

## **Open Access to scientific research: where are we and where are we going?**

Facts and figures on the occasion of the 2010 Open Access Week (October 18-24)

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### **Abstract**

This contribution is aimed at presenting a sort of “state of the art” of Open Access on the occasion of the 2010 international Open Access Week, to be held from October 18 to October 24. We shall see facts and figures about open archives and the mandates to deposit; about Open Access journals; about impact and citation advantages for the researchers, and about economic sustainability.

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«Open Access Week, a global event now entering its fourth year, is an opportunity for the academic and research community to continue to learn about the potential benefits of Open Access, to share what they’ve learned with colleagues, and to help inspire wider participation in helping to make Open Access a new norm in scholarship and research», as Jennifer McLennan from SPARC – Scholarly Publishing and Academic Resources Coalition (<http://www.arl.org/sparc/>) puts it [1].

All over the world Universities, libraries, funding agencies, researchers are going to meet and share their best practices and their creative suggestions in order to reach the “Open Access” to scientific information, i.e., with the words of the **Berlin Declaration on Open Access to knowledge in the Sciences and Humanities**, «a free, irrevocable, worldwide, right of access to, and a license to copy, use, distribute, transmit and display the work publicly» [2]. Please keep in mind that Open Access (OA) applies only to scientific journal articles – often referred to as “give away” literature, because authors aren’t paid – and that is aimed at maximizing the dissemination of the results of the scientific research, by removing price and permission barriers, leveraging on the means provided by the Internet. The underlying principles are that the results of publicly funded research must be publicly available; knowledge must be free [3]. Free on-line availability for peer-reviewed scholarly articles means a wider access to knowledge, which turns into fostering science and accelerating research worldwide: as the *motto* of the OA Week states, «Learn. Share. Advance.».

In this optic, «Open Access has the potential to maximize research investments, increase the exposure and use of published research, facilitate the ability to conduct research across available literature, and enhance the overall advancement of scholarship» according again to McLennan [4]. Let’s try to confirm this statement in facts and figures, reminding yet that each scientific community has its own way to OA, depending on its communication behaviour and specific channels, so we can’t reduce this complexity in few numbers.

We have already explored the basic concepts of the OA world some issues ago [5], so we won’t repeat them. After 3 years, we are now trying to recall the logic, and to stress the main achievements and the ongoing projects. As preliminary reference tools, if you want to learn more on OA, precious starting point collecting principles, instruments, factual lists are **OAD - Open Access Directory** ([http://oad.simmons.edu/oadwiki/Main\\_Page](http://oad.simmons.edu/oadwiki/Main_Page)) and **OASIS – Open Access Scholarly Communications Sourcebook** (<http://www.openoasis.org/>). Peter Suber (Earlham

College, US) posts monthly the **SOAN – SPARC Open Access Newsletter** (<http://www.earlham.edu/~peters/fos/newsletter/archive.htm>), for a regular update. Stevan Harnad (Univ. Of Southampton, Univ. du Québec) blogs his extremely coherent and always clear-eyed comments on his **Open Access Archivangelism** (<http://openaccess.eprints.org/>). The **OA Tracking Project** ([http://oad.simmons.edu/oadwiki/OATP\\_links](http://oad.simmons.edu/oadwiki/OATP_links)) links in Connotea news and noteworthy on Open Access. Heather Morrison (Simon Fraser Univ., Canada) maintains a quarterly series titled **Dramatic growth of Open Access** (<http://poeticeconomics.blogspot.com/2006/08/dramatic-growth-of-open-access-series.html>) with key data and trends.

## Two roads to Open Access

As stated by the **BOAI, Budapest Open Access Initiative** (<http://www.soros.org/openaccess/read.shtml>) there are two roads to get access to scientific literature: self-archiving in Open Archives and publishing in Open Access journals. According to the BOAI, and despite some fierce debates within the scientific community in the last years, «there is no need to favor one of these solutions over the others for all disciplines or nations, and no need to stop looking for other, creative alternatives». Jean- Claude Guédon (Univ. de Montréal, Canada) has always been supporting the idea of «mixing and matching» these two complementary roads in order to regain possess of scholarly communication, to ensure a better circulation of ideas also in the developing countries and, why not, to offer value-added services to researchers [6].

The first path, **self-archiving**, is the so-called “**Green road**”, which means scholars can archive the pre-print of their works in “Open Archives” (or “Repositories”). Self-archiving is a straight path, immediately feasible, and takes only few minutes time. It depends only on the author’s choice and will– or, as we are going to see, on the institution’s mandate.

By self-archiving, the author makes his/her work freely available regardless where the original article has been published, without infringing copyright agreements. One of the most diffused false myths about OA is that OA would be against copyright protection. It sounds false two times: first, because to OA works are widely associated the Creative Commons licenses (<http://creativecommons.org/>), created for online materials according to the principle “some rights reserved”. Second, in Open Archives authors can deposit the pre-print or the post-print of their refereed articles only according to their publishers’ copyright policies and the agreement signed at the moment of acceptance. The authoritative source which lists these policies is the **SHERPA-RoMEO project** (<http://www.sherpa.ac.uk/romeo/>). As of August, 16<sup>th</sup> RoMEO gives access to the policies of 775 publishers, among which a 38% (293 out of 775) doesn’t support any form of self-archiving. Moreover, prestigious institutions have set specific *Addenda* to the publishers’ contracts in order to retain some rights. SCAE is the Scholars’ Copyright Addendum Engine (<http://sciencecommons.org/projects/publishing/scae/>), powered by Science Commons, and generates a copy of an *Addendum* tailored on the authors’ needs. In Europe, JISC and SURF have set the *Licences to publish* (<http://copyrighttoolbox.surf.nl/copyrighttoolbox/authors/licence/>), which grant the publisher a sole licence for economic related rights, and retain to the author rights related to reuse for scholarly purposes.

Open Archives can be **subject-based**, such as arXiv (<http://arxiv.org/>), which since 1991 has become the reference communication frame within the physicists community, or **institutional**, such ORBi, (<http://orbi.ulg.ac.be/>) at the Belgian University of Liège. We shall go back on this

perfect example of Institutional Repository supported by a mandatory policy.

Open Archives are registered in **OpenDOAR** – Directory of Open Access Repositories (<http://www.opendoar.org/>), which as of August, 16<sup>th</sup> lists 1,705 Open Archives searchable by country, subject, type, software, and **ROAR** - Registry of Open Access Repositories (<http://roar.eprints.org/>), which lists 1,838 repositories. At the end of 2006 they were about 800 [7].

Advantages of setting up an Open Archive are clear both in terms of visibility – it becomes the showcase of the scientific production of an institution – and speediness of circulation of ideas: papers deposited in the cited arXiv repository in Physics are cited six months before publication [8], and the success of the RePEC repository in Economics (<http://repec.org/>) is due to the immediate availability of the papers, in a field with quite long delays for traditional publication.

The second path, **publishing in Open Access journals**, is the so-called “**Gold road**”. OA journals are scientific, peer-reviewed journals as well as traditional Toll Access ones. They only have a different logic, which requires no subscription fee for readers, to grant a global dissemination. To cover the costs relating to the editorial workflow, 23% of the existing OA journals asks for an “Article Processing Charge” [9], going from 400 to 2900 US\$ per article (<http://www.biomedcentral.com/info/authors/apccomparison/>). Please keep in mind that the fee is paid once and forever, whilst subscriptions to traditional journals increase at a consistent rate year by year. A waiver is provided for authors from less financed disciplines or countries; in the vast majority of the cases, the fee is covered by the research budget: as a matter of fact, publication is the final, necessary step of any research – even an astonishing finding, closed in a drawer, is useless -, so it can be legitimately included in the research budget. An interesting experience on this side is SCiELO (<http://www.scielo.org/php/index.php?lang=en>), a Latin American model for cooperative OA publishing of scientific journals on the Internet. Especially conceived to meet the scientific communication needs of developing countries, particularly Latin America and the Caribbean countries, it provides an efficient way to assure universal visibility and accessibility to their scientific literature, contributing to overcome the phenomena known as ‘lost science’ in the peripheral countries of the world. SCiELO network is highly based on national infrastructures, which contributes to guarantee its future sustainability; several national institutions, such as the Brazilian Conselho Nacional de Desenvolvimento Científico e Tecnológico, support the project.

In September, 2009 five major US Academic institutions (Harvard, Cornell, MIT, Berkeley, and Dartmouth) committed to the COPE project, Compact for Open Access Publishing Equity (<http://www.oacompact.org/>) by setting a central fund aimed at providing a sufficient and sustainable funding basis for open-access publication. In this way they try to balance the traditional subscription-based model with an equitable support for the processing-fee business model for OA journals. Stevan Harnad coherently argued that before paying for Gold OA institutions should first «mandate» Green OA, being “access” the purpose of OA, and not funding any kind of publishing industry [10]. We shall see in-depth the mandates below.

The most accredited source for OA journals is **DOAJ** – Directory of Open Access Journals (<http://www.doaj.org/>), which lists as to August 16<sup>th</sup> 5,275 titles. At the end of 2006 they were about 2,500 [11]. There are journals born under an OA model and others “converted” to OA, whose list is provided in OAD, [http://oad.simmons.edu/oadwiki/Journals\\_that\\_converted\\_from\\_TA\\_to\\_OA](http://oad.simmons.edu/oadwiki/Journals_that_converted_from_TA_to_OA)). A striking example is the Hindawi publishing group which saw in the first year after the OA conversion a 100% increase in submissions.

As to the sustaining business models, there are lot of options, going from the cited

author/institution pays to the membership to the volunteer efforts. Both OAD ([http://oad.simmons.edu/oadwiki/OA\\_journal\\_business\\_models](http://oad.simmons.edu/oadwiki/OA_journal_business_models)) and SPARC (<http://www.arl.org/sparc/publisher/incomemodels/>) provides lists of possible income/business models.

Scholarly communication market is a complex framework. From one side, the so-called “price crisis”, i.e. an increase of 374% of the journal subscription expenditures from 1986 to 2008 [12], is commonly regarded as one of the triggers of the OA movement alongside with the diffuse cuts in libraries’ budgets, which turned into cancelled subscriptions and therefore a decrease in terms of access. Please notice that “access” to scientific information is strictly necessary for scientists, not accessory. On the other side, gaining reputation and prestige among well established scientific journals is a challenging endeavor and a difficult task. There is a sort of quality-prestige feedback loop that operates as a benign circle for high-prestige journals. But sometimes, quality and prestige can diverge, because quality depends on authors, editors, and reviewers, and prestige depends on communities and brand [13]. But authors are the same for OA and non-OA journals, and there are lots of sample of high-quality OA journals. Prestige remains the only reputational rent for Toll-Access journals, and the competition on the author’s side is strong.

One critical point is that sometimes prestige can be based on inappropriate judgments of quality, such as Impact Factor, which is instead a measure of quantity. On this side, it’s just to mention a recent study which shows that OA journals, even measured with the most traditional citation bibliometric indicator, i.e Impact Factor, rank in the first 50 percentiles with a 38.62% share, which for newly born journals is quite good [14]. As Peter Suber puts it, « Apart from the fact that most OA journals are new, there is no intrinsic reason why OA journals can’t be as high in quality and prestige as the best TA journals» [15].

As a matter of fact, OA journals and their innovative and value-adding platforms have fostered a positive climate of competition in the scholarly communication market.

In concluding this overview on the two roads, a recent study on a sample of scientific articles published in 2008 in different disciplines shows that peer-reviewed papers are freely available on the Web according to OA paradigms by a 20.4% rate [16]. OA proves to be a viable and growing alternative channel in the dissemination of scientific literature, and it is to be considered by all the actors involved - researchers as authors and readers, funders, institutions, publishers, librarians.

### **Advantages for the researchers**

OA means free availability of the results of the research. OA doesn’t deal only with mere “access”, but with all the potentialities offered by an OA environment. From a researcher’s point of view, the right question is: what do OA actually offers different? What could we actually do if all the scholarly production were Open? What can we do right now with Open texts and Open data, which we weren’t allowed to – or we weren’t used to - in the traditional scholarly communication system?

We can try to enumerate some direct and indirect advantages stemming from the free access to scholarly literature:

- **Immediate and global dissemination:** self-archiving a paper in an Open Archive ensures an immediate and global dissemination, without the delay associated with the editorial process (print or online, the workflow is time-consuming). Research results circulate before, thus they are read and used and even cited more and before, speeding the progress of knowledge.

- **Good findability/increased visibility:** each paper in OA “exposes” its metadata (i.e. information about author, title, subject...) via interoperability standards. That’s why OA contributions rank first even in a search with generalist search engines like Google, what means enhanced visibility. Nonetheless, there are specific OA search engines to run searches within OA materials: Scientific Commons ([www.scientificcommons.org/](http://www.scientificcommons.org/)), *BASE* (<http://base.uni-bielefeld.de/en/index.php>) and *OAIster* (<http://www.oclc.org/oaister/>).
- **Increased citations:** several studies has been carried out in the last years to determine if there is an actual OA advantage in citations [17] and, once established, to measure its value and understand its causes. Alma Swan (Key Perspectives, UK) edited a sort of systematic review of these studies and discussed methodological and interpretive issues, starting from the point that «citability rests upon the quality, relevance, originality and influence of a piece of work» and stating, against any dispute, that «that OA would produce an automatic citation boost for every article was never the expectation» [18]. Different selected datasets and control-cases, different measures, e.g. citations or downloads, different time-spans led to different and somehow contradictory results, depending on the considered disciplinary field, the researchers’ attitude and citational behaviour, and the applied methodology. In a nutshell, 27 studies out of 31 show an OA citation advantages. Rates go in Medicine from +300% to +450% and in Biology from +5% to +36%.
- **New metrics:** dealing with the Internet digital environment and open texts, traditional metrics based on citation counts seems to underestimate the real impact of an article, and to limit the notion of “impact” to the academic context, i.e. those who writes and cites. If we agree that «Science is a gift-based economy; value is defined as the degree to which one’s ideas have contributed to knowledge and impacted the thinking of others» [19], new measures based on social network analysis and usage log data are supposed to better describe in their connections and correlations the complexity of “impact” in the scientific process. If you give a look to the fascinating Map of Science built by Bollen and Van de Sompel on the basis of more than 1 billion user interactions in the framework of the MESUR project (<http://www.mesur.org/MESUR.html>; <http://www.mesur.org/services/>), you can at a glance suspect that simple citation counts can’t give reason of this galaxy [20]. Moreover, citation counts are just proxy measures (they apply to the whole journal, not to the single article); they are far from being immediate (the time span in counting Impact Factor is 3 years, starting from the year before the current); and exclude all the communities of practitioners who simply read and use the article but don’t write nor cite. New projects such as the “**Article level metrics**” suggested by the OA publisher PLoS take into account indicators such as the number of downloads, comments, blog coverage, rating and so on [21].
- **Open and innovative peer review:** traditional kinds and ways of peer-review have recently been debated [22]; moreover, clear examples of frauds have been carried out even in a peer-reviewed regime [23]; in my opinion, peer-review if misconduct might also play a role of stopper over knowledge and of gatekeeper of the *status quo*, limiting innovation. But in an OA environment new and innovative kinds of peer review are possible. The journals edited by the OA publisher BioMedCentral make public all the **pre-publication history** (i.e. the comments of the referees) alongside with the article. The OA journal *Atmospheric Chemistry and Physics* – which ranks 2<sup>nd</sup> in its category by Impact Factor – after a preliminary peer review puts the article in a section where comments are welcome

for a period of time; before the final publication authors are encouraged to take into account the comments of this shared, public, **open peer review** [24].

- **New participative Web 2.0 logic:** commenting and rating are common options in OA publishers' platforms, such as the possibility to share the article via social bookmarking tools, reference manager tools or social networks. In addition, the OA journal *PLoS ONE* (<http://www.plosone.org/home.action>) gives to registered users not only the possibility to post a comment at the end of the article, but also to insert notes directly within the text. They will appear to the reader such as bubbles in the cartoons, to highlight them. This winning and charming option actually "opens" the article to the debate, and takes scientific journals back to their origins as venue of scholarly exchanges, sharing, and discussion.
- **New techniques, new value-added services:** in our digital era, too often we are not exploiting the real potential of the Net. It seems we have just limited to "scan" the paper world and to transfer its logic into the digital. Actually, OA opportunities and chances in order to a deeper integration between data, texts and retrieval tools are enormous. The real advantage of an OA scenario lies in the unexplored techniques - like data mining and text mining - which unlock easier and more effective paths to the researchers, fostering the progress of knowledge. But they work only on free and open texts and data. New value-added services offered by the OA repository **PubMedCentral** (<http://www.ncbi.nlm.nih.gov/pmc/>) are based on text mining and sensors techniques operating on open data and texts, and offer e.g. a direct, seamless connection with genetic free databases when a genetic term is involved. Only in an OA environment are possible projects like **Health Commons** (<http://sciencecommons.org/projects/healthcommons/>), aimed at creating «a virtual marketplace or ecosystem where participants share data, knowledge, materials and services to accelerate research», dealing with molecular and cellular interactions that contribute to disease; or **Neurocommons** (<http://sciencecommons.org/projects/data/>), a knowledge management platform for biological research where each information is connected seamlessly via text mining.
- **Open data:** parallel to the OA logic and deeply connected to it is the Open Data movement. It claims for the absolute need of raw data to be published within the scientific record, as a matter of reproducibility on one side and of scientific integrity on the other. Many funders requires in their mandates also the deposit of the data set related to the research output; in many OA publishers platforms is possible (and encouraged) to publish data sets with the article; the Berlin Declaration itself states that « Open access contributions include original scientific research results, raw data and metadata». The **Dataverse Network** (<http://thedata.org/home>) is an innovative project: it is an application to publish, share, reference, extract and analyze research data. The system gives ownership and recognition to author; generates a persistent data citation; converts data sets to a preservable and verifiable format; supports also restricted access; indexes all metadata; and inter-operates with other systems using standards. Another useful tool is **BioMedCentral Databases** (<http://databases.biomedcentral.com/browsecatalog>), a list of more than 1,100 databases on the Web, mostly free, is provided by the OA publisher BioMedCentral.
- **Interdisciplinarity and international cooperation:** a worldwide free access to scientific information, to which OA makes a significant contribution, promotes the

internationalisation of science. OA documents are available globally within a short time span, so authors receive immediate feedback from their colleagues all over the world. It also allows the creation of diffused co-laboratory with shared data. Furthermore, OA materials enable people in poorer countries to access and utilise relevant scientific information, contributing to overcome the digital divide and to allow all countries to share the research findings of the international scientific community. Another benefit stems from the increased visibility of works before closed within disciplinary journals and now freely available, drawing the attention of scientists to information from other fields which they might never have discovered if the article had been published only behind Toll Access articles. It promotes inter-disciplinary cooperation mostly in border areas of research.

- **Access to publicly funded research:** OA repositories and journals allow output of publicly funded research to be publicly available. It solves one of the paradoxes of the current scholarly communication system, in which research is paid four times: first, the institution pays the researchers' wage; second, it gives him the facilities and the funding for the research itself. Once a researcher writes his/her outputs in an article, submits it to a traditional scientific journal and signs a contract upon acceptance, he/she loses any right over the work. So, if the institution wants to read its researchers' works closed behind Toll-Access journals, must pay a third time in subscription fees – usually unsustainable - and in library management. If the author needs to reuse his/her work for scholarly purposes, rights to reuse have to be paid again. This would be the fourth time. Not to mention the fact that practitioners without affiliation or the simple taxpayer can afford neither the subscription fee nor the pay per view charge. That's the reason why the last years have seen several statements of funders and public organizations at national and international level claiming for free access to publicly funded research: among the others, UN World summit on Information Society in 2003, OECD in 2004, US National Institutes of Health in 2007/8, European Research Council in 2008 [25].

### **Public access to publicly funded research: the mandates**

Upon the basis of these declarations, and according to the mentioned principle that publicly funded research outputs have to be publicly available, several – and every day growing - academic and research institution and funding agencies all over the world have adopted mandatory policies in order to deposit and make freely available the research results at least self-archiving in Open Archives. It is to be underlined that no one asks to publish in OA journals – which may imply a cost -, just to make freely available the content. Often a six-month embargo after publication is provided.

In **ROARMAP** (<http://www.eprints.org/openaccess/policysignup/>) you can find the list of the institution and funding agencies adopting an OA policy, with the details of the policy itself: as of August, 16<sup>th</sup> there are 226 mandates and 19 proposed mandates. Some example of institution adopting an OA mandate: CERN (Geneva, CH); Australian Research Council; National Research Council (Canada); Agence National de la Recherche (F); Medical Research Council (UK); MIT (US). The **SHERPA-JULIET** project (<http://www.sherpa.ac.uk/juliet/>) lists the funders' policies; whilst the parallel SHERPA-RoMEO project (<http://www.sherpa.ac.uk/romeo/>) shows the publishers' compliance with the principal policies. In the biomedical field, Wellcome Trust in UK has been a pioneer; Telethon Italy joined in 2010. The most debated policy was the US National Institutes of Health, set in 2007-2008, active since April 7<sup>th</sup>, 2008

(<http://publicaccess.nih.gov/policy.htm>). Peter Suber summarized the political controversy and the alleged copyright concerns – turned to be false - in his October 2008 Newsletter (<http://www.earlham.edu/~peters/fos/newsletter/10-02-08.htm#nih>). The Public Access policy at NIH wasn't retracted and on the contrary generated about 6,000 submissions per month (<http://www.nihms.nih.gov/stats/>) in PubMedCentral, which is the Open Archive elected for deposit. PubMedCentral content appears as “Free full text” in your PubMed search results. Images collected from PubMedCentral are gathered and made available via the **Yale Image Finder** service (<http://krauthammerlab.med.yale.edu/imagefinder/>), which as to August 16<sup>th</sup> contains 592,687 freely reusable images.

On this path, the FRPAA – Federal Research Public Access Act (<http://www.arl.org/sparc/advocacy/frpaa/index.shtml>) is being debated in the US Senate to extend the Public Access policy to all the 11 National research Agencies.

Another peculiar policy is the one unanimously voted the University of Harvard (first the Faculty of Arts and Science, then others) adopted in February, 2008, because it requires that «Each Faculty member grants to the President and Fellows of Harvard College permission to make available his or her scholarly articles and to exercise the copyright in those articles. In legal terms, the permission granted by each Faculty member is a nonexclusive, irrevocable, paid-up, worldwide license to exercise any and all rights under copyright relating to each of his or her scholarly articles [...].The Provost's Office may make the article available to the public in an open-access repository» (<http://osc.hul.harvard.edu/hfaspolicy>).

The institutional policy tied to the Institutional Repository ORBi at the Belgian University of Liège

(<http://www.eprints.org/openaccess/policysignup/fullinfo.php?inst=Universit%C3%A9%20de%20Li%C3%A8ge>) features an interesting incentive, as Rector Prof. Bernard Rentier stated that «only those references introduced in ORBi will be taken into consideration as the official list of publications accompanying any curriculum vitae for all evaluation procedures 'in house' (designations, promotions, grant applications, etc.)». In almost two years the ORBi Institutional Repository reached over 49,000 submitted items.

The European Union, in its path toward OA [26], set an **OA Pilot Project** within the Seventh Framework Programme - FP7, intended to provide researchers and other interested members of the public with improved online access to EU-funded research results ([http://ec.europa.eu/research/science-](http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1300&lang=1)

[society/index.cfm?fuseaction=public.topic&id=1300&lang=1](http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1300&lang=1)). In six areas, accounting for some 20% of the total FP7 budget and namely Health, Energy, Environment, Information and communication technologies, Research infrastructures, Socio-economic sciences and Humanities, and science in society, researchers granted by the EU are requested to deposit peer reviewed research articles arising from the projects in an OA repository of their choice. These areas were chosen because of their high societal impact. A sort of spin-off of this OA Pilot is the European project **OPENAIRE** (<http://www.openaire.eu/>), aimed at establishing underlying structures for researchers to support them in complying with the OA Pilot, including a central repository.

Within the FP7, European Union founds also the NECOBELAC project, aimed at creating awareness of the OA potentialities in the biomedical field in Europe and Latin America-Caribbean: «a network of institutions is being creating to collaborate in ad hoc training programmes in information production and dissemination, including technical and ethical issues. NECOBELAC promotes the coordination and effectiveness of the existing health-related information infrastructures in Europe and LAC countries to achieve a wider scale uptake of

community engagement, embedding the use of open access methods within accepted working practices» (<http://www.necobelac.eu/en/index.php>).

The role of funding agencies seems thus to be fundamental in orienting the choices of the authors and the development of alternative channels in scientific communication.

### **Economic sustainability, costs and benefits, and return on investments**

Economic sustainability and viability in the long term period are crucial and critical points to achieve OA. On sustainability lay the foundations of the development of any new model of scholarly communication.

John Houghton (Victoria Univ., Australia) conducted in 2009 a fundamental survey, *Economic implications of alternative publishing models: exploring the costs and benefits* [27]. The survey, based on the extremely detailed Björk scientific publication life cycle model [28], first identifies and then quantifies costs and benefits associated with each step of scientific communication described in the model. OA results to be the most cost-effective systems. Savings calculated referring to the UK reality go from 159/258 million UK Pounds (for global/unilateral OA) in a self-archiving scenario to 287/500 million UK Pounds in a OA publishing scenario to 308/520 million UK Pounds in a self-archiving plus overlay services scenario. On the basis of the system savings in an OA scenario in UK, it also should be possible to meet costs of alternative publishing models from within current budgetary allocations. As to the cost/benefit ratio, the better seems to be the self-archiving choice, with a 4.0 % ratio within a national UK OA scenario and an 8.3% in a global OA scenario [29]. The survey has been replicated modelling the Dutch reality (savings for 133 million Euros) and the Danish one (savings for 70 million Euros) [30].

Another merit of Houghton's work is having set a global schema to calculate costs and benefits. The model is online (<http://www.cfses.com/EI-ASPM/>), so any institution can input its data. Alma Swan (Key Perspectives, UK) carried out a survey with data from four British Universities different by size, age, and research/teaching attitude, finding that OA actually is cost/effective but not for the most research-intensive institution [31]. Otherwise, Swan invites to consider not only cash savings, but also non-cash benefits such as an increased connection with the production cycle which bring benefits and progress for the whole society. In the triad research-knowledge-innovation, the first two are supposed to be carried out by Faculties, the latter is performed outside the Academy, in the private sector. Therefore, research outputs ought to be freely available to all. The evidence at the Queensland University of Technology in Australia (<http://www.qut.edu.au/>) is that incomes for research external contracts are quite doubled after the adoption of the OA mandate, as result of the enhanced visibility.

Houghton has recently conducted a new feasibility study on *Economic and Social Return on Investment in Open Archiving Federally Funded Research Outputs* [32], which outlines one possible approach to measuring the impacts of the cited US FRPAA - Federal Research Public Access Act (FRPAA) on returns to public investment in R&D. According to Houghton, «Preliminary modeling suggests that over a transitional period of 30 years from implementation, the potential incremental benefits of the proposed FRPAA archiving mandate might be worth around 4 times the estimated cost using the higher end lifecycle costing, 8 times the cost using the NIH costing and more than 20 times the cost using the arXiv costing. Perhaps two-thirds of these benefits would accrue within the US, with the remainder spilling over to other countries. Hence, the US national benefits arising from the proposed FRPAA archiving mandate might be of the order of 5 times the costs».

The ongoing European project **PEER** - Publishing and the Ecology of European Research (<http://www.peerproject.eu/>), is investigating the effects of the large-scale, systematic depositing of authors' final peer-reviewed manuscripts (the so-called "Green OA") on reader access, author visibility, and journal viability, as well as on the broader ecology of European research. The rationale of the project reckons that peer-reviewed journals play a key role in scholarly communication and are essential for scientific progress and European competitiveness. The publishing and research communities share the view that increased access to the results of EU-funded research is necessary to maximize their use and impact. However, they hold different views on whether mandated deposit in OA repositories will achieve greater use and impact. There are also differences of opinion as to the most appropriate embargo periods. No consensus has been reached on a way forward so far, but the project is being carried out as collaboration between publishers, repositories and researchers.

**SOAP** – Study of Open Access Publishing (<http://project-soap.eu/>) is another EU-funded project aimed at analyzing and describing the current business models and at investigating the researchers' attitude towards OA. One of the expected results is an assessment of the risks, opportunities and essential requirements for a smooth transition to OA publishing. In the rationale we read also that «Overall, the SOAP project intends to gather information, generate data and create knowledge that will enhance the search for further innovation in digital publishing in Europe, so that researchers will reap the benefits of these innovations and publishers will better understand market opportunities».

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[1] For more details on the event, see <http://www.openaccessweek.org/profiles/blogs/welcome-to-open-access-week>. SPARC website is available at <http://www.arl.org/sparc/index.shtml>.

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