing On Line* (IPOL), *Open Library of Humanities* (OLH), *Discrete Analysis*, *Glossa* and *SMAI-Journal of Computational Mathematics.*

Recommendations

•   The *European Commission* should provide legal support to researchers who wish to create new journals, or emancipate existing ones from the publishers owning them.

•   Consequently to *Brexit* the *European Commission* should reconsider the present negotiation about the European *copyright law* and take into account the fact that the EU member states, besides United Kingdom, are *author-right law* rather than *copyright law*, those two traditions being very different. This is also an essential international issue since the majority of United Nations members are presently ruled under *author right law* and Europe could play a leading role to help defining an international *author right law* and elaborate the notion of *knowledge commons* (as suggested by Elinor Ostrom, Economy Nobel Prize 2006, see *Understanding Knowledge as a Commons, From Theory to Practice, Charlotte Hess and Elinor Ostrom, The MIT Press, pages 171-208, 2006*).

3.2   Researchers need publicly-owned and *open source* publishing platforms

There already exists all over the world a very large number of institutional or disciplinary *open repositories* (see the *Directory of Open Access Repositories* DOAR http://www.opendoar.org/), where researchers can, voluntarily or mandatorily, deposit a version of each of their article, before or after its publication. The choice of the version depends on how authors have given their *copyrights* to the publishers (see examples of the *copyright* transfer form they have to sign in order their article be published http://openscience.ens.fr/COPYRIGHTS_AND_LICENSES/COPYRIGHTS/COPYRIGHT_TRANSFER_FORMS/). Unfortunately many institutional or disciplinary *open repositories* do not match the appropriate standards for metadata curation and remain hidden to the Web search engines. Moreover, even if someone finds the article she is looking for, she cannot download its full text and has only only access to its metadata (*i.e.*, title, names and institutions of its authors, abstract). This is due to the embargo period most publishers impose in order to retain behind paywalls the articles they publish. Several countries are presently modifying their *copyright* legislation to limit such embargo period to a minimum, or even to forbid them. For instance, France has voted and adopted a new law, called *Loi n°2016-1321 du 7 octobre 2016 pour une Republique numérique,* which limits the embargo period to six months for articles concerning science, techniques and medicine, and to twelve months for those in humanities and social sciences (see http://openscience.ens.fr/COPYRIGHTS_AND_LICENSES/LAWS/LOIS_FRANCAISES/2015-2016_LOI_POUR_UNE_REPUBLIQUE_NUMERIQUE/). Anyway it is possible to overcome the publisher's embargo by providing an *open access button (*also called *request button*, *request-a-eprint* or *Harnad's button)* which, if an article is still under embargo, automatically sends an email to its authors asking them to kindly provide the full text of their article (see https://openaccessbutton.org/). Thanks to such an *open access button*, we have now the *immediate green open access* model which complies with the policy of Carlos Moedas, the *European Commissioner for Research, Innovation and Science*, to have full open access to all scientific publications by 2020 and which was accepted on May 27th 2016 by the *Council of the European Union* (see the point 12 of the *Council* conclusions on the transition towards an *open science* system in http://openscience.ens.fr/DECLARATIONS_ON_OPEN_ACCESS/

Many publishers nowadays use electronic platforms to reduce the cost for peer-reviewing and publishing their journals and, by automating most of the process, they no longer need to provide a secretary to help the editorial board. For instance, *Elsevier* has developed the electronic platform EES *(Elsevier Editorial System)* to handle the peer-reviewing of all its journals, whatever the discipline, and requires that authors, editors and referees use it. As a result, the whole peer-reviewing process of a journal is under the control of its publisher, who owns the documents produced by the editorial board using their platform. This was not the case when peer-reviewing was done using email, since editors were then exchanging private mails with authors and referees. What is wrong with this present evolution is that the authors, editors and referees have to use the electronic platform designed by the publisher to reduce the cost rather than improve the quality of peer-reviewing. A much better solution would be that the editing platforms be designed by researchers, with the help of software developers, in order to facilitate their task and give them the control of what the platform is actually doing. It is important to use *free open source* software, in order to know which data are harvested doing the peer-reviewing process, but also to share expertise between different journals, and thus develop new innovative methods of peer-reviewing and converge towards good practices.

If a *diamond open access* journal is recognised to be useful to its discipline, and as long as its editorial board can prove good peer-reviewing practices, it could be published for free using the services of a publishing platform, which is a publicly-owned and publicly-funded infrastructure, designed to service a very large number of journals from different disciplines. The dissemination of the accepted articles would be done with the help of retrained librarians, together with publishers hired for their services, who would be in charge of curating metadata in order all articles could be properly located by search engines and downloaded for free from *Internet*. The governance of such service unit would be similar to other research infrastructures (*e.g.*, large telescopes, particle colliders, or supercomputers). They should be governed by three independent bodies: a *scientific committee* in charge of selecting the journals allowed to use the service unit for free, an *executive committee* in charge of designing and maintaining the infrastructure (*i.e.*, choosing computers and hiring technical staff, such as software developers, data managers and publishing specialists), and a *user committee* in charge of reporting problems to be overcome and needs for better or new services.

The financial support needed to offer for free such publishing infrastructures to researchers would be : either taken from the budget allocated for public research, on the model of what is made for high performance computing (*e.g.*, the *Partnership for Advanced Computing* PRACE, an international non-profit organisation providing computing and data management resources all over Europe, http://www.prace-ri.eu), or by offering various kinds of supplementary services that would be paid for their added value, such as editing, translating, converting files into various formats that can be stored and accessed through different media, such as pads or cell phones (*e.g.*, the *Freemium* business model used by *OpenEdition,* http://www.openedition.org). Several publicly owned and publicly funded publishing service units to host *open access* journals already exist in different countries and provide electronic platforms developed using *free open source* software. In France, the *Centre pour L'Édition Électronique Ouverte* CLEO publishes in *open access* more than 400 journals and 3,000 books of human and social sciences financed using the *Freemium* model and supported by several public institutions such as CNRS and *Aix-Marseille University* (http://cleo.cnrs.fr, http://www.openedition.org). In Brazil the *State of Sao Paolo* finances the *Scientific Electronic Library On Line* SciELO which publishes in *open access* more than 1,200 journals from many different scientific domains (http://scielo.org). In Germany, the *Deutsche Zentral Bibliothek für Wirtschaftswissenschaften* ZBW*,* jointly funded by the *German Federal Government* and the *States of Germany*, provides the publishing platform *EnconStor* which is an infrastructure for the free publication of scholarly literature in economics and business administration, and also publishes the *open access* peer-reviewed journal *Economics*. The *Max Planck Gesellschaft* MPG offers similar services, in particular the platform *Edition Open Access* for publishing books (http://www.edition-open-access.de), together with the platform *European Cultural Heritage Online ECHO* which gives *open access* to rare scholarly collections which has been digitalised (http://echo.mpiwgberlin.mpg.de).

These public infrastructures, needed for peer-reviewing and publishing *diamond open access* journals, can also be used as *open repositories* for the *green open access* model. Indeed, they can ensure the dissemination services and long-term archiving of all peer-reviewed articles, published in *toll access* journals, which have been deposited on the public platform. Moreover, since articles published in *gold open access* can be copied, thanks to their CC-BY license, they can also be copied and store on the same public platform. Many countries have *National Public Libraries* and it is time to have in addition *Electronic National Public Libraries (e.g.,* the European digital public library *Europeana* http://www.europeana.eu*, t*he *Digital Public Library of America DPLA* https://dp.la, and the digital public library *Gallica* of the French *Bibliothèque Nationale* http://gallica.bnf.fr/). The different National libraries linked together all over the world could thus constitute the *Knowledge Commons* that researchers need, not only to access articles for free, but also to publish them for free, with the guarantee that they will not in the future be privately owned or retained again behind paywalls.

An important issue is the long-term status of the *open access* publishing infrastructures, which should be publicly owned and have a legal structure which guarantees that they could not be privatised. This is why the start-up model might not be adapted for developing them, unless they are then bought by public institutions. What has been observed until now is that, as soon as a start-up is successful and its services are adopted by a large number of researchers, they are bought by commercial publishers who then control them and might thus build new paywalls. This has already happened several times in the past and this why researchers have become reluctant to collaborate with new innovative projects developed by start-ups. For instance, the *Social Science Research Network* (SSRN), which in 2013 was ranked (by *Ranking Web* http://www.webometrics.info/en/world) as the largest *open repository* in the world, was bought in May 2016 by *Elsevier.* Likewise, the start-up *Mendeley*, created in 2007 by three German PhD students who developed innovative Web-based tools for managing and sharing articles and foster research collaboration online, was bought by Elsevier in 2013. Moreover, in 2002 the start-up *Atira* was created and funded in Denmark to help the Danish *Ministry of Science, Technology and Innovation* to help the academic institutions and researchers to manage and improve their research outcomes. *Atira* developed the software *Pure* that was used by over 47,000 research staff in Denmark as their *Current Research Information System* CRIS, but it was bought in 2012 by *Elsevier* and integrated to their software *SciVal* which is sold to research institutions to evaluate and manage their researchers. As a result Denmark is now paying *Elsevier* large amount of public money to use *Pure*, whose development was financed on the Danish public budget. The *open repository arXiv*, which exists since 1990 and has become essential to physicists, mathematicians and computer scientists, might be the next *open access* platform to be bought by *Elsevier,* since its economical model is not yet fully secured. On April 4th 2016, during the *Conference on Open Science* organised by the *European Commission*and, *Springer Nature* has already expressed its intention to buy *open repositories* to further develop its *open access* business.

Documents in appendix
An example of a *free open source* software for publishing scholarly journals is given in Appendix 5 : PKP (*Public Knowledge Project*) and OJS (*Open Journal System*).
Examples of publicly-owned *open access* publishing platforms are given in Appendix 6 : SciELO (*Scientific Electronic Library On Line*), CLEO (*Centre pour l'Edition Electronique Ouverte*) and *OpenEdition* ZBW.

Recommendations

•   The *European Commission* should finance pilot projects to assess the existing publishing platforms and demonstrate their technical and economical suitability to help researchers to disseminate their articles via the Web, to peer-review and to curate them. This will actually be the best way to find out and make public the overall cost of electronic publishing (*i.e.*, investment cost and marginal cost, which is probably negligible), in order to estimate the price a publisher could reasonably ask for providing such a service, in particular what would be the fair price of *article processing charges*. The *Open Access Infrastructure for Research in Europe* OpenAIRE (https://www.openaire.eu/

and Appendix 3) might be the platform to openly publish those cost estimates. An important effort has also to be made concerning the quality of the metadata, attached to each article, and of their curation. Indeed, metadata are essential since they condition the accessibility of the articles deposited in *open repositories*. The *European Open Science Cloud* should federate the best existing publishing and archiving infrastructures, which are scattered across many disciplines and institutions of different EU member states.

•   The *European Commission* should use the ORCID identification system to uniquely identify the researchers who get EC contracts.

•   The *European Commission* should recommend to the *European Investment Bank* EIB and to the EU member states to retain funds (*e.g.*, through their national public investment banks such as the *Banque Publique d'Investissement* BPI in France), in order to bid the offers of commercial publishers for acquiring *open repositories* which might be sold. The *Social Science Research Network* SSRN, which was ranked in 2013 as the top *open repository* in the world (by *Ranking Web* http://www.webometrics.info/en/world), was bought in May 2016 by *Elsevier*. The *open repository arXiv*, which exists since 1990 and has become essential to physicists, mathematicians and computer scientists, might be sold, since its economical model is not yet highly secured. Actually *Elsevier* or *Springer Nature* are just waiting for this to buy it.

3.3   *Open peer-reviewing* improves the reproducibility of published results

There already exist several publishers offering *open peer-review* options for some of their journals and this can take different forms :
- open identity peer-reviewing, where the name and affiliation of the referees are disclosed but not their report,
- *open access* peer-reviewing, where referee reports are made public and the name and affiliation of the referees could be disclosed or not (*e.g.*, option offered by the commercial publishers *EMBO Press* and *Peer J* for the journals they publish, see Appendix 7),
- open invitation peer-review, where anyone interested can contribute to the peer-review process through an open discussion forum provided on the website of the journal (*e.g.*, option offered by the commercial publishers *Copernicus Publications* and *F1000Research* for the journals they publish, see Appendix 7).
Note that nothing prevents a *toll access* journal to practice *open identity* or *open invitation* peer-review (*e.g.*, it is the case of the four journals published by *EMBO Press*, see Appendix 7). Note also that open access peer-reviewing was a common practice for scholarly journals in the 19th and 20th centuries. Let us then use here the definition of *open peer-reviewing* given by *Julien Bordier*, which *'implies that the referees' reports are disclosed, accessible, signed, and that authors and referees are able to discuss them'* (*Julien Bordier, Open peer-review: from an experiment to a model, 2016,* see https://hal.archives-ouvertes.fr/hal-01302597v1).

Presently *open peer-reviewing* tools have been designed by few publishers who propose them as option for the journals they publish. The day researchers will be able to use for free some large scale publishing platforms, they will be able to experiment new ways of peer-reviewing and define themselves the tools they need for that. However, before developing such innovative practices, researchers want to make sure that the platforms they use will be long-lasting and will not, as soon as they will be adopted by many researchers, be bought by some major publishers who will take over control and reinforce their present oligopolistic system which diverts money from research (*e.g.*, *Elsevier* bought several platforms and associated software : *Collexis*, *QUOSA*, *Atira* and *Pure* in 2012, *Knovel* and *Mendeley* in 2013*, Newsflo* in 2015 and the *Social Science Research Network* SSRN in 2016). To avoid this, it is essential that :
- the publishing platform should be owned, either by one or several public agencies or non-for-profit associations, whose statutes ensure that ownership should remain public or not-for-profit,
- the software used to develop those new tools should be *free open source* and made available to anyone on *GitHub*

(https://github.com/),
- the financing should be secured on the long-term by the same public agencies which are funding long-term research programs, since the production of scientific results and their publication should be integrated. Indeed, it is counter-productive to invest public money in research for discovering new results and let companies privatise the publication of those results to sell them back to researchers who have produced them.

Let us now imagine, as a thought experiment, the cooperation between a journal, owned by its editorial board whose members want to experiment *open peer-reviewing*, and a publicly-owned publishing platform. First a researcher submits an article to a journal she deposits the text, figures and data on the website of the journal. The journal's editor in charge of this article first checks it is not just nonsense and then open it to anyone, but without disclosing the name of the author. During a certain period (*e.g.*, one month) chosen by the editorial board, any researcher could refer the article and send to the editor a referee report (no only few comments). All volunteer referees are identified thanks to their ORCID (see Appendix 2) and the editor, after checking that the report is consistent enough and well argued, opens it to anyone on the platform, but without disclosing the referee's identity. Thus a public but anonymous discussion develops between one or several authors and one or several referees, whose role is to criticise (check for mistakes, originality, readability) and improve the submitted article. When the peer-reviewing period (*e.g.*, one month) has expired, the editor takes a decision. If the referee reports are insufficient, either in quantity (*e.g.*, less than three), or in quality, or both, the editor assigns referees, as usually done when peer-review is not open, and ask them to send their report as soon as possible (*e.g.*, within less than one month). If the referee reports are satisfactory, the editor decides if the article is accepted, rejected, or requires a revision (either a minor one which does not imply a new refereeing round, or a major one where the revised version should be referred again). If the article is accepted for publication, the editor also evaluates the quality of the referee reports and selects the best ones to be published together with the article. This innovation would be an excellent way to motivate researchers to do peer-review, since it would give them the chance to have a new publication together with the recognition of the quality of their contribution as referee (*e.g.*, young researchers who have not yet published an article might be recognised by their peers for having found an error in a calculation, or a flaw in a complex argumentation). As soon as the article is accepted, the name of the authors and their affiliation will appear on the article. Concerning a selected referee report, the procedure will be different and the choice left to the referee to refuse its publication or to accept it, with her name and affiliation being disclosed or not.

As long as the referee reports are made public during the open peer-reviewing process, referees will be much more careful in their argumentation and will avoid requiring that the author quote their own papers, which is a distasteful but very common practice nowadays. Keeping the referee reports attached to an article might be highly valuable later on for historian of sciences or ethics committees having to investigate misconduct. Indeed, the current peer-reviewing process is obscure and the ownership of all documents produced by editors, referees and authors during peer-reviewing belong to the publisher, who could then destroy them if they have no commercial value. Therefore another important aspect of *open peer-review* would be to preserve those documents in *open repositories*.

Documents in appendix
Examples of *open access* peer-reviewing practices are given in Appendix 7 : *Open peer-review facilitation through social media* (OPRISM), *Copernicus*, *PeerJ* and *F1000Research*.

Recommendations

• The *European Commission* should recommend to its member states that research institutions and funding agencies provide publishing infrastructures researchers can use for free, as done for computer centres or for Internet, instead of paying the article processing charges that publishers ask researchers to pay to publish their articles in *open access*.

•   The principle of *subsidiarity*, enshrined in the *European Union* law since the *Maastricht Treaty* of 1992, states that : '*Under the principle of subsidiarity, in areas which do not fall within its exclusive competence, the Union shall act only if and insofar as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level.' (Lisbon Treaty, article 5, point 3, 2009).* Therefore the *European Union* should provide, as part as the future *European Science Cloud* or of exiting European programs (such as PRACE or OpenAIRE), a publishing infrastructure for helping researchers to recover control of the dissemination of their results. This should be better achieved if it is designed and supported at the *European Union* level. Indeed, this infrastructure should be large and acts at international scale for the following reasons :

- to face the competition with the major publishers acting at international scale,
- to be able to archive all publications and data which might be useful to future generations of researchers,
- to service several thousands of editorial boards, as major publishers are doing, since it reduces costs,
- those services should be opened to the world and offered for free to all researchers whatever the institution they belong to,
- to guarantee that such an infrastructure will remain a *knowledge commons* that cannot be privatised for commercial purpose.

•   One witnesses today a major break between electronic publishing and paper printing (as the break observed in the 15th Century between printing and copying), but publishers are strongly lobbying to maintain the business model they developed when they were printing houses in order to keep their current profits by controlling the new means of electronic publishing. The *European Commission* should oblige them to change their practices, whatever their losses, otherwise no new business models better appropriate to electronic publishing could ever emerge.

APPENDIX

Appendix 1 :
Definitions, principles and goals of *open access*

- **The *Budapest Declaration* of 2002**

'By "open access" to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.'

http://www.budapestopenaccessinitiative.org/

- **The *Berlin Declaration* of 2003**

The *'Berlin Declaration on free access to knowledge in exact sciences, life sciences, social sciences and humanities'*, signed by 19 academic institutions in 2003, stipulates that *'The Internet has fundamentally changed the practical and economic realities of distributing scientific knowledge and cultural heritage [...] In order to realise the vision of a global and accessible representation of knowledge, the future Web has to be sustainable, interactive, and transparent. Content and software tools must be openly accessible and compatible. [...] Establishing open access as a worthwhile procedure ideally requires the active commitment of each and every individual producer of scientific knowledge and holder of cultural heritage. Open access contributions include original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials and scholarly multimedia material. [...]*

The author(s) and right holder(s) of such contributions grant(s) to all users a free, irrevocable, worldwide, right of access to, and a license 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 [...] A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in an appropriate standard electronic format is deposited (and thus published) in at least one online repository using suitable technical standards (such as the Open Archive definitions) that is supported and maintained by an academic institution, scholarly society, government agency, or other well established organisation that seeks to enable open access, unrestricted distribution, inter operability, and long-term archiving. [...]

Our organisations are interested in the further promotion of the new open access paradigm to gain the most benefit for science and society. Therefore, we intend to make progress by
· encouraging our researchers/grant recipients to publish their work according to the principles of the open access paradigm.
· encouraging the holders of cultural heritage to support open access by providing their resources on the Internet.
· developing means and ways to evaluate open access contributions and online journals in order to maintain the standards of quality assurance and good scientific practice.

· advocating that open access publication be recognised in promotion and tenure evaluation.
· advocating the intrinsic merit of contributions to an open access infrastructure by software tool development, content provision, metadata creation, or the publication of individual articles. We realise that the process of moving to open access changes the dissemination of knowledge with respect to legal and financial aspects. Our organisations aim to find solutions that support further development of the existing legal and financial frameworks in order to facilitate optimal use and access.'

This declaration was signed on 22 October 2003 by the presidents of the DFG (*Deutsche Forschungsgemeinschaft*), of CNRS (*Centre National à la Recherche Scientifique*), of the MPG (*Max Planck Gesellschaft*), of INSERM (*Institut National de la Santé et de la Recherche Médicale*), of *Academia Europaea*, of the *Fraunhofer Gesellschaft*, of the *Leibniz Gesellschaft*, and of the *Helmholtz Gesellschaft*, among others. As of February 2016 there are 541 academic institutions that have signed it and declared their commitment to achieve those goals.

https://openaccess.mpg.de/Berlin-Declaration/

-   The definition given by *Peter Suber* in 2006

'Open access (OA) is free online access. [...] The physical prerequisites for OA are that a work be digital and reside on an Internet server. The legal prerequisite for OA is that a work be free of copyright and licensing restrictions (statutory and contractual restrictions) that would bar OA. There are two ways to eliminate these restrictions: put the work in the public domain or obtain the copyright holder's consent for all legitimate scholarly uses, such as reading, downloading, copying, sharing, storing, printing, searching, linking, and crawling. Consenting to these uses means waiving some rights granted by copyright law. But this is compatible with retaining other rights, such as the right to block the distribution of mangled or misattributed copies. Some OA authors also retain the right to block commercial reuse'.

Peter Suber, Creating an Intellectual Commons through Open Access,
in *Understanding Knowledge as a Commons, From Theory to Practice*,
edited by Charlotte Hess and Elinor Ostrom,
The MIT Press, pages 171-208, 2006

-   The definition given by the *European Commission* in 2012

The report *Towards better access to scientific information: Boosting the benefits of public investments in research*, published by the *European Commission* on July 17th 2012, states that : '*Open access, a model which provides access, use and re-use free of cost to readers on the Internet. Two basic models exist: "Gold" open access (open access publishing): payment of publication costs is shifted from readers (via subscriptions) to authors. These costs are usually borne by the university or research institute to which the researcher is affiliated, or by the funding agency supporting the research. "Green" open access (self-archiving): the published article or the final peer-reviewed manuscript is archived by the researcher in an online repository before, after or alongside its publication. Access to this article is often delayed ("embargo period") at the request of the publisher so that subscribers retain an added benefit.*'

http://openscience.ens.fr/DECLARATIONS/
2012_07_17_European_Commission_Towards_better_access_to_scientific_information.pdf

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Appendix 2 :

Tools to boost *open access*

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-   *Dissemin*, a platform helping researchers to deposit their articles in *green open access*

In order to foster the use of *open repositories* the non-profit organisation CAPSH (*Committee for the Accessibility of Publications in Sciences and Humanities*) has developed the open source platform *Dissemin* (http://dissem.in) to encourage scientists to deposit the full text of their papers as soon as this is allowed by the journal's publisher. It is designed to help scientists to find out which articles are in open access, and where to locate them. *Dissemin* harvests the publication metadata, using *CrossRef* and BASE (*Bielefeld Academic Search Engine*), and identifies the authors using ORCID (*Open Researcher and Contributor ID*) identifier (http://orcid.org/) or disambiguate their name (for those who do not have an ORCID identifier). For each article not yet available in open access, *Dissemin* checks if the journal's publisher allows authors to deposit it in an *open repository* using Sherpa-Romeo. It then provides a very simple interface to deposit the text of the article in *Zenodo* (http://zenodo.org) the *OpenAIRE* repository (https://www.openaire.eu/) hosted at CERN and funded by the *European Commission*. The author has only to provide the pdf of the full text to the platform *Dissemin* which bundles it with the metadata it has previously harvested, and after one click only (for author to confirm deposit) the article is made open access. *Dissemin* can also be used an institution, or for a given discipline, to assess the availability in open access of the publications of their scientists, which is obtained by feeding into *Dissemin* the list of their names. As example, a prototype platform is under development for *Ecole Normale Supérieure* (ENS) Paris (http://dissem.in/institution/1/).

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http://dissem.in/
http://github.com/dissemin
http://association.dissem.in/
http://dissem.in/institution/1/

-   *Digital Open Access Identifier* (DOAI), an identifier for *open access* articles

DOAI is a *open source* software developed by CAPSH (*Committee for the Accessibility of Publications in Sciences and Humanities*) to bypass paywalls. It uses the metadata gathered by *Dissemin* to redirect to an *open access* version of any article which has been deposited in an *open repository*, instead of pointing to its published version which is behind a pay-wall on the publisher's website. For this one needs to replace the link *http://dx.doi.org/…article DOI…* pointing to the publisher's version by *http://doai.io/...article DOI…* pointing to a version in *open access*.

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http://doai.io/
http://github.com/dissemin/doai/
ttp://association.dissem.in/

-   *Open Access Robot* (OAbot), a tool for pointing to the *open access* version of any article

OAbot is a *open source* script developed by CAPSH (*Committee for the Accessibility of Publications in Sciences and Humanities*) which adds links pointing to available free-to-read (alongside paywalled) versions of any reference given in *Wikipedia*, or in any *wiki*. For this it extracts the citations from an article and searches various indexes, APIs, and repositories to fetch the *open access* versions of an article which is itself behind a paywall. OAbot uses the *Dissemin* backend to find these versions from sources of metadata like *CrossRef*, *BASE*, *DOAI* and *SHERPA/RoMEO*. When it finds an alternative version, it checks to see if it is already in the citation. If not there, it adds a free-to-read link to the citation. This helps readers access full text.

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https://tools.wmflabs.org/oabot/
http://github.com/dissemin/oabot/
ttp://association.dissem.in/

- **_Creative Commons_ (CC) licenses for enabling _open access_**

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-   *Open Researcher and Contributor Identifier* (ORCID) for uniquely identifying researchers

The *Open Researcher and Contributor Identifier* (ORCID) is a community-led, open source solution to the problem of name ambiguity in research, scholarship, and innovation. As researchers generate knowledge they add value to the research ecosystem, but this information is often held in closed silos. ORCID exists to enable connections between researchers and all their works and affiliations, from the moment that they share this information. ORCID maintains a registry of unique identifiers for individual researchers. Researchers register themselves and use their unique identifier as they interact with research systems.

This infrastructure is maintained by ORCID Inc., a not-for-profit 501(c)3 company registered in the United States. ORCID Inc. is sustained by membership fees. At the time of writing, more than 70% of ORCID members are research performing organisations or funders and 52% of ORCID's membership comes from EU member states. ORCID is guided by a set of principles which shape the governance and bylaws of the organisation. These bylaws state that the ORCID registry will always be free for individuals to use. The ORCID board of directors, as per the bylaws, is elected from the membership, must be majority non-profit, and is balanced by region and community sector. Any changes to these bylaws would need to be voted on by ORCID's membership. Researchers own and control the data in their record, and decide which systems or organisations should have access to their data. They opt in to grant permission to access or update their records, and can revoke permission at any time. Any data they choose to make public is available under a *Creative Commons* CC0 *Public Domain Dedication*. The registry can be accessed using an open API, and is built using open source code. Providing the 2.3 millions plus researchers who use ORCID iDs with the option to share them with the *European Commission* will improve the accuracy and usability of information for the many downstream services that researchers and administrators depend on. A logical starting point would be to enable the collection of ORCID iDs in the Participant Portal for all members of funded projects. It would ensure that grant information could be linked to people unambiguously. This data could then be passed to services such as *OpenAIRE*, helping them to match publications to authors and grants. It could be used to improve the efficiency and accuracy of Open Access reporting. It would also help national or local systems to collect better information about their researchers' activities, reducing the burden on researchers who choose to use ORCID iDs.

Many publishers use ORCID iDs for authors and reviewers, and data centres are also starting to collect ORCID iDs for contributors and to push that information back to ORCID records, from where it can be shared with other systems. This means that a growing number of articles and datasets have ORCID iDs embedded in them. Connecting these research outputs to grants will be a greatly simplified process if the grants also contain these iDs. Open science demands open, interoperable connections to support discovery and reuse of research results, and identifiers for people help to make those connections work.

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-   *Directory of Open Access Journals (*DOAJ)

The aim of the DOAJ is to increase the visibility and ease of use of open access scientific and scholarly journals, thereby promoting their increased usage and impact. The DOAJ aims to be comprehensive and cover all open access scientific and scholarly journals that use a quality control system to guarantee the content. In short, the DOAJ aims to be the one-stop shop for users of open access journals.

The Directory of Open Access Journals was launched in 2003 at Lund University, Sweden, with 300 open access journals and today contains ca. 9000 open access journals covering all areas of science, technology, medicine, social

science and humanities.

DOAJ is a membership organisation and membership is available in 3 main categories: publishers, ordinary members and sponsors. A DOAJ Membership is a clear statement of intent and proves a commitment to quality, peer-reviewed open access. DOAJ is co-author to the principles of transparency and best practice in scholarly publishing (https://doaj.org/bestpractice) and DOAJ members are expected to follow these principles as a condition of membership. DOAJ reserves the right to reject applications for membership, or revoke membership if a member or sponsor is found to contravene the Principles.

DOAJ is a community-curated list of open access journals and aims to be the starting point for all information searches for quality, peer reviewed open access material. To assist libraries and indexers keep their lists up-to-date, we make public a list of journals that have been accepted into or removed from DOAJ but we will not discuss specific details of an application with anyone apart from the applicant. Neither will we discuss individual publishers or applications with members of the public unless we believe that, by doing so, we will be making a positive contribution to the open access community.

DOAJ is a not-for-profit organisation managed by Infrastructure Services for open Access CIC (Community Interest Company) based in the United Kingdom. DOAJ relies entirely on the voluntary donations of its members and on sponsorship monies received.

https://doaj.org/
https://en.wikipedia.org/wiki/Directory_of_Open_Access_Journals

- **_Registry of Open Access Repositories_ (DOAR)**

OpenDOAR is one of the SHERPA services, including RoMEO (http://www.sherpa.ac.uk/romeo/index.php) and JULIET (http://www.sherpa.ac.uk/juliet/index.php), run by the Cetre for Research Communication CRC (http://crc.nottingham.ac.uk/). Current development work is currently funded by JISC (https://www.jisc.ac.uk/), with contributions from the CRC host organisation, the University of Nottingham (UK).

OpenDOAR is an authoritative directory of academic open access repositories. Each OpenDOAR repository has been visited by project staff to check the information that is recorded here. This in-depth approach does not rely on automated analysis and gives a quality-controlled list of repositories. As well as providing a simple repository list, OpenDOAR lets you search for repositories. Additionally, we provide tools and support to both repository administrators and service providers in sharing best practice and improving the quality of the repository infrastructure. The current directory lists repositories and allows breakdown and selection by a variety of criteria, which can also be viewed as statistical charts. The underlying database has been designed from the ground up to include in-depth information on each repository that can be used for search, analysis, or underpinning services like text-mining.

http://roar.eprints.org/
https://en.wikipedia.org/wiki/Registry_of_Open_Access_Repositories

- **_Open Archives Initiative_ (OAI)**

The *Open Archives Initiative* OAI is an organization to develop and apply technical interoperability standards for archives to share catalog information (metadata). It attempts to build a low-barrier interoperability framework for institutional *open repositories* containing digital content. It allows people to harvest metadata from data providers and use them to provide value-added services, often by combining different data sets.

OAI has been involved in developing a technological framework and interoperability standards for enhancing access to electronic archives, which make scholarly communications like academic journals available, associated with the open access publishing movement. The relevant technology and standards are applicable beyond scholarly publishing.

The OAI technical infrastructure, specified in the *Protocol for Metadata Harvesting* OAI-PMH version 2.0 (https://www.openarchives.org/pmh/), defines a mechanism for data providers to expose their metadata. This protocol mandates that individual archives map their metadata to the Dublin Core (http://dublincore.org/), a common metadata set for this purpose. OAI standards allow a common way to provide content, and part of those standards is that the content has metadata that describes the items in *Dublin Core* format. *Object Reuse and Exchange* OAI-ORE defines standards for the description and exchange of aggregations of web resources.

Funding for the initiative comes from the *Andrew W. Mellon Foundation*, *Coalition for Networked Information* CNI, *Digital Library Federation* DFL, *National Science Foundation* NSF, the *Alfred P. Sloan Foundation*, and and other organizations.

http://www.openarchives.org/
https://en.wikipedia.org/wiki/Open_Archives_Initiative

Appendix 3 :
Examples of *open repositories* for *green open access*

- ***Open Access Infrastructure for Research in Europe* (OpenAIRE)**

OpenAIRE aims to establish an open and sustainable scholarly communication infrastructure responsible for the overall management, analysis, manipulation, provision, monitoring and cross-linking of all research outcomes (publications, related datasets, software and services) across existing, planned and future repositories. Promote the discoverability and reuse of data-driven research results, across scientific disciplines and thematic domains. Its objectives are to be a pan-European Research Information platform:
- to support the H2020 vision of open access for scientific publications and data,
- to monitor OA research outcomes from the EC and other national funders,
- an international OA repository collaboration platform to support global research and scholarly communication,
- to build, for 3rd party providers, innovative services that explore new forms of scholarly communication and promote alternative, competitive Open Access publishing models,
- a legal entity to promote its long-term sustainability and uptake.
In July 2016 Open AIRE provides access to 14,357,555 publications and 18,019 datasets from 6,548 data providers.

https://www.openaire.eu/

- ***Zenodo***

Zenodo builds and operates a simple and innovative service that enables researchers, scientists, EU projects and institutions to share, preserve and showcase multidisciplinary research results (data and publications) that are not part of the existing institutional or subject-based repositories of the research communities. Researchers can thus easily access and reuse shared results in a wide variety of formats (text, spreadsheets, audio, video, and images) across all disciplines. They can also display their research results and receive credit by making the research results citable and integrating them into existing reporting lines to funding agencies like the *European Commission*.

Zenodo provides :

- easy upload and semi-automatic metadata completion by communication with existing online services such as DropBox for upload, Mendeley/ORCID/CrossRef/OpenAIRE for upload and pre-filling metadata,
- easy access to research results via an innovative viewing option, open APIs, integration with existing online services, and the preservation of community independent data formats,
- a safe and trusted service by combining community based curation with short- and long-term archival and digital preservation strategies in accordance with best practices,
- persistent identifiers, Digital Object Identifiers (DOIs), for sharing research results,
- service hosting according to industry best practices in CERN's professional data centres,
- an easy way to link research results with other results and products, funding sources, institutions, and licenses.

https://zenodo.org/
https://en.wikipedia.org/wiki/Zenodo

- **Hyper Articles en Ligne (HAL)**

https://hal.archives-ouvertes.fr/
https://en.wikipedia.org/wiki/Hyper_Articles_en_Ligne

- **ArXiv**

The *arXiv* is an *open repository* of electronic preprints, called *e-prints*, of research articles of cosmology, astronomy, physics, mathematics, computer sciences, statistics, quantitative biology and quantitative finance. In 1989 *Joanne Cohn*, while she was at the *Institute of Advanced Studies* in Princeton, created an electronic mailing list for sharing theoretical physics preprints, which was made possible thanks to the low-bandwidth *TeX file format* which allowed articles written using *TeX* (a type-setting software created in 1977 by Donald Knuth, professor of computer sciences at *Stanford University*) to be transmitted over the *Internet*. In the summer of 1991, *Paul Ginsparg*, who was at the *Los Alamos National Laboratory*, volunteered to help her and created on August 14th 1991 a central repository mailbox which could be accessed from any computer (using the *File Transfer Protocol* FTP in 1991, the *Gopher TCP-IP Protocol* in 1992 and the Web since 1993). When *Paul Ginsparg* moved *Cornell University* in 1999, it developed into the *arXiv open repository* which is hosted by *Cornell University*, with eight mirror sites around the world. Its existence was one of the precipitating factors that led to the *open access* movement. In many fields of mathematics and physics, almost all scientific papers are deposited by their authors on *arXiv* as soon as they are submitted to a peer-reviewed journal or even before. Researchers can select sub-fields and receive daily e-mailings or RSS feeds of all submissions in them.

The annual budget for arXiv is approximately 826,000 $ for 2013 to 2017, funded jointly by the C*ornell University Library*, the *Simons Foundation* (in both gift and challenge grant forms) and annual fee income from member institutions. This model arose in 2010, when Cornell sought to broaden the financial funding of the project by asking institutions to make annual voluntary contributions based on the amount of download usage by each institution. Annual donations were envisaged to vary in size between 2,300 $ to 4,000 $, based on each institution's usage. As of 14 January 2014, 174 institutions have pledged support for the period 2013–17 on this basis, with a projected revenue from this source of approximately 340,000 $.

Files on arXiv can have a number of different *copyright* statuses :
- some are public domain, in which case they will have a statement saying so,
- some are available under a *Creative Commons* license,
- for some the *copyright* has been exclusively transferred by the authors to the publisher who despite this allows them to deposit some version of their article in an *open repository*.

- for most their authors have kept the *copyright* and *arXiv* has only a non-exclusive irrevocable license to distribute them.

-   *Research Papers in Economics* (RePEc)

RePEc is a collaborative effort of hundreds of volunteers in 87 countries to enhance the dissemination of research in Economics and related sciences. The heart of the project is a decentralised bibliographic database of working papers, journal articles, books, books chapters and software components, all maintained by volunteers. The collected data are then used in various services that serve the collected metadata to users or enhance it. So far, over 1,800 archives from have contributed about 2 million research pieces from 2,300 journals and 4,300 working paper series. About 46,000 authors have registered and 75,000 email subscriptions are served every week. See below on how you can be part of this initiative. RePEc emerged from the NetEc group, created in 1992, which received support for its WoPEc project between 1996-1999 by the *Joint Information Systems Committee* (JISC) of the UK Higher Education Funding Councils, as part of its *Electronic Libraries Programme* (eLib). RePEc was created in June 1997 to decentralise the work done by the *Working Papers in Economics* (WoPEc) project and thus make it independent of grant needs. RePEc is then guaranteed to remain free for all parties. RePEc is entirely based on the contributions of volunteers: maintainers of RePEc archives, editors of *New Economics Papers* (NEP), and those who run the various RePEc services.

-   *EconStor*

EconStor is a publication server for scholarly economic literature, provided as a non-commercial public service by the *Deutsche Zentralbibliothek für Wirtschaftswissenschaften (*ZBW). The full texts collected here (mostly working papers, but also journal articles, conference proceedings, …) are all freely accessible according to the principles of Open Access. Authors and editors can also submit papers to *EconStor* free of charge. *EconStor* is among the largest repositories in its discipline with more than 100,000 full-texts, and it regularly reaches top positions in international rankings. More than 400 institutions use it for the digital dissemination of their publications in Open Access. *EconStor* is also an important input service for the *open repository* RePEc, where it is one of the most highly frequented archives. Moreover we also distribute our titles to search engines like Google, Google Scholar or BASE and to academic databases like WorlCat, OpenAIRE and EconBiz.

-   *Social Science Research Network* (SSRN)

The *Social Science Research Network* (SSRN) is a website devoted to the rapid dissemination of scholarly research in the social sciences and humanities. SSRN was developed by *Social Science Electronic Publishing Inc.* founded in 1994 by *Michael Jensen* and *Wayne Marr*, both financial economists. SSRN has seventy employees (twenty in Rochester, New York State, with the others spread across United States), it is used by 300,000 authors, stores about 600,000 published papers available in open access downloaded at a rate of 1 million per month. SSRN was ranked the top open-access repository in the world by *Ranking Web of Repositories* in January 2013. Academic papers in pdf format can be uploaded directly to the site by authors and are then available for worldwide free downloading.

Publishers and institutions can upload papers and charge a fee for readers to download them. Users can also subscribe to e-journals that periodically send emails containing abstracts of papers recently submitted to SSRN in the respective field.

In economics, and to some degree in law, almost all papers are now first published as preprints on SSRN or other paper distribution networks such as *Research Papers in Economics* RePEc before being submitted to a peer-reviewed journal. On SSRN, authors and papers are ranked by their number of downloads, which has become an informal indicator of popularity. SSRN, like other preprint services, circulates publications throughout the scholarly community at an early stage, permitting the author to incorporate comments into the final version of the paper before its publication in a journal. Moreover, even if access to the published paper is restricted, access to the original working paper remains open through SSRN.

SSRN earns revenue from the more than 400 institutions that outsource the distribution of their research papers to SSRN through *SSRN's Research Paper Series*, together with subscription fees for SSRN's subject matter abstracting eJournals, fees received for professional and job announcements, conference fees for SSRN's Conference Management System, and from fees shared with SSRN by publishers who distribute their papers through SSRN on a pay-per-download basis.

On May 17th 2016 SSRN was bought from *Social Science Electronic Publishing Inc.* by Elsevier. A major requirement of the deal was keeping SSRN's model (i.e., free content to submit and download) intact.

http://www.ssrn.com/en/
https://en.wikipedia.org/wiki/Social_Science_Research_Network
http://www.ssrn.com/en/assets/Image/SSRN-Merger_06.03.16.pdf

Appendix 4 :
Examples of peer-reviewed journals published in *diamond open access*

- ***Image Processing On Line* (IPOL)**

Image Processing On Line (IPOL) is a not-for-profit journal currently hosted by *Centre de Mathematiques et Leurs Applications* (CMLA), which is a joint laboratory between the French *Centre National à la Recherche Scientifique* (CNRS) and *Ecole Normale Supérieure de Cachan* (ENS-Cachan). Founded in 2010, the journal IPOL evaluates and publishes the algorithms necessary to establish universal image processing chains, applicable to all raw digital images and video. This journal is simultaneously an experimental online facility. Indeed, not only the full description of algorithms and source code are made public (free *open source*), but everybody can upload his/her images and see the result of each published algorithm in real time. To the best of our knowledge IPOL is the first journal to perform routinely such fully reproducible research. IPOL has so far published 90 reproducible, executable, peer-reviewed papers which are being very successful. The IPOL archive shows 150,000 public experiments made by more than 9,000 different users worldwide, from all scientific fields using images: biology, medicine, astronomy, ethology and from all segments of society. IPOL is also used by academic researchers to create public online demos of their work in progress, called *workshops*. IPOL is addressing a data driven and computation intensive research domain, helping developing tools, establishing norms, building an institutional infrastructure, leveraging access to and sharing information, promoting interoperability, enabling replication. Moreover it is a relevant medium to train students and young researchers and help them deal with image and video data processing and management.

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Jose Luis Lisani <joseluis.lisani@uib.es>

http://www.ipol.im/

- *Discrete Analysis*

Discrete Analysis is an *arXiv* overlay journal with a conventional editorial board, meaning that the published articles have been peer-reviewed and lives on the *arXiv* rather than being hosted by the journal itself. As a result, the cost of running the journal, while not quite zero, is extremely low. Therefore, there are no charges for authors, and obviously none for readers, since the accepted papers are on the *arXiv*. The *Scholastica* platform assists the editors for seamlessly managing peer-review and charges for this $10 per submission, which is covered by a grant from *Cambridge University* to cover this and other very low costs. The total costs average about $30 per accepted article. Therefore there are no charges for authors, and obviously there are no charges for readers either.

The submission process is not different from that of a conventional journals, though in some ways it is simpler, at least if the article is already posted on the *arXiv*. The peer-review procedures are conventional, *i.e.*, if an article is clearly unsuitable, it will rejected, if not, it will be peer-reviewed with opinions and references being anonymous and not publicly viewable. To submit an article to the journal, one should first post it on the *arXiv*. When asked which licence author wishes to use, she should select one of the CC-BY options. (If your article is already posted with a more restricted licence it is not a major problem, since she can give a different licence to a later revision, which she will typically want to make in response to the comments of the referees.) When the article has appeared on the *arXiv*, the author should click on the *Submit article button* and she will be taken through the very short submission process. The main criterion for accepting an article is that it should be genuinely interesting to a reasonable number of mathematicians, and there is room for breakthroughs together with more incremental results. The fact that an article is published in *Discrete Analysis* will indicate that it has been peer-reviewed and that the reviewers and editors find it interesting, although ultimately it is the job of readers to make judgments of the mathematical quality of the articles.

Articles published in *Discrete Analysis* are presented with editorial introductions, which are written by the members of the editorial board and attempt to provide information (such as relevant definitions, background context, and an idea of what is in the paper) that will help a reader browse the content of the journal in a convenient way. Each published article will have a DOI, an ISSN and be listed on *MathSciNet* and *Zentralblatt*. Since *Discrete Analysis* lives on the *arXiv* it has the major advantage over a conventional journal, even if it is an electronic journal, that authors can post updates to their articles if they find ways of improving them. The link from the journal will always be to the accepted version, which will remain the version of record, but the associated *arXiv* page will notify readers if that version has been further updated. Thus, it offers a permanent version of record and the possibility for authors to make subsequent improvements that readers will easily notice. Authors are actually to post updated versions on the *arXiv* if they discover ways in which their papers can be improved. On *Discrete Analysis* website the reader sees a list of article titles with links to the *arXiv*, together with short descriptions of each article. They are written by one of the journal's editor and checked by the author. The descriptions are there to make it possible for readers to browse the journal without having to click back and forth from the journal webpage to the *arXiv*. Moreover, the *Discrete Analysis* website displays well on your mobile phone.

http://discreteanalysisjournal.com/
https://en.wikipedia.org/wiki/Discrete_Analysis

- **7 Episciences journals**

https://www.episciences.org

- **Glossa**

http://www.glossa-journal.org/

- **Journal of Machine Learning Research** **(JMLR)**

http://www.jmlr.org/
https://en.wikipedia.org/wiki/Journal_of_Machine_Learning_Research

- **SMAI Journal of Computational Mathematics** **(SMAI-JCM)**

http://smai-jcm.cedram.org/
https://smai-jcm.math.cnrs.fr/index.php/SMAI-JCM

- **Electronic Proceedings in Theoretical Computer Science** **(EPTC)**

http://about.eptcs.org/

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Appendix 5 :
Example of a *free open source* **software for publishing scholarly journals**
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- **Public Knowledge Project** **(PKP) developing** *Open Journal Systems* **(OJS) and** *Open Monograph Press* **(OMP)**

The *Public Knowledge Project* (PKP) is a research and development project devoted to improving the public and scholarly quality of academic publishing, led by John Willinsky, professor at *Stanford University* (United States), in partnership with *Simon Fraser University Library* (Canada). PKP develops *free open source* software tools for scholarly publishing, as well as conducting research into the impact and value of *open access*. PKP has also worked with the *International Network for the Availability of Scientific Publications* (INASP) and other organisations that have been developing the scholarly publishing capacity of the global South, by providing the software to run *African Journals Online* and similar systems in southeast Asia.

Its flagship software *Open Journal Systems* (OJS) is a complete management and publishing platform for peer-reviewed journals. Its *Open Monograph Press* (OMP) provides a similar service for both monographs and edited volumes. OJS and OMP can be downloaded for free and installed on a local webserver. They offer a flexible, easily configurable editor-operated workflow. They have been designed to reduce the time and energy devoted to the clerical and managerial tasks associated with editing a journal or publishing a book, while improving the record-keeping and efficiency of editorial processes. They seeks to make publishing process more transparent, improving indexing, and enrich the reader's learning and experience. While OMP is being used by a number of presses, including the Smithsonian Institution, it is OJS that has had a much larger impact worldwide.

In 2014, over 9,800 journals around the world used OJS to publish at least 10 articles, and 42 articles on average (with 11% using the subscription module, according to a 2010 study). Cumulatively, over 2.3 million scholarly articles have been published via OJS since its first appearance almost 15 years ago. OJS is available in over 25 different languages with translations contributed by a very active user community. OJS includes the following features:

- It is installed locally and locally controlled.
- Editors configure requirements, sections, review process, etc.
- Online submission, double-blind review, and management of all content.
- Subscription module with delayed open access and non-open access options.
- Comprehensive indexing of content.
- Reading tools for content, based on field and editors' choice.
- Email notification and commenting ability for readers.
- Complete context-sensitive online help support.
- Payments module for accepting journal fees, donations, etc.

John Willinsky <john.willinsky@stanford.edu>
https://pkp.sfu.ca
https://pkp.sfu.ca/ojs/
https://pkp.sfu.ca/omp/

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Appendix 6 :
Examples of publicly-owned *open access* publishing platforms

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-   *Scientific Electronic Library On Line* (SciELO)

The *Scientific Electronic Library Online* (SciELO) is a publishing platform which was created in 1997 by *Abel Packer* and *Rogerio Meneghini* in Brazil to meet the scientific communication needs of developing countries and to provide them an efficient way to increase visibility and access to research articles. SciELO has thus organised a network 14 countries (from Latin America, Caribbean, Portugal, Spain and South African) which develop a common methodology for the preparation, storage, dissemination and evaluation of scientific literature in electronic format. This enables the electronic publication of more than 1,000 peer-reviewed journals (1,249 in October 2015), the organisation of searchable bibliographical and full text databases, the preservation of electronic archives and the production of statistical indicators of the scientific literature usage and impact, including journal evaluation criteria. SciELO is funded by several public institutions: the *Research Foundation of Sao Paulo State* (FAPESP) and the *Brazilian National Council for Science and Technology Development* (CNPq) and the *Latin American and Caribbean Centre on Health Sciences Information* BIREME.

http://www.scielo.br
https://en.wikipedia.org/wiki/SciELO
http://www.scielo.org/local/File/book.pdf

-   *OpenEdition*

OpenEdition is an publishing infrastructure which fosters scientific communication in social sciences and humanities. It offers complementary services on four platforms: for books with *OpenEdition Books*, for journals with *Revues.org*, for academic blogs with *Hypotheses*, for scientific events' announcements with *Calenda*. These platforms have 3 million monthly world-wide visits. *OpenEdition* is developed by the *Centre pour l'Edition Electronique ouverte* (CLEO), a consortium of several French public institutions (CNRS, *Aix-Marseille Université*, *Ecole des Hautes Etudes en Sciences Sociales* EHESS and the *Université d'Avignon*). Each journal hosted on *Revues.org* could be linked to a scientific blog hosted on *Hypotheses*, which enables researchers to report their results and communicate about their work in a non academic way. On July 2016 18th, *Open Edition* offers *open access* to 3,051 books on , 433 journals,

1,554 blogs, and 32,345 scientific events' announcements. CLEO has designed in 2000 the *Content Management System* (CMS) *Lodel* to handle long and complex texts as part of a highly structured editorial environment and is still developing it. *Lodel* is an *free open source* software which produces XML documents and conforms to the usual norms for electronic publishing (*e.g.*, the W3C standards) and other interoperability norms (*Dublin Core*, RSS, OAI).

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https://www.openedition.org/?lang=en
http://cleo.openedition.org

-   Deutsche Zentralbibliothek für Wirtschaftswissenschaften (ZBW)

The *German National Library of Economics*, abbreviated ZBW, is the world's largest library for economics. It also bears the suffix *Leibniz Information Centre for Economics* and is part of the *Gottfried Wilhelm Leibniz* scientific community WGL (http://www.dwz-kairo.de/content/leibniz-association), a union of German non-university research institutes from various branches of study.The headquarters of the ZBW is in Kiel with additional offices in Hamburg. The ZBW is jointly funded by the *German Federal Government* and the *States of Germany*. Its mission is to procure, index, archive and provide literature on economics and business fields to researchers and the general public. It is a depository library of the *World Trade Organisation* (WTO) and maintains at both locations a *European Union Documentation Centre*, a body designated by the *European Commission* to collect and disseminate publications of the *European Union* for the purposes of research and education.at both locations. It also collects all official publications of the *United Nations* UN, the *Organisation for the Economic Cooperation and Development* OECD, the I*nternational Monetary Fund* IMF and the *World Bank* WB. The ZBW is headed by *Klaus Tochtermann*.

With its publication server *EconStor* the ZBW provides an infrastructure for the free publication of scholarly literature in economics and business administration. The mission of *EconStor* is to make research findings in economics accessible in *open access* and thus internationally visible. In addition, the ZBW produces the peer-reviewed journal *Economics* in cooperation with the *Kiel Institute for the World Economy*. The Journal is based on the principle of *open access* and *open assessment* and listed in SCCI. The ZBW is active in national and international bodies in order to foster the idea of free dissemination of research findings. Among these bodies are *Confederation of Open Access Repositories* COAR (https://www.coar-repositories.org/fr/), *Deutsche Initiative für Netzwerkinformation* DINI (http://www.dini.de/projekte/oa-statistik/english/) or the *Priority Initiative Digital Informatio*n PIDI (http://www.allianzinitiative.de/en/).

The ZBW operates *da|ra*, a service operated through the *DataCite* consortium (https://www.datacite.org/), to provide *Digital Object Identifier* (DOI) registration for all German research centres in the fields of social sciences and economics. It also operates a comprehensive metadata schema to ensure proper citation of registered social and economic data. ZBW operates *da|ra*, a service operated through the *DataCite* consortium, to provide *Digital Object Identifier* (DOI) registration for all German research centres in the fields of social sciences and economics. It also operates a comprehensive metadata schema to ensure proper citation of registered social and economic data. As part of the German national research infrastructure, the ZBW also conducts its own apples research, such as the European EXCESS project, whose aim is to reveal and interconnect the treasures of European culture, science and education.

http://www.zbw.eu/de
https://en.wikipedia.org/wiki/German_National_Library_of_Economics

-   Institut National des Sciences Mathématiques et de leurs Interactions (INSMI)

http://www.mathdoc.fr

http://www.numdam.org
http://www.cedram.org

- ***European Digital Mathematics Library*** **(EuDML)**

https://eudml.org
https://initiative.eudml.org

- ***Electronic Library of Mathematics*** **(ELibM)**

The aim of the project is to build and offer a platform for a peer-review OA publishing process of mathematical journals using open source software. A broad mathematics specific infrastructure is set up, within which the specific requirements for mathematical publications and their preparation are already included in the production process. Open Journal System" (OJS) will be the technical backbone accompanied by additional mathematics-specific developments. The main focuses are specifically tailored solutions for mathematical demands, *e.g.*, the processing and management of TeX manuscripts, mathematical formula search and inclusion of mathematical software. This infrastructure is flanked by optional value-added services by FIZ Karlsruhe, such as technical and organisational support in relation to the use of the platform, editorial services, metadata standardization, reference linking, usage statistics, … Publishers have the choice to use these services, demand-driven and individually scalable, but usually against a corresponding fee. A financial model is developed that will guarantee cost effective use and maintenance as well as a long-term availability of the platform. The platform is open to new innovative reviewing concepts. Within the project the *German Mathematical Society* (DMV) as project partner will shift its publishing environment for the *Documenta Mathematica* to the newly created infrastructure. The publishing platform will be closely linked to the existing digital library eLibM that provides an archive of a wide range of mathematical journals and excellent integration into international information systems. The project will be carried out with advice and support of academic societies and publishers from the mathematical community.

https://www.fiz-karlsruhe.de/en/forschung/projekte/ausbau-und-modernisierung-der-electronic-library-of-mathematics-elibm.html
https://www.emis.de/ELibM.html

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Appendix 7 :
Examples of *open peer-reviewing* practices for scholarly journals

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- ***Open peer-review facilitation through social media*** **(OPRISM)**

OPRISM is a set of tools developed by the *Centre pour l'Edition Electronique ouverte* (CLEO).

http://cleo.openedition.org/

- ***EMBO Press***

The *European Molecular Biology Organisation* EMBO was founded in 1964 to promote and encourage the development of molecular biology within Europe and beyond. It is financed by the 27 member states of the Swiss incorporated association *European Molecular Biology Conference* EMBC and owns *EMBO Press* founded in 1982 by *EMBO Press* to publish four journals spanning all areas of molecular biology : *EMBO Journal*, *EMBO Reports*, *EMBO*

Molecular Medicine and *Molecular System Biology*.

EMBO Press has a fair and transparent process to rapidly publish peer-reviewed articles following the following five principles :
- no confidential referee remarks,
- published anonymous referee reports and editorial correspondence,
- editors respect requests to exclude specific referees,
- editors justify editorial decisions in detail and specify what is required for a revision,
- corresponding authors should have an ORCID identifier.

Authors of rejected papers are encouraged to transfer referee reports between selected partner journals for further consideration.

Since 2009, The EMBO Journal has invited authors to have a *peer-review Process File* included alongside their published papers, although authors can decline to participate in this initiative. Currently, 95% of primary research papers at the *EMBO Journal* are linked to a *peer-review Process File*, which documents the timeline (including the dates of each submission, resubmission and decision) and all the correspondence relevant to the processing of the manuscript and contains the referee reports from each round of review (alongside the author responses, the editorial decision letters and any additional correspondence between the editors and the authors), but referees remain anonymous.

http://emboj.embopress.org
https://en.wikipedia.org/wiki/The_EMBO_Journal

- *Copernicus*

Copernicus GmbH is a commercial publisher based in Göttingen, Germany, and founded in 1994. It currently publishes 28 *open access* peer-reviewed journals on behalf of the *European Geosciences Union* EGU, together with other publications. To foster scientific discussion and to enhance the effectiveness and transparency of scientific quality assurance, it started an innovative two-stage publication process, called *Interactive Public peer-review*. The respective journals are comprised of the peer-reviewed journal itself and a public discussion forum. In the first stage, manuscripts that pass a streamlined review are immediately typeset and published on line in the discussion forum. They then undergo an interactive public discussion, during which the referees' comments (anonymous or attributed), additional short comments by other members of the scientific community (attributed), and the authors' replies are published. In the second stage, the peer-review process is completed and, if accepted, the final revised papers are published in the journal. To ensure publication precedence for authors and to provide a lasting record of the scientific discussions, the discussion forum and the journal are both ISSN-registered, archived, and fully citable (including DOI).

http://publications.copernicus.org
https://en.wikipedia.org/wiki/Copernicus_Publications

- *PeerJ*

Peer J is a commercial publisher specialised in biological, medical and computer sciences. It was founded in 2012 by *Peter Binfield* from *PLOS One* and *Jason Hoyt* from *Mendeley* and its office is in Corte madera (California). It proposes peer-reviewers to sign their referee reports and gives authors the option to publish the peer-review history of their article alongside the published version.

https://peerj.com

-   *F1000Research*

Faculty of 1000 (F1000) was founded in 2000 by the entrepreneur *Vitek Tracz,* as part of the company *Science Navigation Group.* It is a subscription-only current awareness service highlighting recent biological and medical research. *F1000Research Ltd* is a private company, established in London, which provides the *open access* and *open peer-review* publishing platform *F1000Research* covering the life sciences. Articles are published first and peer-reviewed after publication by invited referees, whose names and comments are visible on the site. The data behind each article are also published and are downloadable. *F1000Research* publishes multiple article types including traditional research articles, single findings, case reports, protocols, replications and null or negative results.

-   *Publons*

Publons is a website and free service for researchers to share, discuss and receive credit for peer-review which was launched in 2012 by *Andrew Preston* when he doing his postdoc at *Boston University*. It has more than 50,000 referees referenced and more than 16,000 journals use it website to externalise their reviewing process. Reviewers can choose whether or not to make the content of their review open access following publication of the reviewed publication, though member journals can choose to override this. Over 8,000 reviews have been shared in this way, using a *Creative Commons* CC-BY 4.0 license. The goal is to obtain a better accountability and transparency in, as well as recognition for, peer-review. It verifies peer-review contributions allowing to provide official reports to get credit for peer-review, which can be exported to ORCID for maximum visibility and be used in funding and promotion applications. *Publons* keeps track of all papers a researcher has reviewed as they are published and provides altmetrics to compare her reviewing behaviour (in review frequency, paper acceptance rate, average word count) to others.