

# Improving the ETD submission process through automated author self contribution using DSpace

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## 1. ABSTRACT

We are developing support for Electronic Theses and Dissertations (ETD) at the University of North Carolina at Chapel Hill (UNC) as the first step in supporting electronic scholarly publishing in general. In this paper we discuss the planning and initial implementation processes undertaken at UNC as part of our migration from print to electronic theses. Because we found that existing ETD and scholarly electronic publishing applications did not fully meet our needs, we developed extensions to what we felt was the most promising public domain digital library software application for our needs (DSpace) to provide enhanced support for ETD publishing, and electronic scholarly publishing. We have developed enhancements to DSpace that allow single click submission of ETDs and journal articles based on templates for these types of digital content. Our system automatically records, extracts and exports metadata via XML for digital content items (theses, dissertations, journal articles) so that the author and the digital library do not have to fill out forms to do this. Our method maintains the overall DSpace workflow process and simply eliminates the initial steps by automatically extracting the metadata from the digital content item. We have modified DSpace to customize the submission process based on the collection (for instance ETDs versus journal articles). In our initial experience with the submission of master's papers at the School of Information and Library Science (SILS) we find that authors require only a fraction of the time, and are much more likely to submit material using our enhanced paradigm than if they use the standard DSpace forms.

Many universities will soon be faced with the decision of how to incorporate ETDs into their environment. This paper provides a good introduction to the issues, including our reviews of currently available ETD systems. We discuss our choice to use DSpace and why we believe that standard, open source OAI compliant applications like DSpace are a solid base on which to build digital libraries. We also believe that universities will become significant electronic publishers of scholarly material, and that systems like DSpace which can support initial electronic publishing steps like ETDs as well as supporting the electronic publication needs of the whole university are a good choice. In order for a flexible, general system like DSpace to be effective for specific purposes like ETDs, we suggest several important enhancements for DSpace or similar applications. A challenge associated with using a new and developing application such as DSpace, is how to maintain compatibility as the application evolves and potentially changes. We describe the methods we used to accomplish our

enhancements, and discuss our preliminary results, including pros and cons of using DSpace 1.1 for our UNC ETDs.

## **2. BACKGROUND**

The School of Information and Library Science at the University of North Carolina at Chapel Hill (UNC) has begun development of an electronic theses and dissertation (ETD) repository, which will serve as a pilot project for campus-wide adoption of ETDs and as a possible development platform for future electronic publishing initiatives.

Our first step was to model our existing print based submission system for theses and dissertations. We made an abstract model of the workflow without the constraints of the print system, and investigated how we might implement this electronically. With our model for the ETD process, we began reviewing the solutions currently available for building digital publishing systems. Our goal was to find a system that would allow us to build an open, standards compliant ETD repository that would work for the entire university as well as scale to encompass all the university's future electronic publishing needs. Many of our criteria are based on our NeoRef project philosophy, to support freely available universal knowledge that is author self-contributed (<http://neoref.ils.unc.edu/>). We reviewed a number of open publishing systems, as well as the commercial services provided by ProQuest. The results of this analysis provided us with the criteria we used to formulate how available systems, or customizations of available systems, could meet the needs of our university for a scalable electronic publishing solution.

### **Review of Possible Digital Repository Systems**

As a first step we investigated a number of existing ETD programs, to see how closely they matched our model process, as well as to learn from their experiences. This analysis was designed to provide us with a view of current ETD practice which we could incorporate into our requirements and best practices. From this review we also hoped to gain a better understanding of the issues involved with electronic publishing as we developed our generalized model for electronic publishing at UNC.

We began with an evaluation of current ETD programs from the Networked Digital Library of Theses and Dissertations (NDLTD) member schools. For each program we surveyed the scope of each project, their use of software, metadata, copyright. This survey provided us with a better understanding of the requirements for an ETD system which helped us to evaluate the current solutions available for developing an ETD repository. A summary of the survey is shown in Table 1 below.

Programs surveyed	17
Which application was used?	
ContentDM	1
ETD-Db	11
Other	5

Are students required to submit an ETD?	
All students	4
No Students	7
Some Students	2
Unknown	3
Does the author contribute document metadata?	
Yes	17
No	0
How many records in each program? (average)	
	1211
Records found from program in the NDLTD union catalog?	
Yes	4
No	13
Records found in the NDLTD OAI catalog?	
Yes	6
No	11
How many records available from each program via OAI? (average)	
	991

**Table 1.** Information gathered from survey of NDLTD institution websites in October 2003.

We chose to review Virginia Tech's ETD-db software as it was the single most common solution identified during our ETD program review. We also choose to review MIT's DSpace system, which although intended for the more general job of a digital repository, was being considered by several institutions as the mechanism to store their ETDs. We had also reviewed EPrints, but discarded this choice as being similar to DSpace but not as capable. Finally, we reviewed UMI/Proquest, the commercial system, which has been historically used by most all universities to archive and make available their master's papers and dissertations in print form. Proquest now supports a web-based version that allows for electronic submission of ETD.

## 2.1 ETD-db

ETD-db was developed by Virginia Tech as part of their work on the NDLTD. The software is a set of CGI programs written in Perl and uses a MySQL database for data storage. ETD-db was specifically designed as a solution for managing a collection of ETDs.

### Installation

The ETD-db website (<http://scholar.lib.vt.edu/ETD-db/>) provides instructions for installing the software using the Apache web server. Knowledge of Perl and Perl modules is not required but is helpful. We found the installation to be mildly difficult using the software and documentation as provided. Several bugs relating to creation of the database tables were encountered though they were easily remedied.

### Workflow

The ETD-db software supports a single workflow:

1. A student registers to use the submission website
2. The student creates a new submission, entering contact information and metadata regarding their submission

3. The student indicates whether their submission should be released to the public, withheld for a specific time period, or withheld completely
4. This submission is then queued for acceptance by an administrator
5. After acceptance, the submission is released in accordance with the terms specified by the student

This workflow provides for administrative roles that mirror the submission restrictions provided to the student. For each group of submissions (submitted, available, and withheld) there is an administrative role defined. In addition, a general administrator role is defined, as is a maintenance role. These roles are only loosely defined, and may be customized to suit the roles established by an institution using the Apache server's authentication mechanism.

### **Document Submission**

Document submission is performed through a series of forms that allow users to enter metadata describing their submission and then upload their thesis or dissertation as single document or as a series documents. The author is asked to sign a copyright statement granting the university non-exclusive rights to publish the document but reserving all other rights to the student. In addition, the student can select whether they wish their document to be made available to the public, only their institution, or to withhold the document for publication. This allows students whose work may be under patent review or consideration for publication to withhold their work while still submitting the work to the institutional repository. Students do not need to complete this submission process all at once, and may return to their submission at any time they choose to finish the process.

Submissions must be reviewed by an administrator before they are published (or withheld depending on the student's wishes).

### **Administration**

ETD-db provides an administrative interface that allows administrators to review submitted documents, modify those documents, delete the documents, add documents, set availability options on the documents, and approve documents for publication.

The interface is built around the workflow detailed above. As mentioned, this incorporates three stages: withheld, submitted, available. The first interface is "submitted", which allows the administrator to review and approve documents submitted to the collection. Next, the "available" interface allows the administrator to maintain the collection of public documents. Finally, the "withheld" collection allows the administrator to maintain the collection of documents submitted but withheld from public release by the author.

### **Metadata**

ETD-db supports the ETD-MS standard set by NDLTD. ETD-MS is the basic Dublin Core elements with the addition of several elements that further describe parts of the ETD process (<http://ndltd.org/standards/meadata/currently.html>). This is the only metadata standard supported by the software.

## **Comments**

The ETD-db system is designed specifically for ETDs and as such is not as well suited for other digital resources. Furthermore, it is designed to support only the ETD-MS standard for ETD metadata. However, it is an open system and is modifiable. Given the small size of the code base, modifications to the software should not be particularly difficult. This would include integration with campus-wide authentication systems.

## **2.2 DSpace**

DSpace was developed jointly by MIT and Hewlett-Packard (HP). It serves as the foundation for many of MIT's digital library initiatives, and will be used to hold their ETD collection. It is being used by universities in the DSpace consortium (<http://dspace.org/federation/index.html>). It was recently decided that DSpace development should follow the open source model, and this effort has begun (<http://dspace.org/federation/committers.html>).

## **Installation**

The DSpace software is written in Java and requires the use of the Apache Tomcat server and the PostgreSQL database server (being extended to include Oracle and MySQL). Installation requires access to the Tomcat applications directory and administrative privileges for the PostgreSQL server. Some knowledge of system administration is required to configure Tomcat, PostgreSQL, and Apache (use of Apache is optional). Installation was not difficult using the directions provided on the DSpace website (<http://dspace.org/technology/system-docs/>).

## **Document Submission**

Document submission works in much the same manner as ETD-db – users are asked to provide metadata describing their submission and then upload the document in whole or in parts. The interface provided is very straightforward, and allows the user with the ability to interrupt the submission process and finish it at a later time as well as the view which submissions have been approved for publication by the administrators.

Authors are asked to sign a copyright agreement granting the institution the non-exclusive right to publish the document while reserving all other rights for the author. There is not an option available for the author to restrict the distribution of their documents, though this feature could be achieved by modifying the DSpace software.

## **Administration**

The administrative options for DSpace are more flexible than those available through ETD-db. Administrators can manage users, communities (user groups), collections (sets of documents owned by communities), metadata, documents, and workflow. Each community can have multiple collections, each with its own workflow and administrative permissions.

## **Metadata**

DSpace uses a set of qualified Dublin Core elements loosely based on Library Application Profile set of elements and qualifiers. This set is modifiable but is used for all objects in the DSpace collection. This presents a problem when multiple document types are stored in the same DSpace installation. One solution is to create a set of metadata that can describe any object

in the repository, while only providing the appropriate fields for each object when they are submitted.

### **Comments**

DSpace is a very flexible digital collections system. The software is under active development and many features that would be beneficial to an ETD repository are being considered. Both a DSpace Thesis SIG and an ETD DSpace committee have just been formed, and are coordinating activities.

### **2.3 ProQuest**

ProQuest is developing a commercial ETD solution to supplement its existing services. A beta version of this system was reviewed. The web interface for this digital dissertation service was developed by Berkeley Electronic Press (bepress). They have a demonstration system available for trial use on the web (<http://umi.bepress.com/>) that allows one to play the roles of student submitter and administrator.

### **Submission**

The submission process is straightforward, and asks the author to provide contact information, document metadata, and to upload the full-text of their thesis. This process is not substantially different than any of the other packages reviewed. The author is also able to provide additional information to ProQuest, including choices on restricting access of their document, registering copyright with Library of Congress, ordering bound copies, etc.

### **Administration**

The administration interface allows the collection manager to view current submissions and assign them to reviewers. Reviewers can revise the submission, accept the submission, or reject it (with comments). There is a checklist feature for reviewers to use when reviewing the submissions. Reviewers can add comments to a submission from most forms, and can attach general notes as well.

### **Document Access**

Because ProQuest is a commercial service, access in some cases is fee based. Subscribing institutions have access to their own university materials, and fee based access to the full-text of documents published by other universities. ProQuest also supports free access to metadata searching of all dissertations (since 1997), and access to the first 24 pages of dissertations through their Dissertation Express service <http://wwwlib.umi.com/dissertations/>. They also support sending an electronic copy to the university, so that the university could archive the item and make it freely available if it chooses.

### **Comments**

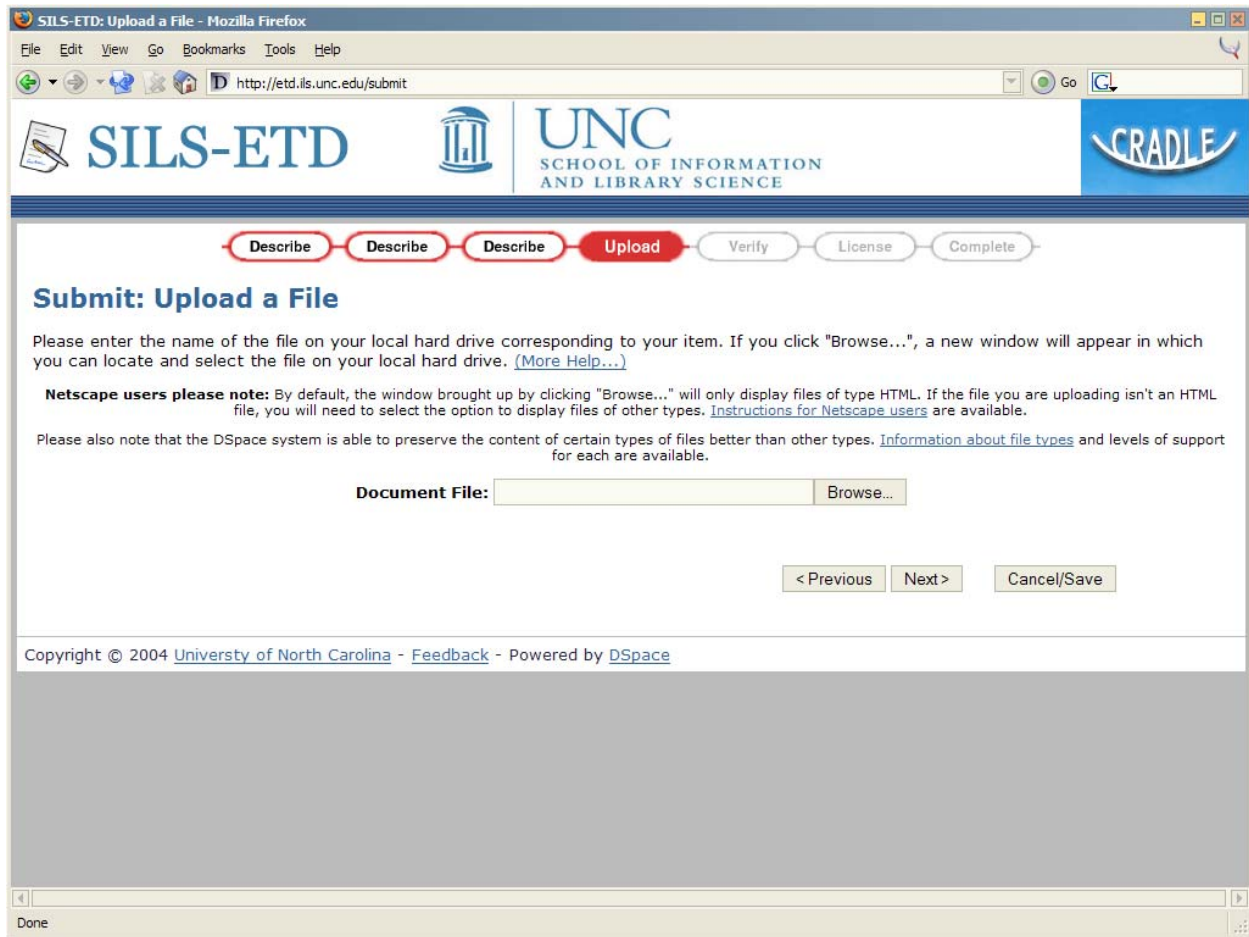
The ProQuest ETD solution provides an easy way for institutions to begin building ETD collections. Since many institutions already work with ProQuest this solution may be very attractive. The ProQuest system is not public so there is less opportunity to customize the system to fit individual needs, although bepress does allow some customization of the web interface forms. In addition, access to documents is much more restricted than with ETD-db and DSpace,

both of which support OAI, and thus allow free metadata searching, and full-text access to all documents. This can be overcome by providing public access to the university copy.

### **3. METHODOLOGY**

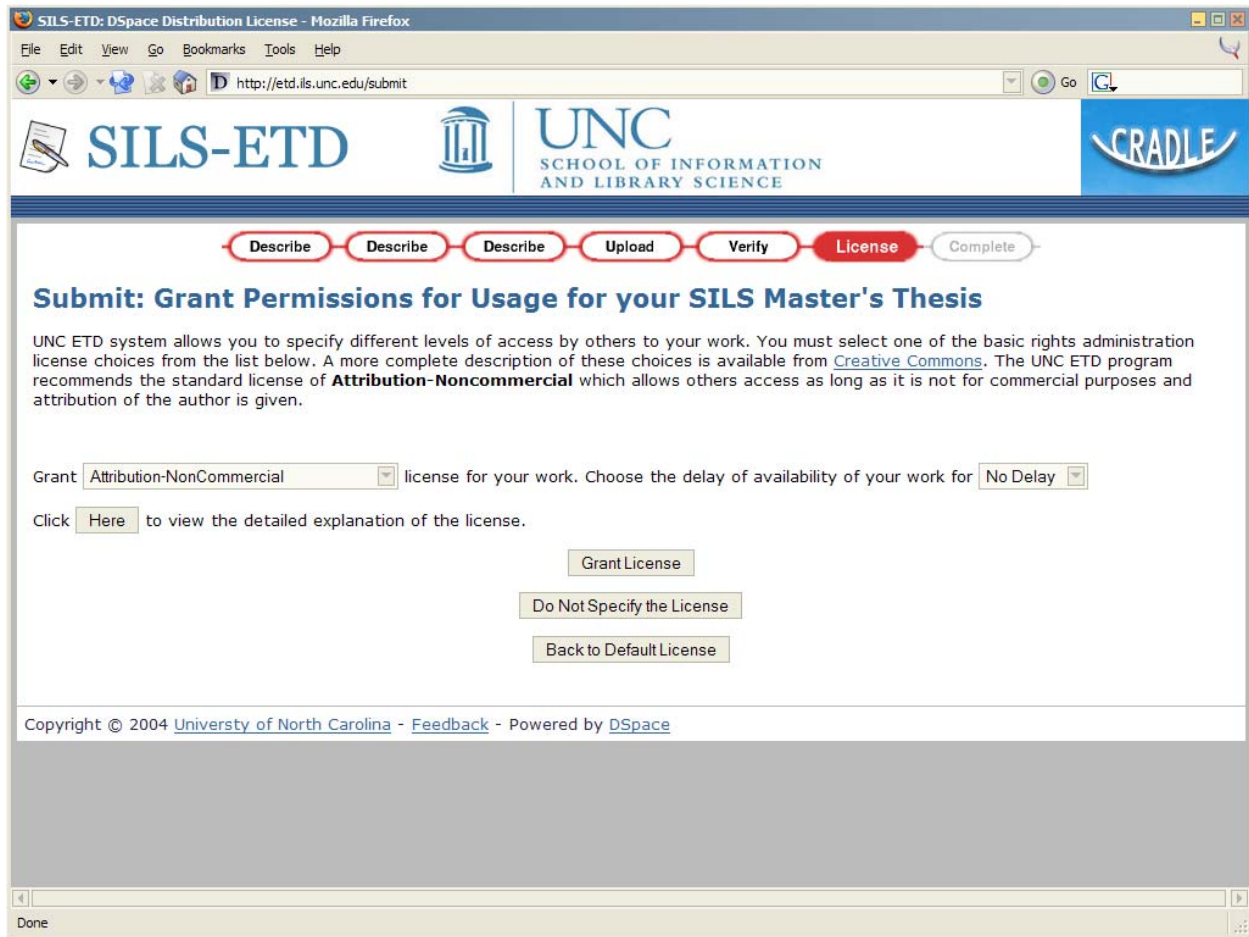
The pilot project at UNC was to create and make operational a digital repository for Master's Papers for the School of Information and Library Science (SILS). This process for SILS Master's Papers is similar to what occurs on campus for master's papers and dissertations. The major difference is that the graduate school acts as the administrator overseeing the verification and publication of the dissertations, while this is done by the SILS' administrative staff for their Master's Papers. Otherwise all roles are functionally equivalent, so the SILS prototype system serves as an effective pilot test for the campus ETD plan.

The major decisions were to choose an application, and to decide on how much customization would be needed. We choose to use DSpace because we wanted to work with a package supporting open access, and one that could ultimately serve as a digital repository for the entire campus. Based on our review of DSpace we decided that the major change required was to make the submission process easier for students. Both because there was a clear redundancy occurring (students or staff having to re-enter all the metadata for a content item), and because in our survey of institutions supporting ETDs digital submissions had not always caught on—at least in part due to users (students) being required to do additional work in order to submit digitally. Our goal was to make the student's content preparation step easier, and to make submission a one click experience, so that submitting digitally would be significantly better from the student's perspective. The standard DSpace workflow pipeline is shown in Figure 1. The first three stages (titled description) involve entering and verifying the descriptive metadata. Our implementation instead enters at the fourth stage (upload). The user clicks on their file, it is uploaded, and then they verify metadata, and then set rights administration. The entire process usually takes 10-20 seconds. The rights administration is also customized to support open access via licensing using Creative Commons (<http://www.creativecommons.org/>). This can be seen in figure 2 (show License Stage). The Creative Commons licensing choices are supported, as are time delays (embargos) on material that authors choose not to release immediately due to patent or other concerns.



**Figure 1.** This is the entry screen for the SILS-ETD process. The red button in the middle is the first step, which is to identify the file to be submitted. The first three red circled steps (describe) are skipped because the metadata necessary is automatically extracted from the input file.

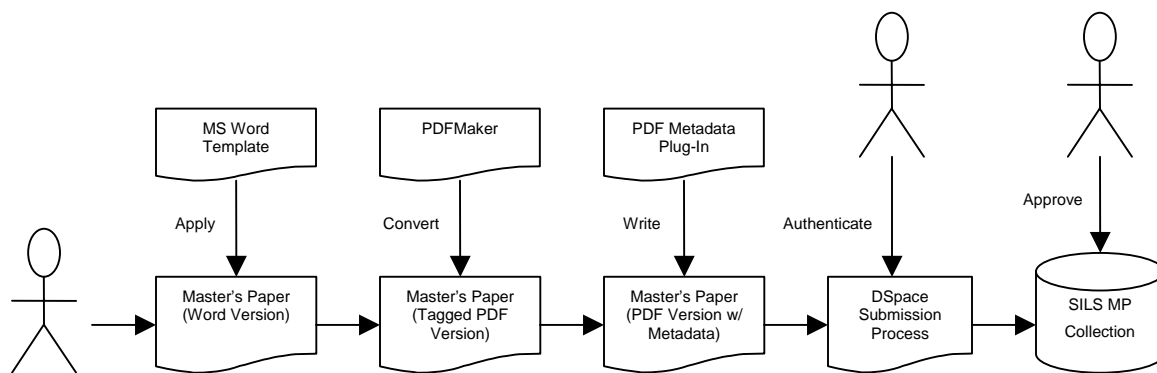




**Figure 2.** This is the licensing screen for the SILS-ETD process. The self contributing author on this screen can choose to accept the default licensing, or to make a custom selection via the submenu. Because we are trying to share the information, licensing using the Creative Commons legal framework is utilized instead of copyright.

### 3.1 Workflow

Figure 3 shows the overall workflow. At the left is the submitting author. At the far right is the administrator in their role of approving the material for publication. The next to rightmost person is the author verifying the submission before sending it off for approval and publication.



**Figure 3.** The workflow of the SILS-ETD submission process is shown from left to right. The author is shown on the left side, as the creator of the document, and to the right of the middle when they authenticate themselves. The person on the far right is the administrator that verifies the masters' paper meets school's criteria, and accepts or approves the paper.

### 3.2 Authoring

This ETD system provides an MS-Word (compatible with Office 2000 and XP) template file for the students to use when writing their master's paper. This serves two purposes: first to make their preparation step easier by setting up all their formatting according to the standard policy, and second, to incorporate tagging of the metadata in the document itself, so that we can extract it automatically and save the work of having to re-enter it.

We use PDF as the archive format as this seems to be the standard choice for an "open" format for text based documents. We are planning to migrate to PDF/A ([http://www.aiim.org/pdf\\_a/](http://www.aiim.org/pdf_a/)) as soon as tools support this. Since most students use Microsoft Word as the tool to write their thesis, we examined choices that would allow us to capture metadata from Word and store it in the PDF files in a manner that would allow automatic extraction of the metadata by the digital repository (DSpace).

The Word template provided has tagged elements for all the metadata we wish to collect, except for rights administration. After the student finishes writing their thesis in Word, they convert it to tagged PDF using PDF Maker supplied with Adobe Acrobat 5.0, which is installed in our library and lab computers. In order to collect the metadata and write to the metadata stream in the PDF file, we provide a plug-in with Adobe Acrobat 5.0. Students click on this, and click OK after viewing the metadata for verification purposes.

### 3.3 Submission

The submission procedure could be done by a librarian or by the students themselves. We are advocates of author self contributed content and metadata, and we chose to have the students

submit their electronic thesis, just as they would a paper one. While they choose the initial metadata, others, such as librarians, could add supplementary metadata, keywords, and classifications at a later time (see for instance the NeoRef model <http://neoref.ils.unc.edu>). The ability to submit to the DSpace system requires that the submitter be associated with the university. This is controlled by having DSpace use the university authentication system to authenticate the user.

The default submission procedure of DSpace does not support automatic metadata extraction from the content item. With our customization, the first page shown to the submitter is the file uploading page, and our program generates the necessary ETD-MS metadata automatically from the metadata in the PDF file. If the submitter finds something wrong, he/she can easily correct it in the verification stage that follows. After this, the license agreement type is selected, and recorded in the metadata, which completes the user's part of the submission process.

### **3.4 Administration**

The main role of the administrator is to then review submitted ETDs and to approve them (accept into digital library), or to reject them for some reason. If a submitted item is not accepted then the administrator's comments are sent to the original author by email. The author revises the material, and then resubmits. They can also review any submitted version with the administrator.

Additional duties of the administrator of the ETD archive include designating groups that can approve user submissions, and management of user accounts including those of the archive administrators. Individual user accounts can use the local authentication scheme, in our case the established UNC ONYEN system for authentication. DSpace supports customizable authentication systems implemented using a standard interface – such a system will need to be implemented to support authentication of administrators and students. Student and administrator accounts will need to be created, supported, and removed as needed. One drawback from the student's perspective is that they need to create a DSpace login, potentially for the single use purpose of submitting their paper. Student submissions will need to be reviewed and approved before they are committed to the ETD archive. This will require a group with appropriate permissions. The EUL-DSpace extensions developed at the University of Edinburgh may be useful in this regard.

### **3.5 OAI**

DSpace supports the OAI-PMH version 2.0. Currently only unqualified Dublin Core attributes are exported – qualifiers are stripped from the attribute when harvested. It should be possible to add further metadata fields by implementing a crosswalk class as defined by the OAICat framework from OCLC. This should allow us to export the theses specific metadata extensions present in the ETD-MS standard created by Virginia Tech.

### **3.6 Search**

Metadata search is supported by DSpace 1.1 for all objects within the DSpace repository regardless of file type. Full-text search is not currently supported by DSpace. Support for full-text search utilizing a plug-in architecture to support multiple file-types is expected in DSpace

1.2. It would be possible in the interim to add full-text search to DSpace using Lucene (which is part of DSpace). This would require developing filters which could produce plain-text versions of the data types to be indexed.

## **4. DSPACE MODIFICATIONS**

The SILS-ETD DSpace implementation incorporates a number of customizations. The default submission process was extended to support automatic extraction of metadata from tagged PDF files, the default metadata scheme used by DSpace was revised to clarify author/contributor roles, and the software was integrated into the UNC ONYEN authentication system.

### **4.1 Metadata Extraction**

The Microsoft Word template provided to students at SILS uses styles to define sections of the paper that must be completed by students writing their master's papers. This information is used to identify descriptive metadata in the Word document during the conversion to PDF. Once this metadata is embedded in the PDF file, it can be identified and extracted when the document is uploaded to SILS-ETD system by the student. Since this process only works with documents created using the SILS Word template, the extraction process will only be employed when a document has been submitted to the master's paper collection. This process required direct modification of the submission Java servlet and its associated Java Server Page (JSP) files.

### **4.2 Author and Advisor**

DSpace uses the Dublin Core `dc.contributor.author` field as the author of the item, and `dc.contributor.advisor` field as the advisor of the theses. When browsing the items in the DSpace, both names appear on the screen as authors, which we found to confuse users and administrators. We modified the DSpace source code and Dublin Core registry to use the `dc.creator` field to identify authors to remove this potential confusion.

### **4.3 User Authentication**

We customized the DSpace authentication mechanism to use the UNC ONYEN (Only Name You'll Ever Need) system. These IDs are given to all UNC students and act as single sign-on IDs for campus resources. The architecture of the DSpace system still requires students to create accounts with the SILS-ETD system, but integration with the UNC ONYEN system allows the students to use their ONYEN logins and passwords.

## **5. DSPACE SHORTCOMINGS FOR ETDs**

There are a number of places where the currently released version of DSpace (1.1) does not support necessary functions, or functions particular to ETDs, as well as it might. We list these in detail below for informational purposes. None of these are serious enough to make DSpace unsuitable as an ETD repository.

### **5.1 Metadata**

- Only one metadata standard is supported by an installation of DSpace
  - This makes it difficult to support multiple collections with differing metadata needs on a single DSpace installation.

- It is difficult to customize DSpace to implement this function.
- Collection based metadata is necessary in order to specify mandatory or optional metadata elements. This is critical to the success of generating high quality author contributed metadata. Under the default DSpace configuration only the title metadata element is required.
- DSpace has limited capabilities for displaying new metadata
  - When new metadata fields are created, there is no way to specify that they should (or should not) be displayed in the default item view. All changes to the display of metadata must be made in the JSP files themselves, and sometimes Java Tag Library source code.
- Adding support for exporting ETD-MS metadata via OAI requires customizing the OAICat software
  - It would be nice if common metadata formats were supported by DSpace OAI, in particular the ETD-MS.
- The default installation of DSpace 1.1 is not fully OAI PMH 2.0 compatible, and cannot be registered as an OAI provider as a result. (This is fixed in DSpace 1.2).
- Applying Dublin core metadata dc.contributor.author as the author
  - Some universities use dc.creator as the author of their ETDs, and they have to change many places of the source code. It would be helpful to have a consistent representation under DSpace.
- When listing the authors, Dspace also includes the advisor as the authors (dc.contributor.advisor), which is inappropriate for the ETDs.
- Dspace doesn't support automatic metadata extraction for the submission process.

## 5.2 User IDs and Authentication

- Users are uniquely identified by email address
  - UNC students each have an "ONYEN" as a unique campus-wide login. Integrating this mechanism with DSpace was difficult since we needed to create a means of associating this ONYEN with a student user. The options available to us were adding the ONYEN as a field in each student record, or finding a way to derive the ONYEN from an email. Fortunately, students are assigned <ONYEN>@email.unc.edu as their campus email address (though not all students use this address as their primary email) and we utilized this.

## 5.3 General Usability Issues

- An administrator needs to know a specific item number before they can edit the item.
- The collection administrator should have privileges to edit the items, and a more convenient and powerful user interface is needed for the collection administrator.
- After submitting, users can't edit their items before being reviewed by administrators.
- No full-text search is available in DSpace 1.1.
- When reviewing, administrators can only see the short version of metadata list about the item.
- No confirmation messages are generated when submitting or approving the items. This would be helpful to provide some protection for mistakes. For ETDs it is important to

verify some of the metadata (for instance that degree is properly selected from a predefined set of enumerated values).

- After having rejected a submission, the administrator cannot bring the item back up under their login to show the student the errors.

## **6. DISCUSSION**

We have discussed above many of the issues involved, both pro and con, in our choice of DSpace for our ETD repository (and potentially our university digital repository). Many of our concerns are being addressed in revisions to DSpace, to be released in the 1.2 or 2.0 versions. It is a positive step by DSpace to adopt the open source software paradigm. This will likely lead to quick improvements, and a community to sustain these efforts. One challenge that results is how to migrate customizations of these early releases to later DSpace releases. At UNC we have tested and will migrate from DSpace 1.1 to 1.2, when it is released later this year. As part of our plan, we are willing to take more risks with the prototype system in use at the School of Information and Library Science. For the University ETD system, we will more likely wait to adopt DSpace 1.2, or possibly 2.0, without customizations if possible. This means that an important role of our work and others on the cutting edge of using DSpace for ETDs is to help identify shortcomings and to propose and possibly implement needed features for DSpace to support ETDs well. To this end, the NDLTD organization has formed a DSpace subcommittee of the ETD implementation committee, to help address this. For more information contact the chair of the group (Brad Hemminger, [bmh@ils.unc.edu](mailto:bmh@ils.unc.edu)). The goals of this group are to

- Communicate information on using DSpace for ETDs to possible implementers, including instructions, FAQ, links to sites.
- Setup email listservs for working group members and the community.
- Propose changes and additions to DSpace that would facilitate ETDs better.

This group is also now coordinating with the recently established DSpace Thesis SIG formed out of the 2004 DSpace meeting. Web pages detailing information on these efforts are located at <http://etd.ils.unc.edu/etd-dspace/>; more information on ETDs is available on the UNC SILS ETD web pages (<http://etd.ils.unc.edu/>). A listserv has been setup at the NDLTD for ETDs and DSpace ([ETD-DSPACE@listserv.vt.edu](mailto:ETD-DSPACE@listserv.vt.edu)).

While DSpace is the open software application most commonly discussed with respect to ETDs, this is in part because it was one of the first established ones with significant functionality. Other large scale systems like Fedora are quickly evolving and should be evaluated as well. ETDs for universities is an emerging market. We expect that Proquest/UMI will offer attractive turnkey solutions for this market. They have already adapted their thesis and dissertation system to support ETDs, and are quickly working on improving on their offerings. Because Proquest/UMI has a monopoly in this market (in the US), and has long established relationships with most every university, it is likely that most universities will adopt some combination approach that still involves Proquest/UMI. This is likely at UNC, where we plan in the long run to use ProQuest's bepress interface for submission, and to have a copy of the ETDs also kept on our UNC archive (providing free universal access) while the ProQuest service is used to provide a long term dependable archival copy.