

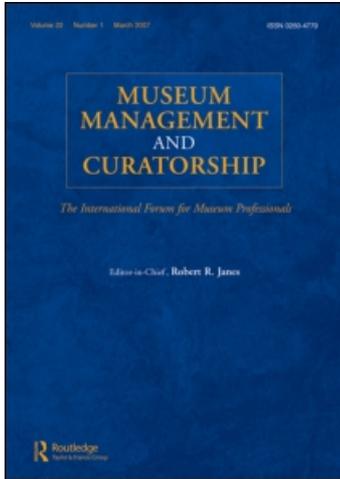
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Emerging convergence? Thoughts on museums, archives, libraries, and professional training

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While ‘convergence’ has been a topic of much discussion in the museum, archive, and library communities, the emerging similarities between these three types of cultural heritage institutions – most apparent in their on-line activities – are not yet evident in the education of professionals who work in them. Curriculum models still support traditional definitions of the roles, functions, and audiences of archives, libraries, and museums. Professional practice can evolve in the context provided by digital heritage and digital curation, and respond in a manner that supports common goals across institution types. New interdisciplinary foci for professional training can provide skills needed across the sector, while respecting the distinct histories, cultural roles, and responsibilities of libraries, archives, and museums.

Keywords: convergence; education; curriculum; archival studies; library science; museum studies

Introduction

The *memory institution* (Dempsey et al. 2000) has captured the imagination of policy-makers as a powerful metaphor for the social role of libraries, archives, and museums. Charged with giving access to and shaping shared cultural heritage, *memory institutions* are sometimes characterized as storehouses, reservoirs to be tapped for many different purposes, from education to entertainment. Drawing on the desire that all information be available to anyone, anywhere, the vision of an integrated cultural web is portrayed as a powerhouse, latent with the potential of unrealized knowledge (European Commission 2009; Zorich, Waibel, and Erway 2008).

What twenty-first century policy-makers accentuate in grouping these institutions together is their similar role as part of the informal educational structures supported by the public, and their common governance (either as public institutions or not-for-profit institutions with a public mission). Though these commonalities have not historically been dominant features in the self-characterization of libraries, museums, and archives, they are increasingly important to their sustainability.

Traditionally, libraries, archives, and museums have occupied different places in our social and informational space. The strategies they have adopted to interact with their users, and the organization and interpretation of their collections, differ and

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shape the definition of 'education' in and for each of these settings. The meaning and methods of access in these institutions have been built upon traditions of gathering, organizing, preserving, and presenting acted out in institutions over time and manifested in different historical identities, and distinct corporate cultures.

As all three types of institutions move toward providing access to their collections increasingly on-line, it is challenging to preserve what each institutional tradition can bring to the creation of the networked information society. The coordinated education of professionals from all three types of institutions within schools of information could contribute to a dynamic integration of these traditions and to the enhancement of professional training as currently offered for each of the separate disciplines. But coordinated should not mean identical, for many of the differences that fostered these institutions' distinct user models remain in the networked world.

Institutions and their user models

An integrated approach to training professionals to work in cultural heritage institutions needs to build on an understanding of and respect for the differences between libraries, archives, and museums. Research libraries, for instance, are most often encyclopedic collections that provide access to the world's knowledge for a sophisticated urban, national, or academic community. The audience for public libraries is a broad one, often the general public, and the clientele of any particular library is diverse. Traditionally, repositories of published material that exists in multiple copies (most often printed), libraries have developed sophisticated systems for helping users find specific resources that correspond to their interests. Catalogs and subject classifications are designed to identify relevant volumes and cluster similar works. Automation came early, spurred on by the efficiency of shared book cataloging and by economies of scale. The librarian is an enabler in the discovery phase of the research process (Bearman and Trant 1998c), but research or learning takes place in an unmediated manner in the traditional library, as it does on the Web. The goal of the traditional librarian (and library system, whether automated or in a card catalog) is to identify relevant works, find a specific volume, and provide materials to patrons for them to read. As a tenet of professional ethics, librarians distance themselves from what patrons do with the information they gather at the library (for example, not keeping records of who checks out which books). This distance precludes the librarian from being an active educator or interpreter.

Great archives are most often agencies of large jurisdictions, particularly nations. Their collections are tied directly to organizational contexts, as recognized in the principle of provenance. Archival materials provide unique evidence of the transactions of organizations and institutions; collections do not circulate. Using an archive is – at least initially – a mediated experience. Consultation begins in correspondence in advance of a visit, and consultation is often on the premises of the institution, in the presence of an archivist or technician. The archival principle of provenance – maintaining *fonds* separately in the order given by their creators – has guided the development of the finding aid, a hierarchically structured document whose content reflects the unique nature of each archival collection. The tendency of archival description to focus on physical organization (with description taking place at the container rather than the item level) has meant that users often need guidance

from an archivist to identify relevant collections, and to establish where in those collections specific types of material may exist. Archival staff may also aid in the interpretation of materials, using their knowledge of document genre and context. Archivists keep records of those who consult their collections; it is not uncommon for an archivist to share details of other specialist researchers. Many archival collections belonging to corporations or institutions remain in the custody of the originating institution to be used (sometimes exclusively) by staff. Large public archives support a class of professional researchers, reviewing land use, legal, or insurance records.

Great museums are most often subject-based collections of exceptional objects or specimens. For all but the most senior scholar, an encounter with a museum collection is a highly mediated experience. Unique artifacts are presented in an exhibition space, assembled according to a curatorial thesis and sequenced to support an argument or illustrate a theme. Within a gallery, didactic educational materials provide context and meaning for the works chosen, offering an interpretation and explanation for the visitor. Labels both identify artifacts or specimens and explain their relevance to a particular context within an exhibition. Interactives in the galleries may explore aspects of works that are difficult to display, or return works of art to their original cultural context (as in the films of the masks being danced in *The Metropolitan Museum of Art*). Visitors are strongly guided through collections. It is common for museums to single out specific works for special treatment; visitors are introduced to masterworks and told why they are important. In-gallery tours actively introduce areas of the collection. Museum educators encourage encounters with artifacts, times, and periods previously unknown to the visitor. Engagement with the collection and its interpreters is encouraged. Museum information resources are created to support the study and interpretation of the collection. Collections documentation – often quite scholarly – is the province of the museum professional cataloger, curator, or subject specialist. Knowledge about individual works or specimens in museum collections is recorded for future professional and scholarly use. Large museums often have both libraries (to support the research of their staff) and archives (to document institutional history).

Within these distinct historical traditions, archives, museums, and libraries have established different communities of users who expect divergent things. Using the library is typically an individual act; people choose books for themselves (or their children) and check them out to read at home, alone. Visiting a museum, by contrast is often a social activity. A visit often includes a stop in the café, and the shop (which is the only place where you can take something home from the museum), and the experience is influenced by that social group (Falk and Dierking 1992). Museum-goers are often seeking general education and entertainment – a visit to the ‘new exhibition’ – rather than the answer to a specific question. Users of archives most often have specific problem or use in mind. Records are consulted to identify the facts surrounding a specific transaction, such as the registration of a birth, or the arrival of an ancestor. Only historical researchers approach an archival collection to ‘browse,’ and then it is within the confines of a known collection.

While admittedly stereotypical, these models are revealing as each description of access assumes a particular kind of use. Very different assumptions about patrons’ needs and their preferred methods of interaction are embedded in the practices of

libraries, archives, and museums and the systems that support them. The differing nature of collections in museums, archives, and libraries has contributed to diverging professional practices that have not been acknowledged in cultural policy focused on on-line access and searching.

Museums most often have unique collections. Rarity and preciousness remain key to the attraction of their objects; it gives them their aura (Hazan 2002). Museum collections protect and preserve. Contrast this with public lending libraries, grounded in access and in public literacy. Their goal is to make materials available; their collections are predominantly books, printed in many copies, inexpensively produced, often weeded regularly. Archives consist of items that are not generally intrinsically valuable but essential as evidence, especially in context. Philosophies and policies about public access in libraries, archives, and museums reflect these distinctions. One visited the rare works on exhibit in museums, researched unique items under supervision in archives, but borrowed the replicable ones in the library. A curator interpreted complex originals in an exhibition or gallery; an archivist explicated the original context of records; the librarian might have referred a user to a source, but its use was personal and individual.

Museums (and archives) have remained involved in the informational content of their collections in a way that public lending libraries have not. Museums (and to a lesser extent archives) interpret unique objects, research works in their collections, track scholars who study these same works, and share discoveries among users (some of these behaviors are shared by Special Collections or Rare Books and Manuscripts sections of research libraries). The distance between the scholarly tradition of scholars leaving notes on mats in the print room (early user-generated content in the form of tagging or annotation) and the protection of the anonymity of library book-borrowers is significant.

The digital environment

Museums, libraries, and archives have been re-thinking their services and revising their user models in light of significant changes in the way information is provided and accessed on-line. With the adoption of the Web as a primary means of publication and interaction, libraries, archives, and museums face a number of common challenges.

Effective digitization

The choices made when representing knowledge of and about the physical world in digital form – in creating digital surrogates for original materials, or abstracting the content of digital materials to enable their discovery – define (and confine) the informational value of digital representations. Technical formats may accentuate one characteristic over another. For example digital images may sacrifice higher color fidelity for smaller, more readily transmitted file sizes. Compression might introduce ‘noise’ into an image. Digitizing a book by representing its contents in a stream of characters sacrifices the meaning carried in the design of those letters as presented on a page. Standards of legibility, authenticity, and fidelity differ across disciplines (Bearman and Trant 1998a).

Choices in digitization strategy are also influenced by attitudes to the original object itself. For many, a digital scan of a brittle book is an appropriate replacement for the original object; a PDF file that includes the text in a searchable form could be considered an improvement on the original. A digital copy of an archival document, made and stored under controlled circumstances, may be considered a faithful and true record, but only if its provenance is clear; for evidential purposes archivists provide 'certified' copies of documents. But a digital photograph of a painting is unlikely to ever be accepted as a substitute for the original work of art – no matter how high the resolution of the reproduction is. The digital representations of objects, and/or the metadata describing them are judged by different criteria depending on discipline, and on form or format. The functional requirements for metadata in the museum context are much more complicated than in libraries, or archives; modeling representations of museum objects is 'modeling the world' (Bearman and Trant 1998c; Trant 1993).

Decisions about digitization strategy need to be made with an appreciation of the users and uses of the resulting digital materials. They then need to be communicated, so that all users (including those other than the intended user community) are aware of the fidelity threshold of a particular digital collection. Museums, libraries, and archives are working together to develop shared approaches that enable users to work with thematically related materials from multiple institutions, and users themselves are developing collections that challenge the custodial authority of institutions – an approach pioneered in the Valley of the Shadow project (Ayers 1993–2007) and the Rossetti Archive (McGann 2000–2007).

Managing digital collections

Libraries, archives, and museums have discovered that they are now managing large digital collections of diverse objects created and maintained for many differing purposes. The management and preservation of digital assets has been an area of common concern for groups such as the Committee of the American Library Association, Society of American Archivists, and American Association of Museums (CALM 2005). Issues of 'digital curation,' which seem at this stage to be defined as digital collections management (without the intellectual interpretation and representation integral to active subject-based curation), are an easily recognized point of common concern for libraries, archives, and museums (Hedstrom and King 2002).

Digital collections will increasingly not be collections of digital surrogates. Archives have been challenged to manage electronic records as evidence for several decades, and museums are now, or will be, accessioning digital art and artifacts. While these new kinds of 'objects' share some technical characteristics with other types of digital library collections, their requirements for preservation and presentation differ significantly (DOCAM 2009).

Managing collections in digital form is just one part of making their content accessible and useful to users on-line and on-site. It is difficult, if not impossible for users of museums, archives, and libraries to bring digital content together in new ways, without compatible means of representing knowledge across institution types. Equally significant, the holdings of museums, archives, and libraries must be searchable together with the rest of the Web, to facilitate their discovery, and enable their subsequent use. Knowledge organization in digital space is complex,

recombinant, and on-going (Bearman 2008). Users with differing perspectives and value-systems, will be examining and using all types of information objects, and – as was the case with Native American masks at the University of British Columbia's Museum of Anthropology (Duffek 2006) – our collective understanding will be richer as a result.

Supporting use

The image of the collections of all libraries, archives, and museums available on-line for consultation, by anyone, anytime, anywhere is a powerful one. In the public imagination, it exists already, as a world where all information is instantly available through the Google search box. Unfortunately, most of the resources of museums, libraries, and archives remain hidden, for technical and cultural reasons. Over time, as most information consumption completes the move into networked space, traditional institutions will have to change, as will the behavior and training of the professionals who work in them.

Digital access to original collections obviates their uniqueness – perturbing a singular characteristic that has been both defining and limiting. Original materials are fragile, and must be consulted in person and on-site; digital materials appear robust, are readily duplicated, and can be transferred anywhere the network reaches. Rather than having national collections confined to the capital, publicly funded and publicly collected resources can be available to the public nationally and internationally. Representations of museum collections can be in classrooms.

But while physical barriers recede, intellectual ones remain. The provision of access has been guided by expectations of user behavior. Supported uses have been grounded in understandings of user needs. The kinds of information made available and the manner in which information is presented are choices made by the suppliers of on-line information resources, steeped in their own intellectual traditions. The user models that underpin the information standards in use in libraries, archives, and museums diverge. A shared model of networked information use is necessary to guide the implementation of resources that can be easily aggregated and used across collections.

There is a commonality introduced into diverse information resources, however, by shared technologies and delivery platforms. First-generation digital collections developed a superficial sameness, as the content of collections was presented on the Web in a largely unmediated manner. Lists of works were made available, composed of thumbnail images, and brief descriptions. Small images gave way to larger ones on a click. There was a keyword search box. These on-line resources offered access with minimal interpretation; they were without the contextualization that allows the non-specialist user to understand the significance of the works presented. At the same time, they were without the depth that enabled specialist use. But their very availability sparked the imagination of many different kinds of users, and triggered theorizing about the transformative nature of on-line integrated resources at all levels (see, for example, 'Our Cultural Commonwealth' from the American Council of Learned Societies (ACLS 2006) for higher education and scholarship, and 'Educating the Net Generation' from EDUCAUSE (Oblinger and Oblinger 2005) for education more generally). This user-driven perspective, where resources are evaluated based on situationally defined personal need, has challenged institutions

to consider a new kind of access to collections and the information they contain. Museums, libraries, and archives have come together to explore the challenges of supporting this vision (led in the USA by organizations such as the National Science Foundation (NSF), the Institute of Museum and Library Services (IMLS), the ACLS, the Coalition for Networked Information (CNI), and the Mellon Foundation, and in the UK by the Joint Information Systems Commission (JISC) and the Museums Libraries and Archives Council).

With information discovery and use taking place in digital space, the boundaries between user-space and institutional-space is blurred, as is the boundary between the catalog and the collection (Trant 2001). Digital tools are expected to operate seamlessly across all phases of the research process, with content readily available for use when it is desired. For collecting institutions this blended information space requires more than supporting digital access to catalogs and collections. Users' processes should be supported, individually and collectively. Providing access is no longer enough – libraries, archives, and museums are expected to enable the discovery, collation, use, and representation of the content they hold (Bearman and Trant 1998b). Different types of institutions, however, have varied levels of openness to re-use, drawn from a sense of custodial responsibility. Ultimately, as users become authors and repositories become co-laboratories, everyone in the system is challenged with new roles.

This new digital space is an adjunct to, not a replacement for, physical spaces. Digital offerings are now available in support of, in tandem with, and before and after on-site services. For some users, encountering digital representations of original objects is exposure to a new kind of information resource, only discovered because it was 'on the network.' Sometimes, the digital surrogate fulfills all needs. For example, digital services have almost replaced physical access to journal articles. But for many users of museums and archives, a digital encounter cannot replace the need to consult the original. Digital access facilitates – or even encourages – on-site consultation. For museums, libraries, and archives, this hybrid environment offers many challenges. Expectations for service have increased, demand has shifted, and resources have most often remained stagnant.

Learning what works

'Raw' information content may not be what is expected; users are looking for data, not metadata – they want the resource, not the catalog record. New genres of digital information require new modes of presentation and interpretation. Archives, museums, and libraries are developing means to communicate the nature of their digital offerings; their Web sites are increasing in sophistication and usability, but many challenges remain. Archives, libraries, and museums need to build their knowledge and understanding of the different modes of presentation appropriate for different audiences and different needs (Peacock, Tait, and Timpson 2009). When an on-line museum exhibition is supported by lesson plans for teachers, links to additional objects, and references to supplementary library and archival resources, it becomes a new publication genre. Evaluation criteria could help with assessment of these new resources (Trant and Best of the Web Judges 2009), but model information architectures, design strategies, and design management techniques are needed.

Educating the Net Generation (the EDUCAUSE-sponsored, in-depth study of the needs and expectations of a new generation of students – the ones who don't know life without the Internet) makes it clear, in both traditional text and multimedia interviews available on-line (<http://www.educause.edu/educatingthenetgen/>), that the next generation of users has an unprecedented level of comfort with technology and equally high expectations about the availability of digital information (Oblinger and Oblinger 2005). Providing educational experiences that engage and challenge them will require a re-thinking of teaching methods and tools. A new approach to information resources is required to support this pedagogy, one that enables the development of critical reading, viewing, and thinking skills. Interestingly, a part of the British Museum Web site provides Joan Lippincott with an example of the kind of 'self-service, interactive Web site' that students intuitively understand (cf. her chapter on 'Net Generation Students and Libraries').

Meeting all of these challenges requires re-positioning archives, libraries, and museums vis-à-vis their users. The 'New Museology' (Vergo 1989) and constructivist theories of learning (Hein 1998; Hein 2000) put the people who use collections at the center of the Museum Studies discourse, as do theories of user-centered information design for Information Studies. But traditional user models do not adequately position museums, archives, or libraries to be facilitators of community interactions. Enabling community constructions of knowledge requires both a letting-go of some authority (Walsh 1997), and the development of a trusting attitude toward the users of our collections. Trust is built on identity; identity requires identification. Anonymity isn't really an option for rich community interaction. We need to know who our users are and meet them out in the open:

Trust is also build upon assumptions that behavior will be appropriate. Assessments of trust require a history of an individual's actions – linking their digital trace with a distinct identity. Individuals build trust by behaving appropriately, over time. Despite the rhetoric, libraries do keep some personal data (about whether or not a person returns books) to assess whether individuals can be trusted with future loans from the collection. On-line communities have used this model for some time to assign levels to users. (Trant 2006b)

Encouraging many forms of user-generated content could enable libraries, archives, and museums to build connections between collections and individuals, and between people and collecting institutions in information space. Community-based relevance could become a distinguishing factor for museums, archives, and libraries. A service-orientation could enable the delivery of local or specialized information to known users in a way that sets collecting institutions apart from the 'rest of the Web' (Styles 2006) and begins to create a trusted web of cultural heritage resources (Trant 1998). Advocates of open content in museums are using sites such as Flickr Commons to meet their users where they happen to be (Bernstein 2008; Bernstein and Caruth 2007; Bray 2009).

Training professionals: the current curriculum

Current methods of training librarians, archivists, and museum professionals emphasize the historic differences between these types of institutions, rather than their emerging similarities. Conventional curricula do not support a profession

committed to the creation of integrated, inter-institutional, inter-disciplinary information resources accessible to a wide public in physical and digital forms. Professional training programs, as now structured, do not foster the cross-sector collegiality and collaboration needed to address shared challenges.

As an example, an unpublished review of the courses offered in the Masters level by the Faculty of Information Studies at the University of Toronto (toward Master of Information Studies with optional concentrations in Archives or Information Systems, and Master in Museum Studies degrees) showed very little overlap in formal courses (Trant 2006a). Each of these programs looked to its profession for guidance on curriculum. The Master of Information Studies program is accredited by the American Library Association (Council of the American Library Association 2008). The Master of Museum Studies follows the International Council of Museums for curriculum guidelines (International Council of Museums/International Committee for the Training of Museum Professionals 1981, 2005). Both of these guidelines reflect pre-digital contexts. The Master of Information Studies offers concentrations in archives, libraries, and information systems. The Museum Studies program is generalist, offering no formal opportunity for specialization. There were 17 courses offered in the Museum Studies program, and approximately 95 courses in the Masters of Information Studies (approximately because some courses were under review, or not yet approved). Within the Master of Information Studies, professional practice in librarianship was set apart by a significant number of courses in areas of library practice (20 of 95), including a number in specialist bibliography. Information Systems was distinguished by technically focused courses in information management, databases, and telecommunications. The Archives concentration had a core of unique courses in records management, electronic records, and archival description. Courses unique to Museum Studies focused on museological history and theory, education, buildings and facilities, and curatorial practice, with a major project focused on the creation of an exhibition. Separate courses focused on collections management and discipline-specific application systems (the use of particular technologies) were offered in the archives, library, and museum areas.

This probe of the status quo of professional education in museums, libraries, and archives showed little convergence. There was almost no overlap in the subject areas, and little apparent methodological overlap in the three existing curricula.

Shared concepts: opportunities for integration in professional education

While the traditions and historical areas of expertise in archives, libraries, and museums may differ, the new challenges facing all collecting cultural institutions are best addressed in concert, in an inter-disciplinary forum that explores multiple solutions and takes advantage of many skills. Both Museum Studies and Information Science have a strong tradition of linking theory and practice, and of placing students in the field to apply their knowledge. When designing new curricular content, this strategy of learning and doing could be emphasized through teaching methods that cross institutional boundaries and draw upon strengths of each traditional specialization. It also meshes well with the need for lifelong learning in a technological environment of continuous change.

Several new areas could form the core of common practice, giving all graduates common and shared knowledge, skills and cross-institutional experiences, and providing archives, libraries, and museums with professionals better equipped to deal with the challenges they face in the networked information environment.

Organizations and governments

The very idea of convergence arises from the fact that libraries, archives, and museums operate within common social, organizational, political, economic, and legal contexts. A common curriculum would address issues of strategy, policy, and administration inside and outside organizations, including:

Management. Graduates will be responsible for contributing to, managing and possibly leading efficient and effective cultural heritage institutions, and will have to address such questions as:

- What are the fiduciary responsibilities of public institutions and organizations operating in the public interest? How do you prepare and monitor a budget? What kinds of financial reporting are required by legal and taxation authorities? What fundraising options are available and which are most likely to be successful in certain contexts?
- What sustainable business models are or could be employed by memory institutions?
- What is the legal context for human resource management in the public and not-for-profit sector? How does this differ inside and outside government? Are there geographic variations too?
- How can you prepare to manage change effectively? What strategies support the creation of a learning organization, with a staff committed to lifelong learning?
- What organizational structures and theories are typical in not-for-profits? How do you work effectively with Boards, Trustees, and Advisory Committees?
- How can traditional institutional activities and new digital activities be integrated?
- What formal processes to not-for-profits and governments use to carry out work? How does specification and procurement work (including tendering, RFI, RQ, RFP, and formal evaluation methods)?

Cultural Policy. Libraries, archives, and museums share governmental, legal, and economic context. Graduates will need to be able to determine:

- Which laws relate to libraries, archives, and museums (e.g. copyright, cultural property)? How is this legal context changing? Are there issues currently being debated that affect the way archives, libraries, or museums function?
- What are appropriate approaches to the exhibition of collections? What ethical considerations need to be taken into account when determining the voice of institutional publications? Which individuals or cultural groups should be represented when collections are interpreted?

- How does multiculturalism change traditional approaches to interpretation? What strategies can the institution adopt to engage more fully with its many communities?
- What sensitive issues is the sector struggling with? Examples from current practice include repatriation (Native American Graves Protection and Repatriation Act (NAGPRA), Ancient Civilizations) and ownership (Nazi spoliation).
- What is the economic impact of arts and culture in the local, provincial, national, and international context? How is this influenced by the role of the voluntary sector?
- What funding models are appropriate for archives, libraries, and museums? How has the funding climate changed, and how is it likely to change in the future, considering sources such as government or foundation support and individual philanthropy? What affects do differing funding models (e.g. grants for projects vs. operations) have on organizations?
- What is particular about national or regional context? Do our national institutions, including arts and research councils, play a distinct role in society?
- Do cultural institutions contribute social value and offer an adequate return on investment? How do you measure this?
- How are publication and distribution models changing methods of scholarly and public communication? What affect do multiple paths of content distribution have on information creation and consumption? How can archives, libraries, and museums adapt and respond?
- How do new social and technological environments, such as the rise of social computing and significant volumes of user created content, affect institutional goals, objectives, and strategies?
- In what ways are the traditional missions of libraries, archives, and museums challenged by changing information contexts?

Creating effective digital representations

Libraries, archives, and museums make choices about how to represent their collections that privilege some aspects over others. Users need to merge resources from multiple institution types to satisfy subject-related queries. Common strategies for creating effective and interoperable digital representations will have to address issues such as:

Authenticity and the Digital Record:

- The mutability of digital information is both an attraction and a danger. How can authenticity be assured in electronic records, in digital collections documentation and in digital scientific datasets? What kinds of changes enhance or add to information sources, and how can they be encouraged?
- How can the use and re-use of the digital record be enabled and facilitated?

- What vocabulary is appropriate for indicating levels of surety in digital representations?

Collections Documentation/Metadata:

- How can traditions of description and access be built upon to record knowledge about a collection, as well as a record of what is in it?
- How can collections in diverse institutions types be brought together into a seamless whole?
- How is metadata from diverse sources reconciled? How do multi-institutional metadata systems operate?
- What knowledge models are appropriate for cultural documentation? What kind of integration across formats is necessary?
- How can the collections of archives, libraries, and museums be linked to other sources of knowledge in our society?

Integrating the Information Landscape:

- What strategies, approaches, and technologies are available to enable access to collections and networked information resources?
- How can information from multiple sources, created at different times, in different formats, and for different purposes serve a common end?
- What tools are needed by scholars, teachers, and students to locate, integrate, analyze, and re-represent digital data?
- What models of information services are appropriate in changing circumstances?
- What infrastructures are essential (or desirable) to support interoperable, distributed information? How can we model and test these?

Digital Visualization and Reconstruction:

- What are the choices made in the digital reconstruction of an artifact, object, site, or structure? How can those choices be communicated?
- How can visualization aid or impair historical and scientific analysis?
- What impact does photo-realistic rendering capabilities have on the perceived veracity of a reconstruction?
- What datasets are required to construct sophisticated digital representations of cultural and heritage phenomenon?
- How can datasets be created and maintained in a manner that enables their longevity and re-use?

Managing digital collections

Decisions that affect the value of digital cultural content are made at its creation, acquisition, description, and publication or distribution. Choices made throughout the digital lifecycle affect the longevity and utility of content. Managers of digital collections need to be aware of:

The Life-cycle of Digital Information:

- How do management needs differ from creation to recording, collection, description, discovery, integration, representation, and re-distribution?
- What are the technical, knowledge representation, and metadata choices at each stage?

- How do changing models of publication and distribution (including self-publication, gray literature, pre-print archives, publishers' on-line archives, and institutional repositories) affect custodial responsibilities of archives, libraries, or museums?

Management of Digital Records:

- What electronic records management policies are appropriate for public institutions?
- What is the role of public or cultural institutions in maintaining the digital record? What are the responsibilities of private organizations?

Preservation:

- How can continued access to digital information be provided in a manner that respects authenticity, assures evidential worth, and enables future use?
- Where does responsibility lie for preserving what?
- How do different sources of loss impact on experiential, evidential, and informational authenticity? What kinds of loss are acceptable and why?

The Challenge of Individual Collections:

- Individual scholars are amassing large collections of digital data in support of their own work. What is the relationship of collecting institutions to individual scholars? How can their work be supported? How will their record be preserved? Should it be?

Inter-disciplinary Teamwork:

- How can individuals with distinct specialties play effective roles in an inter-disciplinary team? How are effective project plans developed and executed? What makes a successful project?

Supporting information use

Information organizations are expected to provide different kinds of information in new and evolving contexts. New users and new uses challenge traditional user models. Putting users at the center of service development and delivery will require:

Understanding Information Users:

- What do users need? What do they actually do?
- What is valued in digital information and services? How can existing practices be made more effective or efficient?
- What might users do if they could? How would providing those services change the memory institution?

Information Literacy:

- How can users of digital resources be made aware of the issues in the creation of digital surrogates? What methods are appropriate for exploring – at an advanced level – the choices made in the creation of surrogates?
- What is the impact of studying digital replicas? Are users aware of the issues of historical simulation and reconstruction?
- How can an understanding of the significance of original artifacts and objects be communicated? Are strategies such as document-based learning appropriate?

Collaboration with Educators:

- Can we train the teacher or professor, and assist in the development of tools for teaching information literacy across media types?
- What information resources are necessary to support the twenty-first century learner?
- Can constructivist learning theories support the development of information-literate next-generation students and scholars?
- What kinds of access to collections do teachers need to support new models of learning?

Implications for Scholarship:

- What is enabled when information resources from multiple disciplines and repositories are readily available?
- Is there a return on investment in digital information environments? For example, does the time saved in information discovery – an estimated 20–25 full time equivalent (FTE) faculty members at the University of Pittsburgh (King et al. 2004, 43–4) – get redirected to other aspects of scholarly work?

Personalization and Localization:

- What are the components of effective, individualized information environments?
- Where are location-aware services appropriate?
- How are services delivered effectively when the user is remote?
- How do services differ depending on user location?

Evaluating information services

Working with new skills and new technologies requires the development of new critical faculties and frameworks. Continuous learning about technology requires a new approach for its assessment. Methods, strategies, and practices for evaluating digital information services and the results of those evaluations will address issues such as:

Technology Assessment:

- What are useful strategies for creating and sustaining digital cultural content?
- What new and emerging technologies could assist in capturing or communicating cultural content?
- Are Open Source and Open Content approaches appropriate? Do they provide useful models for community development?
- How should standards and technologies be evaluated?

Effective Presentation of Digital Information:

- What are the characteristics of good and successful interface design?
- What are the characteristics of successful information architectures?
- How can users be enabled in hybrid information spaces?

‘Virtual Exhibitions’:

- How can strategies of digital interpretation be used to create effective formal and information digital learning environments? Can the exhibition making traditions of museums offer guidance?

- Can the process of creating an exhibition – making meaning through the selection, sequencing, and interpretation of representative artifacts or specimens in physical or virtual space – be a useful pedagogical tool?

These concerns are echoed in literature about training digital librarians (Choi and Rasmussen 2006), and in discussions of the development of Library and Information Science Curricula (Markey 2004) and in a review of the information skills of museum employees (Marty 2007). They are also recognized in sector-wide human resources reviews such as the 8R's study of *The Future of Heritage Work in Canada* (The 8Rs Research Team 2004), and in institution-specific studies of professional development needs (Doering, Karns, and Roberts 2005).

Conclusions

In discussing training needs for libraries, archives, and museums, the 8Rs report (The 8Rs Research Team 2004) repeatedly mentions the importance of non-disciplinary skills – the ability to adapt and change, to grow in a job, to face challenges with enthusiasm, to continue to learn, to master new technology, to work with a team, and to problem solve creatively in a time of diversity and scarcity.

Collaboration across disciplines becomes a natural way of doing business when your education exposes you to diverse backgrounds and viewpoints. Co-operation across institution-types becomes easier when program alumnae can be found in all types of cultural heritage institutions. Creative thinking, problem-solving, teamwork, and continuing education can be emphasized in all aspects of curriculum, and drawn out, consciously, in less-formal parts of the curriculum such as a practicum or internship. Professional development programs that explore common issues across the sector would help librarians, archivists, and museum professionals locally, regionally, and nationally, develop the skills – and predilection – to work together. Seminars could introduce practicing professionals to each other, and to the tools and techniques that will help them position their organizations in networked information space. These kinds of programs, with a strong grounding in shared professional practice, acknowledge the continual need for career-long research, and training opportunities.

But any 'shared practice' needs to reflect differences. For example, while opportunities for specialization exist in an information-focused Museum Studies degree – in areas such as Museum Archives, Museum Information Management, or Museum Knowledge Media – this may be too narrow a future. Joint subject or professional degrees – in areas including Anthropology, Art History, Biology, Egyptology, Geology, History, Management, and Education – could provide another fruitful road for the development of the Museum Studies curriculum.

Whatever their subject matter, professionals in libraries, archives, and museums will increasingly need to work together to meet challenges of digital collections creation, management, use and preservation because the underlying problems of digital collections management and integrated network use are shared and the public policy view of their roles is unified. At the same time, on-line, all these institutions are attracting new users who are more diverse and more demanding, and whose expectations of interaction are grounded in experiences of on-line services as much as in a history of interacting with the physical institutions.

When discussing the use of museum-materials posted on YouTube a group of museum professionals noted that ‘the people watching this were not searching for “museum” content; they were searching for “calligraphy” content’ (Alexander et al. 2008). This small observation represents a profound shift in orientation, from institution-centric to user-centered. It appreciates that museum-generated content belongs in many categories, and that people come to it not interested in museums (or libraries or archives) but the subjects and themes that collections represent. Moving collections from an institutionally defined information-space into a situationally defined user space allows *memory institutions* to maintain meaning and develop immediacy – just the things that can ensure their continued cultural relevance in a world replete with content from many sources.

As collections are being represented digitally, and in some cases are becoming digital, data and metadata are drawn closer together; linking digital resources across institutional types enables network effects. Museum, archive, and library staff need new professional and research skills that, while building on the historic practices of their disciplines, encourage openness, collaboration, and ongoing learning and evaluation. Addressing these challenges together will strengthen the sector as a whole, reinforcing the underlying cultural significance of museums, archives, and libraries, and enabling a vibrant contribution to our evolving networked information society.

Inter-disciplinary, inter-institutional research, and practice requires more than a few shared courses across program streams. It needs to be predicated on a rigorous re-examination of approaches traditionally used in archives, libraries, and museums to collect, record, describe, organize, and make available diverse forms of ‘information objects’ – from books to specimens, manuscripts to multimedia. Converging practices need to support emerging models of networked information creation and use that are centered on users’ needs and interests rather than custodial histories, and that reinforce the role of museums, libraries, and archives as trusted sources.

Notes on contributor

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