



## The Texas Course Redesign Learning Object Repository: Research and Development for a Production System

# Functional & Technical Requirements for the THECB Learning Object Repository

Prepared for

**The Texas Higher Education Coordinating Board**

by

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# Functional & Technical Requirements for the THECB Learning Object Repository

## 1. Introduction

This document describes the functional and technical requirements for the Texas Higher Education Coordinating Board's Learning Object Repository (LOR). These requirements specify what the LOR should support in three areas:

- Administration
- Submission of learning objects
- End user access to the repository and its contents

DSpace, an open source digital repository platform, provides technical foundation for the LOR. Manakin is the second version of DSpace XML User Interface that enables the system to establish a unique look that is different from the default installation of DSpace. The functional and technical requirements, although general, will be specified for a DSpace-based LOR customized with Manakin.

The functional requirements listed below derive from the results of a user requirement assessment and the capabilities the software tools provide. They address the behaviors of the repository application and what types of interactions the application should support. The focus of this document is on the functional requirements. When appropriate, specific technical requirements will be listed.

This document serves two purposes. First, it guides the customization of the repository interface that will yield an application that supports the functional and technical requirements. Second, it provides a baseline for usability testing that will be carried out at the end of Phase II.

## 2. Requirements for Administration

The following requirements address various administrative tasks and responsibilities for managing the LOR. Many of these tasks are carried out using the DSpace administrative interface, but some tasks require access to the server to edit configuration files, set indexing policies, and other responsibilities. These requirements do not address the initial installation and basic setup of the DSpace application and related software dependencies.

The second column, System Needed, specifies the system required for developing each function: DSpace, Manakin, or both. The third column, Priority & Status, describes the priority and development status for each function. The items are of high, medium, or low priority, labeled as 'High,' 'Med,' and 'Low,' respectively. The development status is presented in a parenthesis after the priority level: 'Y' for implemented items, 'N' for unimplemented items, 'P' for items in progress, and 'On Hold' for those that are under discussion and/or will might implemented in the future.

Functionality	System Needed	Priority & Status	Description & Technical Specifications
<b>2.1. Managing User Accounts</b>			
<ul style="list-style-type: none"> <li>• 2.1.1. Identify users who may register with DSpace</li> <li>• 2.1.2. Edit the personal information stored for a specified user</li> <li>• 2.1.3. Delete a specified user from the system</li> </ul>	DSpace	High (Y) High (Y) High (Y)	The DSpace Administrator (DA) can perform a number of administrative functions on user accounts.
<b>2.2. Authorizations and Permissions</b>			
2.2.1. Set up appropriate groups of users within	DSpace		DSpace provides a way to assign a group of

Functionality	System Needed	Priority & Status	Description & Technical Specifications
DSpace and have the following responsibilities: <ul style="list-style-type: none"> <li>• 2.2.1.1. Administer groups</li> <li>• 2.2.1.2. Create a group of users</li> <li>• 2.2.1.3. Name the group</li> <li>• 2.2.1.4. Add user to the group</li> <li>• 2.2.1.5. Delete users from the group</li> <li>• 2.2.1.6. Assign permissions to the group</li> </ul>		High (Y) High (Y) High (Y) High (Y) High (Y) High (Y)	authorized users permissions for adding items to the repository, editing metadata records, reviewing submissions, and other tasks.
2.2.2. Assign authorized users with various permissions including: <ul style="list-style-type: none"> <li>• 2.2.2.1. Specify groups of users permitted to submit to a collection</li> <li>• 2.2.2.2. Specify reviewers, approvers, and metadata editors for a collection's submission process</li> </ul>	DSpace	High (Y) High (Y)	The DA can provide each user with appropriate authorizations for working in the DSpace application.
2.2.3. Administer a variety of other policies related to the LOR including: <ul style="list-style-type: none"> <li>• 2.2.3.1. Set a default distribution policy for all items within a collection</li> <li>• 2.2.3.2. Configure who may modify the items within a collection</li> <li>• 2.2.3.3. Configure who may administer communities and collections themselves</li> <li>• 2.2.3.4. List/abort submission processes</li> <li>• 2.2.3.5. Manage bitstreams format registry</li> </ul>	DSpace	High (Y) High (Y) High (Y) High (Y) High (Y)	The DA also has other areas of responsibility related to the LOR and its users.
<b>2.3. Organizing the LOR</b>			
2.3.1. Structure the repository using DSpace constructs of communities, subcommunities, and collections including: <ul style="list-style-type: none"> <li>• 2.3.1.1. Create/Delete Community/Collection</li> <li>• 2.3.1.2. Edit Community/Collection Home Page</li> <li>• 2.3.1.3. Edit Collection Provenance Description</li> <li>• 2.3.1.4. Specify Collection's Required License</li> <li>• 2.3.1.5. Specify Collection Metadata Defaults</li> <li>• 2.3.1.6. Configure Item Approval Process</li> </ul>	DSpace	High (Y) High (Y) High (Y) High (Y) High (Y) High (Y)	The DA is responsible for setting up communities, subcommunities, and collections. These are DSpace constructs translated into the following three LOR metadata elements: Disciplines (communities), SubDisciplines (subcommunities) and Courses (collections that contain the learning objects).
2.3.2. Structure the repository for varying levels of granularity of learning objects	DSpace	High (Y)	The Course Content will be set up in various collections that best present the content of the course in various levels of granularity.
<b>2.4. Workflow Customization</b>			
2.4.1. Customize the workflow to allow various authorized users with specific responsibilities	DSpace	High (Y)	DSpace uses the concept of a workflow that is assigned at the collection level. The workflow can be set so specific groups of authorized users can carry out specific tasks (e.g., submitting an item, reviewing a submitted item, editing metadata records, approving the submitted item be added to the repository.

Functionality	System Needed	Priority & Status	Description & Technical Specifications
<b>2.5. Customizing Metadata and Metadata Input</b>			
2.5.1. Customize the metadata scheme	DSpace	High (Y)	DSpace allows the use of one or more metadata schemes that contain elements for describing the learning objects. The Metadata Registry is the tool used by the DA to customize the existing Dublin Core metadata scheme and to add new metadata schemes.
2.5.2. Customize the metadata input pages	DSpace / Manakin	High (Y)	DSpace as a file stored in the config directory called input-forms.xml that controls the metadata elements and their order or presentation on the metadata input pages. In addition, this file can be edited to include links to internal DSpace tools (e.g., controlled vocabularies) and external documents (e.g., input rules) to assist the user in creating the metadata records.
2.5.3. Customize license agreements	DSpace / Manakin	Low (Y)	DSpace, as part of the workflow, requires the granting of a license before an item can be submitted to the repository. The DA can customize the text of the license as suitable to the collection.
<b>2.6. Administer Items in Repository</b>			
2.6.1. Manage and administer items once they are in the repository including: <ul style="list-style-type: none"> <li>2.6.1.1. Add/Change/Remove Metadata Values</li> <li>2.6.1.2. Add/Delete Bitstreams</li> <li>2.6.1.3. Expunge Item</li> </ul>	DSpace	Med (Y) Med (Y) Med (Y)	The DA has the capability of acting on all items submitted to the repository, including the actions listed in the bulleted list.

### 3. Requirements for Submission of Learning Objects

The following requirements address the entire process of authorized users submitting learning objects into the repository. The submission process involves logging in to the LOR with an authorized username and password, creating metadata records for items submitted, uploading the files associated with a learning object into the repository, and workflow related considerations.

Functionality	System Needed	Priority & Status	Description & Technical Specifications
<b>3.1. User Accounts</b>			
3.1.1. Allow users to register for an account	DSpace	High (Y)	Users will be able to initiate the registration process for requesting a DSpace account. Users will provide an email address that will serve as the account name. Upon receipt of an email from DSpace, the user will complete the registration process and choose a password for the user account.
3.1.2. Allow users to edit their user profile	DSpace	High (Y)	Users will be able to set up and edit a user profile that will hold information such as their names and contact information; they will also be able to change their passwords.
<b>3.2. Submissions</b>			
3.2.1. Allow users to submit to one or more collections	DSpace	High (Y)	The DSpace Administrator (DA) sets authorizations and permissions to each user.

Functionality	System Needed	Priority & Status	Description & Technical Specifications
			Authorized users will be able to see what collections they have permission to submit to.
3.2.2. Allow users to initiate the submission process	DSpace	High (Y)	Authorized users will choose a collection to submit an item to.
3.2.3. Allow users to create metadata records	DSpace	High (Y)	Authorized users will complete metadata records for each learning object they submit to the repository.
3.2.4. Allow users to upload file(s) into the repository	DSpace	High (Y)	Upon completion of the metadata records, users will be able to upload one or more files associated with the learning object into the repository. When there is more than one file, and one of the files is considered a primary file (e.g., an HTML index page), user can designate it as the <u>primary bitstream</u> .
3.2.5. Allow user to grant a license	DSpace	High (Y)	Users must grant a license prior to the submission being allowed into the repository.
3.2.6. Allow users to review, reject, and/or edit and then approve a submission	DSpace	High (Y)	The DSpace workflow allows submissions to be reviewed, rejected, and/or approved before the item is actually put into the repository. The workflow allows the reviewer to edit the metadata record prior to final approval and submission into the repository.
3.2.7. Allow users to view a list of submissions in process	DSpace	High (N)	Authorized users can save an incomplete submission, and return to it at a later point to continue work on the submission. Authorized users may remove a submission that is not complete.
3.2.8. Allow users to view a list of approved submissions	DSpace	High (Y)	Authorized users can view a list of their submissions that have been approved and are stored in the repository.
3.2.9. Inform users of using descriptive titles and file names; inform users that the vocabulary they choose to describe the objects may vary in a group of disciplines	DSpace	Low (N)	Users will be able to view the input rules and submission guides on the LOR site

#### 4. Requirements for End User Access to Learning Objects

The following requirements address the search, browse, and other interactions end users can have with the LOR. There will likely be two sets of users:

- Public users who do not have an account on the LOR
- Public users who do have an account on the LOR

Because some of the learning objects may not be publicly available to all users, access controls may need to be set for some users, who will need to register for an account. All users should be able to search and browse the LOR and at the least see the metadata records associated with the learning objects, even if not all users will have access to the files associated with the learning objects.

Functionality	System Needed	Priority & Status	Description & Technical Specifications
<b>4.1. Search</b>			
4.1.1. Search by specific fields in the metadata record:	DSpace / Manakin		DSpace allows the customization of the indexing policies to make available certain The

Functionality	System Needed	Priority & Status	Description & Technical Specifications
<ul style="list-style-type: none"> <li>4.1.1.1. Subject</li> <li>4.1.1.2. Title</li> <li>4.1.1.3. Learning Object Type</li> <li>4.1.1.4. Media Format</li> <li>4.1.1.5. Intended Educational Audience</li> <li>4.1.1.6. Instructional Method</li> <li>4.1.1.7. Author Affiliation</li> <li>4.1.1.8. Date created</li> <li>4.1.1.9. Part of speech</li> <li>4.1.1.10. Granularity level</li> </ul>		High (Y) High (Y) High (Y) High (Y) High (Y) High (Y) High (Y) High (N) Low (N) High (N)	bullet list of fields should be considered for searching. These fields will be available for searching on the advanced search interface.
4.1.2. Search by Discipline, Subdiscipline, and Course	DSpace / Manakin	High (Y)	DSpace provides a default Subject Search from its user interface, but this will be customized to search by Discipline and Subdiscipline using the DSpace controlled vocabulary
4.1.3. Full-text search	DSpace / Manakin	High (Y)	Full-text search works across the whole repository and within disciplines, subdisciplines, courses, and course components. It allows for simultaneous search in selected metadata elements and the content of text objects.
4.1.4. All searches should be case insensitive	DSpace	Med (Y)	The DSpace indexing policy should be set so searches are executed in a case-insensitive manner.
4.1.5. Support truncation, wildcards and other advanced search techniques	DSpace	Med (Y)	Provides methods for refining searches and instructions in the Advanced Search interface.
4.1.6. Drop-down menu / lists of terms from controlled vocabularies	Manakin	High (P)	The drop-down menu or the lists only apply to the metadata elements that use controlled vocabulary
<b>4.2. Browse</b>			
4.2.1. Browse by Discipline and Subdiscipline	Manakin	High (Y)	Users should be able to view a browsable list of all courses within a discipline and subdiscipline. This should be available on the left navigation bar of the DSpace interface.
4.2.2. Browse by Course	Manakin	High (Y)	Users should be able to view a browsable list of all learning objects in courses in the repository. This should be available on the left navigation bar of the DSpace interface.
4.2.3. Browse by Subject <ul style="list-style-type: none"> <li>4.2.3.1. Present all subject terms in alphabetical order</li> <li>4.2.3.2. Clickable subject terms in each metadata record</li> </ul>	Manakin	High (Y) Med (N)	Users should be able to see a browsable list of subject terms used to describe learning objects for all courses in the repository. This browse should be available on the left navigation bar of the DSpace interface.
4.2.4. Browse by Title	Manakin	High (Y)	Users should be able to see a browsable list of the titles for all learning objects in courses in the repository. This browse should be available on the left navigation bar of the DSpace interface.
4.2.5. Browse by Date Published	Manakin	Low (Y)	Users should be able to see a browsable list of items submitted to the repository in order of the value in the Date Published field.
4.2.6. Browse within disciplines, subdisciplines, courses, and course content by the following elements: <ul style="list-style-type: none"> <li>4.2.6.1. Title</li> </ul>	Manakin	High (Y)	Within DSpace communities and collections, users can browse by the elements in the bulleted lists.



Functionality	System Needed	Priority & Status	Description & Technical Specifications
<ul style="list-style-type: none"> <li>4.3.2.23. Standardized course number</li> </ul>			
4.3.3. Allow users to view the full item record	DSpace / Manakin	High (Y)	The full item record should show all available metadata.
4.3.4. Provide options for search result sorting	Manakin	Med (P)	Users should be able to sort search results by each of the items shown on the result set list, except for summary (see 4.3.1).
<b>4.4. Accessing Metadata Records and Learning Objects</b>			
4.4.1. Allow all users to view metadata records for all learning objects	DSpace	High (Y)	Whether or not a user has registered for an account on DSpace, all users should be able to view the metadata records for learning objects
4.4.2. Allow registered users to access learning objects	DSpace	High (Y)	Depending on the agreements for using and repurposing of learning objects in the repository, some objects may be restricted to authorized users. This will require permissions to be set for these users to access the bitstreams.
4.4.3. Allow registered users to open and view the files contained in each object	DSpace	High (Y)	Based on the preceding requirement, users will be able to open and view objects (depending on media format, appropriate plugins, etc.).
4.4.4. Allow registered users to download all files contained in each object		High (P)	If an object contains multiple files, users will be able to download all those files from one page
<b>4.5. Other Requirements Related to Access</b>			
4.5.1. Allow users to subscribe to DSpace collections at various levels of granularity	DSpace	Med (N)	Users will receive email notifications when new items are submitted to specific collections.
4.5.2. Allow users to view recent submissions to the repository on the homepage and within specific disciplines, subdisciplines, courses, and course content	Manakin	Low (N)	Recent submissions should be displayed on the LOR homepage and on the pages for each of the Disciplines, Subdisciplines, Courses, and Course Content collections.
4.5.3. Allow users to view a list of most downloaded objects	Manakin	Low (N)	The list appears on the homepage of the LOR site; each title on the list will be linked to its metadata record
4.5.4. Show icons in the interface	Manakin	Med (N)	The icons will appear on the homepage and other pages as appropriate
4.5.5. Visualize relations between objects of different levels of granularity	Manakin	Med (N)	Tree-like display of the structure of the LOR content
4.5.6. Show the definition of the label of each granularity level	Manakin	Med (N)	
4.5.7. Provide instructions on how to download and integrate the objects into the user's own work	Manakin	Low (N)	Users should be able to view/download tutorial from the LOR website
4.5.8. If both of the original object and its revised version will be stored in the LOR, inform users of which is the original	Manakin	On Hold	Under discussion
4.5.9. Allow users to inform course designers of errors in the content	Manakin	Low (N)	Provide feedback form and course creators' email addresses with permission