



Innovation and experimentation in scholarly publishing: Web 2.0 features in Open Access journals

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Abstract:

Open Access journals are rapidly increasing in number and consolidating their reputation in scholarly e- publishing. The Directory of Open Access Journals (DOAJ) listed more than 7.500 OA journals in March 2012 while M. Laakso et al. (M. Laakso et al 2011) estimate a number of more than 250.000 OA articles in 2011.

OA journals are also leading the way in introducing innovative features and concepts in scholarly communication.

Several OA journals have experimented with innovations in different fields: e.g. peer review, business models (article processing fees, membership, sponsorship and so on), topics, formats, layout and structure of articles (Bo-Christer Björk, 2011).

Among the others, Web 2.0 features have been recently adopted by some scholarly OA journals. This article reports the findings of a study carried out by the author in the period March-April 2012 on 1, 057 OA journals selected from the Directory of Open Access Journals.

Findings show that the level of uptake of Web 2.0 features in OA publishing is uneven. It ranges from a non adoption of Web 2.0 technologies to a low level of uptake for OA journals which enable RSS/ATOM applications (e.g. the SciELO electronic library and a fair number of journals adopting the PKP OJS software), to a medium/high level of adoption as in the case of OA journals and platforms which incorporate different sharing tools or set up Facebook pages and Twitter accounts to outreach social networking and microblogging users (e.g. the Redalyc platform, BioMed Central), to a high level of adoption of Web 2.0 tools i.e. in the case of those OA journals which implement inherently Web 2.0 technologies. The

format and publishing structure of these journals are deeply affected by the adoption of these technologies.

This paper aims to highlight the way OA journals are innovating the scholarly publishing system.

The Open Access publishing scenario

In the last 20 years the digital environment has reconfigured the scholarly communication system and the roles of its chain actors: authors, readers, libraries, and publishers.

Specifically, the scientific publishing system has undergone a transformation which has affected first and most deeply the STM segment.

The shift from print to electronic has offered tremendous possibilities to end users, libraries and publishers to enhance services and meet user needs: 24/7 access to resources, more effective abstract and information services, discovery services, interoperable content dissemination, collaborative preservation models (LOCKSS, CLOCKSS, Portico), closer and deeper integration of resources and citation linking (CrossRef).

The scholarly e-journals perform the traditional four-function system as identified by Roosendaal and Geurts in 1997 (Roosendaal and Geurts 1997): registration, certification, awareness and archiving. At the same time the digital medium has offered scholarly publishers the chance to experiment with an array of innovative practices and features in publishing:

- extensive hyper-linking within the text to other articles, graphics and datasets;
- flexible formats (html, ePub);
- new business models: bundles of journals, different subscription models for print only, print plus online, and online only - some publishers now include access to all their back files in their subscriptions (e.g. the American Physical Society)- new pricing criteria - some publishers are now moving away from the historical print pricing model, decoupling the pricing for print and electronic journal (e.g. the American Chemical Society)- OA business models - the majority of commercial publishers also adopt the “author-pays” OA model in combination with the traditional subscription model as they give authors the choice to publish their articles OA (Springer pioneered this in 2004 with an open access program known as Open Choice,)ⁱ;
- innovative layouts and structure of articles (e.g. the Article of the Future launched by Elsevier).
- faster dissemination (article in press).

Open Access journals are at the cutting edge of innovations in e-publishing..

As it is well-known, the Open Access movement underpins free access to scientific literature and fosters the adoption of two strategies to make scholarly outputs freely available in Internet:

- the Gold Road, i.e. the publication in Open Access journals;
- the Green Road, i. e. the self-archiving or archiving of the scholarly outputs in the open access digital repositories, both subject-based and institutional repositories (IRs).

While some Open Access journals were launched before the birth of the Open Access movementⁱⁱ - the Budapest Open Access Initiative published in 2002 is the OA manifesto - ⁱⁱⁱ there has been consistent and quantitative growth in the number of OA journals since 2000.

In March 2012 the Directory of Open Access Journals (DOAJ) listed more than 7.500 OA journals while according to M. Laakso et al. (M. Laakso et al 2011) the number of OA journals increased by 500% and the number of articles increased by 900% during the decade 2000-2009. As a matter of fact M. Laakso et al. estimated that in 2000 around 19,500 articles were published OA, while in 2009 the number raised to 191,850 articles.

The OA publishing scene is extremely varied and covers a full range of e-publications.^{iv} In 2009 the European Commission funded the Study on Open Access Publishing (SOAP) project, which analyzed a total of 2.838 OA journals selected from the DOAJ on a language driven parameter (only English language journals were taken into account). The results of the study show that only 5 publishers, i.e. BioMed Central, Hindawi, Medknow, Bentham Open e Internet Scientific Publications, produce more than 50 journals, altogether representing 19% of journals and 13% of articles in any given year. The science technology and medicine fields (STM) comprise two thirds of the journals while Social sciences and humanities (SSH) comprise 32% of journals and 16% of articles (Dallmeier-Tissen et al., 2010)^v

The growth of OA journals is both quantitative and qualitative. Manifold OA journals have consolidated their reputation in the scholarly e-publishing system.

Some studies have given evidence of this growing reputation:

in 2004 McVeigh (McVeigh 2004) calculated that 239 OA journals had been assigned an Impact Factor (IF), in 2008 Vanouplines and Beullens reported the number as 295 OA journals while two years later according to Giglia (Giglia 2010) 385 OA journals had assigned an Impact Factor by ISI.^{vi}

Recently Xia (Xia, 2012) assessed the quality of Library and Information Science (LIS) journals between 2004 and 2008 by testing the h-index to measure journal impact and to position OA journals in the overall journal rankings. He draws the conclusion that LIS OA journals support high-quality research and publication and are rated as highly as LIS non-OA journals.

Innovative features in Open Access journals

Since the mid Nineties a plethora of studies has explored the innovative features of electronic journals and stressed the advantages of the digital version of a journal over the print version while the topic of innovation in OA journals has been only recently put forward.

In 2011 Bo-Christer Björk, (Bo-Christer Björk, 2011) offered a broad overview of the innovative features of the OA journals, by analyzing the characteristics of 24 open access journals including both representative cases and highly innovative outlier cases:

- new formats and peer review practices: the concept of review of rigor only and the open peer review paradigm (e.g. PLoS ONE, Atmospheric Chemistry and Physics);
- varied business models (membership, article processing charges, submission fees etc.);
- the rise of megajournals (e.g. PLoS ONE, SAGE Open, Acta Crystallography: Structure Reports Online etc.);
- shorter article publication cycles;
- a more flexible layout and structure of the article;
- easy reusability of digital content.

Not all OA journals share the same amount of innovative features, but some OA journals are certainly leading the way in innovation (e.g. PLoS ONE).

To a certain extent this drive of OA journals towards innovation is a natural consequence of the conceptual paradigm of the OA movement as a new model of dissemination of knowledge.

The principles of the OA movement and the necessity to overcome the stiffness and the inefficiencies of the traditional publishing system naturally foster OA publishers to look forward and to experiment with alternative practices and methods of content dissemination.

The time period over which a journal has been published can also explain the OA journals emphasis on innovation as the majority of OA journals started publishing only in the mid and late 1990. Generally speaking, newly founded online journals tend to be more proactive in experimentation and innovation than the commercial mainstream journals. They can support the emergence of new areas of study and new approaches to scholarship.

Moreover OA journals are often regarded as a training ground for both researchers and publishers. These latter feel they have a much “bigger degree of freedom to experiment with innovations.” (Bo-Christer Björk, 2011).

Finally, OA journals must gain widespread acceptance and reputation. The Internet and its tools are an extremely powerful marketing and promotion channel provided that one can exploit all the opportunities offered by the web.

These opportunities have recently been enhanced by the success of the Web 2.0. The new social media combined with the open access paradigm have enhanced the academic discourse.

Web 2.0 features in commercial journals

Since 2004^{vii} Web 2.0 technologies like RSS, wikis, blogs, social networking platforms (Facebook , LinkedIn etc), social bookmarking and reference services (Delicious, CiteUlike, Mendeley, Zotero etc.), microblogging platforms (Twitter) etc. have dominated the digital world. More recently these technologies have entered into the academic world and academic use of the social media for research purposes is increasing (CIBER, Emerald Group Publishing , 2010).

Notwithstanding this, commercial academic publishers have been cautious in the adoption of the Web 2.0 tools. According to Cox & Cox (2008) only about 25% of journal publishers provided Web 2.0 technologies (RSS, wikis, forums, podcast, blogs, tagging, or “other”) in 2008.

In their report on STM publishing Ware and Mabe (Ware and Mabe, 2009) gave some examples of Web 2.0 technologies adopted by commercial publishers: e.g.. Elsevier launched two wiki services in 2008: WiserWiki (Elsevier) with content seeded from an existing (out of print) textbook, and Elsevier’s SciTopics, a wiki-like service that allows invited experts to maintain pages on topics of their choice. Connotea, CiteUlike, and 2collab were launched respectively by Nature Publishing Group (NPG), by Springer, and Elsevier as reference management platforms aimed at academics.

The Nature Publishing Group in particular is a very innovative academic publisher and has activated a set of Web 2.0 tools for researchers: the publisher runs a blog platform for the Nature Publishing Group editors, staff and occasional guest bloggers, a social academic reference management platform (Connotea), and a social network for scientists (Nature Network). Early in 2006 the journal “Nature” also launched a public debate on open peer review as a new peer review system to supplement the traditional one. Notwithstanding these interesting experimentations, and despite the fact that “mainstream” publishers have adopted different types of Web 2.0, technologies Ware and Mabe concluded in their report that “uptake appears slow and publisher investments in Web 2.0 remain difficult to monetise” among STM publishers. (p. 59)

Web 2.0 features in Open Access journals: goals of the study and methodology

The goals of our study on Web 2.0 characteristics of OA journals were:

1. to provide further evidence that OA journals are strongly oriented to innovation and experimentation in the e-publishing scientific arena, by reviewing a selection of OA journals to find out whether, and if so what type of Web 2.0 features OA journals or OA publishing platforms have adopted to date;
2. to highlight differences in the level of uptake of social tools among OA journals belonging to different subject categories.

Unfortunately it was not possible to draw a comparison between Toll Access (TA) and OA publishers' uptake of Web 2.0 technologies, as data on the adoption of Web 2.0 technologies among commercial publishers are few and not consistent.

To these ends, journal data were retrieved from Directory of Open Access Journals (DOAJ) in the period March-April 2012. From the list of 7,456 indexed in the DOAJ in March 2012 the following journal subject collections were selected, as categorized by the directory:

- Agriculture and Food sciences (390 Journals in total, subcategorized in:
 - Agriculture in general (141 journals);
 - Animal Sciences (105 journals);
 - Aquaculture and fisheries (19 journals);
 - Forestry(37 journals);
 - Nutrition and food sciences (38 journals);
 - Plant sciences(50 journals) and
 - Computer science (320 journals) for the hard sciences;
- Arts and Architecture (208 journals in total, subcategorized in:
 - Architecture (42 journals);
 - Arts in general(58 journals);
 - History of arts (12 Journals);
 - Music (47 journals);
 - Performing arts (30 Journals);
 - Visual arts (19 journals) and
 - Law for the soft sciences (139 journals).

On the whole 1,057 OA journals were examined for this study.

This selection from OA journals in DOAJ was intended to represent an overview of the adoption of Web 2.0 features in non mainstream OA journals in different disciplines. Analysis of the Web 2.0 characteristics of highly innovative OA journals, such as PLoSONE, was not a goal of this study.

Selected OA journals were examined by reviewing the home page of each journal's website and by browsing the last published issue and articles. This methodology was used to highlight Web 2.0 technologies in journals which implement them at the article level rather than at the journal level.

Findings

Over the whole set of 1,057 OA journals examined for this study 311 (29,4%) have adopted at least a Web 2.0 functionality. Data analysis shows that 139 out of 390 Agriculture and food sciences journals (35,6%), 75 out of 320 Computer Science journals (23,4 %), 51 out of 208

Arts and Architecture journals (24,5%), and 46 journals out of 139 Law journals (33,1%) have adopted at least one technology of the social web.

Roughly 71% of OA journals selected for this study do not adopt any Web 2.0 technology. Analysis of publishing platforms show that:

- Bentham Open does not offer Web 2.0 functionality, although it is ranked among the large OA publishers (Suenje Dallmeier-Tiessen et al., 2010);
- all journals but one^{viii} published by the Academy & Industry Research Collaboration Center (AIRCC) do not adopt Web 2.0 technologies despite the fact that the AIRCC, a non-profit organization that promotes science and engineering research worldwide, manages a page on Facebook and operates a Twitter stream on AIRCC journals;
- a consistent number of the OA journals using Open Journal System (OJS), the open source Public Knowledge Project (PKP) software^{ix} do not enable feeds in their configuration despite the fact that the software offers a default plug-in for RSS/ATOM feeds.^x

Lack of expertise in managing Web 2.0 technologies, lack of incentives and requests by the referring scientific communities could affect the non-adoption of Web 2.0 tools among the above mentioned journals.

The International Journal of Computer Technology and Applications, the International Journal of Engineering Science and Technology, the International Journal of VLSI & Signal Processing Applications, the International Journal on Computer Science and Engineering adopt QR codes but no Web 2.0 technologies.

These journals were excluded from any further analysis as QR codes do not belong in the strictest sense to the Web 2.0 technologies and are better classified as examples of mobile technologies.

The selected OA journals could be classified into three tiers:

Tier one: OA journals in this tier are defined by a low level of adoption of Web 2.0 technologies, as they adopt a single type of Web 2.0 technology.

Included in this tier are all those journals which have chosen to set up RSS/ATOM feeds, e.g. the journals belonging to the SciELO electronic library covering a selected collection of South-American OA journals, all the journals published by the academic publishers Science Alert and Versita Open and OJS OA journals which enable the Web feed plug-in to syndicate their content.

The OJS platform allows administrators to implement two more Web 2.0 tools:

- by adding social networking links (Facebook, Delicious) to the Reading Tools via the AddThis (<http://addthis.com/>) service;
- by implementing the External feeds plug-in which allows the OJS administrator to display the content of external RSS feeds from other sources in the journal. For example, administrators can display the latest posts from the PKP News blog or the Open Access News blog in the sidebar (Willinsky et al., 2010).

However none of the OJS journals included in our sample implemented the two above mentioned tools.

A few OA journals have incorporated the popular “like” Facebook button on their homepage as a unique Web 2.0 technology, e.g. the Bulletin of the Polytechnic Institute of Jassy, the International Journal of Computer Science and Technology, the Journal of Agricultural Extension, the Journal of Educational Media & Library Sciences. The “like” Facebook button is becoming generally very popular. It is also used in combination with other Web 2.0 technologies, e.g. the journal Hermeneia which also maintains a blogroll on its homepage.

Ethnomusicology Review, The International Journal of the Creative Arts in Interdisciplinary Practice, Liminalities, Psikeba, and Ricerche di s/confine^{xi} publish a blog. Remarkably all these journals belong to the DOAJ Arts and Architecture category. The Humanities blogs are a very powerful tool to enhance scientific discourse. They “enable a kind of conference – without-walls, in which new ideas and new text can be discussed in something closer to a real time” (Fitzpatrick, 2007)

The Journal of Computing and the Digital Medievalist also represent two interesting different study cases:

- the first manages an account on Scribd, the well known social self-publishing platform, to upload last published articles;
- the latter publishes a wiki whose goal is “to make pages on subjects the community of practice of medievalists thinks will be useful for others to look at”.^{xii}

Tier two: OA journals belonging to tier two share a medium/high level of uptake of Web 2.0 functionalities as they adopt a combination of Web 2.0 technologies.

These journals can be subcategorized into two main groups:

- journals which adopt different combinations of Web 2.0 tools, e.g. RSS/ATOM feeds buttons shown in combination with clickable icons of different types of sharing tools which allow readers to recommend the journal to a wide range of Web 2.0 platforms (Blogger, Facebook, Digg, Google +1, LinkedIn, Twenti, Twitter, etc), and to maintain shared bibliographies (Connotea, CiteUlike, Mendeley, etc.), e.g. the OA journals published by the academic publisher Scientific Research and by the Japan Science and Technology Agency, which has recently released a new version of its publishing platform J-Stage.
- journals which have set up a Facebook page and operate a Twitter account, e.g. the International Journal of Sociology of Agriculture and Food, Frontiers, and the Revista de Investigaciones Agropecuarias for the category Agriculture and Food sciences; the e-Conservation Magazine and Aria for the category Arts and Architecture; the International Journal of Advanced Computer Sciences and Applications and the World of Computer Science and Information Technology Journal for the Computer Science category; Politica Criminal for the Law category.

Among the publishing platforms the Academy & Industry Research Collaboration Center (AIRCC), Versita Publishing, eScholarship, and Redalyc have also set up a page on Facebook and a Twitter account.

The OA biomedical publishing platform BioMed Central (BMC) owned by Springer Science and Business Media implements a number of different Web 2.0 tools for researchers: the platform has a page on Facebook and operates different streams on a Twitter account, maintains four different blogs (BioMed Central blog, Chemistry Central blog, Open Repository blog, BMC series blog), incorporates the “like” Facebook button and publishes several types of RSS feeds, i.e. on editor’s picks, on latest, most viewed and most forwarded articles and on various scientific topics.

The seven BMC journals included in our sample (Acta Veterinaria Scandinavica, BMC Veterinary Research, Irish Veterinary Journal, the Journal of International Society of Sports Nutrition, Nutrition Journal, Plant Methods, and Veterinary Research) implement manifold Web 2.0 tools at different levels:

- on their homepage they display several types of RSS feeds - feeds on editor’s picks, on latest and most viewed articles, on news from the web, on readers’ comments - and

- the BMC Twitter link button. In addition Plant Methods enables feeds on the most forwarded articles and on the last tweets posted on the BMC Twitter account;
- on the articles page (BMC journals do not publish issues but articles are published as soon as they have been revised, accepted and are ready for the publication) they display the BMC Twitter button and publish RSS feeds to syndicate the most viewed articles;
- at the article level they implement a wide range of Web 2.0 technologies to share the articles on different Web 2.0 platforms and to allow readers to post comments on every article published.

The strategy to open both a page on Facebook and a Twitter account clearly indicates that the popularity of these two social web platforms is growing rapidly and therefore their adoption can be extremely effective to reach out and to promote journal content among the research communities.

However, the management of a Facebook page and of a Twitter account can represent a time consuming task for publishers, particularly for journals which are published by academic and non-profit publishers. According to Edgar and Willinsky (Edgar and Willinsky, 2010) 51% of the OA journals are published or sponsored by academic department , and 16% by non-profit publishers. These OA journals can draw on very active editorial teams indeed “with 76 percent of the editors engaged in copyediting, 70 percent involved in proofreading, and 58 percent taking a hand in laying out the articles. [...] Most editors (77 percent) reported working without compensation from the journal, with only 16 percent reporting some form of remuneration”. This condition represents at once an opportunity and a critical issue for OA journals. As the majority of OA journals rely on the voluntary activity of faculty and university staff, the OA journals’ sustainability over the long term is still a major concern among OA advocates, and is a problem to be addressed in OA future development.

Tier three: a third set of journals is defined by OA journals which adopt inherently Web 2.0 technologies. Format and publishing structure of journals belonging to this group are heavily reliant on Web 2.0 technologies.

Only a few journals indeed can be classified in this tier and they merit individual examination:

The Acta Societatis Martensis, the journal of the Estonian non profit association Martens Society, is a blog in itself. It is powered by WordPress, the well-known blog platform. Each new issue is a post of its own. However articles are downloadable in pdf format. The structure is somewhat similar to a traditional journal. Readers can post comments on single issues; The Journal of Music and Meaning (JMM) is even more innovative in its structure. Each new issue constitutes a blog of its own. Since the tenth issue of the JMM “new entries are added to the issue as they become ready for publication”.^{xiii} . The overall blog structure facilitates a smoother editing and publishing process.

The Tate Papers, the journal of the famous modern art museum the Tate Gallery, has a clearly visual and multimedia structure. The journal publishes articles relating to art history and theory, visual culture, conservation, gallery education and museum studies. The journal structure is deeply embedded in the multimedia Tate Gallery website.

The Tate Gallery has a page on Facebook and a Twitter account. The museum offers a wide range of audio and video podcasts, including audio tours, interviews and recordings of talks and discussions. To post videos the Gallery has also created a YouTube account.

Sonograma Magazine (SM) is another interesting instance of a multimedia journal. It combines multimedia functions and Web 2.0 technologies to create an open space of cultural interactive exchanges where scholars can experiment with different ways to communicate both in a formally and informally.

Conclusions

With regard to the adoption of Web 2.0 technologies OA journals behave unevenly. The great majority of OA journals (roughly 71%) do not adopt Web 2.0 technologies. Among OA journals using Web 2.0 tools different levels of uptake can be tracked ranging from journals which adopt feeds as a unique Web 2.0 technology to journals belonging to Tier Two and Three which clearly show signs of innovation in format and publishing structure. Particularly in OA journals classified in Tier Three distinctions between journals and blogs (i.e. Acta Societatis Martensis , Journal of Music and Meaning) and between journals and portals (i.e. Tate Papers, Sonograma Magazine) are blurred and the boundaries between **types** and forms of **publication** become less clearly defined. The size of an OA publisher is not predictive of a high level of adoption of social web technologies: the large OA academic publisher Bentham Open (more than 230 journals) does not implement Web 2.0 technologies while BioMed Central (237 journals) implements a full set of different Web 2.0 tools for researchers. Again, Subject category does not predict adoption of Web 2.0 technologies. However some differences can be ascribed instead to qualitative aspects of the research performed by the referring scholarly communities. OA journals in the Arts and Architecture tend to publish more blogs and pay more attention to editorial and multimedia aspects. Due to the rapid evolutions and spread of Web2.0 technologies, further analyses will be necessary in the near future to provide a deeper understanding of the OA publishing systems and adoption of these technologies. In particular, it would be interesting to examine qualitative and quantitative differences in the uptake of Web 2.0 technologies among Toll Access (TA) and OA journals and publishing platforms.

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ⁱ The level of authors who have chosen to take up an OA option in commercial journals is still very low. Ware and Mabe (Ware and Mabe, 2009) report a percentage of 1/ 2 % on average across all publishing offering in 2008, although it must be remarked that this percentage is very uneven among disciplines and it has increased to date.

ⁱⁱ In their article M. Laakso et al. suggest three distinct periods in the development of OA publishing: the Pioneering years (1993–1999), the Innovation years (2000–2004), and the Consolidation years (2005–2009).

ⁱⁱⁱ Following the BOAI two other statements include a definition of Open Access to scholarly literature, i.e. the Bethesda Statement and the Berlin Declaration on Open Access to Knowledge in Sciences and Humanities. The three declarations are best known in the OA jargon as the “BBB definition”.

^{iv} OA journals are primarily electronic journals. Occasionally print editions are published as an optional fee-based add-on. It is the case of the Italian OA journal in Library and Information Science “JLIS.it”.

^v Suenje Dallmeier-Tiessen, Robert Darby, Bettina Goerner et al., *First results of the SOAP project: Open Access Publishing in 2010*, September 2010, <http://arxiv.org/ftp/arxiv/papers/1010/1010.0506.pdf>

^{vi} In some disciplines OA journals rank among the top ISI journals, e.g. PLOS Biology.

^{vii} The term Web 2.0 was coined by Tim O'Reilly, president of the publishing company O'Reilly Media Inc., in 2004 at a conference in San Francisco during a brainstorming on marketing strategies with the web publishing company MediaLive International.

^{viii} The International Journal of Computer Networks & Communications

^{ix} The software OJS had been developed in 2002 as part of the Public Knowledge Project's research program at the University of British Columbia in Vancouver, Canada with the participation of the Simon Fraser University Library, the Canadian Centre for Studies in Publishing, and the Stanford University.

^x OJS allows the administrator to show the feeds button on the homepage and/or at the issue and article level.

^{xi} The Bright Lights Film Journal and Tate Papers also maintain a blog in combination with a set of other Web 2.0 tools.

^{xii} The citation is taken from the journal website.

^{xiii} The citation is taken from the journal website.

^{xiv} All references were last retrieved on 3rd of May 2012