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IS IT TOO LATE TO ENSURE CONTINUITY OF ACCESS TO THE SCHOLARLY RECORD?

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Abstract

Once upon a time university libraries could rely upon an informal agreement whereby research libraries held much of what we call the scholarly record. To provide access also meant to keep content, for use today and tomorrow. The role of 'holding library' exercised by research libraries also provided support to many more 'access libraries', through various forms of document supply. Today, it is the publishers not libraries who deliver researchers and students with an ease of access that would once have seemed unimaginable. Are university libraries now only customers, no longer custodians of content; are their e-collections really only e-connections? This paper considers the implications of these changes and argues that changing roles demand a new consideration of preservation action and greater library and consortia involvement with the global digital archiving infrastructure.

Keywords: preservation, infrastructure, scholarly record, web-scale, archives, consortia, registry

Introduction

The shift to digital publishing over the last 20 years has revolutionised the scholarly process. It has enabled the communities to which research libraries are accountable to have quick and easy access to staggering amounts of information around the clock from desktops, laptops, and mobile devices. The focus of this paper is not the scholarly process, however, but rather the scholarly record, as represented by the scholarly content that is issued in parts of serials. This is a call to libraries in research and technical universities to take responsibility for ensuring the stewardship of what could be termed our digital back copy. It is supported by evidence from the Keepers Registry and by recommendations on what can be done, individually and in cooperative action, both at the national and regional level and through international associations of libraries.

There is an imperative in the two fundamental questions posed by Vicky Reich in a 2006 *Serials Review* editorial:

1. From this moment on, who will have custody of society's information?
2. From this moment on, who will control and govern the archival assets of society?

[p.68]

The scholarly record and the associated resources needed for scholarship represent an important subset of society's information and, almost ten years on, research and university libraries have yet to address these questions to sufficient satisfaction. The need for assurance of continuity of access and long-term preservation of the scholarly record was recognised as early as 1994 by the Task Force on Digital Archiving formed by the Commission on Digital Preservation and Access. In order to effectively preserve digital material, their report concluded, "we need to understand the costs of doing so and we need to commit ourselves technically, legally, economically and organizationally to the full dimensions of the task. Failure to look for trusted means and methods of digital preservation will certainly exact a stiff, long-term cultural

penalty" [4]. The community's commitment to these requirements and to tackling the issues of digital preservation has grown but is still not confirmed, as noted ten years later in 2005: "responsibility for preservation is diffuse, and the responsible parties ... have been slow to identify and invest in the necessary infrastructure" [Waters, p.1].⁰ Today, another decade on, this still rings true: as a community, we need to ask whether we are in danger of leaving it too late to ensure continuity of access to the scholarly record.

Research Libraries and the Archive Layer

As Abrahams and Rosenblum note, "the printed journal has long served as the archival record of intellectual discourse" [2003, 155]. As key vehicles of knowledge sharing and debate, they have formed and will continue to form a substantial part of the scholarly record, "that stable body of graphic information." As Ross Atkinson has put it, "upon which each discipline bases its discussions, and against which each discipline measures its progress." [1990, p.356] In the age of print, preservation of this record, or at least physical custody, was an incidental by-product of the access role undertaken by libraries. Research libraries took professional pride in developing and maintaining extensive collections of these journals, providing access not just for present scholars but also for the benefit of future students and researchers and for scholarship over the long term. These 'holding libraries' supported the more numerous 'access libraries', especially those that emerged as higher education provision expanded with the creation of new universities, through various forms of document supply. Today it is publishers, rather than libraries, which support that document supply, and ease of access, via online access to journals on a variety of commercial access platforms.

Libraries now provide e-connections rather than e-collections and act as customers rather than custodians. Their practice of stewardship would seem to have receded as libraries cease to take physical custody and ownership of digital resources:

Now the archive is not constituted by what is held within the Library's walls, nor even by those holdings plus the licensed content it provides from the cloud. These collections are no longer thought to constitute a complete, guaranteed and permanent store of scholarly materials proofed against loss. They are not an underpinning layer of the academy. Our institutional libraries are in retreat from their role in providing the scholarly archive. [MacColl, 2012]

The research library's historical role as trusted repository of our scholarly records—a role that for centuries has been crucial to the library's identity, even definitive—has been put in doubt. Given that "funding for libraries, museums, and archives is implicitly contingent on their acceptance of various preservation responsibilities" [Burke et al.] this has potential consequences which are profound.

It may be that 'completeness' of collection is now beyond any single institution. We have begun to think in terms of aggregated collections and shared resources, what Heather Christenson [2010] referring to HathiTrust,¹ calls research libraries 'at web scale'. Along with preservation agencies such as LOCKSS², Portico³ and CLOCKSS,⁴ and working in concert with initiatives like WorldCat, PubMedCentral and others, such organisations form what John MacColl has called 'the archive layer':

a diverse patchwork of services [which] consists of services provided by cooperatives, national agencies, national libraries, publishers, disciplinary hub services and content archive stores [...] all of which claim to operate on behalf of libraries and research.

[MacColl, 2012]

This diffuse and emergent infrastructure is only now coming into view. This is where the Keepers Registry, as a 'lens' on archiving activity worldwide, becomes especially valuable.

The Keepers Registry and the extent archived

The Keepers Registry⁵ is the global monitor of archiving activity for online serials. It resulted from a project to pilot an e-journal preservation registry service, initiated by Jisc in 2008. The design and development of this pilot was carried out by EDINA⁶, the national data service at the University of Edinburgh, and the ISSN International Centre in a project called PEPRS⁷ (Piloting

an E-Journals Preservation Registry Service). The design is illustrated in the diagram below (Fig. 1), taken from the reference paper published in *Serials* [Burnhill et al., 2009].

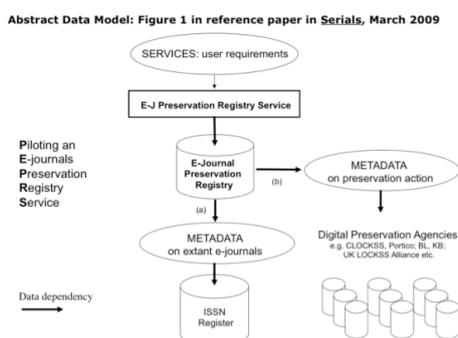


Fig 1. Data Model for PEPRS project

Re-named the Keepers Registry in 2011, the service validates, aggregates, and reports archival activity against the ISSN Register providing search across the most authoritative available list of 'continuing resources' being preserved around the world.⁸

There were initially five archiving organisations in the PEPRS project. These included CLOCKSS, Portico, e-Depot⁹, the British Library¹⁰ and the Global LOCKSS Network.¹¹ During the second phase of the project, other archiving organizations joined: the Archaeology Data Service (ADS)¹², the National Library of Science of the Chinese Academy of Sciences¹³ and HathiTrust.¹⁴ At the time of writing there are ten archiving organisations reporting into the Registry, including the Library of Congress (USA)¹⁵ and Scholars Portal (Ontario, Canada).¹⁶

Having many archiving organisations is a very good thing, as digital preservation is best secured by replicating content at multiple archives run by autonomous organisations [Cooper et al. 2002]. However, it is necessary to have the means to aggregate data from these diverse sources, allowing discovery of who is looking after particular titles, and providing evidence on what is not (yet) in the keeping of an organisation with archival intent. This is the main purpose of the Keepers Registry.

This aggregation of information about archiving activity also allows the Keepers Registry team and others to conduct analysis of progress on serials preservation worldwide. In 2011, the Keepers Registry reported 16,558 titles as ingested with archival intent by at least one 'keeper': in 2013, that figure was 21,557; in 2014, it was 23,236. This year, Keepers Registry records archiving activity for 27,463 serial titles. The number of online continuing resources in safe hands is growing in absolute terms. However, this number is put into perspective by comparing it with the total number of resources. At the outset of the initial project there were a little over 35,000 e-ISSN assigned. During the course of the project the ISSN Network dramatically increased the number of e-ISSN assigned to 100,000 in 2012, covering the vast majority of commonly used e-journals. At the time of writing, that number had risen to over 160,000.

One measure of success is to compare the absolute count with the total number of ISSN assigned for online serials and other continuing resources, the Ingest Ratio. At the time of writing, this stands at approximately 17% (27,463 divided by 160,000). That percentage has remained about the same over the last five years: the count of ingested titles has increased in line with the growth in the total number of ISSN assigned, which in itself is good news. Another measure of success is to highlight those serial titles that are being ingested with archival intent by three or more 'keepers'. This KeepSafe Ratio now stands at only 6%. This is down from 7% estimated the previous year.

In 2011/12, the Keepers Registry team checked the archival status of the serials listed by three major US research libraries (Cornell, Columbia and Duke). The result is shown in the table (Fig. 2) below.

Table 1
E-Journal Preservation Status^a for Three US Research Libraries.

University library	% 'Preserved' by 1 or more	% 'Preserved' by 3 or more	% Not known as 'Preserved'	Total having a valid ISSN
Columbia	26	12	74	58,882
Cornell	28	13	72	54,698
Duke	22	10	78	61,682

^a When checked against preservation activity of The British Library, CLOCKSS, e-Depot (Netherlands), Global LOCKSS Network, HathiTrust, National Science Library of China and Portico, as reported into The Keepers Registry.

Fig 2. Table showing preservation status of e-journal collections of 3 US libraries

As can be seen, only a worryingly low 25% of those titles were then known to be archived: about three quarters of the titles to which those universities subscribe are *not* being archived. The KeepSafe Ratio is just over 10%, although this is higher than the overall KeepSafe Ratio.

Another way to consider the problem is to analyse whether agencies are preserving what users want to read. Analysing requests for articles recorded in the usage logs of the UK OpenURL Router in 2012, a cross-check against the Registry in 2013 gave an Ingest Ratio of about a third (32%) being archived by one or more keeper. Taking that same set of requested titles and re-doing the analysis two years later, in 2015, the Ingest Ratio had risen to just over 40%. Note that there are now more archiving agencies reporting in, which although good news in itself does qualify the sense of archival progress. Moreover, over half of the online serials and other continuing resources that researchers want to access are not being archived.¹⁷

Keepers, the long tail and resolving priorities

The large publishers are to be congratulated for having engaged with CLOCKSS and Portico from an early stage and to be paying the costs to have their content kept safe – indeed some publishers enable archiving into three or more of those agencies that report into the Keepers Registry.¹⁸ However what is becoming apparent is that the journals from smaller publishers — those in the so-called 'long tail' — are less likely to be ingested by organisations with archival intent, and are therefore at much greater risk of loss. Ensuring that this part of the scholarly record is kept safe is perhaps the most difficult task facing the library community.

An example may illustrate what is at stake. We recently conducted an exploratory analysis with data from the Research Excellence Framework (REF), the British government's audit of research activity within UK universities. One of the journals that figured heavily in the REF return, having significant published work by UK researchers across a number of disciplines was *Science*, the flagship publication of the American Association for the Advancement of Science. This high impact journal is not being preserved by any of the archiving agencies reporting into the Keepers Registry. Despite its prominence and evident importance to researchers, the online contents of *Science* must be considered at risk of loss.

Many of the conference proceedings and publications of scholarly associations and societies that are issued online are in a similar position. In some instances these issuing bodies contract with commercial publishers who do arrange archiving on their behalf. But many are not in that position and either do not or cannot pay for that archiving. This must be where research libraries, both university and national libraries, need to make special arrangements.

Journals are often regarded as scholarly because they may employ peer review for submitted articles or otherwise enjoy editorial prestige. However, the output of scholarship is also be found in the journals and magazines of practitioners, as has long been noted in analysis of the published work of social science, as summarised by Hicks [2004]. More recently, Hicks and Wang [2013] have noted that the New York Times receives more citations from academic journals than the American Sociological Review, Research Policy, or the Harvard Law Review. In addition, trade magazines, media, and 'grey literature' can be deemed to fulfil a complementary function to what are termed scholarly journals. While the latter constitutes a 'peer-to-peer' and comparatively closed communications circuit, the former takes on what Burnhill & Tubby-Hille [1994] designate as an 'enlightenment' function, with potential to extend beyond academic communities into more diverse reader- and userships. This role has always been vital for technical and applied subjects. More recently, extending the impact of research

beyond the academy is an increasingly urgent priority, at least in the UK where such 'impact' has become a significant criteria in the assessment of funding applications. The importance of such literature is only likely to grow in future.

ISSN assignment by the 80+ national centres in the ISSN Network goes a long way to promote identification and therefore awareness of these 'enlightenment' publications. As the following diagram (Fig. 3) illustrates, in principle ISSN are assigned to two classes of 'continuing resources': the first are 'serials' which are issued in parts; the second are 'ongoing integrating resources' which have content that changes over time.

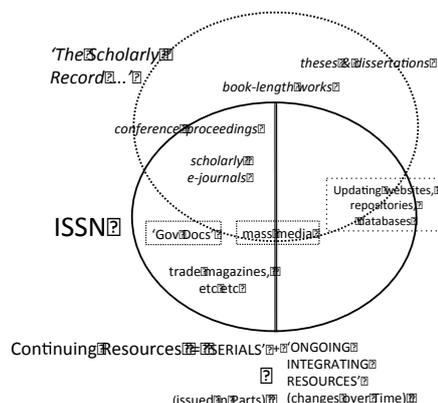


Fig. 3. Schematic showing types of continuing resources assigned ISSN

As this schematic reminds us, the scholarly record includes more than serials (the book length work, for example) and now extends to other online venues such as websites, blogs and repositories, also embracing databases and software. Not all will be assigned ISSN, although the rules to allow eligibility are widening. Evidently the configuration of stakeholders around scholarship is not the only thing that is changing: borders around the scholarly record itself are shifting too as many resources such as government papers, newspapers etc. are increasingly published in electronic formats.

These diverse materials originate from different countries around the world, and while there may be increasing trend for scholarly journals to be written in English, this is not the case for these practitioner journals, trade magazines, blogs and government websites which will more often than not be written in a language native to the country of origin. This supports the argument that identification and preservation of such resources can only be carried out at local or regional level, although of course the collection policies of major research libraries will always extend beyond the boundaries of language and the borders of legal jurisdiction.

Collection Development Partnerships for Local and Global Action

Having stated the problem, the progress being made, and the scale of the challenge, we turn now to the question of what should be done: Is the archive layer that has grown up around us beyond the governance of the library community? A key question, as MacColl suggests, is whether the international research library community can find ways to help structure, influence, and shape the activity within this layer. In a recent white paper on the future of research libraries, published in 2015, Lorcan Dempsey points to the development of shared services as a major trend reshaping the future of the library, adding to the call for more engagement with the web-scale infrastructures that are developing around us:

A trend towards shared services makes the structure and planning for such frameworks more important. This is an important area requiring conscious coordination among libraries and higher education institutions. The governance of the organizations to which these responsibilities are entrusted also becomes a critical community issue. [2015a, p.28]

Successful coordination depends upon several matters. One is the ability to share knowledge and transparently monitor activity: this is what the Keepers Registry enables. Another is development of an effective governance strategy.

As individual librarians and individual institutions, each of us may feel that challenges are overwhelming and beyond our local capacity to act, or, noting the emergence of organisations that have stepped forward to undertake archival responsibility, we may feel that stewardship is someone else's job. Yet, we would argue that research libraries need to re-assume full responsibility for archiving scholarly resources. As Ross Atkinson, Collections Librarian at Cornell University argues in his 2006 paper 'Six Key Challenges for the Future of Collection Development':

Such materials no longer reside in libraries, but are rather maintained exclusively in vendor databases around the world. While we have made every effort to compensate for this condition through our licenses, such legal safeguards remain clearly inadequate. The greatest single failure of research libraries in the past decade has been to allow this situation to evolve. We must now take whatever steps are necessary to reverse this condition and to resume full responsibility for preserving those materials upon which scholarship will rely in future.

The collective nature of this imperative, Atkinson's 'we', is the key to success in meeting this challenge. There is no single body that is responsible, no one 'fix' or 'solution': it will be plural actions at various scales and taken in diverse ways that will add up to a greater chance of long term security and access.

There are multiple keeper agencies: their different collections, different technologies, different data structures, different governance models, and different geographical locations, all work to protect against major loss. There is room for many more keepers, each with their own distinctive missions, priorities and capacities. We would like to see many more national libraries reporting into the Keepers Registry, for example, and we are aware that there are subject specific repositories that could also contribute to the conversation. These multiple keepers need in turn to be supported by diverse local, regional and global library-led initiatives. Digital preservation agendas and policies need to become something that libraries are involved with, that they advise on, and advocate for. There will be mistakes, but our best guard against losses is a scenario in which multiple organisations around the world are working towards the preservation of the scholarly record, and effectively documenting their decisions and actions.

Collaborative initiatives and library consortia will have an important role to play: part of the challenge, as Dempsey expresses it, is about "right-scaling":

... finding the optimal level at which activities should be carried out. Libraries are going to have to think harder about both sourcing and scaling. What does it make sense to do at the institutional level? What does it make sense to do collaboratively at a different scale? What should be left entirely to other providers? [2015b, p. 85]

Data sharing among consortia is currently reaching new levels, with increasingly integrated systems and services. "As libraries continue to leverage scale to increase efficiencies and impact," Dempsey predicts "we will see consortial activity evolve and diversify" [2015b, p. 83]. Even if consortia do not want to follow the lead of preservation pioneers such as HathiTrust and Scholars Portal, it is certainly the case that collection management decisions, including decisions around preservation policies, lobbying and advocacy can be taken at this 'above campus' level [Courant and Wilson, 2010]. The UK Research Reserve initiative is a case in point. This is cooperation between a consortium of university libraries with a national library (British Library), gaining leverage from a national union catalogue (SUNCAT) for its operation.

Consolidation of existing relationships and the formation of new strategic partnerships and networks will be required as we consciously consider the ways in which individual roles, individual projects and individual institutions can contribute to a clearly defined and consciously formed 'archive layer' which is greater than its sum of parts.

If this still sounds daunting, then let us conclude with some concrete actions that could be taken fairly easily and immediately. The first way in which a university library can exercise

responsibility is to commit to providing financial support to one or more of the organisations that are active in archiving serial content. Typically this means allocating a small percentage, perhaps only 1%, of the annual materials budget to membership of one or both of the two web-scale archiving organisations: CLOCKSS¹⁹ and Portico.²⁰ Ensuring their financial sustainability should be regarded as part of the mission of a research library, to secure that subscribed content from the large commercial publishers continues to exist over the long term.

Secondly, using the Keepers Registry, to which CLOCKSS and Portico both report, libraries can contribute through their expertise in collection development, by checking the archival status of the journals that are of key importance for the business of the university. Then, if insufficient archiving is taking place for those titles, make it a priority to ensure that archiving takes place. Armed with knowledge provided by the Keepers Registry, libraries can take action by approaching one or both of:

- a. the publisher, to explain that archiving is a requirement for continued subscription. Such an approach might be especially effective if done by a consortium of subscribing academic and technical libraries.
- b. the national library (or equivalent), to provide a priority list of the titles (published in the country in which the university and the national library are located) that need to be archived. This may also require an approach by a consortium of academic and technical libraries. The national library can respond via compulsory legal deposit or some form of voluntary arrangement supported by enabling legislative provision.

Finally, academic and technical libraries should consider their responsibilities and options for collaborative action, at regional or national level, in order to ensure that all of the above is satisfactory and complete with respect to their collection policies. A guide to the actions being taken by library consortia around the world through the deployment of a Private LOCKSS Network (PLN) is given in Vicky Reich's paper, 'Building and Preserving Library Digital Collections Through Community Collaboration' delivered at UNESCO's 2012 conference on The Memory of the World in the Digital Age.

Perhaps not everything can be saved. It certainly is not being saved now. The question is one of assigning priority of attention: what should be preserved, where and by whom. One value of the Keepers Registry is its ability to generate lists of the titles that are not being archived and must therefore be presumed to be at risk of loss. The next step is to prioritise attention amongst those titles. Judging what is important is not straightforward, and will vary according to the collection policy that each research library or consortia of research libraries decides upon, but setting out these policies will be a crucial step forwards. A strong library commitment to preservation of the scholarly record is important not just for the scholarly community now and in the future, but much more broadly. As Barbara Fister has recently argued,

the values [academic libraries] hold are of immense importance to a world in which knowledge has been transformed into intellectual property, the Web has been turned into a shopping platform, and social interaction online is used to collect and monetize our lives [...]. As the invisible infrastructure of our technological future is taking shape, society needs library values more than ever. [2015, p.79]

Nowhere is this more pressing than in the field of preservation, and nowhere can libraries have greater impact than in the shaping the digital scholarly record as it is preserved in the invisible infrastructure of the 'archive layer'.

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¹ <http://www.hathitrust.org/>

² <http://www.lockss.org/>

³ <http://www.portico.org/>

⁴ <http://www.clockss.org/>

⁵ <http://thekeepers.org>

⁶ <http://edina.ac.uk/about/>

⁷ <http://edina.ac.uk/projects/peprs/>

⁸ The ISSN-L enables linking between print and electronic publications, both for the reports from the archiving organisation and for those who make use of the Registry.

⁹ <http://www.kb.nl/hrd/dd/index-en.html>

¹⁰ <http://www.bl.uk/aboutus/stratpolprog/legaldep/#elec>

¹¹ <http://www.lockss.org/>

¹² <http://archaeologydataservice.ac.uk/>

¹³ <http://english.las.cas.cn/>

¹⁴ <http://www.hathitrust.org/about>

¹⁵ <http://www.loc.gov/>

¹⁶ <http://www.scholarsportal.info/>

¹⁷ Thus far, there has been no statistical investigation into the degree to which there are missing volumes and issues. However, there are serious gaps in the scholarly record. Progress on this necessary detail requires consensus around a 'holdings statement', with a format that enables computation. This is one of the several matters about metadata for serials discussed in Burnhill, 2013.

¹⁸ There are too many such publishers to mention, but they include the twelve who sit alongside the twelve libraries on the CLOCKSS Board: http://www.clockss.org/clockss/Board_of_directors

¹⁹ http://www.clockss.org/clockss/Contribute_to_CLOCKSS

²⁰ <http://www.portico.org/digital-preservation/join-portico/for-libraries>