

Publishing Scientific Research: Is There Ground for New Ventures?

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Abstract

This paper highlights some of the issues that have been reported in surveys carried out by the RIOJA (Repository Interface for Overlaid Journal Archives) project (<http://www.ucl.ac.uk/ls/rioja>). Six hundred and eighty three scientists (17% of 4012 contacted), and representatives from publishing houses and members of editorial boards from peer-reviewed journals in astrophysics and cosmology provided their views regarding the overlay journal model. In general the scientists were disposed favourably towards the overlay journal model. However, they raised several implementation issues that they would consider important, primarily relating to the quality of the editorial board and of the published papers, the speed and quality of the peer review process, and the long-term archiving of the accepted research material. The traditional copy-editing function remains important to researchers in these disciplines, as is the visibility of research in indexing services. The printed volume is of little interest.

Keywords: subject repositories; publishing models; overlay journal model; astrophysics & cosmology

1. Introduction to the project

The RIOJA (Repository Interface for Overlaid Journal Archives) project (<http://www.ucl.ac.uk/ls/rioja>) is an international partnership of academic staff, librarians and technologists from UCL (University College London), the University of Cambridge, the University of Glasgow, Imperial College London and Cornell University. It aims to address the issues around the development and implementation of a new publishing model, the overlay journal - defined, for the purposes of the project, as a quality-assured journal whose content is deposited to and resides in one or more open access repositories. The project is funded by the JISC (Joint Information Systems Committee, UK) and runs from April 2007 to June 2008.

The impetus for the RIOJA project came directly from academic users of the arXiv (<http://arxiv.org>) subject repository. For this reason, arXiv and its community is the testbed for RIOJA. arXiv was founded in 1991 to facilitate the exchange of pre-prints between physicists. It now holds over 460,000 scientific papers, and in recent years its coverage has extended to mathematics, nonlinear sciences, quantitative biology and computer science in addition to physics. arXiv is firmly embedded in the research workflows of these communities.

This paper highlights some of the issues that have been reported in the community surveys, which, as part of the RIOJA project, surveyed the views of scientists, publishers and members of editorial boards of peer-reviewed journals in the fields of astrophysics and cosmology regarding the overlay journal model. To gather background to their views on publishing, the respondents were asked to provide information about their research, publication and reading patterns. The use of arXiv by this community and the reaction of its members to the overlay publishing model were also addressed in the survey. Respondents were asked to provide feedback about the suggested model; to indicate the factors that would influence them in deciding whether to publish in a journal overlaid onto a public repository; and to give their views on the

relative importance of different features and functions of a journal in terms of funding priorities. The publishers and members of editorial boards of peer-reviewed journals provided an insight into existing publishing practices.

2. Statement of the problem

The overlay concept, and the term “overlay journal” itself, appear to be attributed to Ginsparg [1]. Smith [2] further defined the model by discussing and comparing functions of the existing publishing model with what he referred to as the “deconstructed journal”. Although aspects of overlay have been introduced to journals in some subject domains, such as mathematics and computing [3-6], overlay journals have not yet been widely deployed.

Halliday and Oppenheim [7], in a report regarding the economics of Digital Libraries, recommended further research, in the field of electronic publishing in particular. Specifically, they suggested that the costs of electronic journal services should be further investigated, and commented that the degree of functionality that users require from electronic journals may have an impact on their costs. In a JISC funded report, consultants from Rightscom Ltd [8] suggested that commercial arrangements for the provision of access to the published literature are made based on the nature of the resource and the anticipated usage of the resource. Cockerill [9] indicated that what is regarded as a sustainable publishing model in the traditional sense (pay for access) is actually supported by the willingness of libraries to pay [... “*even reluctantly*”, p.94] large amounts of money to ensure access to the published literature. He suggested that as open access does not introduce any new costs there should not be any problem, in theory, to sustain open access to the literature. Waltham [10] raised further questions about the role of learned societies as publishers as well as the overall acceptance of the ‘author pays’ model by the scientific community.

Self-archiving and open access journals have been recommended by the Budapest Open Access Initiative (<http://www.soros.org/openaccess/read.shtml>) as the means to achieve access to publicly-funded research. The overlay model has the potential to combine both these “Green” (self-archiving) and “Gold” (open access journal) roads to open access. Hagemmann [11] noted that “...*overlay journals complement the original BOAI dual strategy for achieving Open Access...*” and suggested that the overlay model could be the next step to open access. In support of open access to information the BOAI published guides and handbooks on best practice to launching a new open access journal, converting an existing journal to open access, and business models to take into consideration [12-14].

Factors such as the expansion of digital repositories, the introduction of open source journal management software, an increasing awareness within the scholarly community at large of the issues around open access, and an increasing readiness within the publishing community to experiment with new models, suggest that the circumstances may now be right for an overlay model to succeed. The RIOJA survey was designed to test the reaction of one research community, selected for its close integration with a central subject repository, to this prospective new model.

3. Methodology

The RIOJA project is currently being carried out in six overlapping work packages addressing both managerial and research aspects of the project. This paper will discuss the results from community surveys which were undertaken to explore the views of scientists in the fields of astrophysics and cosmology concerning the feasibility of an overlay journal model. In addition to a questionnaire survey, a number of publishers and members of editorial boards were approached to discuss and elaborate on some of the initial questionnaire findings. These complementary studies were intended to enable a more rounded understanding of the publishing process, and to help the project to explore whether an overlay journal

model in astrophysics and cosmology could be viable in the long term .

The Times Higher Education Supplement World Rankings [15-16] was used to identify scientists in the top 100 academic and 15 non-academic institutions in the fields of astrophysics and cosmology worldwide, so as to capture feedback from the research community at an international level. Additionally, the invitation to participate in the survey was posted to a domain-specific discussion list, “CosmoCoffee” (<http://www.cosmocoffee.info>).

The survey was launched on June 8th 2007, and closed on July 15th. The questionnaire comprised 5 sections that aimed to: a) gather demographic and other background information about the respondents, b) find out about the research norms and practices of the scientists, from their perspectives as both creators and readers of research, c) identify issues around the researchers’ use of arXiv; and d) the final section sought their views regarding the viability of the overlay journal model. The target group was restricted to scientists who have completed their doctoral studies, and who therefore could be assumed to have produced research publications or to be in the process of publishing their research outcomes. 4012 scientists were contacted, and 683 (17%) participated.

The supplementary interviews involved representatives from PhysMath Central, Public Library of Science (PloS), and Oxford University Press (OUP), and members of the editorial boards of the journals Monthly Notices of the Royal Astronomical Society (MNRAS) and Journal of Cosmology and Astroparticle Physics (JCAP). The interviews lasted between 1.5 and 2 hours, were comprised of semi-structured questions, and on several occasions benefited from the participation of the project’s academic staff.

4. Results

The community surveys received responses from 683 scientists (17% of 4012 contacted), and representatives from publishing houses and members of editorial boards from peer-reviewed journals in astrophysics and cosmology, as described in the previous section. The respondents to the questionnaire survey represented a range of research interests, roles and research experience, and an almost equal proportion of returns (51/49) came from scientists who were English native speakers and those who were not.

Results indicated that more than half of the respondents (53%) were favourably disposed to the idea of overlay journal as a potential future model for scientific publishing. Over three quarters (80%) of the respondents were, in principle, willing to act as referees in an arXiv-overlay journal. Those scientists who expressed an interest in an overlay publishing journal (35%) but did not consider it important elaborated on some concerns and provided suggestions that are described in the following subsections.

4.1 Some issues around publishing research outcomes

The vast majority of the respondents to the survey (663 people) noted that papers for submission to peer-reviewed journals were their main research output. An average of 13 papers per scientist over a two-year period indicates a healthy research field with substantial ongoing research activity. These findings confirm the importance that peer-reviewed journals, and peers in general, play in the validation and dissemination of research in this discipline.

The journals in which the respondents had mostly published their research were among those with the highest impact factor as reported in the Thomson ISI Journal Citation Reports, 2005 [17]. Irrespective of ongoing discussions in the literature about the validity of citation analysis, these findings suggest that impact factor does have a bearing on scientists’ decisions on where to publish. However, the majority of the researchers (494 people) reported that the most important factor in their decision where to publish was the quality of the journal as perceived by the scientific community. Other factors from the scientists

pointed to the relationship between the quality, readership and impact of a journal with the reputation of the editorial board, and clear policies around the process of peer review. Although factors such as whether the journal is published by a professional society (473) or published in print (463) were considered unimportant, emphasis was placed on the importance of long-term archiving and sustainable access to the published literature. The subject coverage of the journal, the efficiency and ease of use of the submission system, its handling of images and various file formats (eg LaTeX), and the time that it takes for a paper to reach publication were also noted as influential factors (Table 1).

Statement	Rating	% agree	95% confidence limit	
Perceived quality of the journal by the scientific community		97.3	±	1.2
High journal impact factor		88.9	±	2.4
Being kept up-to-date during the refereeing process		81.6	±	3
Other factors (please specify)		75.3	±	9.4
Inclusion in indexing/abstracting services (e.g. ISI Science Citation Index)		67.9	±	3.6
Reputation of the editor/editorial board		66.2	±	3.6
Journals that do not charge authors for publication		64.5	±	3.6
Open Access Journals (journals whose content is openly and freely available)		52.8	±	3.8
Low or no subscription costs		33.9	±	3.6
Journals which publish a print version		29.8	±	3.5
Journals published by my professional society		26.9	±	3.4
Journals which have a high rate of rejection of papers		21.1	±	3.1

Key:

Table 1: Factors affecting the scientists' decision where to publish

4.2 Use of arXiv and indexing services

The scientists confirmed the important role that arXiv plays in communicating and disseminating research in the fields of astrophysics and cosmology. About 77% of the respondents access the arXiv on a daily or weekly basis. About 80% visit the arXiv “new/recent” section to keep up to date with new research (Figure 1). In addition, when the scientists were asked “*on finding an interesting title/abstract, where do you look for the full article*”, e-print repositories (such as arXiv) were denoted as the first port of call by 610 people (89%).

In the context of an overlay journal, repository policy clearly needs to be aligned sympathetically with the

journals's objectives. For example, observations were made about the quality of papers submitted to arXiv, and the fact that papers which have been subjected to peer review and those which have not co-exist on the repository without being clearly distinguished. Limitations on the size and format of files that may be uploaded to arXiv were also highlighted. . Some example of the comments the scientists made:

- *“arXiv has its own flaws, mostly related to the freewheeling unrefereed nature of the papers posted there... “*
- *“To be fair, arxiv is quick and fast in spreading information, but the quality of papers in terms of language and typesetting varies greatly - and this is the (expensive) benefit of having journals copy-editing the papers, which I do appreciate. Furthermore, other changes that they would welcome would be in the policies about file formats and image sizes”.*
- *“Large versions of color figures should be available”*
- *“I think the idea of “enhancing” the arXiv with a proper peer-review lens is a good idea, provided that what I see are the key advantages of current journal articles are retained: 1. The refereeing process; 2. Proper copy editing; 3. High-quality figures (the current arXiv limits on file sizes for figures leads to figures which are often illegible)”.*

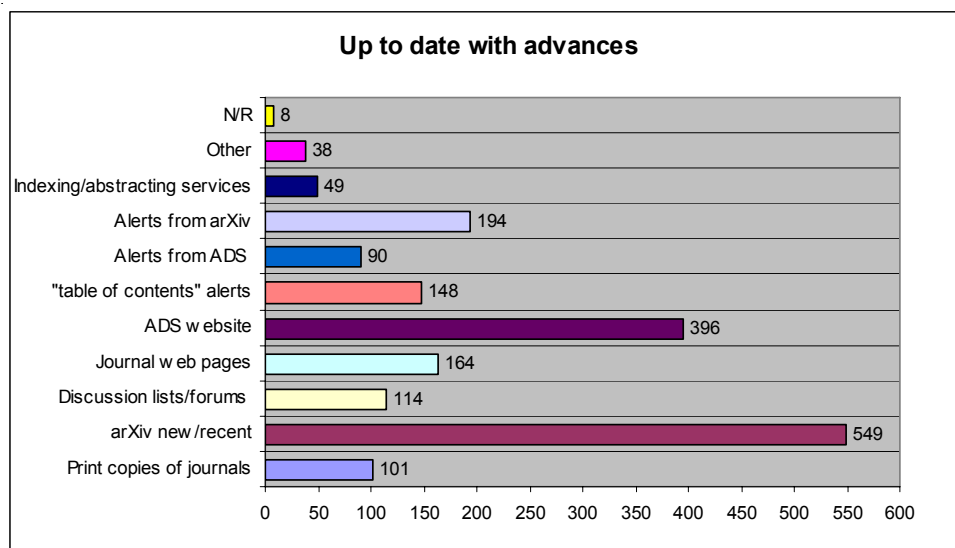


Figure 1: Keeping up to date with research advances

To search for back literature, 68% of the scientists prefer the ADS service. “Other” responses showed that information gleaned from colleagues, journal alerting services, attendance at conferences and workshops, and visiting the SPIRES Web site are all important.

4.3 Costs

The interviews with publishers and editors did not reveal any substantial information about costings that have not already been reported in the literature [10] or are available on some publishers' websites, e.g. PhysMath Central (<http://www.biomedcentral.com/info/about/apcfaq>). Interviewees suggested that the price per article processing varies by journal, discipline and usage. Drawing up exact costings for the set-up, production and running of an overlay journal was out of scope of the project.

The interviews with publishers indicated that the interest of academic and research staff in new publishing models is the prime driver for their adapting to technology challenges. For example, one of the publishers interviewed stated that one of their most successful journals, both in terms of revenue to the publisher and in terms of perceived quality and acceptance by the scientific community, was converted to open access (the ‘author pays’ model) purely because of community demand.

Meanwhile, a question included in the questionnaire survey concerning how expenditure should be apportioned towards particular functions of a journal was subject to criticism: respondents queried whether a scientist has adequate knowledge of the publishing process and its associated costs to make any useful observations. It was also observed that the publishing process entails more than the distribution phase, which some respondents felt that the survey appeared only to address. However, the costs associated with the work of scientific editors, with the integrity and long-term archiving of journal content, and with the transparency of peer review were highlighted as worthwhile (Table 2, scale 1 (little) – 5 (most of the amount)). An indicative comment is listed below:

“... Very-little of a high-cost journal may be more than a considerable amount of a low-cost one. Perhaps it would be better posed in terms of one’s priorities in paying for the journal. I think that in this day paying those such as the editors and referees, and ensuring the integrity of the archive, ought to be a higher priority than producing a paper version of the journal. Especially for an overlay journal such as you propose”.

Suggested expenditure/priority	None	1	2	3	4	5	Not sure
Paying scientific editors	23	23	60	240	141	15	21
Paying copy editors	8	28	73	256	134	6	15
Maintenance of journal software	4	20	73	238	147	9	30
Journal website	5	28	79	225	149	20	15
Online archive of journal's own back issues	9	27	52	202	189	18	19
Production of paper version	138	101	125	107	29	4	14
Extra features such as storage of associated data	30	63	105	182	100	6	26
Publisher profits	142	122	138	91	9	0	19
Paying referees	249	70	70	85	22	8	18
Other	3	1	1	1	3	2	3

Table 2 Suggested expenditure/priorities

Copy editing, the level of author involvement in it, and who should be responsible for any costs associated with it, were also issues that were commented upon. Some respondents favoured the idea of charging extra for papers that require extensive copy editing. Almost half of the respondents favoured the suggestion that the cost of copy editing should be borne by the author, and that it should also be variable based on the amount of copy editing required. Furthermore, almost half of the respondents (47%) appear to be in agreement that those changes should be carried out by the author (Table 3). The appearance and layout of the published papers were considered important.

- *“The idea of charging authors for papers that require excessive copyediting is a great one!”*
- *“Copy editing is a difficult issue: it should be the [responsibility] of authors to improve their writing, on the other hand the journal should take [responsibility] for what it published. Perhaps an author could have say three chances and after that*

should pay for copy editing?”

- “...my position is that a basic copy editing should be provided by the journal, but that extremely messy papers should be penalized, perhaps by introducing extra costs”
- “I do believe money [is] being wasted on the copy-editing of already copy-edited articles, on paper copies of journals, on library subscriptions, etc. The publications process needs to be streamlined and a new type of open-access peer-reviewed journal might just be the right thing”.

Statement	Rating	% agree	95% confidence limit
The cost of copy editing should be borne by the author and vary from paper to paper, depending on the amount of copy editing required		48.2	± 3.8
Copy editing should be carried out by the author		47.3	± 3.8
A referee should be prepared to assess whether or not copy editing is required		18.1	± 2.9
The cost of copy editing should be borne by the journal		11.1	± 2.4
When a journal makes copy edits, the corrected LaTeX should be returned to the author (after his/her approval)		4.7	± 1.6

Key:

Table 3: Copy editing

When asked where the funding to meet those costs should come from, the respondents preferred to select research funders (485 people, 71% of base=683), library subscriptions (432 people, 63%) and sponsorship, for example by a Learned Society (350 people, 51%). A model requiring an author to pay from research funds either on acceptance (218 people) or on submission (47 people) of a paper was endorsed (Figure 2). Other sources mentioned in comments included: personal donations, professional association contributions, commercial and/or not-for-profit organisations, advertisements, subscriptions and even models of having authors pay partially on submission and partially acceptance.

Sources for covering journals' costs

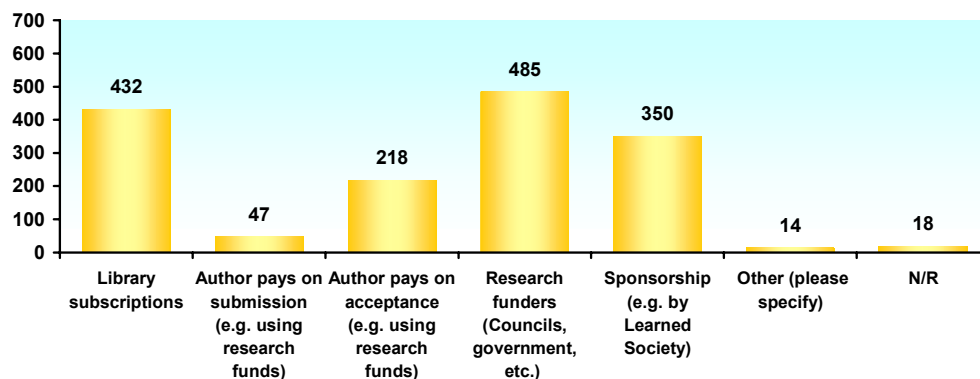


Figure 2: Sources for covering journals' costs

4.4 Peer review

The process of peer review, as noted above, was raised by the scientists as a very important factor when selecting the journals in which they publish their research and, and in informing their opinion about a journal. Aspects of peer review that the respondents considered important were the transparency of the process, the proven track record of the referees, that of the scientific editor and his/her role in the peer review process, high reviewing standards, and relevance of the chosen reviewers. These factors were cited as acceptance criteria for an overlay journal. In general, the comments were grouped around the speed, quality and reliability of the process. Some comments on the speed of peer review concerned the role of the editorial team and a journal's support services. It was indicated that an easily accessible editorial team that keeps scientists informed at each stage of the review process, while responding promptly and reliably to questions, is desirable.

Also welcome, perhaps as an alternative, would be access to an online system that allows authors to keep track of the peer review process, supplemented by a clear statement of how review is conducted and the assessment criteria in place. In comments about the quality of peer review, the scientists raised issues around the transparency of the process, the selection of the referees and the importance of a proven record of past refereeing: what a respondent called "respected peer review". Furthermore, comments also referred to the competence, care, efficiency and responsibility of editors and editorial boards. Comments from the respondents also addressed other peer review models such as open and community peer review [18-19]. One school of thought called for a more open, publicly available peer review system, incorporating the use of new technologies such as wikis, voting systems, and discussion forums, and so on. A second preferred to maintain the anonymity of peer review, but was keen to see more exploration and possible adaptation of the more rigorous models of peer review which are applied in other disciplines. The administration of peer review was also pointed out as time-consuming and, along with copy editing, costly, by the publishers who were interviewed.

4.5 Concerns – overlay journal model

The scientists who participated in the survey expressed some concerns about new and untested models of publishing, the overlay model included. However, they were positioned favourably towards trying new models and means for publishing scientific research - provided that they could ensure that the published research outcomes would continue to assist them in establishing an academic record, attracting funding and ensuring tenure. Specifically, the following issues received particular mention:

- Impact, readership, and the financial sustainability of the journal.
- Peer review process, with particular emphasis on ensuring quality
- Long-term archiving and the sustainability of the underlying repositories
- Clarity and proof of viability of the proposed model.

4.6 The overlay journal model - success factors

The most important factors which would encourage publication in a repository-overlaid journal were the quality of other submitted papers (526 responses), the transparency of the peer review process (410) and the reputation of the editorial board (386). Respondents also provided a range of other factors that they considered important, among them the reputation of the journal; its competitiveness measured against other journals under the RAE (the UK's Research Assessment Exercise); the quality both of the journal's referees and of its accepted papers; a commitment to using free software; a commitment to the long-term

archiving and preservation of published papers; relevant readership; and its impact factor, (which, it was noted, should only take into account citations to papers after final acceptance and not while residing on arXiv prior to “publication”).

5. Discussion

The questionnaire survey received responses from 683 scientists in the fields of astrophysics and cosmology (a 17% return). The respondents represented a range of research interests, roles and research experience, and an almost equal proportion of returns (51/49) came from scientists who were English native speakers and those who were not. The respondents indicated that they each produce, on average, 13 papers over each 2-year period. They confirmed the important role of scientific journals in communicating research: 97% indicated that papers for submission to peer-reviewed journals are the main written output of their research.

When it comes to choosing a journal in which to publish, the scientists highlighted a journal’s impact factor, readership levels and acceptance by the scientific community as having the most weight in the decision. This is exemplified by the list of journals in which the respondents had mostly published their research, which included the 10 with the highest impact factor in these fields (ISI Journal Citation Reports, 2005). Other factors which affect the scientists’ decision on where to publish include the subject coverage of the journal, the efficiency and ease of use of the submission system, the time that it takes for a paper to reach publication, open access, indexing in services such as the ADS and the publishing requirements of particular projects.

The most important functions of a journal were identified as the online archive of the journal’s back issues, the journal’s website and maintenance of the journal software. Journal production costs should, it was felt, be covered by research funders or by library subscriptions.

In the context of an overlay journal, repository policy clearly needs to be support the journals’s objectives - some of arXiv’s current policies and practices (for example, policies about file sizes, submission, acceptance and citation of unrefereed papers, multiple versions of papers, etc.) were highlighted by this community as issues which would need to be addressed if arXiv overlay were trialled.

Open access was also an issue brought up by several scientists, and they emphasised the importance of having free access to the scientific literature. In particular, free access to less privileged scientists was highlighted as desirable.

The inclusion of journal content in indexing and alerting services was deemed important. The ADS services are regarded favourably as an access point to the literature by the majority of the respondents.

The respondents showed particular concern with the speed, quality and reliability of the peer review process, which was repeatedly mentioned in comments made by the respondents. It is not always clear to authors how peer review is being conducted by a given journal. Their comments suggest that, perhaps, there is room for improvement in the system, although there was no consensus on the best way to make those improvement.

As documented elsewhere, arXiv use is prevalent in this community:

- 77% of respondents access arXiv on a daily or weekly basis
- 80% visit arXiv’s “new/recent” to keep up to date with advances in their fields

The respondents were broadly receptive to the idea of overlay publishing: 53% welcomed it, and 80% would be happy to be involved as referees for an arXiv-overlay journal.

The questionnaire survey, therefore, found some encouragement for the overlay journal model in the fields of Astrophysics and Cosmology. However, general issues were raised about new and untested models of publishing, the overlay model included. It is clear that, for any new publishing model to succeed, it will have to address many ‘traditional’ publishing issues, among them impact, peer review quality and efficiency, building a readership and reputation, arrangements for copy-editing, visibility in indexing services, and long-term archiving. These are generic concerns, for which repository overlay is not necessarily the complete answer.

6. Summary and conclusions

This paper has discussed some of the issues around scientific publishing in astrophysics and cosmology and presented some of the findings of two community surveys in those fields.

The roles, responsibilities and experience of the respondents primarily involve research. The preferred output from their research is peer-reviewed journal articles, which confirms the importance in this discipline of certification by quality-assured journals. The scientists indicated that the quality of any journal publishing model is very important to them, and they choose to publish in journals that demonstrate to them the endorsement of the scientific community, whether through readership levels, impact factor, or perceived quality of the editorial board and journal content.

In general the scientists were disposed favourably towards the overlay journal model. However, they raised several implementation issues that they would consider important, primarily relating to the quality of the editorial board and of the published papers, and to the long-term archiving of the accepted research material. The traditional copy-editing function remains important to researchers in these disciplines, as is visibility in indexing services. The traditional printed volume is of little interest.

The initial results from this survey suggest that scientists in the fields of astrophysics and cosmology are, in the main, positioned positively towards a new publishing model that, in a respondent’s own words, “...*is more open, flexible, quicker (and cheaper?), and as “safe” or safer (i.e. ensuring science quality) as would be needed*”. A full examination of these results, together with the other findings from the RIOJA project, is expected to enrich our understanding of the many issues around the acceptance and sustainability of the overlay journal as a potential publishing model.

7. Acknowledgements

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