## 2. Foundational knowledge – informing Aquifer with environmental scans conducted in key areas

### *2.1 What lessons can Aquifer learn from IMS's work in the area of content/information interchange? What tools emerging in this space from within the IMS arena and in which Aquifer might take an interest?*


## Summary

IMS Global Learning[1] is a membership-driven organization whose role has been serving as a catalyst for discussions among varied players in the e-learning and (more recently) in the digital library arenas. IMS hosts a wide range of work aimed at the development of specifications for various aspects of systems and services supporting research, teaching, and learning. A number of these specifications have and are being moved beyond abstract status into successful implementations.

Recently, IMS has produced their *Abstract Framework*[2], an overall context for mapping current and next-generation work both by IMS itself as well as by the many complimentary agencies and efforts that make up the broader learning management systems community.[3] Via the *Framework,* Aquifer can take advantage of advanced, second-generation analysis, modeling, and design work from the IMS community at large.

We can leverage the results of IMS and related efforts to jumpstart our work on interoperability and resource sharing. We can target learning management systems as the first Aquifer *piping* projects and deliver visible, practical demonstrations of moving digital content to serve a variety of teaching and learning system environments spread across the DLF membership.


## Introduction

Simply stated, one of Aquifer's goals is facilitating effective distribution and use of digital content in support of teaching and learning. We can frame the scope of issues and range of constituent communities in this arena using the McLean/Lynch white paper: *Interoperability between Library Information Services and Learning Environments – Bridging the Gaps.*[4] Among several hurdles to be overcome in fostering better communication among library and learning management communities, the authors noted that *terminological confusion abounds around the term "repository" and around the terms associated with managing digital content. Repositories are a particular problem in that numerous groups are building or defining systems that they describe as*

---

[1] http://www.imsglobal.org

[2] [introduction] http://www.imsglobal.org/af/index.cfm,
[summary] http://www.imsglobal.org/af/IAFReviewv1.pdf,
[detail] http://www.imsglobal.org/af/afv1p0/imsafwhitepaperv1p0.html#1519888

[3] *e.g.* JISC (Joint Information Development Committee, UK), DEST (Department of Education Science and Training, Australia), IC (Industry Canada)

[4] http://www.imsglobal.org/digitalrepositories/CNIandIMS_2004.pdf

*repositories – all of which are different!* Indeed. This very same ambiguity pervades the Aquifer context.

McLean and Lynch go on to note that *library communities are largely unfamiliar with the work done by IMS and allied groups; IMS, in turn, is often unaware of relevant work happening in library automation, digital libraries, or related areas!* How then do we best take advantage of what the learning management community at large has to offer?

First, let's assume the ongoing success of what libraries do best:

- selection, curation, and preservation programs that build and protect rich, diverse, and useful collections
- metadataand interpretation programs that help faculty and students navigate, discover, and use an increasingly complex array of resources.

Second, let's assume these programs will continue increasing both the levels of their activity and diversity of their work in digital realms.

Then, with robust content and metadata programs moving forward on the supply side of the equation, let's look at the flow of content from the *delivery* end of the pipeline. Let's see what we can learn from the needs and expectations of those who design, build, and manage systems that directly support faculty and students in their teaching and learning roles. Let's take *learning system services* as our point of departure and look at three venues worthy of careful scrutiny.

**Sakai**

The most active learning management effort in the U.S. has Sakai at its center. Half a dozen core sites have development teams at work. The Sakai Education partners Program has staff working toward its goal of launching a sustainable community of a few hundred members who will "own and shape" Sakai's future. In and around this project, one sees a host of different takes on *repository* and related functions:.

- data stores/services that support **C**reate, **R**ead, **U**pdate, and **D**elete functions
- systems aimed at formal, authenticated documentation of academic careers (ePorfolios)[5]
- repositories that gather and service the intellectual capital of academia[6]
- services that deliver metasearch and citation capture/management capabilities[7]
- components for content transport, packaging, transformation, aggregation and annotation, plus the data stores and functions that power such tools[8]

Of special importance here are two groups – SEPP/Content and SEPP/Library. In these discussions, both core and educational-partner institutions are working in the Sakai context to define services and functions that are required to find, gather, deliver and manage digital content.

---

[5] http://www.theospi.org/

[6] http://www.alpsp.org/htp_openarc.htm

[7] [metasearch] http://searchenginewatch.com/links/article.php/2156241, http://www.niso.org/news/events_workshops/MS-2003_ppts.html, [Resource List Interoperability] http://www.imsglobal.org/rli/rliv1p0/imsrli_confv1p0.html

[8] http://www.imsglobal.org/content/packaging/index.cfm, http://www.nln.ac.uk/index.asp, http://www.adlnet.org/, http://www.webct.com/ims, http://www.blackboard.com/docs/r6/6_1/instructor/bbls_r6_1_instructor/add_nln_scorm_and_ims_content.htm

**DLF**

From the library side of the equation comes a recent DLF report to the Mellon Foundation: *Digital Library Content and Course Management Systems: Issues of Interoperation*[9] A summary of their statement of current issues is both instructive and telling:

- high barriers to finding and re-using extant digital materials in a course context
- diverse, numerous systems containing materials useful in teaching and learning
- diversity of players in the digital domain impedes simplifying environments
- diversity of academic tools and systems complicates learning environments

Among the reports recommendations, comes a call for action -- a call for moving from theory to practice:

> *The need for improved interoperation between learning systems and digital library systems has been much discussed, but we have today few working examples of such cooperation. As long as these discussions remain theoretical, neither the developers of instructional support systems nor the developers of digital library systems are likely to spend the resources required to support interoperation. We are at a point where some convincing demonstration projects are badly needed. The purpose of such projects include:*
> - *demonstrating the utility of interoperation in the real world …*
> - *testing the hypotheses about what functions matter …*
> - *providing experience with modes of interoperation …*
> - *providing a basis for projecting the resources required to implement and support wider interoperation …*

***Learning Management Communities***

We can begin to parse the current wide range and depth of relevant activity in this arena via the collection of papers and session reports that came out of this summer's *alt-i-ab 2004* [10] (Advancing Learning Technology Interoperability). Said in the organizers own words:

> **alt-i-lab 2004** *was the 2nd annual meeting of creators, vendors, users, and buyers of learning technology. The purpose of the meeting was advancing learning technology interoperability. The participants are informed business and technical decision makers and technology leaders from the vendor and consumer communities. This is a working meeting in which informed participants assessed the status of the field through presentations, demonstrations, and discussion sessions to make plans for solving challenging interoperability problems.*
>
> *alt-i-lab is a continuing cross-industry, international collaboration. This year's meeting was co-hosted by IMS Global Learning Consortium, SIF, the Sakai Project, ALIC, MERLOT, European SchoolNet, and CEN/ISSS WSLT. It was sponsored by Blackboard, Sun Microsystems, Microsoft, Giunti Labs, WebCT, McGraw-Hill, Oracle, and Desire2Learn …* [and included] *a meeting of the ePortfolio Secretariat.*

This was a two-day, up-to-the-minute snapshot the learning management system community Neil McLean (Director, IMS/Australia) coordinated a *State of the Art*

[9] http://www.diglib.org/pubs/cmsdl0407/cmsdl0407.pdf
[10] http://www.imsglobal.org/altilab/index.cfm

*Assessment*[11] and embedded in this same session were three quite useful, more targeted summaries:

*Trends and Issues in E-learning Infrastructure and Development*[12]:

Among the topics scanned here are:

- E-learning in context
- Interoperability through standards development
- Convergence of service oriented approaches

The paper also appends a valuable literature survey:

| | | |
|---|---|---|
| A. Infrastructure Models | B. Digital Repository Projects | C. Peer-to-Peer |
| D. Educational Modeling Lang. | E. Learning Design | F. Virtual Reference |
| G. Search | H. Publishing | I. Mobile Learning |
| J. Games for Learning, … | K. Next Generation Internet | L. Regional Initiatives |

*Repository Management and Implementation*[13]

This is snapshot of thinking about repositories from a learning management point of view that takes McLean/Lynch as its point of departure. There's a *Current environment* snapshot, a thoughtful look at what repositories do, and useful work in the realm of *Services and architectures* with pointers that include ELF[14] (E-Learning Framework) as well as a goodly number of other efforts -- some of which are quite well known in library circles, and others which deserve our attention.

*Digital Rights Management*[15]

Quoting from the paper's summary:

> *DRM is a broad and deep topic. Each aspect of it - including technology, legal aspects, standardization and policy making - must be studied on its own. Nonetheless, conversations about DRM with educators and education administrators often boil down to questions about transferring classical models, usually based on publishing, to the digital world. With this as a starting place, it is important to recognize the fundamental forces and changes that are at work. Among the most important of these are the unbundling of various services and the attenuation of relationships that existed in the classical "bricks and mortar" world. This has led to more responsibility being placed on technological solutions and to a greater need for interoperability, neither of which is overly mature at this point. As stated in a quote pointed out to the author by one of the reviewers of a draft of this paper,*
>
> > *Until the technical path can be settled on, people can't see or think much about the deeper issues that lie beyond that first technical step ... But in fact, the really tough issues just begin once that technical hurdle is crossed*
>
> *In DRM, the tough issues include finding acceptable and beneficial Intellectual Property Rights and market models. This requires experimentation, but experimentation cannot begin until the technical issues are solved. The technical issues, in turn, cannot be solved until those crafting the solutions have understood what has fundamentally changed and not changed so they can successfully evolve old ideas and find new ones*

---

[11] http://www.imsglobal.org/altilab/altilab2004/Context%20for%20alt-i-lab%202004%20White%20Papers.pdf
[12] http://www.imsglobal.org/altilab/altilab2004/Altilab04-Trends-Issues.pdf
[13] http://www.imsglobal.org/altilab/altilab2004/Altilab04-repositories.pdf
[14] see *Service Oriented Frameworks: Modeling the infrastructure for the next generation of e-Learning systems* [http://www.imsglobal.org/altilab/altilab2004/infrastructure/AltilabServiceOrientedFrameworks.pdf ],
[15] http://www.imsglobal.org/altilab/altilab2004/Altilab04-DRM1.pdf