Squaring the Circle: Towards an Integrated Print and Digital Journal Preservation Strategy

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Introduction

In tackling a topic of such broad scope, it is important to state up front what this paper will and will not cover. This paper will not cover the technology of creating or maintaining a digital repository for ejournals. It will not cover the minutiae of Last copy agreements or provide a comprehensive account of repository networks or cooperative collective development in libraries.

What we will be discussing is how to confront one of the most seminal issues facing academic and national libraries today, namely the preservation of scholarly journals. This paper will accomplish this task through a focus on high-level strategy and policy actions that can be brought to bear to address the problem on both the print and digital environments. The academic library community has thrown a significant amount of intellectual and financial capital behind efforts to preserve scholarly journals. To date, the strategies that have been developed and show promise have been developing in a state of 'informed isolation' from one another; that is, the academic library community is aware of the two convergent trends, and some have even advocated for a coordinated strategy, but no significant progress has been made towards bridging the gulf between print and digital archiving. This paper will advance a strategy for moving forward on an integrated archiving strategy, illustrating both the challenges and benefits of merging these two approaches to maximize the likelihood of long-term preservation of scholarly journals.

Part 1 – Current Landscape

Print journal preservation
The need for preservation is something that is an integral part of the DNA of academic libraries; our community holds this imperative as core to our historic and continuing mission. Up until the advent of the Internet and digital formats, this has meant preserving the print artifact. Cooperation on print preservation and off-site storage facilities grew out of the cooperative collection development movement in the latter half of the 20th century. Given the large degree of overlap in collections of academic journals across libraries, and the prohibitive costs of building off-site storage for many libraries, scholarly journals became the natural focus of numerous cooperative storage efforts.

During the 1970s and 1980s, large research library systems such as the University of California system (NRLF and SRLF facilities) and the Five-College Library Depository in Massachusetts, strained to meet the demand for increased space for physical materials brought on

by burgeoning collections. These groups eventually started to band together in state or consortium based arrangements to share space and facilities (Reilly 5-6). These developments towards cooperation on space sharing were emulated across North America, with further academic libraries cooperative storage initiatives appearing in Ohio (Northeast / Southeast / Southwest Ohio Regional Depositories, CONStor [Five Colleges of Ohio]), the Northwestern United States (Washington Research Library Consortium, ORBIS Alliance [Oregon and Washington]) and in Canada (Tri-University Group of Libraries). Among ARL/CARL Libraries, nine offsite library storage facilities were built between 1920 and 1990; since 1990 there have been 29 more facilities built (Payne 10).

Several national models of joint storage between national libraries and partner academic libraries have evolved in parallel to these state and consortia models, including the National Repository Library of Finland (1989), the CARM Centre in Australia (1997), and CASS (Collaborative Academic Storage for Scotland) and the UK Research Reserve (UKRR) in Britain (2005, 2008). This pattern of scaling up cooperation on print preservation resulted in the creation of a few supra-regional initiatives, most notably the North American Storage Trust project. The fundamental advance made by NAST and the various projects and working groups that it has spawned has been to challenge libraries to embrace a 'trust relationship' to facilitate collections decisions based not on what is held in storage locally, or even within a regional consortium, but within a network of repository libraries offering services reciprocally (Gherman 273). The successor projects to NAST, the Shared Print Collections Program are moving from analyses of policy and governance towards enacting best practices in the management of print resources.

The challenges to the print preservation mission are numerous and well known. These include a lack of accurate numbers of unique 'at risk' journals, an ongoing debates as to the economic case for maintaining low use materials in repositories (O'Connor 22) and a lack of consensus on the need and extent of environmental controls and preservation standards (RLG OCLC Shared Print). Even with the work done to date, there is little consensus on one of the key questions in preserving journals: the numbers of last copies to be retained in print repositories. A survey conducted by the Ontario Council of University Libraries (OCUL) revealed significant differences in the number of copies mandated for retention across a number of different Last Copy and storage efforts (both single depositories and repository networks).

Electronic Journal Preservation
At the same time, the rapid transition to digital has itself presented a number of new questions on how to handle print retention issues. Moreover, the pervasiveness and the rapidity in the shift to electronic journals have challenged many of our assumptions as to what we need to do to fulfill the preservation imperative. Some authors have challenged: why invest in housing and servicing an activity which online communication systems will make either totally or partially redundant in the not too distant future (McCarthy 90)? The resulting effect of print cancellations as a result of consortia licensing of electronic licenses is well documented (Waller 29-30) and outright discarding of local print copies of journals, based on last copy agreements, perpetual access guarantees or both, are gaining in momentum across North America.

The Metes and Bounds Study distilled academic libraries options on ejournal preservation down to two primary options: either rely solely on the publisher/vendor to provide

access in perpetuity or establish some form of digital self-archiving using one of a number of various technologies (Kenney et al 7-8). The third option, represented by CLOCKSS and Portico, is essentially a cooperative blend of these two main options. The development of the first option evolved directly from libraries' concerns about permanence and archiving at a time when other options (like TDR's or Portico) where not yet in place. The second option of libraries taking on the role of digital archiving, grew out of a growing realization that libraries needed to take back an active role in preserving digital content that was being acquired (Muir 89). This second stream, represented by LAN-RL, OhioLink EJC and the Ontario Scholars Portal, initially focused on providing current access to ejournals through a local host ("light archive approach"), but has developed longer term preservation missions as an important second focus.

However, even those who argue solely for digital archiving (eschewing any concern for print) have acknowledged the challenges posed by digital preservation are potentially even more daunting than print. The most obvious and widespread fear is that current licensing provisions and safeguards for perpetual access provided by vendors are not adequate (Ibid, 71) (Okerson Slide 5). Other commonly referred to concerns include format, especially durability and conversion issues, and the role and extent of participation between various players in the information chain – publisher, vendor, library. As with print archiving, the viability of the economic models for digital archiving have been challenged on the basis of sustainability (LaVoie; Moghaddam 86). Finally, one may ask whether the rise of cooperative or "Third Party" digital archiving solutions (ECO, LOCKSS, CLOCKSS, and Portico) has enriched or further confused the landscape of long term journal archiving.

Part 2 – Key Developments to Integration

It is clear based on the amount of literature alone devoted to both topics that the academic library community is responding to the preservation imperative. It is also becoming clear that there does appear to be something approaching a consensus on both the print archiving and digital archiving tracks; these are summarized below.

Print Repository Networks

With such a long history of effort and cooperation, it should not be surprising that there is something of a clearer consensus solution for academic libraries in retaining print journals. There has been a long evolution from the local to the regional to the 'surpa-regional' or network concept. The evolution towards what has come to be called a 'distributed print repository network' has been a natural evolution. Moving from a concept of overflow space for locally owned collections, the repository network develops as an increasingly distributed union set of holdings formed across an interconnected set of library groupings:

Depository (local) ⇨ Print Repository (regional) ⇨ Repository Network (supra-regional)

This scaling up has been accelerated to by the presence of a parallel digital realm which has convinced many libraries that duplicate legacy print collections are prime candidates for disposal (Gherman 274). The overwhleming logic of this approach to print archiving has been

summed up by Lizanne Payne in her seminal OCLC report *Library Storage Facilities and the Future of Print Collections in North America*:

> Viewed in the aggregate, library off-site storage facilities represent a shared infrastructure for print preservation efforts on a vast scale. By leveraging this collective capacity, and building on existing networks of trust within the library community, we can begin to manage our physical inventories in ways that reduce unnecessary redundancy while preserving the world's print heritage as a shared public good.   (Payne 30)

Schoenfeld argues that individual libraries should carry out a systematic evaluation and strategic planning review for the full-scale transition to digital that should include plans to join an existing paper repository, or sponsoring the creation of a new repository (Schonfeld 186). The shift from individual storage through depository libraries to shared repositories to a repository network will ultimately prevail because the key sticking points of ownership and governance will buckle under the efficiencies (staff and money saved), space gains, sharing of infrastructure and common services that define this concept. The North American consensus thus appears to be that Repository facilities will have a remarkable future when they act as a system and not individually (Di Tillio 9).

Digital Archiving – Here, There and Everywhere

In stark contrast to print archiving, there is precisely no single 'silver bullet' solution to archiving ejournals. This is, in the first instance, a function of the lack of comprehensive solutions available. While many authors argue that current provisions for ejournal archiving are far from satisfactory (Moghaddam 94; Muir 87-88), there is also a growing recognition that multiple viable options exist that, particularly when enacted in concert, may lead to a durable and longer term strategy (Kenney 71).

While there have been efforts to lessen the onerous nature of licensing ejournals, and to standardize the rights and terms of such agreements (through model licenses) including the essential provisions needed for perpetual access and other post-termination rights, licensing of e-resources will continue for the foreseeable future. This is primarily a function of the fact that most rights applicable to information found in traditional scholarly journals are still under the jurisdiction of the publisher. National deposit requirements in particular have not to date been successful in North America and are only voluntary in several European countries (Kenney 22). To try to overturn the current licensing landscape for ejournals would be arduous and ultimately counterproductive. This is true particularly of the final formatted copy, or the copy of record, for most journals. However, given the impetus behind digital archiving, it is beholden upon libraries and consortia to pressure publishers move the exercise function towards greater levels of archival certainty. This will mean that libraries require publishers to convey those rights (to the extent possible) that are necessary for digital archiving to ejournal programs and to do so in a way that is standardized and predictable (Kenney 28).

The paper *Urgent Action* by Waters et al. has in convincing the library community that demanding archival rights and deposit is simply not sufficient; libraries must themselves invest in a qualified archiving solution to serve as further insurance against content loss (Waters 2).

Roughly speaking, based on the most current research by OCLC, CLIR, CRL, OCLC and others, we can identify the most promising initiatives that fall into this concept of 'qualified solutions' into three broad categories:

a) Local digital archiving:
  a. Open Access (OAIS Compliant) – including e-print repositories (E-LIS, LANL)
  b. Local Host Repositories (OhioLink, Scholars Portal, CDL)
b) Caching Software (LOCKSS)
c) Portico

(Kenney Okerson, ARL SPEC 245, Moghaddam).

These initiatives flow out and can be combined at three (3) jurisdictional levels:

• International (LOCKSS/CLOCKSS Alliance, Portico)
• National (UK LOCKSS, Dutch KB e-Depot, PubMed Central, Australia)
• Consortia (OhioLink, Scholars Portal, UCL/JSTOR Project)

At a minimum then, both consortiums and large library systems will have to invest in both vendor licensing activities and either a local TDR or third party archiving service. While there is no single consensus choice among the 'qualified solutions', it appears, following the lead of some large research library consortia (notably the University of California) that the "both and" solution may be the ideal path. This in effect would provide for a triple level of redundancy in assuring the long term survival of digital content: through licenses, through the local digital archive (TDR) and through participation with a third party archiving entities like CLOCKSS or Portico.

Given the seriousness with which the research library community has engaged, and the challenges inherent to both models, the need for cooperation and coordination across both endeavors appears inevitable. Such a strategy would be both backward looking (in responsibly handling our print legacy collections) and forward looking (towards a time when preservation of print will wane significantly). In a 1999 article, Kisling, Haas, and Cenzer argued that an integrated approach to print/digital archiving was not only desirable but necessary on a number of levels:

• To maintain the traditional role of libraries as repositories and curators of our scholarly cultural heritage
• As a deterrent to monopolistic control by the publishers / vendors
• To mitigate the risks of substandard licensing provisions and content loss as a result of changes to economic or business model of journal publishers/vendors
(Kisling et al. 90, 92)

Ten years on from this seminal article, and with numerous conferences, exhaustive research reports and scholarly papers written, why is the research library community still essentially following two parallel paths?

The closest realization to a working dual print/digital archive for journals has been the University of California's recent initiative with the Center for Research Libraries (CRL) on JSTOR. While the JSTOR project has been a success, it is limited in scope. Building on the success of the JSTOR partnership, the UC – CRL group aims to create a repository of paper journals to be built around content in licensed E-Journal Packages; particularly those that are hosted/archived at the California Digital Library (Elsevier and Sage) (CRL 2009). However, this initiative just appears to be starting to realize the vision set down by Kisling. To this central question, we can posit several responses.

Scale:
Perhaps it is the fact that no single library or consortia will be able to fulfill the entire preservation mission on its own. Is the scope of the problem even larger than our community originally anticipated?

Staff:
One could also ask whether the resource demands (people, economic, legal, technological) required for each strategy so different that the projects on the ground cannot be easily merged?

Role Confusion:
Has the introduction of third parties, publishers, vendors, cooperative organizations such as OCLC, into the preservation process blurred the distinctions between those who create, those who use and those who preserve information? Have debates about the extent of participation of any or all of the stakeholders distracted us from our core mandates?

Loss of Focus:
Can we may ask whether libraries have gotten bogged down in the logistics of implementation of print/digital repositories and lost sight of a higher goal (the repository network)?

Papyrophobia:
Finally, is it possible that the research library sector is becoming less enthusiastic or simply not concerned about the fate of paper archives? Are we willing to sacrifice our stewardship over the printed record to focus most of its efforts on the emerging digital paradigm?

Beyond these conjectures, I will argue that there are four common issues, drawn from the current consensus describe above, that are common to both the print and digital archiving streams. An analysis of these issues will help to explain the current status of integrating preservation projects and provide a way forward to realizing a more integrated print / digital archiving strategy for journals.

1) Legal Agreements and Frameworks: enabling coordination through licensing, rights management and common services provision

2) Archiving Infrastructure: to put in place tools and coordinate facilities to accomplish the work of archiving

3) Holdings Registry: to address the need for identification and effective disclosure of archiving commitments through a journal registry covering both formats

4) Consortia Leadership: case for why library consortia are best positioned to accomplish the above tasks through the exercise of leadership and coordination

Part 3 – Description of Integrated Preservation Strategy

By bringing together the best features of the current consensus on print/digital archiving under the umbrella of academic library consortia, a compelling case can be made for journal archiving. The diagrams that follow illustrate an outline for a policy and action framework that will equip libraries to engage with the four key issues outlined above. The development of the network concept in print repositories should be broadened beyond the print world to include digital archiving to create a 'meta-network' for preserving both formats for journals. The cooperation of libraries through consortia as their primary vehicle will create a network of mutual support and interdependence.

Legal Agreements and Framework
The framework needed to establish the integrated preservation strategy must begin with legal agreements on how all parties intend to cooperate and the roles that each will play. These two parallel streams need to be built upon and built out from a foundation of 'paper infrastructure' to ensure both formalization and transparency (Reilly 36) of all preservation activities. The two key pieces of the framework are a last print copy agreement that delineates the scope and functioning of the print repository and a composite digital solution for licensing rights from publishers and qualified local archiving solution. This policy layer will enable the coordination and effective communication that will be required to bring together both archiving functions in a deliberate and visible manner (*see Figure 1*).

Figure 1
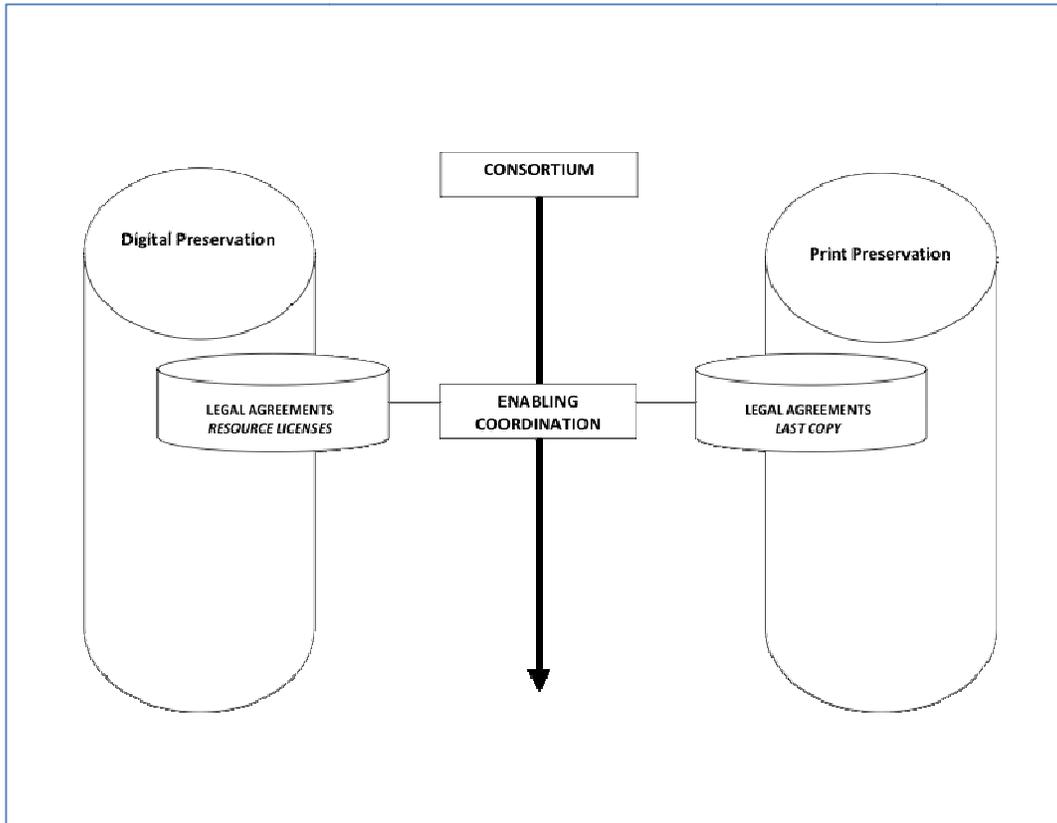
For the print preservation strategy, this will mean a comprehensive understanding on the number of print copies to be held by the consortium, as well as space allocations, and access and retention considerations such as the conditions upon which materials could be recalled from the repository. Environmental controls and conservation measures will need to be set within these policies to ensure maximum participation and minimize costs. It should also include provision of services, such as print ILL delivery and on site access to collections. Standards will be needed for each separate facility across the network to ensure each participant can meet the requirements for preservation agreed to by the consortium. Definition of terms, key to the functioning of the last copy agreement such as duplication, withdrawal and reasonable replacement efforts, will need to be agreed upon (Malpas 12). Finally, questions about ownership of the materials will need to be definitively addressed given that

Digital preservation policy will be driven through negotiations directly with the rights holders for the journals, primarily the publishers. On the digital side this would include firstly licensing perpetual access guarantees, almost exclusively negotiated via consortia to ensure consistency across the network. An important feature of this part of the initiative will be the continued use and prevalence of Model Licenses that enforce the fairest and widest application of digital archiving and transfer of the necessary rights to the repository network to accomplish the tasks of archiving (such as format migration). Like the print preservation activities, service guarantees will need to expressly detailed, whether they relate to content hosted locally or through clear and definitive publisher commitments to archiving through their own services or through third parties such as Portico.

Perhaps most importantly for both aspects of the policy layer, is the need for proper business models that include fair and thoroughgoing cost share mechanisms among the participating members. A clear governance model that spells out lines of authority on As Reilly has noted, the undertakings that are most likely to be successful are those with a long history of common governance and coordinated action (Reilly 35). The TUG Libraries have employed a cost share formula developed by the accounting firm Ernst and Young which covers all services from ILS maintenance, to book/article delivery to associated staff costs that has worked exceedingly well for well over a decade. Finally, the enabling policy layer will need to be constructed in such as way as to facilitate easy interaction and cooperation with other library consortia acting within different regions and political jurisdictions.

Infrastructure Provision

The provision of infrastructure flows out from the policy directives adopted by the consortium on journal preservation. It is at this level that the library consortium accomplishes the 'doing' of preservation. The activities of print repository and the local digital archive remain separate but interdependent. Not all content that is held in the print repository will form part of the meta-network. Likewise, newer 'born digital' ejournals may not have print artifacts stored in the repository libraries.

Key elements of the print archiving infrastructure include all of the necessary functionality for maintaining a print storage facility and allied services. The repository architecture will pull together the activities and services across the consortium members' aggregated journal holdings. A core functional requirement will be to determine the extent of overlap between holdings and identify complete last copy for each journal maintained. It is here also that the key distinction of collection ownership will determine to what degree facilities will be shared or remain under the auspices of participating libraries.

On the digital side, infrastructure will include the agreements, technology, expertise and support necessary for the running of a local digital repository. To ensure a robust set of digital archiving services, the consortium will ensure the complete transfer of source files and meta data from publishers through agreements on local digital hosting. The consortium staff will need to undertake a high degree of quality control and will have to ensure data migration for ejournal content both in terms of platform software and the underlying source files.

In cases where a consortia has opted for the use of third party archiving solutions like LOCKSS caching software, this will involve the regular maintenance of the local caching activities and the monitoring of 'trigger events' to determine when the alternative access via the node needs to be enabled.

To ensure that operations on digital archiving are robust and well maintained, the local repository will need to be audited through an accrediting body such as CRL. While there is no such equivalent for print, thorough periodic reviews of the storage repository, and a strong management structure should ensure the viability of ongoing operations.

Holdings Registry

One of the most challenging layers of the integrated preservation strategy is the creation and maintenance of accurate and fully descriptive holdings data. An effective, up-to-date, and comprehensive title registry is the key technical factor to facilitate work across the distributed network. This concept is nothing new, and has been posited as a central part of the NAST initiative and its successors (RLG - OCLC Shared Print Collections Committees) for print materials (Gherman 273) (Payne 15). However, these groups have foundered on the data rationalization and coordination aspects of a unified registry and on the proper vehicle for its dissemination. Malpas has argued that networks must arrange registry data in such a way that it can be effectively disclosed to both consortium and external partners (Malpas 12). To this end, the Shared Print Group is currently working through proposals to use WorldCat and standardized MARC tags. The current investigation by OCUL last copy preservation is looking at other tools using Mark Logic and xml protocol (same tools being used to) to effectively incorporate and share data.

Defining features of a 'meta' journal holdings registry will include bringing together print and digital holdings into a single data source (issue, volume enumeration), but also explicit retention commitments on the part of consortium participants. Core components of digital license metadata (perpetual access guarantees, publisher archiving commitments) and participation information > where is the journal archived? Locally – via LOCKSS or TDR? Or remotely via Portico or ECO? Depending on the system architecture chosen to support the consortium's repository, an ERM system may be used to pull and manage such data.

Figure 2
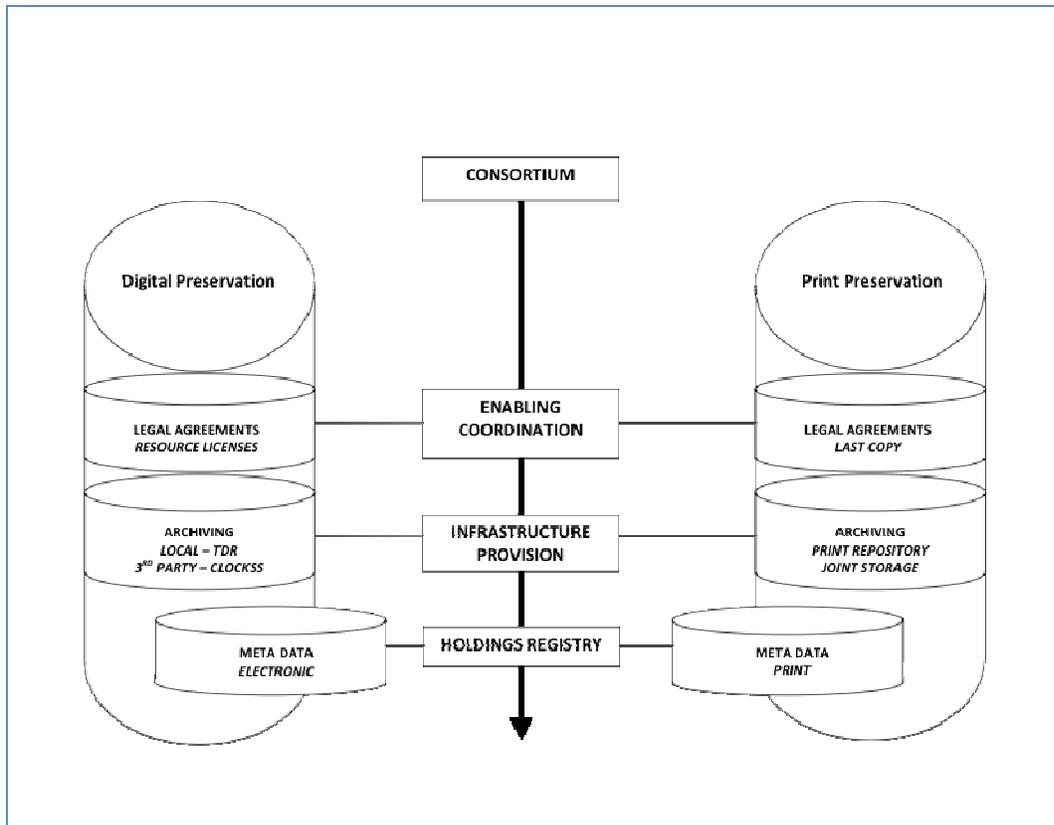
The Case for Consortia Leadership

The level of coordination and leadership that will be required to develop, implement and sustain a coordinated print – digital preservation strategy is immense. This fact, more than any other discussed in this paper, helps to explain why the call to action made by Kisling and Waters remains largely unfulfilled. If we return to our diagram in *Figure 2*, we can see that the central core action represents the coordinating function that must be played by an oversight body. This will be true of both the 'hard' lines of communication (negotiating with publishers, communicating with stakeholders) and the 'soft' lines of communication (persuasion, creating 'buy-in' among participating libraries). The specific characteristics of library consortia in North America uniquely equip these bodies to take on this challenge.

Within Canada and North America generally, it is consortia, with the assistance of third parties such as publishers and OCLC that have led archiving initiatives in both print and digital. At the same time, the role of national deposit, and specifically a lack of clear depository rules for electronic journals, in North America make the situation far less amenable to this solution than European jurisdictions (Kenney 22). Canadian and American jurisdictions also have not had a strong tradition of direct cooperation between academic sector and national libraries on large scale projects on par with that of the Finland, the Netherlands or the United Kingdom.

Beyond political considerations, there are several compelling reasons to think that leadership of library consortia is the most appropriate locus for an integrated preservation strategy.

1) Research library consortia represent an already existing vehicle for cooperation between libraries (through ICOLC, CARL/ARL). Reilly describes this history of common action through goal setting and a strong inter-institutional culture as leading to an environment of trust and interdependence (Reilly 35-36).

2) Research library consortia possess a direct line to negotiate with publishers and vendors, and can do so from a position of strength and influence. As proof of this concept, the JISC in Britain has already begun requiring permission for digital archiving rights through the LOCKSS Alliance in all negotiations for consortium ejournal licenses (NELi2) (Hockx-Yu 49). In this regard, the ongoing business relationship can be used to instill a higher degree of confidence between libraries and publishers as it provides a central point for negotiating such rights with a large numbers of parties on both sides using standard and predictable instruments.

3) Research library consortia are best equipped to sustain economic models needed to sustain an integrated preservation strategy, especially in the areas of securing external funding through government and other funding bodies. Within Canada, there is the example of CRKN successfully lobbying for CFI funding twice in Canada. At the Ontario level, government grants helped build Scholars Portal. There are similar parallels in the United States for consortia and cooperative ventures securing grants through the Mellon Foundation (LOCKSS, CRL Distributed Print Archives).

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4) Library consortia are best placed to oversee the audit and compliance process that will be critical to ensuring the continued viability of the integrated preservation strategy. At present, only CRL conducts audits of ejournal repositories. As part of this process, consortia can provide dedicated and centralized staff at a more affordable scale and can ensure that multiple local projects can be brought into line with standards required for certification.

Part 4 - Key Benefits of a Fully Integrated Strategy
There are a myriad of potential benefits if the academic library community could realize through a strategic focus on melding together their print and digital archiving streams.

Firstly, library consortia themselves will realize gains from an integrated strategy. Having archived and secure print and digital copies could allow research libraries acting across a network to finally resolve the debate on the number of last copies. Effectively, having a digital copy increases the number of 'Last copies' whereby one or more digital copies could act as a substitute Last copy giving the network a minimum of two or more. This crucial gain should produce increased efficiency, greater streamlining and ultimately a more robust group of services between individual libraries on the network for resource sharing along the lines of current repository network schema that would also include considerations of digital holdings. In addition, having both preservation mandates within the same envelope centralizes expertise for licensing and digital preservation issues (pooled resources)

From an organizational viewpoint, an integrated journal preservation strategy would enable participating libraries to make a better political case with key stakeholders (such as faculty) who may not yet be willing to embrace a solely digital archiving regime. Individual libraries should realize more flexibility on the whole, as a network of last print and secure digital libraries moves towards greater cooperation and certainty by overcoming the strengths/weaknesses inherent in varying sizes of collection, budget and institution. As an example, by participating in an integrated preservation network, members would realize an even greater capacity to de-commission legacy print collections based on accurate and confident understandings of risk and security for any one journal.

Finally, when we look at the core business of libraries, harmonizing the print/digital strategy allows our sector to fully realize the preservation mandate in two crucial ways. First, it allows libraries of all stripes (including those beyond the academic/research, who may participate in the network; government, national, large publics) to regain the critical role in long term preservation of the intellectual and cultural record. Second, by maintaining both print and electronic materials, we secure, strengthen and reinforce the rights of libraries to share information between institutions and with users freely as part of Fair Dealing/Fair Use copyright regime in North America. Because these rights are inextricably linked to print at present, maintaining print as well as digital material will ensure this right continues to exist.

Conclusion
This paper has shown the benefits of an integrated preservation strategy for ejournals. It has forwarded a number of strategic issues, including delineating a strategy for a Title Archiving registry and made the case for why consortia are best positioned to take on the leadership role in

realizing this strategy. As Okerson notes: "'Perpetual' is a function of the confidence we have in the life of our institutions" (Okerson slide 9). In closing, it is appropriate to ask what future areas of investigation might also contribute. Within the realm of ejournals alone, there are number of potentially fruitful avenues of research such as a thorough examination through sampling of what percentage of a given publisher's journals (either print or digital) are currently archived, by which stakeholder, and to what degree. Beyond the realm of ejournals, one could see the potential for the application of the methodology described in this paper brought to bear on government documents through connections already established under depository services agreements. Such an endeavor would begin to include other key stakeholders beyond research library consortia.

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