Overview of Digital Asset Management Systems

EDUCAUSE Evolving Technologies Committee
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Introduction

Higher education spends considerable resources to acquire, manage, and disseminate information – much of now digital in nature: text files, still images, audio and video files, research datasets, and real-time experimental data. We distribute these assets through our Web sites and portals, public broadcasting stations, streaming services, and collaborative environments. Digital assets are re-purposed to support traditional on-campus classroom instruction, Web-based course management systems, and delivery by external partners. We also “lose” a tremendous quantity of valuable intellectual property by not effectively capturing and preserving campus activities such as lectures, symposia, and performances.

A Digital Asset Management System (DAMS) can help higher education address these issues. A DAMS infrastructure can ingest digital assets, store and index assets for easy searching, retrieve assets for use in many environments, and manage the rights associated with those assets. The U.S. market for DAMS technologies is expected to grow to over $5B by 2007, driven by several factors including:

- The evolution of integrated consumer products for capturing, storing, editing, and distributing video;
- The explosion of peer-to-peer computing and the associated need to protect the rights of digital assets;
- The FCC’s mandate for broadcasters to switch from analog to digital video television signals;
- The integration of rich media content into e-commerce web environments; and
- The need to minimize the “loss” of copyrighted and branded digital assets.

What Is DAMS?

DAMS is an integrated suite of infrastructure components used to capture, catalog, store, and manage digital assets, and to expose those assets to creative tools for producing video, audio, Web, and print content. While DAMS is related to the market segments of document management, Web content management, and integrated library systems, we view DAMS as an infrastructure component that supports these other environments. Defining DAMS elements include:

- Viewing assets as digital content plus the associated metadata that enables it to be identified;
- The ability to group individual assets to form collections or packages of assets;
- The ability to ingest, index, catalog, navigate, transform, re-purpose, package, and publish to a wide range of digital formats while protecting the integrity of the original assets;
- Enterprise capability and linkage to technical infrastructure (e.g. network, storage, database) and enterprise services such as integrated library systems, Web portals, and course management systems;
- The ability to define rights, permissions and process rules about assets to enable their use in a variety of settings while protecting the rights of owners; and
- The ability to administer and control the flow of assets into and from the system, as well as the groups and individuals who have access to assets.

2 See http://www.aiim.org for more information on document and content management.
3 See Marcia Deddens’ Evolving Technologies white paper on the future of integrated library systems.
For the purposes of this white paper, we do not consider the technologies used to create digital assets as part of the DAMS infrastructure; a wide range of technologies can create standards-based digital content. There are also many creative tools – Quark, Dreamweaver, PowerPoint, FinalCut Pro, Avid, and many others – that are used to manipulate and “publish” digital assets in print, Web, or broadcast form. Because these originating and creative environments are so diverse, the DAMS infrastructure must be open, flexible, and must support the translation of standards-based digital assets into a wide variety of formats. The DAMS infrastructure must not limit access to particular types of workstations, operating systems, or creative software, and must scale to handle large volumes of content and high usage levels.

Metadata flexibility is another requirement of the DAMS environment. Each discipline, school, project, or application type may require unique metadata structures – taxonomies that are meaningful within the discipline or within the context of a workflow. At the same time, all digital assets should share common metadata information established upon ingestion, with standards such as the Dublin Core providing guidance. This common metadata structure must result from collaboration with university libraries as they continue to improve methods for cataloging rich media assets. A DAMS technology suite must have the ability to manage multiple metadata structures, and to associate any digital asset with multiple taxonomies so that asset can be included in the campus integrated library system while retaining value to other processes.

The management of intellectual property rights will be a prerequisite for the widespread adoption of DAMS in higher education. The evolution of Digital Rights Management (DRM) frameworks is driven by the need to protect property rights and royalties, the protection of privacy and confidentiality, and the protection of asset integrity. A DRM framework would store basic ownership information and process rules for assets (e.g. price, duration of license, frequency of access, type of rendering, and ability to transfer to other users). The DRM framework would encrypt assets where needed, and would process and track royalty payments associated with the use of assets by various constituent groups. Especially important to higher education will be the ability to assemble assets and process rules into a “rights package” that can accompany the use of these linked assets within a distributed learning environment. For example, a student could be assigned exclusive use of an asset package for the duration of an on-line course, but could not forward the package to other users.

Most commercially available DAMS product suites include workflow tools to help manage the flow of assets through the enterprise. In higher education, workflow tools will be important to areas such as public information, broadcasting, sports information, library archives, and course content development. Workflow tools can even support research projects. For example, a researcher may define a workflow where an undergraduate student assistant ingests a research video, a graduate assistant adds discipline-specific metadata about the asset, and the researcher adds interpretive metadata about key elements of the video.

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4 See [http://www.fgdc.gov/metadata/metadata.html](http://www.fgdc.gov/metadata/metadata.html) for one example of metadata standards developed to support the geospatial data discipline.
5 See [http://dublincore.org](http://dublincore.org) for more information.
6 See [http://www.ec2.edu/dccenter/dam/readings.html](http://www.ec2.edu/dccenter/dam/readings.html) for related readings.
8 See [http://www.dlib.org/dlib/june01/iannella/06iannella.html](http://www.dlib.org/dlib/june01/iannella/06iannella.html) for an overview of DRM technologies.
Why Is DAMS Important to Higher Education?

Most commercial DAMS implementations focus on creating and tracking new assets to leverage brand identity, and to provide global access to assets for employees, customers, and business partners. Higher education can use DAMS in similar ways to catalog and manage instructional and research objects, to serve as a repository for content describing the intellectual life of the institution, and to provide global access to these assets by multiple constituencies:

- DAMS can be used to improve on-line course delivery by integrating rich media content into course management systems, improving the quality and relevance of on-campus and off-campus learning. DAMS can provide the infrastructure to deliver rich media content consistent with standards developed by efforts such as the Instructional Management System (IMS)\(^9\) and Open Knowledge Initiative.\(^10\)
- DAMS can support real-time capture of perishable intellectual property, enabling faculty members, administrators, and students to ingest, catalog, and re-purpose campus experiences into rich media learning objects. We manage to capture only a small percentage of the perishable intellectual property that we generate each day; the rest is lost forever.
- DAMS can extend library collections to include rich media developed both on- and off-campus, and to make these collections readily available to faculty members, researchers, and students.
- DAMS can be used to improve administrative processes in areas that routinely use rich media, including news services, broadcasting, development, marketing, athletics, and graphic communication. DAMS, through an integrated DRM system, can also support the distribution of the university’s intellectual property as well as the administration of external content licenses to multiple communities.
- DAMS can be used to enhance institutional image by providing public access to the intellectual life of the institution.

What Are The Implementation Challenges?

There are few large-scale DAMS reference implementations in higher education; most implementations support specific research projects or specialized library collections (see the “Related Higher Education Projects” section). Most DAMS reference implementations exist in the private sector, and most of these implementations function within operational “silos” such as marketing, video production, or Web site management. There are several major challenges to the adoption of DAMS in higher education:

- Faculty members and administrators need the opportunity to experiment with DAMS technologies to discover how they can use DAMS to improve teaching, research, and administration.
- We need to collaborate on the definition of multiple metadata structures to effectively catalog assets, to support their use by multiple communities, and to integrate digital assets into our library collections. We need to understand the linkages between personalized digital collections, departmental or project-based collections, and permanent library collections.
- We need to develop comprehensive rights management solutions that are understandable and usable by attorneys as well as faculty members, and which support the appropriate use of assets by multiple constituent communities.
- We need to explore the application of workflow technology to units using rich media in a “production” mode.
- We need to manage the deployment of the DAMS infrastructure because of the significant impact of rich media on the campus IT infrastructure. We will need strong security and access controls to integrate with our directory and authentication environments, and to insure the integrity and authenticity of widely distributed digital assets.


Who Are The Major DAMS Vendors?

Vendor approaches within the broad rich media marketplace – including DAMS, document management, and Web content management – vary widely and have evolved via acquisitions and/or partnerships. Vendors in the rich media market space focus on one or more of these product components:

- **Content repositories** that support print and/or on-line marketing workflow;
- **Workflow management** tools linked to databases;
- **Web site content and version control** tools;
- **Print distribution** and print image repositories;
- **Digital media ingesting** and logging;
- **Encryption and content distribution systems** for commercial digital assets;
- **Digital asset management infrastructure** tools; and
- **Systems integration and hosting** services.

The following vendors focus largely on digital asset management infrastructure. Due to their diverse heritage, products include various elements of content management, version control, and Web production:

- **Campus Pipeline** [http://www.campuspipeline.com/products/luminis/luminis_cms.html](http://www.campuspipeline.com/products/luminis/luminis_cms.html) - Luminus product includes Web content management, workflow, and packaging, with Documentum as a partner.
- **Documentum** [http://www.documentum.com](http://www.documentum.com) - Acquired Bulldog Software in December 2001 to focus on video ingestion and management. Clients include BBC and North Carolina State.
- **FlexStor** [http://www.flexstornet.com/home.html](http://www.flexstornet.com/home.html) - Network-oriented solution, partnering with Sun and Oracle.
- **North Plains** [http://www.northplains.com](http://www.northplains.com) - TeleScope product is a network-oriented solution.

How Should We Proceed?

As the integration of rich media into instruction is still in its infancy, we recommend considerable investigation and experimentation before adopting campus-wide DAMS solutions:

- **Initial investigation and preparation** – This phase consists of initial research and product evaluations, and dialogs with campus units to identify a DAMS “community of interest.” This community may include academic units, distance learning units, libraries, administrative units, broadcast organizations, intercollegiate athletics, and IT providers. Each of these units is likely to use a unique set of hardware and software to generate, capture, store, and re-purpose digital assets. Each unit will likely use different metadata structures – some standards-based, some personalized, some primitive – to support their uses of rich media. Some units may use workflow, DRM, or e-commerce applications already.

- **Selection of technologies and vendors** – This phase consists of identifying one or more technologies and/or vendor partners to advance the use of DAMS on campus, and to evaluate the potential to construct a DAMS infrastructure. This selection process is likely to combine experimentation with the issuance of formal requests for proposal.

- **Initial and large-scale pilot projects** – This phase consists of developing, implement, and evaluating the use of DAMS technologies to support specific academic and administrative activities.
Conclusion

The extent to which DAMS emerges as a campus IT infrastructure component depends on several factors:

- The **rate of acceptance** for DAMS solutions;
- The **scaling of underlying IT infrastructure** elements;
- The availability and quality of **technical and end-user support**;
- The general **availability of off-campus broadband technologies** for remote access to rich media content; and
- The **co-evolution of integrated library systems and the DAMS infrastructure**. As Marcia Deddens points out in her white paper:

  “We can view the ILS as insular to the library or we can view it as a university DAMS. We can look at DAMS offerings and consider managing library content through such systems. We can maintain two discrete systems, both doing largely the same tasks. In any case, the digital asset management aspects of Integrated Library Systems can bring library and IT professionals together for the betterment of the academy.”

The “value proposition” of DAMS to higher education will likely not be expressed in purely economic terms from a central perspective, but will rather be closely associated with instructional quality, research value, and student services as defined by academic and research units. University units must first have the opportunity to witness for themselves the capabilities of DAMS technologies, and to develop their own value propositions for implementing DAMS technologies.

Due to the rapidly evolving nature of rich media technology, it is likely that universities will consider partnerships with vendors who are committed to the higher education marketplace and who are in relatively strong financial positions. These partnerships should include collaborations between institutions and with initiatives promoting development and deployment of learning object standards and integrated digital collections.
Related Higher Education Projects

4. Evia Digital Archives http://www.indiana.edu/~eviada/ - Ethnomusicology archives at Indiana and Michigan, funded by the Mellon Foundation.
8. Open Video Project http://open-video.org - Participants include Carnegie Mellon, Maryland, and UNC – Chapel Hill.
10. USC Digital Commerce Center http://www.ec2.edu/dccenter/dam/ - Focuses on DAMS and DRM.
11. VDe Initiative http://www.vide.net - promotes deployment of digital video.

Related EDUCAUSE2002 Sessions

Tuesday, October 1
- 8:30 a.m. - 4:30 p.m. – Full-Day Seminar: Seminar 02F - Digitizing Library and Archival Research Collections for Access

Wednesday, October 2
- 11:40 a.m. - 12:30 p.m. – Track 6: An Open Source Model for Academic Content Dissemination and Pedagogical Collaboration: An Oxymoron or Just Impossible?
- 3:50 p.m. - 4:40 p.m. – Track 5: Using Streaming Media for Online User Training in IT
- 3:50 p.m. - 4:40 p.m. – Track 6: Creating Learning Objects from Research Content to Open the University
- 4:55 p.m. - 6:10 p.m. – Poster Session - Library: Journal Finder: Getting to the Full Text Regardless of the Database
- 4:55 p.m. - 6:10 p.m. – Poster Session - Library: Knowledge Community: Developing a One-Stop Shop for Faculty Scholarly Output and Teaching Best Practices

Thursday, October 3
- 11:45 a.m. - 12:35 p.m. – Track 1: The Video Development Initiative
- 11:45 a.m. - 12:35 p.m. – Track 4: Content Management Systems: Panacea or Pandora's Box?
- 11:45 a.m. - 12:35 p.m. – Track 6: Object-Oriented Content: Importance, Benefits, and Costs
- 2:20 p.m. - 3:10 p.m. – Track 6: The Open Knowledge Initiative
- 3:55 p.m. - 4:45 p.m. – Track 3: Coursewhere?: Integrating Library Services and Resources into Course Sites
- 3:55 p.m. - 4:45 p.m. – Track 6: Copyright Ownership and Digital Course Materials: Policy Characteristics and Best Practices
- 4:55 p.m. - 6:10 p.m. – Poster Session - Teaching and Learning: Creating Course Content, or How Not to Do It Twice

Friday, October 4
- 8:10 a.m. - 9:00 a.m. – Track 3: You Can't Take It with You: Extending the Usefulness of Your Digital Media Resources to the Land-Grant Community
- 9:30 a.m. - 10:20 a.m. – Track 3: Birth of a Digital Media Library: From Student Need to Institutional Resource
- 9:30 a.m. - 10:20 a.m. – Track 4: Technology Futures
- 9:30 a.m. - 10:20 a.m. – Track 6: Using Emerging Technologies to Advance the Scholarship of Teaching and Learning: E-Portfolios, Virtual Workspaces, and Support Tools