

Knowledge Bank Implementation Plan and Support Request

Submitted to Ed Ray, Executive Vice-President and Provost,
by Joseph Branin, Director of Libraries and Chair,
Knowledge Bank Planning Committee
December 17, 2002

Progress since June 2002 Report

Since the original Knowledge Bank proposal was submitted to the Distance Learning/Continuing Education Committee in June 2002, interest in the initiative has increased notably. Additional OSU faculty and staff have become participants in the planning process. OhioLINK has become an active partner as well and brings its experience in building the Digital Media Center and its important statewide perspective to this project. (See Attachment A for a list of current members and partners in the Knowledge Bank Project.)

We have made progress on a number of action items including creating an inventory of OSU digital initiatives and assessing how the Knowledge Bank will benefit our faculty and students. We see many advantages to carrying out the project. It offers a means of leveraging who we are as one unified institution and a way to create a scholarly Web of trusted content.

The institutional repository concept has become a topic of national conversation, and the OSU Knowledge Bank Project, along with similar projects at MIT and the University of California, is viewed by many as a pioneering effort in implementing this concept. The OSU Knowledge Bank project has been reported on in *The Chronicle of Higher Education* (“Superarchives' Could Hold All Scholarly Output” by Jeffrey R. Young) and in a new Association of Research Libraries' paper on institutional repositories (http://www.arl.org/sparc/IR/IR_Final_Release_102.pdf). OCLC, a partner in the development of the Knowledge Bank, is using this project as an example of a new and promising information technology application in its national and international communications.

Malcolm Litchfield, Director of the OSU Press and a member of the Knowledge Bank Planning Committee, wrote an editorial in the June 28, 2002 issue of *The Chronicle of Higher Education* about the Press's need for an institutional repository approach that has been widely cited. In October in Washington D.C., Joe Branin, Director of Libraries, spoke about the Knowledge Bank at a national workshop on institutional repositories that was attended by 300 academic librarians and information technologists. Sally Rogers, the Libraries' Assistant Director for Information Technology and a member of the Knowledge Bank Planning Team, has had an article about the project accepted for publication in *Portal: Libraries and the Academy*. Two members of the Libraries' staff have made presentations on the Knowledge Bank at professional meetings in Charleston, South Carolina, and in San Antonio. Susan Metros, Deputy CIO, and Joe Branin have been invited to submit a presentation proposal on the Knowledge Bank for the upcoming Midwest EDUCAUSE conference and will submit it to the national conference as well. Finally, OSU has agreed to be a partner in a Mellon Foundation grant with MIT to test their

new institutional repository technical platform called DSpace, which just went live in November and has been featured in many media communications.

Clearly, with the Knowledge Bank we have hit a chord of national interest. The time appears right to exploit this interest and excitement about bringing a knowledge management system to higher education by increasing the pace and commitment to implementation.

Major Activities of Focus for 2003/2004

To maintain the momentum of the Knowledge Bank initiative and continue development, the Planning Committee has identified the following major activities for 2003/2004.

DSpace implementation and testing

OSU is one of five institutions participating in a year-long Mellon-funded DSpace federation project. We anticipate that this involvement will offer us the opportunity to experiment with faculty contribution of digital intellectual content to one or more OSU repositories using the DSpace open source software as a default platform. Development of federated access to these and other distributed repositories within and outside OSU also will be a priority. (A schematic and description of the proposed technical architecture are included as Attachments B and C.)

Federated search and retrieval

Successful search and retrieval of Knowledge Bank content will depend on the quality of the metadata that is included for each digital object in the same way that successful search and retrieval in the Libraries' online catalog depends on the quality of the catalog records created for our books and journals. Just as we have followed established standards in creating the library catalog, we will need to be sure that we follow emerging national standards for metadata in creating the Knowledge Bank. Following standards, such as those being promoted by the Open Archives Initiative, will allow interoperability among digital repositories and enable federated (unified) access to scholarly content stored in multiple locations. The goal is to use a powerful search engine to gather distributed digital content into a scholarly portal to meet the needs of the OSU faculty, staff, and students.

Encourage and assist faculty in creating, sharing, and preserving academic digital assets

Faculty buy-in to the Knowledge Bank concept will determine its success. The Knowledge Bank must meet instructional and research needs that act as incentives to participate. For example, faculty who lack time to prepare an entire online course could create components that could be organized and managed within the Knowledge Bank as building blocks for courses in multiple disciplines. Interesting new types of datasets being generated by OSU researchers could be made available for collaborative work through the Knowledge Bank.

Much of the instructional and research "content" that will become part of the Knowledge Bank exists in the form of media asset collections: 35mm slides, video and audio tapes, digitized images and streaming media files. The Web Media Collective at OSU has already established a framework that enables faculty to organize, use, and share these kinds of resources with peers and students at Ohio State and beyond. As part of the Knowledge Bank initiative, the Web

Media Collective's primary role will be to continue working with individual faculty, departments and curricular groups to gather, process and catalog items that will be included in the Knowledge Bank system.

The Knowledge Bank project will build on and strengthen work already underway at OSU by the Web Media Collective to create and coordinate rich media assets in the arts and humanities. The Digital Union proposed for the Science and Engineering Library will provide space, equipment, and staff services to aid all faculty in their creation and use of digital assets in teaching and research.

Digital Union

The Offices of the CIO and the University Libraries are developing plans for a Digital Union that could be incorporated into the Science and Engineering Library. The Digital Union will provide space and support services for the operation of the Knowledge Bank. It would also be a place for faculty, students, and their cross disciplinary teams to conduct research using new and emerging technologies. The Digital Union would present cutting edge information technology environments through partnerships with hardware, software, and furniture vendors as well as provide a multimedia lab and learning technology support services. When fully implemented, the Digital Union will include:

- Advanced public computer lab open 24 x 7
- Multimedia development lab to provide support for faculty and students in designing and developing rich media digital assets for instruction
- Digital Union center that showcases new information technology, equipment, furniture
- Office, work, and training space for the Knowledge Bank Project and technology support staff
- Space to explore new modes of communication and to contain video-conferencing capabilities for faculty and students
- Wireless and mobile training facilities
- Graduate student e-dissertation and thesis preparation support center
- Adaptive technologies demonstration and support lab (sponsored by the Adaptive Technologies of Ohio)

Faculty research directory

The College of Medicine and the OSU Research Foundation (OSURF) are working on a prototype of a faculty research directory that builds on the Community of Science (COS) directory. Information about scholars at OSU could be extracted from COS and combined with other OSU data sources to create an expertise directory and reports of scholarly activity more easily. The directory would also simplify the maintenance of individual profiles when faculty move from one university to another.

Learning object management

With a high level of experience and expertise in instructional technology, OSU is positioned, we believe, to have a head start in the area of learning object management. Susan Metros is planning a Learning Object Summit for Winter Quarter to bring key players together to inform Knowledge Bank direction and development in managing this type of content. In addition, OSU

has been selected to host a National Learning Information Infrastructure (NLII) focus session on learning objects in October 2003.

OSU digital resources inventory

We have begun identifying digital initiatives already underway in colleges and departments to create an inventory of OSU digital projects as a starting point for identifying content that would be appropriate for inclusion in the Knowledge Bank.

This online inventory can be viewed at <http://dlib.lib.ohio-state.edu/DISC/academics.php>.

Intellectual property policy development

Faculty are concerned about ownership of the digital intellectual content they create and who has the right to access it. There are complex intellectual property and rights management issues that must be addressed for the Knowledge Bank to be successful in the long term. David Winwood, the new Associate Vice President for Knowledge Transfer & Commercialization in the Office of Research, will have a leadership role as the University addresses these important issues.

Funding and Support Request

(Note: a detailed budget request is included as Attachment D)

Personnel

We have assembled an excellent group of players to lead the Knowledge Bank initiative on a volunteer basis through their participation on the Planning Committee over the last four months. However, the level of activity associated with the project has reached the point where some dedicated staff will be needed to carry the agenda forward at a more rapid and sustained pace.

The first priority is for a project director with a knowledge management background, interest and enthusiasm who can engage others in the development process and get things done. In addition we need a metadata specialist to establish standards and conduct training, a technology support person to handle infrastructure issues, and some graduate student assistants to aid them. These personnel are needed for the startup phase (1-2 years) to get the project implemented and established. Ultimately, management and ongoing operations of the Knowledge Bank will need to be mainstreamed into the Libraries and the CIO's organization.

The Project Director for the Knowledge Bank will report to the Director of Libraries and to the Chief Information Officer. On an operational basis, the Project Director will coordinate his or her work with the Deputy CIO/Executive Director for Educational Technology and Distributed Learning, and with the Libraries' Assistant Director for Information Technology. The Knowledge Bank Planning Committee, which represents a cross section of constituents served by the Project, will become the Advisory Committee to the Project Director. (See Attachment A for a list of committee members.) Working groups will be formed to assist the Project Director with focused activities of implementation. Knowledge Bank staff will report to the Project Director.

Space

Areas within the Science and Engineering Library will be reorganized and refurbished to accommodate a 24x7 advanced public lab, a multimedia development center, a Digital Union, and new office space for the Knowledge Bank and technology support staff.

Equipment

The exact needs for hardware and software to support the Knowledge Bank are not known, but will become clear as the project evolves. We will use existing technical infrastructure capacity in the Offices of the CIO, the University Libraries, and OhioLINK, and add equipment and software only as needed.

We will need equipment and furniture for the Digital Union services in the Science and Engineering Library. The CIO office will be contributing some equipment from the multimedia lab in Denney Hall and the videoconferencing facility in Baker Systems for the Digital Union.

Web Media Collective

As the Knowledge Bank moves into its first phase of technical specifications and design, it is critical to keep content digitization and cataloging progressing steadily at the same time. The design of a system as broad and complex as the Knowledge Bank must be based on existing content and actual needs, not assumptions based on best guesses. The Web Media Collective has helped several groups in Arts, Architecture and Humanities organize their efforts and create on-line collections that can be shared, collections that will ultimately become part of the Knowledge Bank. Support is being requested to cover personnel and overhead costs to allow the Web Media Collective to continue its work with individual faculty, departments and groups.

Partnerships and Grant Funding Opportunities

The Offices of the CIO and the University Libraries have been fortunate to engage OhioLINK, OCLC and Chemical Abstracts in the planning phase of the Knowledge Bank. We will continue these partnerships in the implementation phase of the Project and continue to call on our partners for help with expertise and resources.

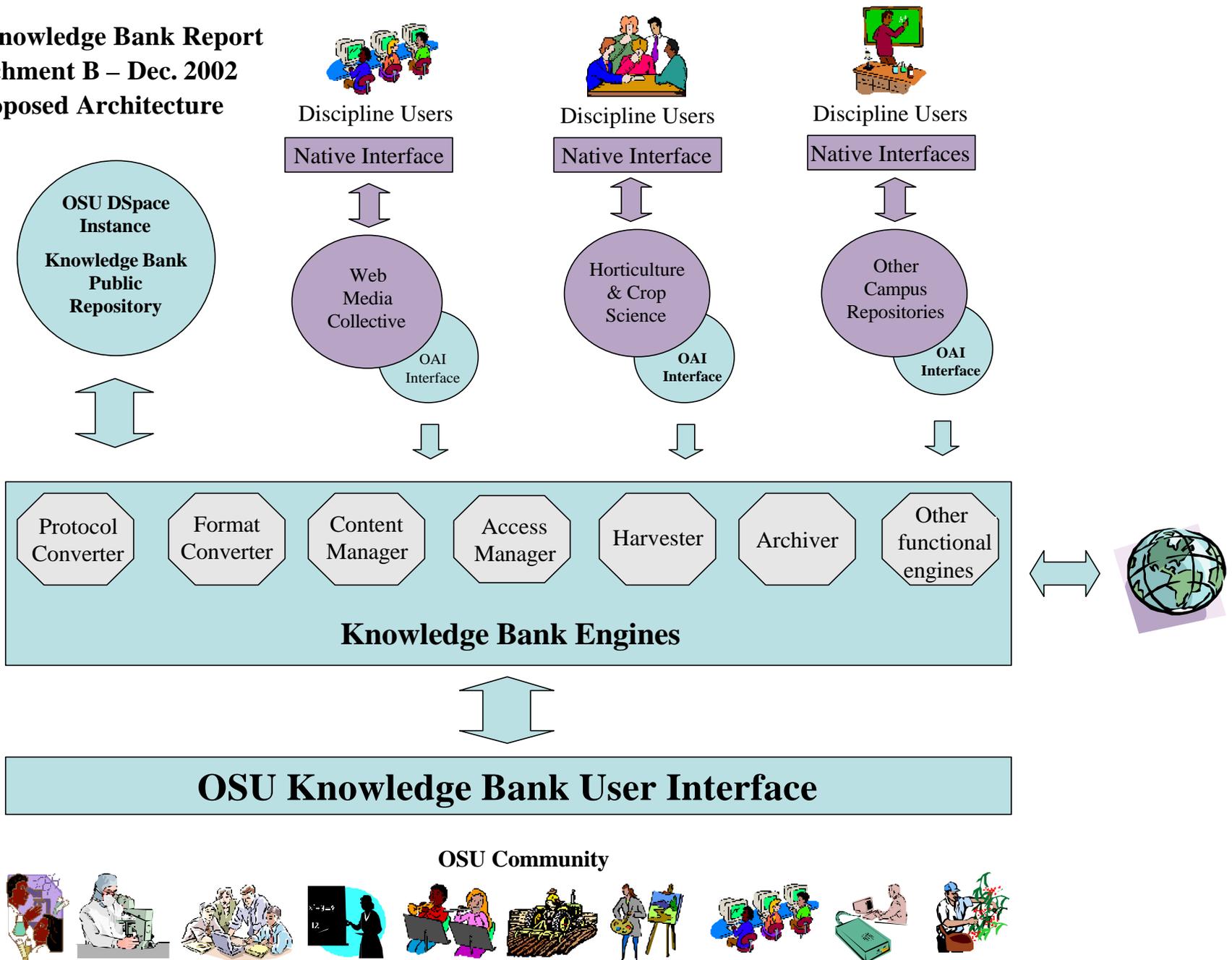
With the national attention the Knowledge Bank concept has generated, there should be local and national funding opportunities available to us. We will make every effort to uncover and exploit funding opportunities with technology vendors, local and national foundations, and State and national government agencies.

**OSU Knowledge Bank Report - December 2002
Attachment A**

Knowledge Bank Planning Committee and Work Group Members (2002)

Bauer, Charly	OhioLINK
Boomgaarden, Wes	University Libraries
Branin, Joe	University Libraries
Carver, Blake	University Libraries
Couch, Nena	University Libraries
Craft, Sheila	Office of Academic Affairs
Dagefoerde, Diane	College of Humanities
Dempsey, Lorcan	OCLC
Dennis, Michael	Chemical Abstracts
Donovan, Maureen	University Libraries
Escovitz, Alan	Offices of the CIO
Green, Cable	College of Pharmacy
Kalal, Bob	Offices of the CIO
Khurma, Anand	College of Pharmacy
Kroll, Susan	Health Sciences Library and Biomedical Informatics
Litchfield, Malcolm	University Press
Logan, Susan	University Libraries
Mason-Middleton, Cheryl	University Libraries
McCandless, Pat	University Libraries
Metros, Susan	Offices of the CIO
Rhimes, Ilee	Offices of the CIO
Rhodus, Tim	College of Food, Agricultural, and Environmental Sciences
Rogers, Sally	University Libraries
Russell, Beth	University Libraries
Sawyers, Betty	University Libraries
Starr, Sarah	OSURF
Strauber, Chris	Kent State University School of Library & Information Science (project intern)
Vaughan, Will	Office of Technology Partnerships
Westman, Stephen	University Libraries

**OSU Knowledge Bank Report
Attachment B – Dec. 2002
Proposed Architecture**



OSU Knowledge Bank Report – December 2002
Attachment C
Proposed High-Level System Architecture

Basic functional needs for a knowledge bank include:

- A user interface to support submitting and describing knowledge objects
- A storage subsystem to maintain the digital knowledge objects and metadata
- An infrastructure to provide:
 - Indexing
 - Identification
 - Content and system management
 - Exposure, including external search and retrieval
 - Archiving
 - Protocol and format transformations
 - Access management including user authorization and authentication
- A user interface to support intelligent access, retrieval and synthesis

The OSU Knowledge Bank was originally conceptualized during work by the university's Distance Learning/Continuing Education Committee. The concept evolved to include a repository for OSU's intellectual capital along with technology enablers to support portal access, digitizing, indexing, and so forth. Content evolved from text and images to include the full range of digital assets including most recently learning objects.

It was clear that one specific need would be a large and robust digital repository. While beginning work to refine the OSU Knowledge Bank concept, we surveyed the campus to identify existing campus digital repositories and retrieval systems. These systems typically maintain digital objects and metadata and provide user interfaces and services targeted to specific, often discipline-based, user audiences. There are a number of such projects and systems including the Web Media Collective, combining resources from several departments, and Professor Rhodus's web-based Horticulture and Crop Science Information bank

These existing repositories hold substantial amounts of OSU's intellectual property and serve their user constituencies well. One approach to an OSU knowledge bank would to leverage the presence of the existing and even future discipline-based OSU digital repositories by including them in a federation with a public campus community repository. MIT's DSpace provides the basis for such a public repository and OSU is included in a Mellon Foundation grant to federate multiple instances of DSpace in higher education. DSpace has been released as open-source and uses OCLC's open source Open Archive Initiative (OAI) software to exchange objects and information.

OSU can build the Knowledge Bank on a three-level federated model. On the first level, the public repository can be a large instance of DSpace, running perhaps on the campus enterprise server under the LINUX operating system. Or the public repository might be managed by OhioLINK as part of a statewide higher education effort. This large, public repository would be federated on the same level with other campus digital repositories through an OAI Toolkit

developed for use by the existing repositories. The toolkit would not interfere with existing discipline-specific interfaces, but would work in a complementary manner to expose the repository's content and metadata to the federation.

On another level, the Knowledge Bank would then need a locally developed browser-agnostic web-based user interface. The interface would provide a portal-like environment with intelligent access to OSU intellectual property, including licensed material held off campus. It would also provide tools for user submission and description of new digital objects.

The Knowledge Bank would also need a series of infrastructure engines. These engines would be locally developed, developed from open source models, or purchased. They would provide infrastructure services such as metadata harvesting, metadata and content exposure, archive services, access management including authorization and authentication and perhaps billing, content and version management, and protocol and format conversions. The engines would exist in a middle layer between the repository level and the user interface level and would communicate with both to provide functions as needed. The engines would also communicate with each other for support services and with other federated entities and authorized OAI-compliant systems as well as content providers outside OSU.

With OSU's high-speed data network, this standards-based architecture can be physically distributed about campus, or even more widely in the state, as needed and can be implemented on heterogeneous computer platforms. Repositories and both user interface and infrastructure servers can be built and located however and wherever they make the best economic and organizational sense. The infrastructure functional engines could be locally-developed and hosted, adapted from existing software and locally-hosted, developed and/or hosted in partnership with allied organizations such as OhioLINK and OCLC, or outsourced.

DETAILED FUNDING REQUEST

OSU Knowledge Bank Report - December 2002 Attachment D

STAFFING

	2003				2004			
	Base	Benefits	Fee auth.	Total	Base	Benefits	Fee auth.	Total
Project Director	\$60,000.00	\$18,000.00		\$78,000.00	\$62,400.00	\$18,720.00		\$81,120.00
Metadata Specialist	\$52,000.00	\$15,600.00		\$67,600.00	\$54,080.00	\$16,224.00		\$70,304.00
IT Support Specialist	\$48,000.00	\$14,400.00		\$62,400.00	\$49,920.00	\$14,976.00		\$64,896.00
WMC IT Support (0.5 FTE)	\$19,000.00	\$4,940.00		\$23,940.00	\$19,760.00	\$5,928.00		\$25,688.00
Graduate Assistant (0.5 FTE)	\$10,800.00	\$140.40	\$8,820.00	\$19,760.40	\$11,232.00	\$146.02	\$8,820.00	\$20,198.02
Graduate Assistant (0.5 FTE)	\$10,800.00	\$140.40	\$8,820.00	\$19,760.40	\$11,232.00	\$146.02	\$8,820.00	\$20,198.02
Annual staffing cost				(1st year) \$271,460.80				(2nd year) \$282,404.03

SPACE

SEL collection reallocation	\$25,000.00
Space renovation	\$100,000.00
Office construction	\$35,000.00

One-time space cost \$160,000.00

EQUIPMENT

Institutional repository pilot

Hardware/digital storage \$10,000.00

< Cost estimate for a full implementation of an OSU institutional repository using MIT's DSpace architecture as a model:
\$175,000 one-time, \$71,000 annual

WMC server maintenance

\$10,000.00

< To cover two years (\$5,000 annual cost)

Digital Union

Personal computing equipment \$170,000.00
 Server and network infrastructure \$22,500.00
 Software \$30,000.00
 Multimedia and other equipment \$45,000.00
 Furniture \$20,000.00

< Preliminary estimate of startup costs; Regents instructional equipment funding may also be requested for this or additional equipment

One-time equipment cost \$307,500.00

NOTE:

< MIT estimates annual cost to maintain DSpace at \$285,000 (\$225,000 staffing; \$25,000 operating expenses; \$35,000 system equipment escrow)