

# **Museum informatics across the curriculum: Ten years of preparing LIS students for careers transcending libraries, archives, and museums**

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## **Abstract**

Library and Information Science (LIS) students are increasingly interested in pursuing careers that transcend traditional boundaries between libraries, archives, and museums. To help students achieve these goals, the LIS programs at the University of Illinois and Florida State University have offered courses on museum informatics—the sociotechnical interactions between people, information, and technology in museums—since 2001 and 2003 respectively. An examination of the evolution of these courses over the past decade provides a unique opportunity to explore their relevance and value to LIS students, their ability to meet student needs and educational goals, and their integration into the LIS curriculum. Through a content analysis of course syllabi and assignments, this article examines how the teaching of museum informatics in LIS programs has evolved in response to course evaluations and research publications documenting the changing nature of information work in museums. It discusses key milestones in the evolution of the course from examining museums as a unique information organization to helping students acquire the knowledge they need to work across all types of cultural heritage institutions.

## **Key Words**

Museum informatics; cultural heritage organizations; information professionals; course development and evolution; content analysis; transcending libraries, archives, and museums.

## **Notice**

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# **Museum informatics across the curriculum: Ten years of preparing LIS students for careers transcending libraries, archives, and museums**

## **Introduction**

Library and Information Science (LIS) students are increasingly interested in pursuing careers that transcend the boundaries between libraries, archives, and museums. They are well aware that access to digital resources has blurred traditional distinctions between information organizations, leading to a digital convergence of libraries, archives, and museums (Zorich, Waibel, & Erway, 2008; cf. Rayward, 1998). To improve their understanding of the responsibilities of information professionals in cultural heritage institutions, they seek out courses on digital archives and digital preservation, and they enroll in interdisciplinary programs in the digital humanities and museum studies. Recent years have seen renewed interest in research exploring the overlapping educational goals of LIS, archival studies, and museum studies programs (Given & McTavish, 2010; Trant, 2009). Workshops, conferences, and new funding initiatives have focused on the common challenges facing libraries, archives, and museums, exploring how educators and practitioners can work together to meet their shared information needs (Marty, 2008).

This paper contributes to this small but growing body of literature by documenting the evolution of a course on museum informatics—the sociotechnical interactions between people, information, and technology in museums—at two different universities: the University of Illinois and Florida State University (FSU). An analysis of the evolution of these courses over the past decade provides a unique opportunity to explore their relevance and value to LIS students, their ability to meet student needs and educational goals, and their integration into the LIS curriculum. This study identifies important milestones in the evolution of the course, detailing how each new iteration of the class was influenced by research publications and course evaluations, and examining the lessons learned at each stage in the process. The results help illustrate best practices for LIS, museum studies, and archival studies educators and practitioners as they work to meet the shared challenges facing cultural heritage organizations.

## **Literature Review**

Museum informatics is the “study of the sociotechnical interactions that take place at the intersection of people, information, and technology in museums” (Marty, 2010, p.3717). This literature review provides the necessary background for a study of museum informatics in LIS programs by examining the historical connections between museum studies and LIS education, and recent initiatives to prepare students for careers in libraries, archives, and museums.

### *Museum Studies and LIS Education*

There has long been a close relationship between LIS and museum studies. Many museum employees, including museum librarians and registrars, have LIS backgrounds (Reed & Sledge, 1988), and museum professionals, along with librarians and archivists, have a great deal of experience solving information management problems (MacDonald, 1991). There is a history of teaching courses about archives, museums, and other memory institutions in LIS programs (Cox

& Larsen, 2008), and LIS students are frequently interested in pursuing careers in museums, archives, rare books, and special collections (Marty, 2005).

Recent research has demonstrated the value of LIS skills and expertise for museum professionals (Marty, 2007b), and chronicled the rise of a new type of museum professional, one whose interests lie in managing museum information resources (Hamma, 2004; cf. Hermann, 1997). These individuals need to be capable of setting information policy, administering content management systems, implementing metadata standards, etc., and museum administrators have become increasingly concerned over their ability to find employees who understand the unique information environment of the modern museum (Marty, 2007a).

As museum professionals look forward to new ways of interacting with information resources and technologies, there is an unprecedented opportunity to promote integration and cross-disciplinary collaboration between LIS and museum studies, in education and practice. With museums interested in hiring LIS graduates (museum job postings frequently list a master's in LIS as "highly desired"), and with LIS students interested in pursuing museum careers, it makes sense that the information needs of museums be included in LIS curricula.

### *Preparing LIS Students for Cultural Heritage Careers*

Teaching LIS students about museum informatics is only the first step; LIS educators today are focused on preparing their students to meet information needs in many different organizations. While there has always been a strong relationship between libraries, archives, and museums (Given & McTavish, 2010), the ongoing digital convergence of cultural heritage institutions has prompted educators and practitioners to re-examine how they can combine forces to better serve their users, many of whom do not distinguish between different institutions or the information resources they manage (Marty, 2008). Recent years have seen a renewed focus on integrating LIS, archival studies, and museum studies education (Ray, 2009; Trant, 2009).

These efforts have prompted LIS programs (e.g. Illinois, FSU, UCLA, etc.) to offer courses on information management in museums, and museum studies programs (e.g. Harvard, Johns Hopkins, JFK University, etc.) to offer courses on museums and information technology. Schools such as the Faculty of Information at the University of Toronto have experimented with offering master's degrees in LIS and museum studies as part of the same program, and there are now several universities (e.g. the Universities of Michigan, Washington, and British Columbia) where it is possible to seek advanced degrees in LIS, archival studies, and museum studies from the same university, even if the degrees are offered by different departments.

Such initiatives are rare, however, and even at universities where it is possible to pursue degrees in LIS, archival studies, and museum studies simultaneously, there are very few students (if any) actually doing it. In an attempt to break down pre-existing academic silos, new programs have been developed with the specific aim of preparing students to transcend the boundaries between cultural heritage organizations. The cultural heritage informatics curriculum projects at Simmons College and at the University of South Carolina, and the Digital Curation Curriculum project at the University of North Carolina at Chapel Hill, provide excellent examples of such initiatives.

Given the strong interest from students and faculty in developing programs in cultural heritage informatics, there is a need for studies that improve our understanding of how courses such as museum informatics have been integrated into LIS curricula. The results of such studies will help determine the future education of information professionals who wish to work across the boundaries of libraries, archives, and museums.

## **Methods**

This study examines how the teaching of museum informatics at two LIS programs—the University of Illinois and Florida State University—has evolved in response to student evaluation data and empirical research documenting the changing nature of information work in museums. Through a content analysis of course syllabi, student evaluations, and research publications, we identified the factors that led to curricular changes at these universities from 2001 to 2010. As opposed to providing a single snapshot of the course as it existed at a given point in time, this approach allows us to document how these programs have evolved over the years, and provide a detailed analysis of the factors that influenced these changes.

We began our analysis by gathering all available material for each iteration of the class, a total of 15 unique course offerings across two universities from 2001 to 2010. Available data included syllabi, readings, assignments, lectures, and other notes documenting the development and dissemination of course materials. Our analysis followed an iterative design approach, where each stage in the course's evolution was treated as an independent instance and compared with those iterations that preceded and followed it. Course syllabi were cross-referenced with course evaluation data (including closed and open-ended student comments) and with contemporaneous developments in the museum informatics research literature, allowing us to tease apart the influences of different forces on the evolution of the programs.

When analyzing course syllabi and content, we coded for changes in educational platforms (instructional delivery methods, course management systems, social computing tools, etc.), the types and numbers of topics covered (virtual museums, digital collections, metadata, etc.), assigned readings (textbooks, journal articles, conference papers, etc.), and class assignments (papers, projects, labs, etc.). Our goal was to document the stages of evolution and identify the critical milestones that occurred during this ten year process. In coding the data, we focused on such aspects as the choice of topics and their relationship to LIS education, instructional delivery methods and their relationship to educational platforms (e.g., face-to-face vs. online learning), and the nature and types of the assignments completed by the students.

When examining course evaluation data, we used closed-ended responses to determine student satisfaction with course content, and open-ended comments to determine whether the course covered topics of value to LIS students. We specifically coded for student perceptions about the importance of offering museum informatics in an LIS program, the value of the assignments for meeting the students' learning objectives, and the relevance of course concepts to student needs and interests. These data were limited by the fact that students had little knowledge of previous iterations of the class, and therefore could react only to a given semester's syllabus; aggregated over time, however, student evaluations provided insight into whether the course was evolving in a direction suitable for meeting student needs.

Finally, we used reading lists and personal bibliographies to track the influence of published research on the course's evolution, looking at how topics and assignments shifted along with changing ideas about museum informatics and the changing needs of museum information professionals. We assessed how many and what type of new readings were added to the syllabus each year, what older readings were removed, and how those modifications reflected changing notions about the topics to be covered in a course on museum informatics. We also looked to see what older articles were kept on the reading list as examples of seminal papers for historical purposes. In coding these changes, we focused on how the course content reflected the evolving interests of the authors, the students, and the profession as a whole.

The results of this analysis allow us to isolate and discuss key milestones in the integration of museum informatics in the LIS curriculum, identifying lessons learned at each stage in the evolution of the course. By examining these milestones, we can explore the value of museum informatics for LIS faculty and students, the factors that influenced the evolution of the course across the two universities, and the reasons for offering museum informatics in LIS programs.

## **Findings**

The LIS programs at the University of Illinois and Florida State University have offered courses on museum informatics since 2001 and 2003 respectively, based on a course initially developed at Illinois in 2000/2001, and moved to FSU in 2002/2003. Figure 1 illustrates the evolution and divergence of the course over the past decade, indicating when each iteration was taught at both universities; significant milestones in the evolution of the class are marked on the figure and discussed in detail below. These findings provide a capsule summary for each iteration, explaining what changes were made from iteration to iteration, how those changes were influenced by research publications and course evaluations, and the relative effectiveness of those changes for instructors and students. For additional details about the course content, including syllabi, assignments, and reading lists, please see <http://marty.ci.fsu.edu/lis5590/> and <https://apps.lis.illinois.edu/wiki/display/sp09lis490mu/>.

### *Development at the University of Illinois*

When the Graduate School of Library and Information Science (GSLIS) at the University of Illinois decided to offer a special topics course on museum informatics in Fall 2001, it advertised the class as a “brand-new course in a brand-new field of study.” Designed to be discussion-based, hands-on, and very interactive, it was positioned as being focused on museums and information technology. The course announcement invited students to “find out what happens when new technologies are applied in the museum environment!”

The Fall 2001 iteration of the class used *The Wired Museum* (Jones-Garmil, 1997) as a textbook, and met three days a week face-to-face (twice in a classroom, and once in a computer lab). Assignments included weekly labs on different museum technologies and three papers—two on assigned topics, and one on a topic chosen by the student. The course was designed as an overview, with each week covering a different topic such as virtual museums, digital collections, metadata, digital imaging, and educational outreach (topics were based on the Marty, Rayward,

and Twidale (2003) *Annual Review of Information Science and Technology (ARIST)* chapter on museum informatics, see below). Course evaluations indicated that students appreciated the opportunity to study museums as a part of their LIS curriculum.

### *Evolution at Florida State University*

Museum informatics was offered for the first time at FSU in Spring 2003. The class met twice a week, face-to-face, alternating between classroom discussions and hands-on computer labs. While the same topics were covered as in Fall 2001, the labs were updated to include recent examples of online technologies, and the readings were greatly expanded. This iteration used two textbooks (adding *Digital Collections* (Keene, 1998)), and tripled the number of assigned readings—a frequent complaint in the course evaluations was that there were too many readings!

The next iteration, Spring 2004, was the first time museum informatics was taught online, with asynchronous discussions using online forums, and weekly synchronous sessions in text chat. Modifications were made to the labs so that they could be completed by students at a distance, and the number of assigned readings was dramatically reduced in response to student comments from the previous year. The covered topics remained the same, but were reordered slightly. The three original papers were replaced by six papers on topics such as Surrogates of Physical Objects, the Virtual and the Real, and Standards for Data Sharing. A complex point system was introduced, where papers were worth up to 10, 20, or 30 points, based on the amount of material covered. Students had to write 60 points during the semester and could choose any combination of papers and points—two 30-point papers, six 10-point papers, three 20-point papers, etc.

The Spring 2005 iteration was the first time museum informatics was taught with a permanent course number (it was previously taught as special topics course). Besides minor updates to the readings and labs, there were almost no changes to the syllabus, although the written paper assignments were reduced, in response to student comments, from 60 to 50 points worth of papers. These flexible point value papers were confusing to students (and to the instructor), and this was the last semester in which they were assigned.

The Spring 2006 iteration witnessed a complete reorganization of the course's content, based on the conceptual framework of a new edited book about museum informatics (Marty & Jones, 2008) being prepared by the instructor at FSU, see below for details. The course outline was reformulated to follow the book's sections on information resources, information management, information interactions, information behavior, and information collaborations in museums; as the book was still in development, students read draft copies of the book's chapters in class. The complicated paper assignments were dropped in favor of a simple two-paper system (mid-term and final) with students choosing from three paper topics for each. Labs continued to be updated to reflect changing technologies, and were submitted directly to the instructor, with no opportunity for students to share lessons learned.

The Spring 2007 iteration was taught with almost no changes from the previous year (the biggest change to the assignments was that the choices of mid-term and final paper topics dropped from three to two). The Marty and Jones book was complete but not yet published, and students continued to use a draft copy of the manuscript in class; the Spring 2008 iteration was the first to

be taught with the edited book in print. Between Spring 2007 and 2008, there were no changes to the topics covered, or the papers, but in an attempt to increase participation on the discussion boards the 14 labs were replaced with discussion questions; students were required to answer at least four questions over the course of the term, posting their responses online.

The Fall 2008 iteration witnessed a complete reorganization of the course, including its topics, assignments, and philosophy. Influenced by the Cultural Heritage Information Professionals workshop (see below), the class was restructured into four modules—Collections Management, Digital Exhibits, Social Computing, and Virtual Worlds—where students worked in tandem on individual projects using different platforms, such as OpenCollection, Pachyderm, and SecondLife. This approach allowed students to see each other's work and share lessons learned from the assignments, and helped them see how these online platforms could be applied across libraries, archives, and museums. All previous assignments (papers, labs, and discussion questions) were dropped in favor of these four projects. Despite the years spent developing the museum informatics edited book, the book was dropped as a guiding force for the class; instead, each module had a list of recommended readings, including some of the book's chapters.

The Fall 2009 iteration (along with the planned Fall 2010 iteration) followed the Fall 2008 iteration almost exactly. While readings were updated and assignments tweaked (e.g. replacing OpenCollection with Omeka), course evaluations showed that the students found the new project-based format very compelling, and had no desire to move back to a less hands-on format.

### *Evolution at the University of Illinois*

After the original developer of the course left Illinois for FSU in 2002, museum informatics remained on the course catalog as a special topics course but was not taught again until 2006. The resurrection of the course (with a new instructor) was a direct result of repeated requests from LIS students, some of whom chose to attend Illinois specifically because of its existence. While the revived course was strongly influenced by the original course and its evolution at FSU, the new version had a distinct project-based focus, with students assigned to investigate and develop a prototype museum technology application.

The Spring 2006 iteration of the course was taught by two instructors, and included discussions of interdisciplinary topics, including natural history informatics and cultural informatics. A class wiki was used to involve students in discovering relevant readings and collaboratively building a course bibliography. The class met once a week for three hours, which allowed for substantial hands-on investigations of existing applications and resources in the computer lab. For example, in one three-hour session, students can be introduced to museum websites, investigate specific websites in small groups, and conduct simple usability tests where individual students take turns being the "test user" on a website investigated by another group. Activities can flow seamlessly from one to the next, and serve as an introduction to a homework assignment where students assess the usability of museum websites and report their findings the following week.

The Spring 2007 iteration reverted to having one instructor, and focused primarily on cultural, art, and science museums. Selected chapters from the museum informatics edited book were used for the first time, but student-led discovery of peer-reviewed conference papers remained an

important part of the class. Promotional materials emphasized the course's open and multidisciplinary nature, and increased attention was paid to scaffolding the process of working on the final project (as suggested in the previous year's course evaluations). Prototyping and iterative design are still relatively uncommon activities in LIS courses, and many students were unfamiliar with the process of designing an application, preparing a demonstration, and reporting on the final product and its design process. Students needed reassurance that the class was indeed for them, and techniques such as paper prototyping were particularly effective in developing confidence and competence with applications development and design skills.

The Spring 2008 iteration followed the previous year's format for the most part, although topics continue to evolve along with the interests of the instructor. Increased emphasis was placed on supporting design activities, adding homework to provide inspiration for project topics earlier in the semester. Student diversity remained high, with advanced undergraduates from GSLIS's information technology studies minor enrolling along with undergraduate and graduate students from computer science, management, history, LIS, Art Education, and Fine and Applied Arts, each bringing substantial domain expertise and practical museum experience, invaluable assets in multidisciplinary design teams.

The Spring 2009 iteration witnessed even more emphasis on supporting project work, as well as increased use of readings from conference proceedings, particularly the online proceedings of the Museums and the Web conference (<http://www.archimuse.com/mw/>). These resources provided students with an excellent source for the latest innovations of researchers and practitioners working in or closely affiliated with museums. Students used these readings as inspiration for design ideas, including critiquing earlier published prototypes, and considering how recent technological developments create new opportunities by building on previous lessons learned.

In Spring 2010, the course was taught online at Illinois for the first time. To maintain as much of the hands-on, design lab ethos as possible, project activities were formalized into specific assignments, including analyzing and discussing particular online resources such as informational websites, collections databases, and educational games. This approach required increased planning on the part of the instructor, and made it slightly more difficult to engage in the spontaneity of coming across an innovative application in the morning and deciding to ask students to try it out in that afternoon's class in the computer lab. The GSLIS-wide requirement that online students come to campus for an intensive one-day session halfway through the semester was especially valuable for solving these problems, enabling hands-on teaching of rapid techniques for usability testing, systems analysis, and paper prototyping.

[INSERT FIGURE 1 HERE]

*Figure 1: Timeline of Course Iterations and Key Milestones*

## **Discussion**

Several important milestones emerged from these findings that significantly influenced the evolution of the course—its topics, assignments, and overall philosophy. An examination of these milestones allows us to reflect on the decisions that were made to modify the course in response to externally or internally imposed circumstances, including new research publications,



the shift to an online teaching environment, and the authors' own work defining the field of museum informatics. The following discussion explores lessons learned for LIS faculty and students from these key milestones in the evolutionary process.

### *Integrating Museum Informatics into the LIS Curriculum*

The initial course development for museum informatics was heavily focused on its successful integration into the LIS curriculum: was this course of value to LIS students? why would they want to take it? what purpose would it serve? how do the concepts of museum informatics fit with traditional topics covered in an LIS program? To answer these questions, course content focused on how key issues in LIS theory and practice were implemented in museums: how do museums organize their information resources? how do museums handle information storage and retrieval? what metadata systems do museums use?

The driving force behind this approach was the writing of an ARIST chapter on museum informatics (Marty, Rayward, & Twidale, 2003). Decisions about concepts to be covered in class were directly connected to decisions about topics to be covered in the review chapter, and vice versa—a process that underscores how the research literature can influence course development, especially when the instructor is also the researcher. The development of museum informatics as a course of study paralleled attempts to define museum informatics as an area of research, with both efforts focusing on distinguishing museum informatics as a unique component within LIS. This approach offered LIS students the chance to consider how museums differed from or were similar to libraries, but offered little opportunity for students to look beyond the existing academic silos of libraries, archives, and museums.

Lessons learned from this milestone reflect the difficulties of integrating new topics into LIS education, and the importance of overcoming the hurdles that arise when assessing the value of a new field of study for LIS faculty and students. Involving students in discussions to define the field can influence whether faculty will be successful when bringing new ideas into curricula. The use of wikis at Illinois to encourage ongoing conversations is a good example of this principle in practice, especially when students are asked to contribute readings to the course wiki as a part of class discussions, thereby involving students in the co-creation of course material. Over time, these discussions help students and faculty gain a clearer picture of how museum informatics fits into a larger philosophy of LIS education that transcends libraries, archives, museums, and other cultural heritage organizations.

### *Migration from Face-to-face to Online Instruction*

Moving a course that was originally developed for and taught in face-to-face classrooms to an entirely online teaching environment involves using technology creatively to meet course objectives. At FSU, the shift to a fully online teaching platform in 2004 necessitated a new approach to the hands-on work that had previously been accomplished in computer labs under instructor supervision; Illinois did not move the course online until 2010, and even with the advances in technology in the interim, innovative pedagogy was still required.

Attempts to replicate the computer lab environment online by asking students to write about their experiences using different museum systems or technologies each week were ultimately unsuccessful, primarily because there was little opportunity for collaboration among students. It was not until Fall 2008, when the course was restructured around four topical modules (each ideally suited for a collaborative, online learning environment), that the development of truly effective online projects was successful (see below for details). Each topic centered around a suite of collaborative systems and online tools, supported by recommended readings and discussion topics. Students worked together to share ideas and lessons learned online, spending three to four weeks on each topic, but with each student individually responsible for completing the assigned projects.

At FSU, this approach succeeded in leveraging the online environment by identifying tools that encouraged collaborative learning while simultaneously supporting individual work. As of Fall 2008, students start the course by contributing their object records to a common database (e.g. Omeka), helping each other learn how to apply metadata standards effectively. They finish the course with their avatars working side by side in Second Life, learning from each other how to develop 3D exhibits, and in the process, what constitutes an effective multi-user virtual environment. The successful migration of this class online underscores the importance of selecting e-learning tools that promote collaborative learning and individual accomplishments.

At Illinois, the instructor wished to take the ethos of a design studio, where students were encouraged—indeed required—to comment on and make suggestions about each other’s projects, and translate it to an online community. This required more attention to interactive and social processes than in a face-to-face computer lab, where it can be easier to innovate quickly, trying out an activity in class, monitoring its progress, and deploying recovery strategies if students are not benefitting as much as was hoped. When things go wrong technologically, it can be harder to offer help and propose workarounds, and the chances for misunderstanding increase. With care, however, it is possible to collaboratively explore design issues remotely and online.

Lessons learned from this milestone center on the interesting aspects of migrating courses with hands-on components or class projects online. This requires replicating the collaborative atmosphere of a computer lab, with students working side-by-side, in pairs or small groups. Doing this successfully means identifying systems that support hands-on projects in online environments, and finding ways to encourage individual learning through collaborative efforts.

### *Museum Informatics Edited Book*

Over the years, the assigned readings were regularly updated to reflect new research topics of interest to museum information professionals (as portrayed in annual conference proceedings, for instance). Concepts covered in class were also influenced by changing ideas on the part of the instructors about which readings were most significant and which topics were most useful in defining the field. In this way, the course content evolved along with the pedagogy to reflect changing ideas in research and practice. Articles looking at online exhibit design and museum web-based education, for example, were replaced by papers covering metadata sharing across libraries, archives and museums and cross-platform content design for mobile devices, while more museum-specific topics such as digital imaging and interactive exhibits were replaced by

broader, more encompassing concepts such as information behavior and social computing (see below for more on this transition).

It is perhaps unsurprising, then, that the development of a new edited book on museum informatics (Marty & Jones, 2008) provided a valuable opportunity to shape the focus of the course and its value to LIS students. Much as the 2003 ARIST chapter drove the original organization of the course, planning a new book on museum informatics offered the chance to reconceptualize the field and its presentation as a part of the LIS curriculum. The selection of authors, chapters, and sections for the book reflected new notions about what topics should be covered in the class, and the order in which those topics should be taught. New thoughts about museum informatics—its meaning and purpose—arose from class discussions and informed the development of the book, which then in turn informed the presentation of concepts and topics covered in future iterations of the course. By 2006, the book’s development was nearly complete, and its conceptual framework had prompted a complete restructuring of the course syllabus at FSU, underscoring once again how research informs teaching, and vice versa.

At Illinois, the edited book was used primarily to provide a theoretical perspective that supplemented the more design-oriented readings students were assigned in class. The museum informatics book offered students manageable and carefully chosen selections that provided an overview of the subject area; over time, however, such readings risk becoming progressively less relevant as scholarship advances and research interests change. The combination of an edited book and online conference proceedings demonstrates the value and complementary nature of having highly focused, carefully selected texts supplemented by constantly changing, and highly topical online readings.

Lessons learned from this milestone speak to the need for courses to evolve in response to research developments and teaching philosophies. While the edited book had a profound effect on the presentation of course materials at FSU initially, new ideas about the role of museum informatics in the LIS curriculum meant that the edited book would no longer guide the structure of the course after Fall 2008. It is intriguing to reflect on how quickly this book, which was specifically developed to meet educational needs for students of museum informatics, became—in a sense—obsolete, as the course’s focus shifted from museums to cultural heritage institutions.

### *Learning Concepts through Hands-on Projects*

When the museum informatics course was first developed in 2001, it was almost exclusively a research-based reading and writing course; the only exceptions were the lab assignments, which gave students a small amount of hands-on experience with museum technologies. There was nothing that could be considered a “project,” in the sense that it gave students the opportunity to try their hand building a piece of museum technology similar to what they might encounter while working as museum information professionals.

While the value of shifting from theory to practice is well known in LIS education, it has been informative to follow the development of this concept in museum informatics. The Spring 2006 iteration at Illinois was the first to implement a course project to complement weekly readings and individual homework assignments. When projects were introduced at FSU in 2008 they were

used to completely restructure the course into four modules, each with its own project. Each approach offers trade-offs: a semester long project can be more substantial than four shorter projects, but it also means that students cover fewer topics. Either way, supporting project-based learning can be time-consuming for students and instructors, and this milestone was strongly influenced by the availability of new open source tools that were easy to use but offered sophisticated features that encouraged students to explore new ideas in depth.

When the course was first developed, hands-on class projects would most likely have been restricted to proprietary systems that were difficult to install and did not lend themselves to the more general concepts to be covered in a survey course (especially one taught online, see above). Since then, the development of open source tools that are easy to install and can be used to cover a wide range of concepts helped move the course in the direction of learning by doing. One important consequence of these developments was that students gained more familiarity with unfamiliar technologies. Students who may have been initially concerned about having to learn new information systems were encouraged by how collaborative content management systems (such as Omeka) helped them learn design concepts and develop complicated applications with little overhead or previous programming experience necessary.

Early projects at Illinois, for example, were often simple websites used to prototype online museum exhibits, museum kiosk displays, or smart phone interfaces. As new applications became more powerful, robust, and easy to use, more polished prototypes and more sophisticated projects became possible. Free blogging software such as Wordpress, for example, helped students develop powerful multimedia exhibits, while easy to use web services such as Google Maps, IBM's Many Eyes, and other data visualization resources allowed for innovative explorations of how museum information can be portrayed to different audiences. Only a few years ago, such systems would have been available only to expert programmers with considerable skill and substantial resources, but today they can be incorporated into class projects by LIS students without any previous design experience.

Lessons learned from this milestone center on the value of developing hands-on projects using open source tools that help students realize what they—and cultural heritage institutions—can do with limited budgets and technical expertise. Educators and practitioners have reached a watershed moment where the tools are becoming more sophisticated but also easier to use, where the threshold for implementing technology is decreasing while the reward for getting over that threshold is increasing. This is not only an encouraging message for those institutions in need of technical help; it is also an important message for our students. Experimenting with hands-on projects helps students see how they can meet needs across libraries, archives, and museums, in education and practice, in the classroom and in cultural heritage organizations.

### *Transcending Libraries, Archives, and Museums in LIS Education*

Over the years, the focus of the course, as conceived and taught at both universities, slowly shifted from examining museums as one type of information organization to helping students acquire the knowledge they need to work across all types of cultural heritage institutions. The most recent iterations of the course syllabus represent the culmination of a decade's worth of incremental changes to topics and concepts, with each iteration slowly moving faculty and

students away from museums and toward the broad sweep of cultural heritage organizations. This shift can be seen in the evolution of the course content as readings incorporated such topics as collaboration among libraries, archives and museums (Zorich, Waibel, & Erway, 2008).

This process was directly influenced by the discussions that took place at the Cultural Heritage Information Professionals (CHIPs) workshop in Sarasota, FL in April 2008 (Marty, 2008). The opportunity to examine connections between education and practice in libraries, archives, and museums at a national level helped stimulate new ideas for what topics a course on museum informatics could cover. The workshop's outcomes, for instance, helped reinforce the idea that the development of technologies to support collaboration between cultural heritage organizations in practice can affect the teaching of concepts common to libraries, archives, and museums in education—a realization that not only influences the way a course is taught, but also addresses how that course will continue to evolve in the future, as new technologies are developed and implemented in the curriculum. Students may begin a class interested in learning about specific systems developed by museums for museums, but it is equally important that they learn that those systems have implications that go beyond museums, and how existing, non-museum-specific systems (e.g., image sharing sites such as Flickr) can encourage collaboration among libraries, and archives, and museums (e.g., Kalfatovic et al., 2008).

Lessons learned from this milestone reinforce the importance of emphasizing the shared challenges of cultural heritage institutions and the shared educational goals of LIS, museum studies, and archival studies programs when developing new curricula. The evolution of museum informatics, as presented in this paper, is not just about the evolution of one class, but rather the evolution of a teaching philosophy—one that is slowly moving LIS programs toward a broader conception of cultural heritage informatics. Just as students can learn more from working with technologies that are not limited to a single type of information organization, a course on museum informatics can speak to concepts that transcend divisions between libraries, archives, and museums, and illustrate the importance of integrating the larger-scale perspective of cultural heritage institutions into LIS education.

## **Conclusions**

Our ultimate realization, after ten years of teaching museum informatics to hundreds of LIS students, is that the class not about museums. Instead, museums serve as a conduit for larger lessons that transcend cultural heritage organizations: they can familiarize students with advanced information technologies; they can encourage design thinking and help students become more comfortable using new technologies to meet information needs; they can provide a venue through which students learn how to work as intermediaries on multidisciplinary teams conducting interface design, usability analysis, and project development; and they can emphasize the commonalities of education and practice in libraries, archives, and museums.

Over the years, our conception of the course's value and significance for LIS students has evolved along with the course itself. Creating and modifying a course is an act of design, and the evolution of a course syllabus is a matter of acknowledging and dealing with trade-offs, where deciding what to remove is just as important as deciding what to include. As part of this process, we transitioned from the integration of museum informatics as distinct component in the LIS

curriculum to the realization that LIS education writ large should increasingly focus on teaching across libraries, archives, and museums. As LIS educators, it is fascinating to witness how the evolution of museum informatics paralleled and prefigured the current national trends focusing on the shared challenges of cultural heritage institutions, and the common educational goals of LIS, museum studies, and archival studies.

Just as the best way to help LIS students understand the commonalities between libraries is not to have separate courses on academic, public, and corporate libraries, the best way to help LIS students understand the commonalities between cultural heritage organizations is not to have separate courses on museums, archives, and rare book rooms. It is critically important that the concepts of digital convergence be taught across the LIS curriculum, and it is intriguing that the philosophical shift driving this focus on transcending cultural heritage organizations has been made possible in part by the evolving technologies now available for use in the classroom. As new technologies prompt the digital convergence of libraries, archives, and museums in practice, so too do they help us meet the information needs of cultural heritage organizations as an integral part of LIS education.

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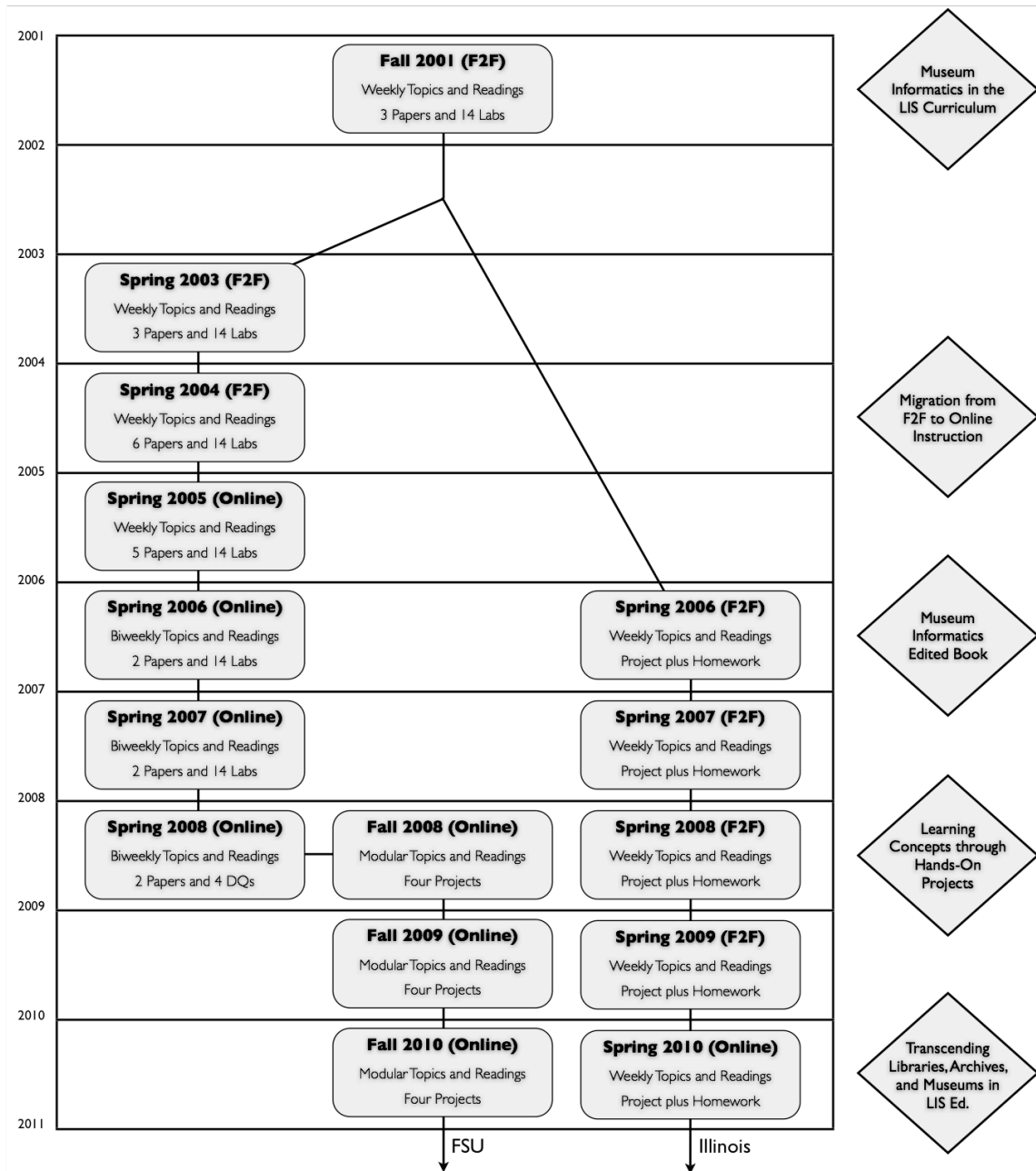


Figure 1: Timeline of Course Iterations and Key Milestones