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CASE 10

Managing UIC Medical Center Policies Using DSpace

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ISSUE: The University of Illinois at Chicago’s University Archives found that using the DSpace institutional repository software is an effective, if not elegant, solution for the submission, search, and retrieval of a set of vital university records. This case study discusses the process of using the institutional repository to manage the University of Illinois Medical Center’s electronic policies and procedures documents.

KEYWORDS: Administrative records, Institutional repository, Vital records, Metadata, File format issues

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Institutional Context

The University of Illinois at Chicago (UIC) is the largest university in the Chicago area with 25,000 students, 15 colleges, and annual research expenditures exceeding \$332 million. It is part of the state University of Illinois system, with sister universities in Urbana-Champaign and Springfield. Excellence in health science research, education, and clinical care is a central mission of UIC. The health science campus includes the Colleges of Applied Health Science, Dentistry, Medicine, Nursing, Pharmacy, and Public Health. The UIC College of Medicine is the largest medical school in the United States.

The University of Illinois has operated a hospital since 1941, when it acquired the Research and Education Hospital. Today, the University of Illinois Medical Center (Medical Center) is the largest state-owned medical center in Illinois. It includes the hospital (rebuilt in 1980), the Outpatient Care Center, and a number of satellite clinics around the city. The Medical Center discharges more than 17,000 inpatients annually and provides care during 400,000 outpatient and 53,000 emergency room visits every year. The annual budget for the Medical Center is more than \$500 million.

Records of the Medical Center, like the rest of UIC, are Illinois State records and are subject to Illinois public records laws. The UIC University Archivist is responsible for creating retention schedules for these records, and the UIC University Archives is responsible for preserving the records of enduring historic value.

Nature of the Records: Medical Center Policies and Procedures

The Medical Center administration produces policies and procedures (hereafter “policies”) on an ongoing basis. The policies cover such clinical areas as infection control, nursing, and patient care as well as administrative topics, including management of information (medical records) and human resources management. These policies apply to the entire Medical Center, although more detailed policies may be created at the department level. Each policy is updated at least every three years, on a rolling basis, or more frequently when necessary. As a result, several policies are updated every month. Each policy is created as a distinct Microsoft Word document. It is saved using a file naming convention that reflects a code assigned by the Medical Center.

Medical Center policies constitute vital records for the university. They serve as essential tools in the provision of standard, high-quality care in the Medical Center. They are also key documents in the defense of the hospital in civil litigation. The University Counsel’s Office receives several discovery requests for superseded policies every year. For example, a typical request may ask for the policy on “latex allergy and sensitivity” that was in place in June 2003.

Medical Center administrators recognized that each version of a policy needed to be retained permanently. However, they worried that clinicians might refer to outdated

policies if they were maintained in the hospital. As a result, in 2004, the University Archives made an exception to its standard practice of only accessioning inactive, historic records. For the first time, the archives began accepting Medical Center policies into the archives as soon as they had been superseded. Although the superseded policies are no longer used by the clinicians at the hospital, they continue to be well-used by the Office of Legal Counsel.

THE UNIVERSITY OF ILLINOIS AT CHICAGO UIC Medical Center Chicago, Illinois	NO.:	IC 1.03 DATE: March 1998 PAGE: 1 of 2
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**UNIVERSITY OF ILLINOIS AT CHICAGO MEDICAL CENTER
HOSPITAL MANAGEMENT POLICY AND PROCEDURE**

SUBJECT: Hand Washing and Glove Usage

OBJECTIVE

UICMC fosters reduction in patient morbidity and mortality from nosocomial infections through hand washing.

DEFINITION

Hand washing is the application of a liquid with antibacterial properties and the mechanical action of friction to the hands for the purpose of reducing the transmission of infection.

POLICY

UICMC staff will wash their hands when and where appropriate.

The choice of soap shall be determined by the Hospital Material and Supply Committee following the recommendations of the Infection Control Committee.

The soap selected for use in patient care areas shall:

- a. have antibacterial properties
- b. be stored in closed containers to prevent contamination.

Small bars of soap are restricted to patient use only.

The use of hand lotion shall be limited to small personal bottles or shall be dispensed in a way that prevents microbial contamination of the lotion, e.g., pump bottles.

PROCEDURE

At a minimum, hands should be washed:

1. At the beginning of the work day.
2. Before eating.
3. Before handling or preparing food.
4. After handling soiled patient articles.
5. After using the toilet.
6. Before, between, and after patient contact.

Gloves are to be worn during patient care activities when the likelihood of transmission of infection from or to a patient is high. Gloves should be disposed of upon completion of any activity where contamination is likely to occur. Hands should be washed after removing gloves.

Figure 1. An example of a superseded Medical Center policy.

Preservation Environment

Before 2007, UIC Medical Center policies were transferred to the University Archives twice a year on a compact disk that contained the Microsoft Word documents. The policies were stored electronically on a server in the archives. Each time that the Office of Legal Counsel received a discovery request for a policy, Legal Counsel staff would call and ask the archivist to perform a search. This system was time-consuming for the archives, especially given the file naming convention, and the often-vague requests from opposing counsel.

In 2008, the University Archives decided to use the university's institutional repository, administered by the University Library and running in DSpace, to manage the submission, authorizations, search, and preservation of these policies.

DSpace offers a number of advantages:

- It allows Medical Center staff to deposit policies into the institutional repository directly
- It permits Legal Counsel staff to browse and search for policies without the intervention of the Archives
- DSpace's search engine allows for a keyword search of the metadata resulting in easier retrieval in the case of imprecise requests
- Authorizations can be set so that access to the policy documents is limited to specific staff members
- Data is stored on a Library server, regularly backed up to the university's servers, which are, in turn backed, up to tape
- DSpace includes a checksum feature to ensure the authenticity of the documents

Indigo: DSpace at UIC

The institutional repository at UIC is called "Indigo" and is managed by the University Library. It uses the open-source DSpace software developed for this purpose at the Massachusetts Institute for Technology (www.dspace.org). The institutional repository was established, primarily, as a repository for faculty research including data sets, articles, publications and presentations. However, it is not being widely used for this purpose. To date, electronic records that have been accessioned into the University Archives dominate the institutional repository.

The Library is running DSpace release 1.3.2. Aside from customizing the interface to use UIC colors and images, no additional modifications have been made to the basic version of this software.

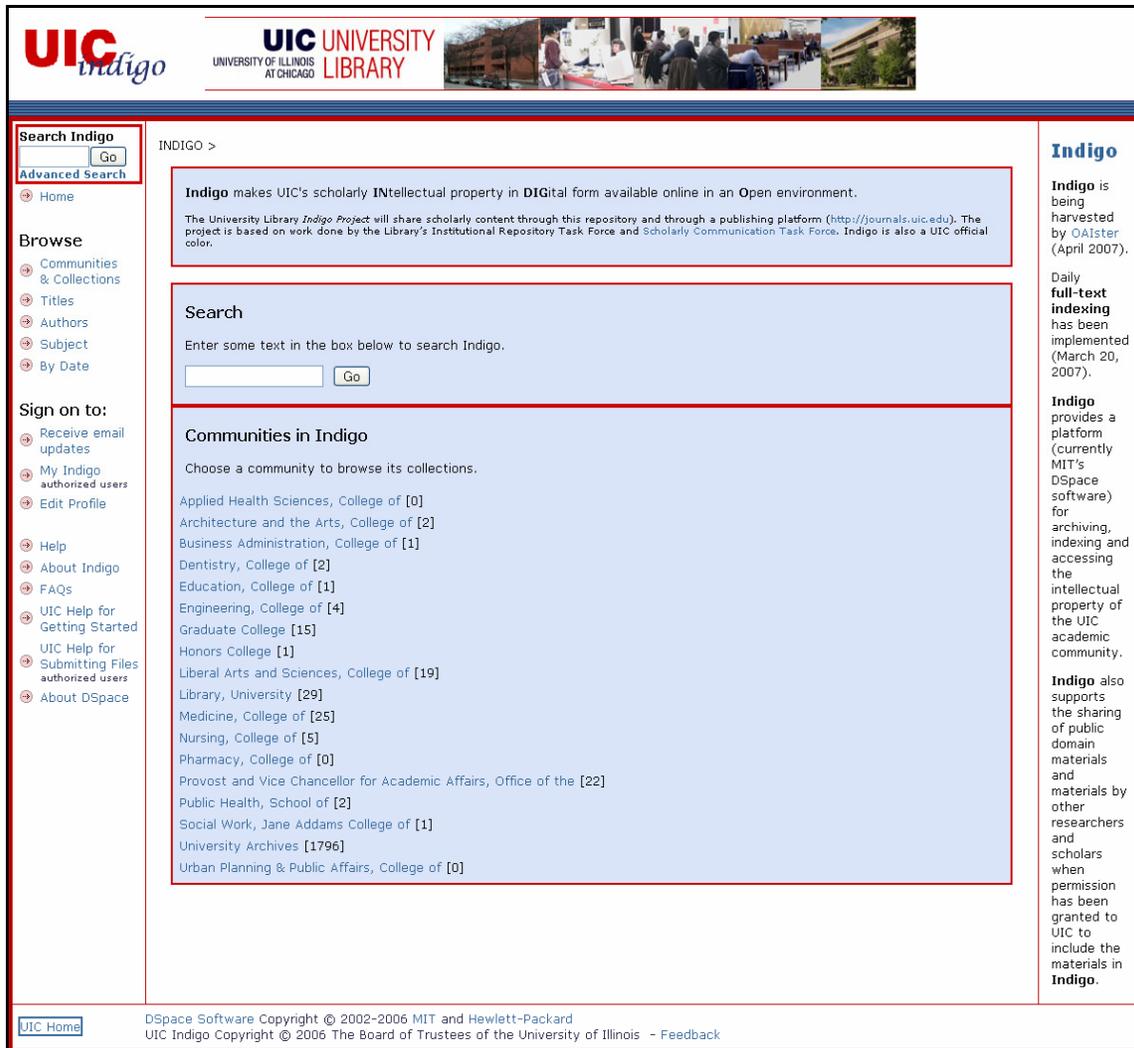


Figure 2. Screen shot of the Indigo home page—the UIC institutional repository.

Submitting Policies to DSpace

The University Archives decided on PDF as the approved file format for Medical Center policies. PDF has the advantage of being harder to manipulate than Word files. As an ISO standard, it is also a good format for long-term preservation.

The archives experimented with converting the policies to PDF/A, the PDF format designed for long-term preservation of electronic documents. However, so many of the policies contained graphics and other unsupported elements, that this proved to be impractical.

After deciding on a file format, and converting the policies from Word to PDF format, the next step was to upload the approximately 1,300 existing electronic policies into the

institutional repository. This proved to be a time-consuming task. UIC's instance of DSpace has no batch-upload capability. As a result, each policy document was uploaded separately, and a distinct metadata record was created for each one. The submission of each record involved clicking through eight separate screens. Since this process was time-consuming, but routine, the archives found it to be a good task for a student worker.

Now that the backlog of superseded policies has been uploaded into DSpace, newly superseded policies are submitted directly by the Medical Center. Since so few policies are superseded each month, this process takes Medical Center staff less than half an hour per month to upload the documents.

Metadata

Records in the University Archives at UIC are arranged according to a record group system that reflects the hierarchical organization of the university. Every record series in the University Archives is assigned a record group number, and a collection-level record is available for every record series in the University Archives holdings database. The database entry for the Medical Center policies directs the user to the institutional repository. The University Archives uses the "Communities and Collections" feature of DSpace to organize the records in the institutional repository. The communities, sub-communities and collections mirror the University Archives record group system, which in turn represents the hierarchy of the university administration.

The Medical Center policies and procedures are in the "University Archives" community, and in the "UIC Medical Center" sub-community (record group #19, see Figure 2). The policies themselves are divided into 16 "collections" based on a category assigned by the Medical Center.

At the item level, the University Archives chose a minimal set of metadata. Each record contains a title, issue date and rescission date for each policy. The title contains the Medical Center code for the policy and the descriptive name of the policy (see Figure 3).

- 006-01-03 -- Architecture and Arts Oral History Project [20 items]
 - ◊ 011 -- College of Liberal Arts and Sciences
 - 011-01 -- Office of the Dean
 - 011-00-06 -- AtLAS [3 items]
 - 011-01-00-02 -- Notes from the Dean [2 items]
 - 011-05 -- Department of Chemistry
 - 011-05-00-03 -- Chem News [4 items]
 - 011-13 -- Department of History
 - 011-13-00-06 -- History Department Newsletter [27 items]
 - 011-15 -- Department of Mathematics, Statistics and Computer Science
 - Mathematicians and Educational Reform Forum [0 items]
 - ◊ 012 -- College of Urban Planning and Public Affairs
 - 012-03-01 -- UIC Oak Park Project Records [5 items]
 - ◊ 016 -- College of Medicine
 - 016-00-20 -- UMED Newsletter [4 items]
 - 016-00-21 -- Dean's Communique [0 items]
 - 016-33 -- Hispanic Center of Excellence
 - 016-33-00-02 -- Publications -- Adelante [4 items]
 - ◊ 019 -- UIC Medical Center
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- Continium of Care [136 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- EC Management of Environment of Care [161 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- GO -- Governance [6 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- Guidelines [90 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- HR -- Management of Human Resources [62 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- IC -- Infection Control [55 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- IM -- Management of Information [205 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- LD -- Leadership [92 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- MA -- Management [41 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- MS -- Medical Staff [10 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- NR -- Nursing [13 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- PE -- Assessment of Patients [9 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- PF -- Patient Education [16 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- PI -- Performance Improvement [4 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- RI -- Rights of Patients [74 items]
 - 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- TX -- Care of Patients [198 items]
 - [Indigo Instructions] [2 items]
 - ◊ 036 -- Center for Research on Women and Gender
 - 036-00-01 -- Building Research Connections [22 items]
 - ◊ 064 -- Office of Public Affairs
 - 064/00/01 -- UIC News Release [23 items]

Figure 3. Detail of the University Archives hierarchy in DSpace.

INDIGO >
 University Archives >
 019 -- UIC Medical Center >
 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- IC -- Infection Control >

Please use this identifier to cite or link to this item: <http://hdl.handle.net/10027/538>

Title: IC103 Rev 2.08 -- Hand and Nail Hygiene/ Glove Usage
Issue Date: Feb-2008
Description: Rescission May 2005 September 2004 December 2002 March 2002
URI: <http://hdl.handle.net/10027/538>

Appears in Collections: 019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- IC -- Infection Control

Files in This Item:

File	Description	Size	Format
IC103 Rev 2.08.pdf		32Kb	Adobe PDF View/Open

Items in Indigo are protected by copyright, with all rights reserved, unless otherwise indicated.

Figure 4. Metadata record for a Medical Center Policy.

Controlling Access

UIC Medical Center policies are not strictly confidential, but they are internal documents not intended for the public. As a result, access is controlled using DSpace's authorizations policies. Each authorized user of the policies in the Medical Center, Archives and Legal Counsel's offices must have a DSpace account. Once the account is established, the DSpace Administrator (in this case the University Archivist) gives this individual access to submit or read the policies (or both). Access to the policies is controlled at the collection level.

Users without authorization can view a list of the policy titles. When unauthorized users try to access an item-level record, they receive an "access denied" message. Without access to the item record, users cannot download the policy document.

INDIGO >
Administer >

Policies for Collection "019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- IC -- Infection Control" (hdl:10027/535, DB ID 69) Help...

Add New Policy

ID	Action	Group		
19263	ADD	MedCtrPolicy_InfectionControl_SUBMIT	Edit	Delete
ID	Action	Group		
19265	DEFAULT_BITSTREAM_READ	MedCtrPolicy_InfectionControl_READ	Edit	Delete
ID	Action	Group		
19264	DEFAULT_ITEM_READ	MedCtrPolicy_InfectionControl_READ	Edit	Delete
ID	Action	Group		
19260	READ	Anonymous	Edit	Delete

Figure 5. Example of access policies for Medical Center policies.

Search and Retrieval

Medical Center policies in DSpace can be accessed in a number of ways. Within each collection, the records can be sorted by title or date. A title sort will arrange the policies alphabetically by the unique code assigned by the hospital (a typical access point for Medical Center staff, see Figure 6). This also groups all of the policies on a single topic together, even if the name of the policy has changed slightly.

INDIGO >
University Archives >
019 -- UIC Medical Center >
019/01/00/01 -- Hospital Management -- Policy and Procedure Manuals -- IC -- Infection Control >

Browse by Title

Jump to: 0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
or enter first few letters:

Showing items 1-21 of 55. [Next page](#)

Issue Date	Title	Author(s)
Feb-2006	IC101 Rev 2.06 -- Infection Control – Role of Committee, Departments, and Staff	-
Mar-2001	IC101 Rev 3.01 -- Infection Control – Role of Committee, Departments, and Staff	-
Mar-2003	IC101 Rev 3.03 -- Infection Control – Role of Committee, Departments, and Staff	-
Mar-2003	IC101 Rev 3.03 -- Infection Control – Role of Committee, Departments, and Staff	-
Mar-1998	IC101 Rev 3.98 -- Infection Control – Role of Committee, Departments, and Staff	-
Feb-2006	IC102 Rev 2.06 -- Management of Infectious Outbreaks	-
Mar-2001	IC102 Rev 3.01 -- Management of Infectious Outbreaks	-
Mar-2003	IC102 Rev 3.03 -- Management of Infectious Outbreaks	-
Mar-1998	IC102 Rev 3.98 -- Management of Infectious Outbreaks	-
Feb-2008	IC103 Rev 2.08 -- Hand and Nail Hygiene/ Glove Usage	-
Mar-2001	IC103 Rev 3.01 -- Hand Antisepsis / Hand Washing and Glove Usage	-
Mar-1998	IC103 Rev 3.98 -- Hand Washing and Glove Usage	-
Jul-2005	IC103 Rev 7.05 -- Hand and Nail Hygiene/ Glove Usage	-
Sep-2004	IC103 Rev 9.04 -- Hand Hygiene/Hand Washing and Glove Usage	-

Figure 6. Example of a collection of policies sorted by title.

The policies can also be sorted by date. DSpace permits a keyword search of the metadata records that can be structured so that a single collection, a community, or the entire institutional repository is searched

Legal Counsel staff members with authorization to view the policies now perform their own searches. This makes accessing policies quick and easy for the Counsel’s Office and requires much less work for the Archives. It also lets the Counsel’s Office make the decision about what policies to produce in the case of a vague request from opposing counsel.

Staff Training

The University Archives conducted two sets of staff training—one for the Medical Center staff person who submits to DSpace and another for Legal Counsel staff members who search the database. The training sessions were crucial to the success of this project because the interface for DSpace (without customization) is not very intuitive. For example, in order to sign in, users need to click on a link called “My Indigo,” which is located midway down a column of links on the left hand side of the home page. In addition to conducting a training session, the University Archivist prepared step-by-step illustrated instruction manuals for submitting and searching the Medical Center policies.

Analysis

The project to use DSpace to manage the Medical Center policies was a success, in part, because the project had the following characteristics:

- There is a small, highly-motivated group of staff members using DSpace to submit and access records.
- The records, though internal, do not contain sensitive data.
- There are a relatively small number of records, and they benefit from an item-level description.

The University Archives would like to expand this project to have units across the campus self-submit their records to DSpace. However, before this could reasonably be accomplished, the university will need to make some improvements to the institutional repository.

Many of the challenges that arose during this project resulted from the fact that UIC is running the DSpace “out of the box” without any customizations that either streamline processes or create a more user-friendly environment.

Submission and Access

One of the primary challenges with using the basic version of DSpace for submission and access to electronic use is the interface that novice users find very difficult to decipher. From the cryptic “My Indigo” sign-in on the first page to the search interface for the collections, new users were invariably confused at least once during the process of submitting or searching for a document.

In addition, the ingest process is cumbersome. Each file must be uploaded separately in a process that involves at least eight mouse clicks in addition to entering the metadata.

The difficult interface did not prove to be a major obstacle in this project because of the small number of participants. It was possible to teach this small group how to use an idiosyncratic system. Furthermore, for these users, the advantages of being able to browse the policies and access them instantly far outweigh the problems associated with a complicated interface. Campus units for whom DSpace is not the answer to an existing problem may not be so forgiving, however. The interface will need to be improved before direct submission to DSpace could be a viable option for the widespread submission of electronic records to the archives.

With the release of Manakin, the customizable interface layer for DSpace, cumbersome interface and processes need not be a problem for all users of DSpace. The Manakin program allows institutions to more easily customize the submission and search processes in DSpace. Institutions that have customized their interfaces using Manakin have been

able to create very user-friendly formats for their institutional repositories.¹ Indeed, Manakin will be the default interface in a future unspecified release of DSpace.²

Managing Authorizations

A drawback to using DSpace for this project was the nature of DSpace authorizations. Institutional repositories are not designed to manage confidential documents, but instead to disseminate research findings to a large audience. As a result, while the software does allow the administrator to limit access to documents, DSpace is not ideal for restricted records.

For example, there proved to be no way to suppress a metadata record from being indexed by web browsers. While members of the public cannot access the policies, the list of policy titles is returned by a search of the institutional repository, or indeed by a general Google search. The Archives has already received several requests to view the policies and procedures from people not associated with UIC.

The stakeholders in this project (the University Archives and the UIC Medical Center) agreed that this was an acceptable level of exposure for these documents, since they are internal, but not confidential. Clearly DSpace would not be an appropriate repository for records that contain genuinely sensitive data (patient information, for example.)

Furthermore, the authentication process for user sign-in is adequate for present purposes but would not be sufficient if there was valuable private information being submitted to the database. The UIC instance of DSpace uses clear text authentication for the user login—making the database more vulnerable to hacking than if the user authentication process was encrypted.

Authenticity, Long-term Preservation, and Support

Since superseded Medical Center policies are used primarily as evidence in lawsuits, ensuring the authenticity of the records is especially important. The checksum feature in DSpace makes this quite easy. A “checksum” is a value assigned to each document whose purpose is to ensure the integrity of the data over time. It is created using an algorithm that calculates the binary values of a group of data. Any change made to a set of data (in this case a document), would result in the calculation of a different checksum value. A file that has not been altered will retain the same checksum value. This feature allows the DSpace administrator to track all changes made to the DSpace record and would allow the university to prove that the document has not been altered since being deposited into the institutional repository.

¹ For example, the Texas A&M University digital repository at <http://repositories.tamu.edu/>.

² Phillips, Scott, Cody Green, Alexey Maslov, Adam Mikeal, and John Legett. “Manakin: A New Face for DSpace” *D-Lib* 13 (11/12): 2007. Accessed at <http://www.dlib.org/dlib/november07/phillips/11phillips.html>.

Medical Center policies are scheduled for permanent retention and need to be maintained in a trustworthy repository. At present, the UIC institutional repository is one of the most trustworthy options for long-term storage of electronic records available on campus. The server is reliable and is backed up regularly to tape by the campus's Academic Computing Center. The university administration and the University Library have both committed to maintaining the institutional repository in the long term. Furthermore, there is a large DSpace user community including many large universities. This suggests that the software will continue to be supported by the open-source community.

Even though the institutional repository is the most trustworthy system available to the UIC University Archives, it does not meet the Trusted Digital Repository standard.³ The institutional repository, for example, lacks a succession plan that would ensure that the repository would continue should the current source of funding dry up. Clearly, the campus stakeholders in the institutional repository will need to address some of these deficiencies before it can be considered a permanent solution to the problem of long-term storage of university records.

Conclusion

Although it may not be the perfect solution to the challenge of managing electronic records, the institutional repository is a useful tool for some small collections of electronic archival records. For the UIC Medical Center policies—records that are deposited regularly and need to be accessed immediately—DSpace proved to be a good solution. The Medical Center policy project met all of its objectives: Medical Center policies are now stored in a reliable, secure storage environment; the University Archives has been removed as the middle-man in the submission and retrieval of policies; and the Office of Legal Counsel now has instant, 24-hour access to all of the Medical Center policies produced since 2000.

One of the most important outcomes of this project has been the improved relationship between the Archives and two important campus stakeholders. The staff members at the Medical Center and the Office of Legal Counsel have been very pleased with the improved access to Medical Center policies. To these two campus units, at least, the University Archives has gone from being a gatekeeper—or worse an impediment—in the acquisition of important information, to being an office that is responsive to the needs of its constituents and that facilitates access to university records.

³ The Trustworthy Repository Audit and Certification Checklist (TRAC), the relatively new standard for certifying the long-term viability of a digital repository, is available from the Center for Research Libraries at <http://www.crl.edu/content.asp?11=13&12=58&13=162&14=91>.