A Proof-of-Concept Repository for Learning Objects: Supporting the Reuse and Repurposing of Redesigned Courses and Their Content

A Proposal to

The Texas Higher Education Coordinating Board's

Request for Proposal for the Texas Course Redesign Project: Phase II Fast Track

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1. Introduction

This proposal from the Texas Center for Digital Knowledge (TxCDK) at the University of North Texas (UNT) to the Texas Higher Education Coordinating Board (THECB) responds to its Request for Proposal for the Texas Course Redesign Project: Phase II Fast Track. TxCDK proposes to develop a proof-of-concept application of a learning object repository that will demonstrate how THECB can leverage the courses being developed through the Course Redesign Project by making the course content available for reuse and repurposing. To demonstrate this, the proposed project will work with a THECB-funded redesigned course being created at UNT, *U.S. History I*. This course is being developed under the direction of Dr. Kelly McMichael and Dr. Philip Turner, who will serve as Co-Principal Investigators for the proposed project.

When completed, the *U.S. History I* courseware will consist of four **units**, each of which contains multiple **lessons**, which in turn include multiple **topics**. The course also includes ten **case studies** that can be used in conjunction with lessons and topics or outside of the redesigned course. The digital objects that comprise the course content include:

- Text
- Images
- Audio
- Video
- Flash animations
- Multiple-choice quizzes

The courseware's components can be reused and repurposed in multiple instructional delivery modes including online, blended (hybrid), and face-to-face.

The proposed proof-of-concept learning object repository project will develop procedures for decomposing the course into logical and physical learning objects to store in the repository; identify and implement appropriate metadata to describe and manage the resulting learning objects; demonstrate and document workflows associated with submission into the repository; provide search and browse capabilities to discover and access the objects stored in the repository; test and assess repository functionality; and identify future opportunities for system features that will support both the reuse and repurposing of course content.

2. Statement of the Problem and the Opportunities

THECB's Course Redesign Project is intended to support the development of courseware that will be available to faculty in the State of Texas for reuse in the courses they teach. Once these courses have been completed, several problems confront THECB in leveraging its investment in the redesigned courses.

The first problem addresses how the courseware will be stored and made available for discovery and subsequent effective access and use. We propose that a learning object repository application can address this initial problem. To make these courses visible and available to potential users, there is a need to provide a storage environment that enables potential users to search for, locate, and obtain the courseware. Digital repositories are becoming key infrastructure components for 21st Century universities, and repositories for handling learning objects are under development and being implemented.

The second problem encompasses the potential users and uses of the courseware. We suggest that there may be at least three levels of use of the courseware to consider. The first level of use is a turnkey level, where a THECB redesigned course is utilized virtually intact. Supporting this level of use requires storage of the entire courseware in ways that allow potential users to preview the course and also facilitate the import of the courseware into a learning management system.

Anticipating or expecting the reuse an entire course, where the entire course can be considered a learning object, may be a reasonable assumption, but recent literature in the area of instructional design and learning objects have investigated how decisions on the granularity of learning objects can affect reuse and future instructional value. Granularity addresses, in general, the extent of a learning object (e.g., an entire course, a lesson within a course, a topic within a lesson, etc.) and is discussed below in more detail. To address the issue of future use, we believe it is important to differentiate two key concepts about how potential users might utilize existing courseware developed as part of THECB's Course Redesign Project. For purposes of this proposal, we use the following two concepts:

- **Reusing:** Acquiring a learning object (at whatever level of granularity) and using it as it currently exists without any modification and additional effort by the new user of the object.
- **Repurposing:** Acquiring one or more learning object and using them as a basis for a new learning object either through modification of the original, recombination of multiple learning objects, or any other actions that are carried out on the learning objects to serve a similar or new purpose compared to the intentions of the original creator of the learning objects.

Reuse and repurposing of course content are, respectively, the second and third levels of use. We believe that there may be significant demand to reuse and repurpose discrete learning objects that comprise a complete course. Although the turnkey level will be addressed, the second and third levels of use are the primary foci of the proposed proof-of-concept learning object repository. THECB does not need to view these levels of use as mutually exclusive. One of the purposes of the proposed project is to demonstrate that courseware can be placed in the repository to support both reuse and repurposing of course content. A critical decision, however, is determining the level of granularity at which the courseware will be decomposed and stored in the repository. We believe that repurposing of courseware may provide as much if not more value than simply reusing the existing courseware. For example, specific content in the *U.S. History I* course may have potential value in a geography or anthropology course. To support repurposing of the course content means that the learning objects need to be discrete enough to enable recombination or modification to work with instructional materials in other courses. The Project Design and Plan section below describes how *U.S. History I* course content will be decomposed at three levels of granularity for storage in the repository.

Granularity, in the context of this proposal, refers to the logical and/or physical extent of a learning object. The level of granularity is a continuum from very low or coarse (e.g., the entire course is the learning object) to very high or fine (e.g., an individual image used in a lecture is the learning object). South and Monson (2000) argue that learning objects with low granularity have the highest potential for reuse and are more cost effective, but they also state that instructional value increases with granularity. Wiley (2002) suggests that a large object view of learning objects (i.e., courses or even the entire curriculum is considered a learning object) diminishes the possibility of learning object reuse. Harvey (2005) states: "The smaller [higher] the granularity, and the finer the objective of the LO [learning object] is designed to achieve, the greater the LO's reusability, for the object will be applicable across a greater number of learning contexts and adaptable to different learner characteristics.

Learning object repositories are software applications that provide flexibility in storing objects at whatever level of granularity is deemed most appropriate. Determination of the appropriate granularity must be based on an understanding of the potential users of the learning objects, their practices, and needs. The proof-of-concept repository proposed here can demonstrate how a THECB redesigned course can be decomposed into several levels of granularity, and that metadata (i.e., descriptive and other information associated with a learning object) can support finding, identifying, selecting, and acquiring the learning objects (at usable levels of granularity). A metadata-driven learning object repository will also support the management of the learning objects over time.

To support potential users of the course content, the learning object repository must store not only the learning objects, but also store descriptions of the stored objects that can help users find, identify, select, and acquire relevant and useful learning objects. The problem of describing information objects has been an area of theory and practice for library and information professionals, and the problem is addressed through the use of metadata. In the context of the proposed repository, the

metadata needs to be appropriate to learning objects. The IEEE Learning Objects Metadata (LOM) scheme (1484.12.1-2002 IEEE Standard for Learning Object Metadata) provides a rich set of elements to describe and manage learning objects. The IMS Global Learning Consortium **<http://www.imsglobal.org/>** has adopted this standard and provides additional specifications and best practices for use of the IEEE LOM. There are other candidate metadata schemes that could be considered, including the Dublin Core Metadata Initiative and its Dublin Core Metadata Element Set (DCMES). Both DCMES and IEEE LOM offer useful approaches for the repository's metadata, and this project will select an appropriate set of metadata from one or more of the relevant metadata schema. The selection will be made in collaboration with Dr. McMichael, an expert in American History, and with input from the History Master's and Ph.D. students working with Dr. McMichael on the *U.S. History I* course, to ensure that the selected metadata provide a foundation for adequate and appropriate description of the learning objects.

Finally, repositories are intended to store digital resources. To reuse or repurpose course content **requires the packaging of learning objects according to standards to easily import the course content into learning management systems.** The IMS Global Learning Consortium has defined a content packaging specification **<http://www.imsglobal.org/content/packaging/cpv1p1p3/imscp_infov1p1p3.html>** and also best practices related to use of these specifications. Several learning management systems support the packaging of course content into IMS standard content packages for exchange and reuse. The proof-of-concept repository will store logical components of content from the *U.S. History I* (e.g., a lesson, a topic, etc.) in IMS packages to demonstrate how users can acquire decomposed course content from the repository and import the package into a learning management system that supports the IMS specifications.

In summary, the proposed project will address various problems related to the reuse and repurposing of course content. Further, it will demonstrate the opportunities for reuse and repurposing by decomposing an entire course into usable components, store them in a digital repository, describe them through metadata, provide search and browse capabilities for potential users to discover and acquire the learning objects, and enable those users to download course content formatted in IMS standards conformant content packages for import into a learning management system.

3. Project Goal and Objectives

The proposed project's goal is to demonstrate a proof-of-concept learning object repository's capability to leverage redesigned course content for reuse and repurposing. The project has the following objectives:

1. Implement an open source software platform for a learning object repository application.
2. Identify and implement an appropriate metadata scheme to describe and manage the learning objects in the repository.
3. Enable search and browse capabilities in the repository to support end user tasks of finding, identifying, selecting, and accessing the learning objects.
4. Decompose a THECB redesigned course in at least three levels of granularity and store the decomposed course content in the learning object repository
5. Provide course content in packages that conform to the IMS content packing standard for import into learning management systems that support the IMS standard.
6. Develop methods and procedures for assessing the functionality of the repository based on requirements and use scenarios
7. Identify and describe a set of next steps to deploy an operational THECB learning object repository, including but not limited to: planning and design, user studies to inform the design, and assessment procedures to validate system functionality against user requirements, behaviors, etc.

The focus of the proposed project is to demonstrate the functionality of a learning object repository to support reuse and repurposing of course content. The timeframe for this project does not allow research into user requirements, user behaviors, and user testing of the proof-of-concept system developed during the project. If, based on the results of this project, THECB determines to move forward towards an operational learning object repository, systematic user research is critically important to ensure that the

operational system responds to the needs and behaviors of potential users. The proof-of-concept repository developed by the proposed project can serve as a useful tool for conducting aspects of the user research.

4. Project Design and Plan

The proposed project consists of several major work areas, each of which has one or more key activities that are aligned with project objectives. The following provides descriptions of each of the work areas and what they encompass.

Work Area A: Project Management

The success of any application development project is active management of the project. Managing for success includes the creation of a detailed project plan to guide all project work. The detailed project plan will be developed by the Principal and Co-Principal Investigators to ensure all objectives of the project are addressed. The functional and technical requirements for the repository will also be a focal activity in this work area. These requirements will be commensurate with the goals and objectives for this proof-of concept repository. A production-level learning object repository may have other requirements, but the purpose of this project is to demonstrate to THECB how a learning object repository can be used to leverage the content developed in its Course Redesign Project.

Key Activities

- Develop a detailed project plan that identifies all work areas' activities, deliverables, timeline, and staffing
- Identify and document functional and technical requirements for the proof-of-concept learning object repository.

Work Area B: Installing and Configuring the Repository Application

For the proof-of-concept repository, the project team will use DSpace, an open source software repository platform developed by MIT Libraries and Hewlett-Packard Labs **<http://www.dpsace.org>**. TxCDK has used DSpace in previous repository projects (see Appendix A for Dr. Moen's curriculum vitae and list of those projects). Based on our previous experience, DSpace provides the necessary functionality for the proof-of-concept repository. DSpace will be installed on a UNT server under the administrative control of project staff. DSpace configuration includes a variety of tasks including: customizing the look and feel of the application; incorporating appropriate metadata elements required for the learning objects; setting up search and browse capabilities; modifying the submission process to enable easy submission of learning objects into the repository and creation of the metadata associated with each of the objects.

Key Activities:

- Install and configure DSpace for use as this proof-of-concept learning object repository
- Customize the DSpace metadata component to reflect the output of Work Area C
- Configure search and browse capabilities of DSpace to support the requirements identified in Work Area A
- Customize the DSpace submission process to enable efficient submission and metadata creation for the content from the *U.S. History I* course.

Work Area C: Metadata Application Profile Development

A critical feature of the proof-of-concept repository is the determination of the metadata necessary to describe the learning objects to support their management and access. The selection and specification of appropriate metadata will be documented in a metadata application profile. An application profile is a schema that consists of metadata elements and their specifications for a particular application (Heery and Patel, 2000). A sample metadata application profile from another repository application is available at: **<http://meric.lis.unt.edu/files/AppProfile_Draft5_17Jul2006.pdf>**, part of which is contained in Appendix B.

A number of existing metadata schemes have been developed for use in conjunction with learning objects. The two primary schemes that will be considered for this proof-of-concept repository are:

- Dublin Core Metadata Initiative and its Dublin Core Metadata Element Set (DCMES)
- IEEE Learning Technology Standards Committee P1484 (IEEE LTSC) and its IEEE LTSC Learning Object Metadata (LOM)

Selection and specification of metadata elements will be made in conjunction with the project team members who are domain experts in the discipline of History and who are creating the course content. Upon completion of the application profile, the DSpace application will be configured to support the metadata elements for the submission process.

The project team will also create input rules to guide the creation of metadata records for the learning objects. These rules specify what data value is associated with each metadata element, formatting and other aspects for inputting the data values to ensure a high-quality metadata records for the learning objects.

Another activity in this work area will investigate an alternative metadata approach for handling complex digital objects such as comprise the content of the *U.S. History I* course. The Metadata Encoding and Transmission Standard (METS) **<http://www.loc.gov/standards/mets/>** is a standard for encoding descriptive, administrative, and structural metadata for complex digital objects, and it is expressed as an Extensible Markup Language (XML) schema. The METS Editorial Board (2007) describes METS as:

> The Metadata Encoding and Transmission Standard, (METS) is a data encoding and transmission specification, expressed in XML, that provides the means to convey the metadata necessary for both the management of digital objects within a repository[1] and exchange of such objects between repositories (or between repositories and their users).

The project team will explore how METS can be used for sample content of the *U.S. History I* course.

Key Activities:

- Review and select appropriate metadata elements in consultation with project team members working with the course content
- Create an application profile to document the specifications of the metadata for the repository
- Create input rules to prescribe the contents of metadata records and to guide creators of the metadata records
- Customize DSpace to support the metadata elements selected and to ease metadata record creation when learning objects are submitted to the repository
- Investigate the use of METS as a container and metadata approach for sample course content.

Work Area D: Preparing and Submitting Course Content into Repository

Work Areas B and C provide the physical and information organization infrastructures for the proof-of-concept repository application. Work Area C addresses the content of the *U.S. History I* course that will be submitted to the repository. The following information describes the logical and physical structure of the course.

The *U.S. History I* redesigned course is divided into a two part structure:

- 15 chronological, media-rich **lessons** with multiple-choice mastery learning assessments
- 10 historical **case studies** with rubrics-based **assessments**

The course is comprised of the following logical components (and an indication of the number of each):

- **Units:** Four units, each of which contains a preview of the entire unit, its learning objectives, and two or more lessons
    - **Lessons:** Fifteen total lessons, each of which contains three or more topics
        - **Topics:** Approximately 50-75 topics, which may include text, graphics, flash animations, self-assessments, etc.
    - **Case Studies:** Ten case studies that can be used in association with a lesson or topic, or can be used outside of the course content

Each of the 15 lessons contains the following types of digital files:

- Text
- Images
- Audio
- Video
- Flash animations

Each of the 10 case studies contains:

- A historical problem
- Primary and secondary sources digitized
- Five modifications for delivery (discussion, debate, panel presentation, reaction panel, role-playing simulation)
- Rubrics for assessing each modification
- Teaching guide for modification delivery in online, blended (hybrid), or face-to-face formats

An example of a lesson is available at:
<http://web3.unt.edu/cdl/course_projects/HIST2610/content/01_Unit_One/01_week_one/00_unit_one_week_one.htm>.
Appendix C shows the components of the course (using Unit 1 as an example) along with a listing of the physical files that comprise the components.

The course content can be decomposed at one or more levels of granularity for purposes of reuse and/or repurposing. The proof-of-concept repository will demonstrate how course content can be decomposed at low, medium, and high levels of granularity. For example, the following describes the levels of granularity for course content that can guide how the content will be stored in the repository using Unit 1 for illustration:

- **Low Level of Granularity:** Each entire **unit** is stored and described as a logical object in the repository. For Unit 1, this means that all component parts of all lessons are bundled together, and they are retrievable and reusable as an IMS conformant package. Appropriate description of the unit is recorded in the metadata record and will be searchable under terms that describe the subjects addressed in the unit. In addition to the IMS package, all separate physical files that comprise the lesson are stored in the repository.

- **Medium Level of Granularity:** Each entire **lesson** is stored and described as a logical object in the repository. For Lesson 1, this means that all component parts of a lesson are bundled together, and they are retrievable and reusable as an IMS conformant package. Appropriate description of the lesson is recorded in the metadata record and will be searchable under terms that describe the subjects addressed in the lesson. In addition to the IMS package, all separate physical files that comprise the lesson are stored in the repository.

- **High Level of Granularity:** Each **topic** is stored and described as a logical object in the repository. For example, Lesson 1 contains the following four topics: *The Americas before Columbus*; *How Did the First Peoples Come to the Americas*; *Central and South American Natives*; *North American Natives*. At this level of granularity, the component parts of each topic

are bundled together, and they are retrievable and reusable as an IMS conformant package. Appropriate description of the topic is recorded in the metadata record and will be searchable under terms that describe the subjects addressed in the topic. In addition to the IMS package, all separate physical files that comprise a topic are stored in the repository.

In addition to these three levels of granularity into which the course content can be decomposed, the repository will also allow the entire U.S. History I course to be stored as a logical, describable, and retrievable bundle packaged as an IMS conformant package. Further, course content in the form of flash animations can be considered as discrete and valuable learning objects, and those will be stored and described separately in the repository.

We anticipate approximately 800 physical files will comprise the entire *U.S. History I* course. All digital files comprising the course will be submitted to the repository and, depending on the level of granularity for bundling the learning objects, separate metadata records will be created to describe and manage the repository's learning objects.

A major level of effort in Work Area C involves project staff organizing the physical files into logical groups aligned with the levels of granularity listed above, submitting course content into the repository in the context of the three levels of granularity, and creating metadata records to describe and manage the objects. An innovative aspect of this project will be the pairing of library and information science students, who are knowledgeable about metadata, with the history students, who bring domain expertise, to work jointly in submitting objects into the repository and creating high-quality metadata records.

Key Activities:

- Decompose the course content to address the three levels of granularity and organize the physical files for efficient submission to the repository as bundles of physical files associated with learning objects at the specified levels of granularity
- Create IMS conformant packages of selected learning objects to submit into the repository
- Submit the physical files (in appropriate bundles) and the IMS conformant packages into the repository and create metadata records for each of the learning objects.

Work Area E: Testing and Evaluating the Repository

This work area assesses the proof-of-concept repository for functionality through two methods: system-level functionality, and use scenarios. For each of these methods, appropriate procedures will be used to validate functionality at system and use levels.

As noted above, Work Area A will specify a set of functional and technical requirements for the repository. Those requirements may be adjusted as the project implementation occurs, and changes to the requirements will be documented. During the last part of the project, the repository will be tested to assess the extent to which the specified requirements were met. This assessment is focused on system-level functionality.

To assess the repository at the use level, we will use a set of use scenarios. A scenario is a user-centered description of hypothetical uses of a system. The content of the proof-of-concept repository will be limited to content from the *U.S. History I* course, and the scenarios will reflect the need of instructors looking for learning objects related to this content. Because of the short time frame for this project, in-depth research on user needs and behaviors cannot be carried out. However, the expert domain knowledge of Dr. McMichael and her History graduate students will inform the use scenario development. In addition, Dr. Ron Carriveau at UNT's Center for Teaching, Learning, and Assessment, will participate in the development of the scenarios and their implementation in the assessment, bringing his expert knowledge on assessment to the use scenario methodology. The project team will create 3-5 use scenarios that describe realistic, but hypothetical, needs of potential users of the repository. The following is an example of a use scenario:

The faculty members who are responsible for overseeing the teaching of U.S. History at a large community college in Texas are dissatisfied with the student learning outcomes and retention rates for the current version of the course. With the leadership of the department chair, they form a team to redesign the course so that it will be taught with an approach that blends face-to-face and online components. They connect via the web to the THECB Learning Object Repository and browse the list of course titles stored in the repository. They discover a complete U.S. History I course available for download in a format to enable easy import into their university's learning management system.

They decide to use the complete materials from ten of the lessons and to use most of the topics from four of the five remaining lessons. Because they have online development support available, they are able to replace some of the topics in four lessons and develop a fifth lesson almost entirely to fit their subject emphases. They discover the case studies and decide to build the in-class activities around five of them.

In addition, the team discovers a variety of student self-assessment tools designed for use with the course. They browse through the descriptions of a number of these tools and select two tools for downloading to a local computer. After reviewing these, they decide to modify them to accommodate the particular students in the college. When finished revising, they upload those into the learning management system for students to access and conduct self-assessment of their learning related to specific topics covered in the course.

Project team members will use the scenarios to exercise the repository and assess the capability of the repository to respond to potential user needs and behaviors.

Key Activities:

- Prepare a test plan based on Work Area A's requirements to assess the proof-of-concept learning object repository at the system level
- Prepare a set of use scenarios to use to assess the capability of the proof-of-concept learning object repository to respond appropriately to potential users who are looking for learning objects for reuse and/or repurposing
- Conduct and report results of the two assessment methods.

Work Area F: Documenting and Reporting

This work area addresses all requirements for documenting project activities, and preparing and submitting required reports to THECB. A number of documents will be created to describe the repository application including but not limited to the application profile and system configuration. The structure of the entire *U.S. History I* course content will be mapped (as illustrated in Appendix C). The methodologies for assessing the repository described in Work Area D will be documented along with the results of the assessment.

In addition, a final report to THECB will identify and describe a set of next steps to deploy an operational THECB learning object repository, including but not limited to: planning and design, user studies to inform the design, and assessment procedures to validate system functionality against user requirements and behaviors.

Key Activities:

- Prepare appropriate technical documentation for all repository components
- Document methods and results of repository assessment
- Create final report to submit to THECB.

Summary

This proposal outlines a plan of work for an application development project, and the key success factors include:

- Articulation of a detailed project plan
- Identification of functional and technical requirements
- Implementation of an appropriate repository platform
- Selection of a standards-based set of metadata elements from appropriate learning object metadata schemes
- Decomposition of course content into varying levels of granularity for submission into the repository
- Creation of metadata records to describe and manage the objects in the repository
- System functionality to support user interaction with the repository to find, identify, select and obtain relevant learning objects.

The project's design and plan, along with active project management, will ensure these factors are addressed and result in the successful completion of the proof-of-concept repository.

5. Project Management and Timelines

The project goal and objectives provide the overall framework for this project. The anticipated period of the project is April 23, 2007 to August 31, 2007 (19 weeks). Given the short time period available for this project, effective management is critical to achieve the project's stated objectives and to produce the deliverables. Effective management will involve appropriate planning, oversight, and ongoing monitoring to ensure milestones are met and deliverables are produced. The fiscal resources for direct costs of the project, amounting to $120,783, will be managed efficiently to produce a cost-effective project. Dr. Moen will serve as overall project manager and allocate staff resources to the work areas to ensure continuing and concurrent progress on the multiple work areas. Drs. Moen and McMichael will be responsible for leading efforts in the work areas as indicated in the table below, which also shows anticipated duration of each work area.

Work Area	Lead	Apr 2007	May 2007	Jun 2007	Jul 2007	Aug 2007
Work Area A: Project Management	**Moen**					
Work Area B: Install and Configure the Repository Application	**Moen**					
Work Area C: Metadata Application Profile	**Moen**					
Work Area D: Decompose and Submit Course Content	**McMichael**					
Work Area E: Test and Evaluate Repository	**Moen & McMichael**					
Work Area F: Final Report and Documentation	**Moen & McMichael**					

Dr. Moen has managed a number of large research and development projects (see Appendix A for resumes), including two National Leadership Grants funded by the U.S. Federal Institute of Museum and Library Services, and a two-year project to design and develop a metasearch implementation for the Library of Texas. As principal investigator, Dr. Moen was responsible for overall project design and management, management of project funds, and staffing. UNT will provide accounting and billing services for the proposed project, and the project will follow all appropriate UNT administrative procedures related to staffing, payment of salaries, travel, and other aspects of the project where expenses are incurred.

6. Project Budget

To accomplish the goal and objectives for the proposed project, we are requesting $120,783. Appendix D details the expense categories and amount requested.

Over 60% of requested funds will provide wages and benefits for nine UNT graduate students who will carry out project work. These students bring expertise and domain knowledge in areas of information technology, information science, repositories, metadata, history, and course design. The project provides

a vital opportunity for these students to further develop their knowledge and skills, and will assist in their development as the next generation of higher education personnel for whom online courseware, technology, and repositories will be their common tools. The number of student staff is justified by the short time frame for this project and the quantity of work to be accomplished.

Dr. Moen, as Principal Investigator, will devote 75% level of effort during the summer to the project. From the start date until June 1, he will commit 50% level of effort from his current teaching and research load, at no additional cost to the project.

Dr. McMichael, as Co-Principal Investigator, will devote 25% level of effort from project start date until August 31. She will be relieved of other duties in her staff position to accommodate the level of effort committed to the project.

Dr. Carriveau, as Assessment Expert, will devote 15% level of effort from project start date until August 31. He will be relieved of other duties in his staff position to accommodate the level of effort committed to the project. His primary project responsibility will be the development of the methodology for use scenario creation and implementation to assess repository functionality.

Dr. Pullin, as Metadata Expert, will be hired for 20 hours a week (50% level of effort) for the duration of the project. His primary project responsibility will be the investigation of the Metadata and Encoding Transmission Standard (METS) for use in the repository and other metadata-related and technology concerns for the project.

The budget also contains a line item for travel by the Principal Investigator and Co-Principal Investigator to Austin for meetings with THECB staff related to the project. We anticipate these meetings will allow presentation and demonstration of the proof-of-concept learning object repository.

UNT will provide various resources at no cost to the project, including but not limited to: workspace for project team members; computing resources; network access; telecommunications; office supplies; copying; and delivery services.

We believe the requested funds and the number of staff supported by the funds are justified by the short time frame for this project and the quantity of work to be accomplished.

7. Project Deliverables

The proposed project's deliverables are related directly to the project objectives. The deliverables will be in the form of a proof-of-concept learning object repository and a set of reports, specifically:

- A functioning proof-of-concept learning object repository populated with course content from *U.S. History I*, a THECB-funded redesigned course.
- A report containing the specifications related to the repository software, its implementation and configuration, and the metadata application profile.
- A final report that describes all aspects of the project and includes ideas and suggestions for the consideration of THECB to move forward with a production-level learning object repository.

8. Impact and Benefits of the Project

The THECB Course Redesign Project will yield valuable courseware that can be reused and repurposed by faculty in institutions of higher education, primarily in the State of Texas, but with opportunities to license the courseware to others. This major investment by THECB can be leveraged by providing access to both the entire courseware created and also to the learning objects that comprise the courseware. This proposal intends to demonstrate how a learning object repository containing the content from the *U.S. History I*, a THECB-funded redesigned course developed at UNT, can support broad access to the course content and support not only reusing but also repurposing of the learning objects.

As a proof-of-concept, this project is intended to demonstrate to THECB and others the potential impact for potential reuse and repurpose of digital learning objects. The impact is all the greater because the proof-of-concept learning object repository is based on open source software and uses key standards related to learning objects including metadata schemes and packaging specifications for easy import into standards-compliant learning management systems.

THECB and the broader higher education community in Texas will benefit from the proposed project. Specifically, it presents a minimal-risk and cost-effective approach to demonstrate the utility of a learning object repository. By the end of the project, THECB will be able to see in action a repository that can be used to discover and acquire learning objects that embody solid pedagogy and instructional design considerations. The project will store and provide access to the learning objects at three levels of granularity to illustrate how discrete learning objects can be acquired for reuse and/or repurposing. Such reuse and repurposing presents a range of new opportunities for THECB-funded courseware to be utilized in ways not previously envisioned.

Individual institutions, such as UNT, are considering the development of in-house learning object repositories to assist in managing the increasing amount of online course content being produced. These institutions will benefit from the outcome of the proposed project by having access to the technical and other documentation produced by the project.

9. Sustainability and Dissemination

This proof-of-concept project is intended as a demonstration of the utility of a learning object repository for making THECB- funded courseware more broadly and flexibly available. TxCDK will make the proof-of-concept learning object repository available to THECB and others (if so desired by THECB) available for at least six months. Upon successful completion of the project, no further development on the repository will be done.

The project will document all aspects of the proof-of-concept learning object repository and these documents will be publicly available (with permission of THECB) on a TxCDK-sponsored website. This will provide ongoing dissemination of the results of the project and serve as a point of information about learning object repositories. We will also develop one or more articles for publication based on the lessons learned through this proof-of-concept project.

10. Qualifications and Readiness of the Project Team and Institution

A team of specialist in learning object repositories and metadata schema creation will work in collaboration with History content experts to fulfill the project's objectives. The project team includes the investigators and a staff. Drs. Moen, McMichael, and Turner will serve as Principal and Co-Principal Investigators (Appendix A contains abbreviated curriculum vitae for the investigators):

Dr. William E. Moen, Interim Director, Texas Center for Digital Knowledge (TxCDK), will serve as Principal Investigator. Dr. Moen has designed and implemented several repository projects and is an expert in metadata schemes and their application. He will serve as overall project manager and will assemble a group of Master's and Ph.D. students from the School of Library and Information Sciences to carry out work related to design and implementation of the proof-of-concept repository.

Dr. Kelly McMichael, Associate Director, Center for Teaching, Learning, and Assessment, has served as head instructional consultant for UNT's Blended Learning Projects and the Quality Enhancement Plan. She is serving as the head of the team redesigning *U.S. History I*.

Dr. Philip Turner, Vice Provost for Learning Enhancement, serves on the UNT academic leadership team. He has twenty years of senior leadership experience in higher education with seventeen years leading major digital learning projects. He currently serves as the Director of UNT's Quality Enhancement Plan which involves a seven-year course redesign effort.

The project team will also include other UNT staff and students including:

Dr. Ron Carriveau, Assessment and Measurement Specialist. Dr. Carriveau has extensive experience in all aspects of evaluation of learning outcomes. He has led statewide assessment projects as well as developing commercial tests. Dr. Carriveau's main assignment at UNT is to work with course redesign teams to develop and implement high quality assessment. Project responsibilities: Use scenario development and implementation to assess use level functionality of repository.

Dr. Mike Pullin, School of Library and Information Sciences adjunct faculty. Dr. Pullin has extensive technology and online teaching experience. He teaches technology-related courses, and has a background in library technical services, including metadata. Project responsibilities: Examination of METS as an alternative metadata approach and technology support.

Graduate students from the Department of History: A number of Master's and Ph.D. students from the Department of History will carry out various project activities. William Watson (ABD), Deborah Kilgore (MA student), and Kelly Houston (MA student) serve on the redesign team for the THECB-redesigned *U.S. History I* course. These students are familiar with both the redesigned course content and structure and logic needed to decompose the course. One additional research assistant from the Department of History will join this group, and all will be under the supervision of Dr. McMichael. Project responsibilities: Preparing and organizing course content for submission to repository; submitting objects into repository and creating metadata records for submitted learning objects; creating structure map for entire course; use scenario development and implementation; report writing and documentation.

Graduate students from the School of Library and Information Sciences and Texas Center for Digital Knowledge: A number of Master's and Ph.D. students from the School of Library and Information Sciences (SLIS) will carry out various project activities. These students have experience and expertise in key project areas such as metadata development, systems administration, DSpace implementation and operation, metadata quality assessment, and other related knowledge and skills required for this project. Svetlana Barnes (Ph.D. student) will serve as project coordinator; Bryce Benton (MS student) and Serhiy Polyakov (Ph.D. student) will serve primarily as system administrators, programmers, and technical support. In addition, two additional SLIS students who have experience with metadata and DSpace will join this group, and all will be under the supervision of Dr. Moen. Project responsibilities: Project management and coordination; system installation, configuration, and customization, and general technology support; metadata application profile development; metadata record rules; submitting objects into repository and creating metadata records for submitted learning objects; report writing and documentation.

The project team collectively has the knowledge, skills, and experience to successfully accomplish project goal and objectives. The staff size is commensurate with the amount of work to be accomplished within the short time frame for the project.

TxCDK and UNT are institutionally ready to carry out the proposed project. TxCDK and UNT will provide the necessary computing infrastructure for the technology components of the project. TxCDK will perform the project management, including detailed project planning, oversight, and monitoring all project activities leading to the successful completion of the project. UNT has the largest online enrollment of any four-year public institution in Texas with 31 programs online and over 12,000 students enrolled in online courses. The institution has in place the technological infrastructure, intellectual property policies, funding incentives, training programs, instructional design and production support to enable its faculty to utilize emerging information technologies to enhance learning.

TxCDK is currently piloting two repository applications: an institutional repository application called STARchive **<http://meta.lis.unt.edu/starchive>**, and a metadata education and research information commons called MERIC **<http://meric.list.unt.edu>**. Both of these use DSpace as the repository platform. This combined with expertise and experience with metadata-driven web-based applications, and current metadata standards and practices provide the knowledge and skill base for carrying out this project. The

interdisciplinary team for this project encompasses the domains of Library and Information Sciences, Information Technology, and History, which yields a foundation grounded in competence and innovation.

11. Proposal Summary

This proposal describes a project to develop a proof-of-concept application of a learning object repository that will demonstrate how THECB can leverage the courses being developed through its Course Redesign Project by making the course content available for reuse and repurposing. To demonstrate this, the proposed project will work with a THECB-funded redesigned course being created at the University of North Texas, *U.S. History I*. The project has the following objectives:

1. Implement an open source software platform for a learning object repository application.
2. Identify and implement an appropriate metadata scheme to describe and manage the learning objects in the repository.
3. Enable search and browse capabilities in the repository to support end user tasks of finding, identifying, selecting, and accessing the learning objects.
4. Decompose a THECB redesigned course in at least three levels of granularity and store the decomposed course content in the learning object repository
5. Provide course content in packages that conform to the IMS content packing standard for import into learning management systems that support the IMS standard.
6. Develop methods and procedures for assessing the functionality of the repository based on requirements and use scenarios
7. Identify and describe a set of next steps to deploy an operational THECB learning object repository, including but not limited to: planning and design, user studies to inform the design, and assessment procedures to validate system functionality against user requirements, behaviors, etc.

The proposed project consists of several major work areas: Project Management; Installing and Configuring the Repository Application; Metadata Application Profile Development; Preparing and Submitting Course Content into Repository; Testing and Evaluating the Repository; and Documenting and Reporting.

The project, when completed, will deliver the following:

- A functioning proof-of-concept learning object repository populated with course content from *U.S. History I*, a THECB-funded redesigned course.
- A report containing the specifications related to the repository software, its implementation and configuration, and the metadata application profile.
- A final report that describes all aspects of the project and includes ideas and suggestions for the consideration of THECB to move forward with a production-level learning object repository.

As a proof-of-concept, this project is intended to demonstrate to THECB and others the potential impact for potential reuse and repurpose of digital learning objects. THECB and the broader higher education community in Texas will benefit from the proposed project. Specifically, it presents a minimal-risk and cost-effective approach to demonstrate the utility of a learning object repository.

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Heery, Rachel and Patel, Manjula. (2005) Application profiles: Mixing and matching metadata schemas. *Ariadne*, Issue 25.
Available URL: <http://dublincore.org/documents/2004/09/10/library-application-profile/>.

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Wiley, D. A. (2002). Learning objects need instructional design theory. In A. Rossett (Ed.), The *2001/2002 ASTD Distance Learning Yearbook*. New York: McGraw-Hill.

Appendix A: Brief Curriculum Vitae of Investigators

This appendix contains brief curriculum vitae for the three investigators:

- **Principal Investigator:** William E. Moen, Ph.D. Texas Center for Digital Knowledge, University of North Texas
- **Co-Principal Investigator:** Kelly McMichael**,** Ph.D.**,** Associate Director, Center for Teaching, Learning, and Assessment, University of North Texas
- **Co-Principal Investigator:** Philip M. Turner, Ed.D., Vice Provost for Learning Enhancement, University of North Texas

William E. Moen, Ph.D.
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Texas Center for Digital Knowledge
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Complete CV is available at: http://www.unt.edu/wmoen/VitaCurrent.pdf

ACADEMIC PREPARATION

Institution	Major	Degree	Date
Syracuse University	Information Transfer	Ph.D.	1998
Louisiana State University	Library and Information Science	M.L.S.	1988
University of Montana	Philosophy	B.A.	1987

TEACHING AND PROFESSIONAL EXPERIENCE

Associate Professor. School of Library and Information Sciences. University of North Texas. 2002– Areas of teaching and research include the organization of information; metadata and networked information organization and retrieval; Internet applications and services; Z39.50.

Fellow. Texas Center for Digital Knowledge. University of North Texas. 2001–.

Assistant Professor. School of Library and Information Sciences. University of North Texas.1998–2002.

Instructor. School of Library and Information Sciences. University of North Texas. 1996–98.

Network System Research Analyst. Network Development and MARC Standards Office, Library of Congress. 1989-1991.

PUBLICATIONS (Selected)

Journal Issues (Special Issue Editor)

Metadata: A Networked Information Strategy to Improve Access to and Management of Government Information [Symposium Issue]. *Government Information Quarterly*, 18(3) July 2001.

Chapters in Books/Journal Articles

The Challenges of Nonstandardized Vendor Usage Data in a Statewide Metasearch Environment: The Library of Texas Experience (with Fatih Oguz and Charles R. McClure). *Library Quarterly*, v 74, no 4 October 2004: 403-422.

A Service-Based Approach for Virtual Libraries (with Kathleen R. Murray)**.** *Texas Library Journal.* Fall 2002. Available URL:

Designing and Demonstrating a Resource Discovery Service for the Library of Texas (with Kathleen R. Murray). *Texas Library Journal.* Fall 2002.

The Metadata Approach to Accessing Government Information. *Government Information Quarterly*, 18(3) July 2001: 155-165.

Assessing Interoperability in the Networked Environment: Standards, Evaluation, and Testbeds in the Context of Z39.50. In *Evaluating Networked Information Services: Techniques, Policy, and Issues* (pp.85-109), edited by Charles R. McClure and John Carlo Bertot, Publisher: ASIS thru Information Today, Inc. 2001.

Interoperability for Information Access: Technical Standards and Policy Considerations. *Journal of Academic Librarianship*, 26(2) March 2000: 129-132.

Published Conference Papers

An Extensible Approach to Interoperability Testing: The Use of Special Diagnostic Records in the Context of Z39.50 and Online Library Catalogs (with Sebastian Hammer, Mike Taylor, Jason Thomale, and JungWon Yoon). In *Proceedings of the 68th ASIS&T Annual Meeting, v 42.* Charlotte, North Carolina, October 28 – November 2, 2005. Silver Spring, MD: American Society for Information Science and Technology.

Design, Development, and Implementation of a Texas Library Directory Database: A Multipurpose Database for the Library of Texas (with Irene Lopatovska and Fatih Oguz). In *Proceedings of the 67th ASIS&T Annual Meeting, v 41*. Providence, Rhode Island, November 12-17, 2004 (pp. 93-1001). Medford, NJ: Information Today, Inc. 1997.

Optimizing Resource Discovery Service Interfaces in Statewide Virtual Libraries: The Library of Texas Challenge (with Kathleen R. Murray and Irene Lopatovska). In *Proceedings of Libraries Without Walls 5:* The *Distributed Delivery of Library and Information Services*. Molyvos, Greece, September 19-23, 2003. London: Facet Publishing. 2004.

Assessing Metadata Utilization: An Analysis of MARC Content Designation Use (with Penelope Benardino). In *2003 Dublin Core Conference: Supporting Communities of Discourse and Practice – Metadata Research and Application.* Seattle, WA, September 28-October 2, 2003. Seattle: Information School of the University of Washington, 2003.

Mapping the Interoperability Landscape for Networked Information Retrieval. In *Proceedings of First ACM/IEEE-CS Joint Conference on Digital Libraries*. Roanoke, VA, June 24-28, 2001 (pp. 50-52). New York: The Association for Computing Machinery, 2001.

RESEARCH ACTIVITIES (Selected)

Co-Principal Investigator (with Dr. Jiangping Chen). Authors @ Your Library: Web Database System.. Funded by the Association of American Publishers. A 12-month research and development project to create a match-making service for library programs and publishers and their authors. 2005-2006.

Principal Investigator. Examining Present Practices to Inform Future Metadata Use: An Empirical Analysis of MARC Content Designation Utilization. Funded by a National Leadership Grant from the U.S. Federal Institute of Museum and Library Services. A 21-month project to investigate library catalogers' use of MARC content designation. 2004-2006. Extended to August 2007.

Principal Investigator. Developing an Alternative Approach for Interoperability Testing of Library Z39.50 Servers. Funded by the U.S. Federal Institute of Museum and Library Services as an extension to the National Leadership Grant, Realizing the Vision of Networked Access to Library Resources. An 8-month project to develop an alternative method of interoperability testing using specially-created MARC diagnostic records. 2004-2005.

Principal Investigator. System Configuration for Implementing the LOT Resource Discovery Service. Funded by the Texas State Library and Archives Commission. A project to begin implementation of the LOT resource discovery service for the Library of Texas. 2003.

Principal Investigator. Needs Assessment Study of Texas Academic, Public, and School Libraries: Funded by the Telecommunication Infrastructure Fund (TIF) Board. A 9-month project to survey Texas libraries to inform the TIF Board and is Library Working Group on the state of these libraries in terms of technology, skills, and other needs. 2002.

Principal Investigator. The Z Implementation Component of the Library of Texas. Funded by the Texas State Library and Archives Commission. A 10-month project to develop the virtual catalog and integrating search/retrieval interface for the Library of Texas. 2001-2002.

Principal Investigator. Illinois Library Resources and Library Automation in the Networked Environment: An Analysis and Recommended Strategies. Funded by the Illinois State Library. A 7-month project to assess shared library automation and recommend strategies for statewide access to library resources. 2001-2002.

Principal Investigator. Realizing the Vision of Networked Access to Library Resources: An Applied Research and Demonstration Project to Establish and Operate a Z39.50 Interoperability Testbed. Funded by the U.S. Federal Institute of Museum and Library Services. A 20-month project to improve interoperability in search and retrieval with online library catalogs. 1999-2001. Extended through December 2003.

SELECTED SCHOLARLY & PROFESSIONAL ACTIVITIES & ACHIEVEMENTS

Frederick G. Kilgour Award for Research in Library and Information Technology. Library and Information Technology Association (LITA) and OCLC Online Computer Library Center. 2005.

Interim Director. Texas Center for Digital Knowledge, University of North Texas. 2004-present.

Fellow. Texas Center for Digital Knowledge, University of North Texas. 2001-present.

Chair. Metadata Working Group for the Texas Digital Library, 2007-present.

KELLY MCMICHAEL, Ph.D.
2232 Jefferson Trail Road
Denton, TX 76205
214.543.1508
kmcmichael@unt.edu

Education

- Ph.D. in U. S. History, University of North Texas, August 2001
  Dissertation: "From Lost Cause to Female Empowerment: The Texas Division of the United Daughters of the Confederacy, 1896-1966."
  Director: Dr. Richard Lowe
  Secondary: Dr. Randolph B. Campbell

Publications

- **Books**
  Waxahachie, Texas: Where Cotton Reigned King, South Carolina: Arcadia Publishers, 2002.

  SparkNotes U.S. History 101, Colonial Period to 1877, New York: Barnes and Nobles, 2005.

Under Contract

Sacred Memories: A Guide to the Civil War Monuments of Texas (under contract with the Texas State Historical Association, anticipated publication spring 2008).

Remember Our Southland: The Texas Division of the United Daughters of the Confederacy and the Construction of Social Memory, 1896-1927 (under contract with Texas Tech University Press, anticipated publication Fall 2008).

- **Edited Books**
  "'Memories are Short but Monuments Lengthen Remembrance': The United Daughters of the Confederacy and Civil War Memory," in *Texas: Myth, Meaning, and Historical Memory*, eds. Elizabeth Hayes Turner and Gregg Cantrell (Texas A&M University Press, 2006.)

- **Articles**
  "Abigail Adams: An Early Female Voice," in *Early America Examined: A Reader*, ed. Jerry Baydo (National Social Science Press, 2004).

  "Roosevelt, Lewis Douglas, and the Raw Deal: The Economy Act of 1933," *The Historian* 64 (Fall 2000), 105-119.

  "The Meaning of the Lost Cause in Dallas, Texas, 1894-1897," *Legacies* 12 (Spring 2000): 4-12.

  Coauthor, "Texas History: A Checklist of Theses and Dissertations," *The Southwestern Historical Quarterly* (July 1993): 81-118; "Part II" (October 1993): 313-344.

Current Position

- Associate Director, Center for Teaching, Learning, and Assessment, University of North Texas, 2006-present

Instructional Design Experience

- Senior Instructional Consultant, Center for Distributed Learning, University of North Texas, 2005-2006

Recent Teaching Experience

- Lecturer, University of North Texas, 2005-present
- Visiting Lecturer, University of North Texas, 2004-2005
- Adjunct Faculty, Dallas Baptist University, 2002-2005
  (including online courses/hybrid courses—Blackboard delivery)
- Adjunct Faculty, Texas Christian University, 2001-2004
  (including web-enhanced/hybrid courses—E-College delivery)

State and National Grants Received

- Principal Investigator. "U.S. History Course Redesign, Pre-Columbian to 1877," Texas State Course Redesign, 2006-2007. Budget: $194,000.
- Principal Investigator: "Building Excellence in History Teachers (BEHT)," Federal Teaching American History Grant, Department of Education, 2007-2010. Budget: $994,000.

Recent Conference Papers and Scholarly Meetings

- "Next Generation Course Redesign," Post-Conference Workshop, Southwest Regional Educause Conference, February 23, 2007.

- "Using Simulated Case Study Games to Transform the Undergraduate Classroom," Presented at the Collaboration Conference for Motivating Students for Better Retention, Learning, and Achievement, November 18, 2006.

- "Developing an Institutional Blended Learning Program." Presented jointly with Gary Chinn, the Pennsylvania State University, Educause Impact 2006, October 10, 2006.

- "The Blended Learning Project: A Foundation for Undergraduate Academic Transformation." Presented at WebCT Impact 2006, Chicago, July 10, 2006.

- "The Gender of Charity: The Texas Confederate Woman's Home." Presented at the Southern Association of Women Historians Conference, June 2006.

Philip M. Turner
<pturner@unt.edu>
<http://www.unt.edu/courses/pturner/main.htm>
University of North Texas
School of Library and Information Sciences

Current Appointment:

Vice Provost for Learning Enhancement
University of North Texas

Educational Background:

1966-69. Boston State College, Mathematics, B.S., 1969
1971-72. Univ. of Wisconsin—LaCrosse, Inst. Tech. M.S., 1972
1975-77. Texas A&M Commerce, Lib. Science, M.S.L.S., 1977
1974-77. Texas A&M Commerce. Inst. Tech. Ed.D., 1977

Selected List of Publications:

Helping Teachers Teach: A School Library/Media Specialist's Role. Libraries Unlimited, 1985, Second edition, 1993, Second edition, April 1993. Third edition, September, 2003.
"Search Time and Test Anxiety in a Visual Location Task," *Contemporary Educational Psychology*. 10(3), July 1985: 292-301.
"Good-bye to Ivory Towers," *Planning for Higher Education*. 25, Fall, 1996: 20-26. (Reprinted in *The Best of PHE*, Society for College and University Planning, 1997).
"Surviving the Digital Revolution: A Risk Assessment for Colleges and Universities," *Planning for Higher Education*. 29(3), Spring, 2001.
With Viola Osburn, "Identifying At-Risk Students in LIS Distributed Learning Courses," *Journal of Education for Library and Information Science*. 43(2), Fall, 2002.
With Yan Wu, ""The Relationship of Bandwidth, Interaction and Performance in Online Classes: A Study, " Online Journal of Distance Learning Administration.9, 1, Spring, 2006.

Recent Presentations:

"Online Training For Law Enforcement, "International Conference on Democracy and Security. Istanbul, Turkey, June 11, 2005
"To the Desktop Training for Public Librarians: Reality Now," American Library Association. Chicago, June 25, 2005.
"The Blended Learning Project at UNT," Texas Distance Learning Association, San Antonio, Texas, March 2006.
"Bringing Training to the Desktop: Challenges and Strategies," Public Library Association, Boston, Massachusetts, March, 2006.
"Blended Learning: Challenges and Successes," WebCT IMPACT, Chicago, Illinois, June 14, 2006.
"A Partnership of an Institution of Higher Education and Libraries in South Texas and New Mexico to Prepare New Library Professionals," First Joint Conference of Librarians of Color, Dallas, Texas, October 14, 2006.
"Using Simulated Case Study Games to Transform the Undergraduate Classroom," The Collaboration for the Advancement of College Teaching & Learning, Bloomington, MN, November 18, 2006.

Selected Current Grants

The Rio Grande Initiative: A Partnership to Educate Librarians Along the U.S.-Mexico Border. Funded for $1,442,377 from the Institute of Museum and Library Services (IMLS) in 2004.(Primary Investigator).

(with Ana Cleveland, Martha Bedard, and Gale Hannigan). Educating Health Information Professionals for the 21st Century. Funded for $614,210 from the Institute of the Museum and Library Services (IMLS) and the rest from Texas A&M University Medical Sciences Library in 2004.

A Partnership to Create Web-based Courseware for Continuing Education for School Librarians and Library Staff. Funded by the Institute of Museum and Library Services (IMLS) for $279,698 in 2005. (Primary Investigator).

Selected Honors and Awards:

Recipient of Outstanding Commitment to Teaching Award, 1978. Sponsored by The University of Alabama National Alumni Association

Recipient of the Sixth Annual Award for Achievement in Managing Information Technology. Sponsored by Carnegie Mellon University and American Management Systems, April 26, 1994.

Selected as Librarian of the Year by the Beta Kappa Chapter of Beta Phi Mu, the International Library Science Honor Society, 1991

Appendix B: Sample of an Application Profile

The following sections are from an application profile developed for a pilot implementation of the Metadata Education and Research Information Commons (MERIC). It provides an illustration of an application profile.

MERIC Application Profile

2. Namespaces and Format of entries

2.1 Namespaces
The MERIC Application Profile contains several namespaces:

- DCMI Metadata Terms http://dublincore.org/documents/dcmi-terms/
- Dublin Core encoding schemes http://dublincore.org/usage/terms/dc/current-schemes/
- DSpace Federation Metadata http://dspace.org/technology/metadata.html
- GEM 2.0 Metadata Elements http://raven.ischool.washington.edu/about/documentation/metadataElements/
- MERIC encoding schemes
- MODS encoding schemes http://www.loc.gov/standards/mods/v3/mods-3-1-outline.html

2.2 Format of entries
This Application Profile is presented following the "Dublin Core Application Profiles Guidelines" produced by the CEN MMI-DC Workshop; some field definitions have been altered to suit the needs of the MERIC profile.

Name of Term	A unique token assigned to the term
Term URI	A Uniform Resource Identifier (URI) used to identify the term.
Label	A human-readable label assigned to the term.
Defined By	An identifier of a namespace, pointer to a schema, or bibliographic reference for a document within which the term is defined.
Source Definition	The definition of the term in the namespace in which the term originated.
MERIC Definition	The MERIC definition of the term, with any changes in semantics necessary. However, the MERIC definition is within scope of the Source Definition.
Source Comments	Comments on the term from the namespace in which the term originated.
MERIC Comments	MERIC comments about the term.
Type of term	The grammatical category of the term (e.g. "Element", "Element Refinement", or "Encoding Scheme").
Refines	Indicates that the described term semantically refines the referenced term. A refinement makes the meaning of the element narrower or more specific. It will share the meaning of the unrefined element but with a more restricted scope.
Refined By	Indicates that the described term is semantically refined by the referenced term.
Has Encoding Scheme	Indicates that the described term is qualified by the referenced encoding scheme and indicates the encoding scheme that qualifies the described term. Using an encoding scheme will aid in the interpretation of an element value. These schemes include controlled vocabularies and formal notations or parsing rules. A value expressed using an encoding scheme will thus be a token selected from a controlled

	vocabulary (e.g., a term from a classification system or set of subject headings) or a string formatted in accordance with a formal notation (e.g., "2000-01-01" as the standard expression of a date). If an encoding scheme is not understood by a client or agent, the value may still be useful to a human reader. In some cases, encoding schemes not yet registered are indicated. These may be registered and/or approved by the DCMI Usage Board as DC Encoding Schemes in the future.
Obligation	Indicates whether the element is required to always or sometimes present and when present must have an associated data value. In this application profile the obligation can be: • mandatory (M) • mandatory if applicable (MA) • strongly recommended (R) • optional (O) • system-supplied (SS) • not applicable (N/A). Mandatory ensures that some of the elements are always supported and mandatory if applicable means that this element must be supported if the information is available. An element with a mandatory obligation must have a value. The strongly recommended and the optional elements should be filled with a value if the information is appropriate to the given resource but if not, they may be omitted. System-supplied elements are not entered by the resource describer. Not applicable is entered when the element is a top level element (unqualified element) which cannot be used to describe a MERIC resource because its unqualified form is ambiguous in meaning.
Occurrence	Indicates any limit to the repeatability of the element. In this application profile the occurrence can be: • repeatable (R) • not repeatable (NR) • not applicable (N/A). Repeatable elements can be entered multiple times with no limitations, unless comments and guidelines provided specify a limitation on the repeatability. Elements which are not repeatable can only be used once. Not applicable means one of the following: 1) the element is a top level element (unqualified element) which cannot be used to describe a MERIC resource because its unqualified form is ambiguous in meaning, or 2) the value for obligation is system-supplied, and therefore the occurrence is determined by the system.

3. Table of Contents

4. MERIC Application Profile

4.1 Top-Level Elements and Refinements

Name of Term	title
Term URI	http://purl.org/dc/elements/1.1/title
Label	Title
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	A name given to the resource.
MERIC Definition	
Source Comments	Typically, a Title will be a name by which the resource is formally known.
MERIC Comments	This element may be repeated up to three times with each element having one data value.

Type of term	element
Refines	
Refined By	
Has Encoding Scheme	
Obligation	M
Occurrence	R

Name of Term	**creator**
Term URI	http://purl.org/dc/elements/1.1/creator
Label	Author
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	An entity primarily responsible for making the content of the resource.
MERIC Definition	
Source Comments	Examples of a Creator include a person, an organisation, or a service. Typically, the name of a Creator should be used to indicate the entity.
MERIC Comments	
Type of term	element
Refines	
Refined By	
Has Encoding Scheme	
Obligation	MA
Occurrence	R

Name of Term	**audience**
Term URI	http://purl.org/dc/terms/audience
Label	Audience
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	A class of entity for whom the resource is intended or useful.
MERIC Definition	
Source Comments	A class of entity may be determined by the creator or the publisher or by a third party.
MERIC Comments	Do not use this element in unqualified (unrefined) form.
Type of term	element
Refines	
Refined By	educationLevel
Has Encoding Scheme	
Obligation	N/A
Occurrence	N/A

Name of Term	**educationLevel**
Term URI	http://purl.org/gem/qualifiers/EducationLevel
Label	Education Level
Defined By	http://raven.ischool.washington.edu/about/documentation/metadataElements/
Source Definition	A general statement describing the education or training context. Alternatively, a more specific statement of the location of the audience in terms of its progression through an education or training context.
MERIC Definition	
Source Comments	Information about the education or training level of the audience for a resource is frequently explicitly stated by the creator of the resource. For example, the resource might be intended for students in the 5th grade (US) or for the vocational sector (AU). Statements about the level can be captured here in the educationLevel element. Unless such a level is explicitly stated, the cataloger should be reluctant to infer such statements

	from the body of the resource unless qualified to do so. Where available, it is best to select statements for the educationLevel element from a controlled vocabulary (i.e., a 'value URI'). When entering a level statement that is not taken from a controlled vocabulary, care should be given to identify the jurisdiction (country, region, locale) that defines the statement. For example, if the term "5th Grade" is intended to denote that level in the United States, the level statement should make that fact clear by appending a jurisdictional parenthetical notation to the statement–e.g., "5th Grade (US)".
MERIC Comments	
Type of term	element refinement
Refines	Audience
Refined By	
Has Encoding Scheme	MERIC Education Levels
Obligation	M
Occurrence	R

4.2 Encoding Schemes

4.2.1 Registered Encoding Schemes

Name of Term	**IMT**
Term URI	http://purl.org/dc/terms/IMT
Label	IMT
Defined By	http://purl.org/dc/terms/
Definition	The Internet media type of the resource.
Comments	
See Also	http://www.isi.edu/innotes/iana/assignments/media-types/media-types/
Type of term	encoding scheme
Encoding Scheme For	Format

Name of Term	**W3CDTF**
Term URI	http://purl.org/dc/terms/W3CDTF
Label	W3C-DTF
Defined By	http://purl.org/dc/terms/
Definition	W3C encoding rules for dates and times – a profile based on ISO 8601.
Comments	
See Also	http://www.w3.org/TR/NOTE-datetime
Type of term	encoding scheme
Encoding Scheme For	Created, Available, dateSubmitted, dateAccepted, dateOther

4.2.2 Unregistered Encoding Schemes

Name of Term	**MERIC Education Levels**
Term URI	
Label	MERIC Education Levels
Defined By	
Definition	A list of education levels to be used in the MERIC repository.
Comments	
See Also	
Type of term	encoding scheme
Encoding Scheme For	educationLevel

Appendix C: Mapping *U.S. History I* Course Content to Physical Files

The *U.S. History I* redesigned course that will be used in the proof-of-concept learning object repository contains the following components:

- **Units:** Four units, each of which contains a preview of the entire unit, its learning objectives, and three or more lessons
  - **Lessons:** Fifteen total lessons, each of which contains two or more topics
    - **Topics:** Approximately 50-75 topics, which may include text, graphics, flash animations, self-assessments, etc.
  - **Case Studies:** Ten case studies that can be used in association with a lesson or topic, or can be used outside of the course content

The following shows the units and lessons for *U.S. History I:*

Unit 1: Colliding Cultures
Lesson 1: Pre-Columbian America
Lesson 2: European Exploration and Colonization of the New World
Lesson 3: The New World and the Old
Lesson 4: The Colonial Experiment

Unit 2: Colonization and Revolution
Lesson 5: The English Empire
Lesson 6: The Revolution
Lesson 7: Creating the United States
Lesson 8: Change of Power

Unit 3: A New Nation Emerging
Lesson 9: The Growing Nation
Lesson 10: Rise in Democracy
Lesson 11: Manifest Destiny
Lesson 12: American Society and Culture

Unit 4: A Country Dividing
Lesson 13: A House Dividing
Lesson 14: Civil War
Lesson 15: Reconstruction

The following table only presents the components and titles for one Lesson within one Unit, where the lesson has four topics. The table illustrates how the logical components of course content are comprised of zero or more physical files. A work activity during the project will be to complete a table like the following for the entire course content.

Top Level Component: *Title*	Second Level Component: *Title*	Third Level Component: *Title*	Physical Components (filename)	Notes
Unit: *Colliding Cultures*			N/A	A Unit is an organizing construct that has a name. No physical files associated with this component, except for the files of the subcomponents.
	Preview: *Unit One Preview*		01_preview.htm	Page presented to user includes: • Text
		Objectives: *Unit One Objectives*	02_objectives.htm	Page presented to user includes: • Text
	Lesson: *Pre-Columbian America*			A Lesson is an organizing construct that has a name. No physical files associated with this component, except for the files of the subcomponents.
		Topic: *The Americas Before Columbus*	01_americas_before_columbus.htm	Page presented to user includes: • Text • Links to external resources
		Topic: *How did the First People Come to the Americas*	02_how_did.htm FirstPeopleMap.swf	Page presented to user includes: • Text • Links to external resources • Flash animation map
		Topic: *Central and South American Indians*	03_central_south.htm SouthAmericaMap.swf aztechumansacri.jpg	Page presented to user includes: • Text • Image • Links to external resources • Flash animation map
		Topic: *North American Indians*	04_north.htm NorthAmericaMap.swf Hopefwellpottery.jpg	Page presented to user includes: • Text • Image • Links to external resources • Flash animation map
		Topic: *Summary*	05_summary.htm Comparing_cultures.swf	Page presented to user includes: • Text • Flash animation self-test

One can see from this table that course content can be bundled at the unit level, at the lesson level, and at the topic level, where each bundle can be considered a learning object for storing in the repository. In general, the separate physical files that comprise a topic will not be unbundled for storing in the repository as separate learning objects. However, the flash animations can be considered as stand-alone learning objects that can be stored and described in the repository.

Appendix D: Budget