Use, Users, and User-Centered Design & Evaluation in the Digital Library

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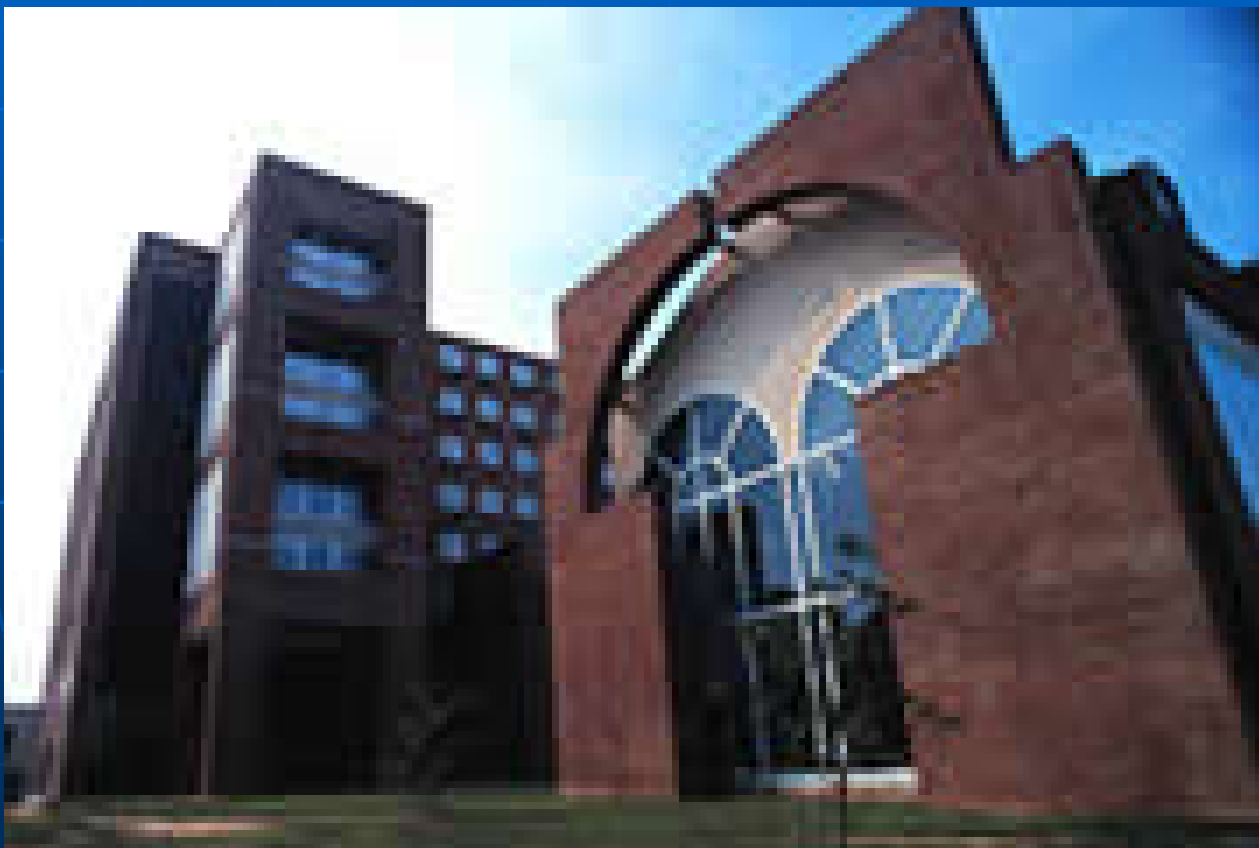University of North Carolina
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Manning Hall
Home of the
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Davis Library

The Old Well

The Old Well in April

The Old Well, c. 1875

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UNC Library at Chapel Hill

Thank You

- Thank you Costantino, Tiziana, Vittore and Yannis for this opportunity to share in the 3rd DELOS Summer School on Digital Library Technologies.

This Morning's Session

- The digital repository environment.
  - What is a digital library?
  - What is a digital archive?
- Traditional library perspectives.
- Why users are important.
- Studying information needs.
- Information seeking behaviors.
- User-centered evaluation.

The Digital Repository Environment

- Digital libraries are just one type of digital information store.

- Digital archives.

- Digital museums.

- Planetariums, herbariums, aquariums, & many cultural institutions.

- Online bookstores.

What Is a Digital Library?

What Is a Digital Library?

- Collections of digital objects.
  - Library of Congress – American Memory.
  - Documenting the American South.
  - Tate.
  - Vatican Museums Online.
  - Los Alamos Library Without Walls.
- Organization underlying the collections.
- Computer system underlying the collections. (NSF DLI)

Perspectives on DLs

- Computer science, engineering, and research views and definitions
  - "content collected on behalf of user communities" – Borgman, 1999
- Librarian or LIS perspective
  - Focuses on services and the DL as an institution.

Borgman, 1992

- a National Electronic Library is
  - a service;
  - an architecture;
  - a set of information resources, databases of text, numbers, graphics, sound, video, etc.; and
  - a set of tools and capabilities to locate, retrieve and utilize the information resources available.

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Clifford Lynch

- Lynch (1993) was prescient in noting that the term `digital library' is problematic because it obscures the complex relationship between electronic information collections and libraries as institutions.

Lynch, 1993 OTA Briefing Paper

- Access to information in a networked environment is an area that is often treated very superficially.

- There is a tendency to incorrectly equate access to the network with access to information; part of this is a legacy from the early focus on communications infrastructure rather than network content.

Lynch on Information Equity, 1993

- In the new "information age" information will not necessarily be readily accessible or affordable;

- If information is to become the new coin of the realm, there is no doubt in my mind that there will still be the rich and the impoverished-though even the impoverished may have a relatively high standard of access to information, compared to today's information poor in the US, or tomorrow's information poor globally.

Clifford & Garcia-Molina, 1995

- Digital libraries were viewed as systems providing a community of users with coherent access to a large, organized repository of information and knowledge…

- The ability of the user to access, reorganize, and utilize this repository is enriched by the capabilities of digital technology; …

IEEE - 1994

- A DIGITAL LIBRARY is an assemblage of digital computing, storage, and communications machinery together with the content and software needed to reproduce, emulate, and extend the services provided by conventional libraries based on paper and other material means of collecting, cataloging, finding, and disseminating information.

IEEE - 1994

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IEEE, 1994

- A full service digital library must accomplish all essential services of traditional libraries and also exploit the well-known advantages of digital storage, searching, and communication.

Bishop & Starr, 1996

- Some sense of a collection, with some kind of organization;
  - the content may be partly physical and partly electronic, or entirely electronic;
  - a collection that is not entirely bibliographic or exclusively a set of pointers to other material, it must contain some `full-form online material' and may be in a variety of formats

Bishop & Starr, 1996

- a goal exists to link "audience, group, patron, or community with attributes of the collection," whether in the manner that physical collections are selected for an audience or in the sense of the virtual space that can be created around a community.

Lesk, 1997

- A Digital Library is simply "a collection of information which is both digitized and organized."

Borgman, 1999

- The content of digital libraries includes data, metadata that describe various aspects of the data (e.g., representation, creator, owner, reproduction rights), and metadata that consist of links or relationships to other data or metadata, whether internal or external to the digital library.

Borgman, 1999

- Digital libraries are constructed - collected and organized - by [and for] a community of users, and their functional capabilities support the information needs and uses of that community.

- They are a component of communities in which individuals and groups interact with each other, using data, information, and knowledge resources and systems.

- In this sense they are an extension, enhancement, and integration of a variety of information institutions as physical places where resources are selected, collected, organized, preserved, and accessed in support of a user community.

Marchionini & Fox, 1999

- Digital library work occurs in the context of a complex design space shaped by four dimensions: community, technology, services and content."
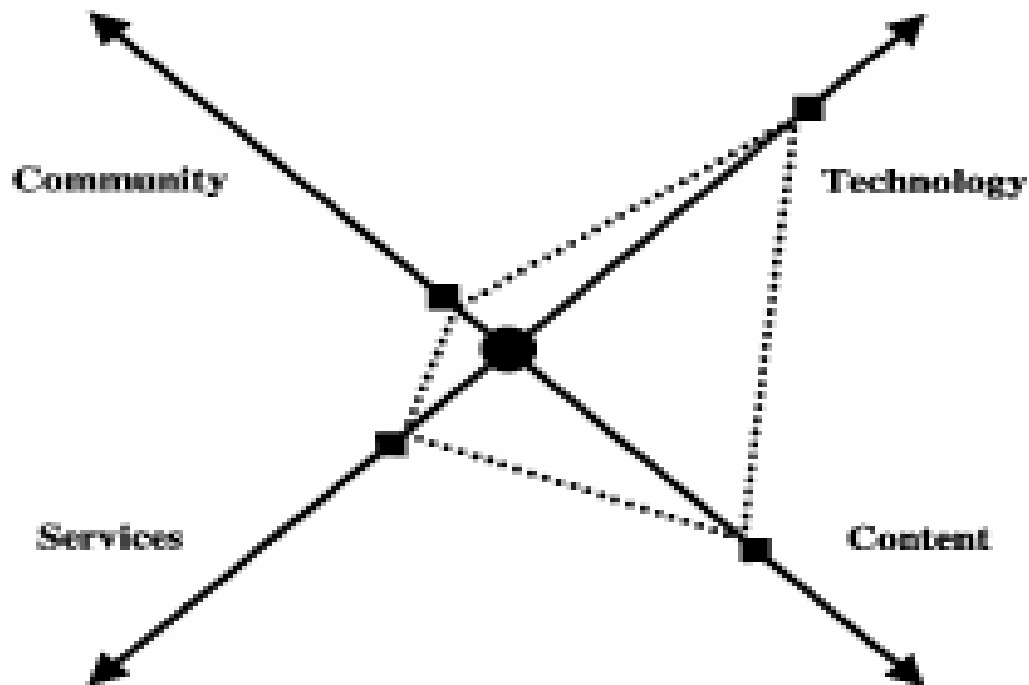
Marchionini & Fox

Fig. 1. Digital library design space dimensions.

Technology Dimension

- Technology serves as an engine pushing the field, leading to continual shifts in solutions that coalesce around what is necessary, desirable and feasible.

- DL researchers have leveraged technical progress in networking, storage and retrieval, multimedia representation and user interface design to link people to DLs and DLs to each other.

Content Dimension

- Content is often what one thinks of first in a library - books, journals, maps, art, music and innumerable other forms and genres of expression that may have representations either outside computers, inside them or in both versions.

- DL research has made good advances in digitization and representing content and considerable work is underway to leverage metadata to transparently connect people to content in different DLs.

Services Dimension

- Services reflect the functionality afforded by systems serving the community of users. Access services that facilitate search and browsing have been central to DL research thus far...

Community Dimension

- "Community" reflects social, economic, political, legal and cultural issues.

- This includes the needs, information-seeking behaviors and attitudes of the individuals within a community.

- This dimension is exceedingly complex and has to date received the least amount of attention.

Marchionini & Fox

- It may be more accurate to consider digital libraries as `middleware',

- One might consider digital libraries as "super information systems," charged with "pushing the envelope" to focus on a unified and activity-supportive treatment of user needs.

Simmons Digital Library Class DL Characteristics,1999

- serve a defined community or set of communities
- may not be a single entity
- are underpinned by a unified and logical organizational structure
- incorporate learning as well as access
- make the most of human ("librarian") as well as technological resources
- provide fast and efficient access, with multiple access modes
- provide free access (perhaps just to the specified community)

Simmons DL Class
DL Characteristics

- own and control their resources (some of which may be purchased)
- have collections which are large, and persist over time
- are well organized and managed
- contain many formats
- contain objects, not just representations
- contain objects which may be otherwise unobtainable
- contain some objects which are born digital

IFLA

- Digital libraries are the digital face of traditional libraries that include both digital collections and traditional, fixed media collections. So they encompass both electronic and paper materials.

- Digital libraries will also include digital materials that exist outside the physical and administrative bounds of any one digital library.

IFLA

- Digital libraries will include all the processes and services that are the backbone and nervous system of libraries. However, such traditional processes, though forming the basis digital library work, will have to be revised and enhanced to accommodate the differences between new digital media and traditional fixed media.

IFLA

- digital libraries ideally provide a coherent view of all of the information contained within a library, no matter its form or format.

- digital libraries will serve particular communities or constituencies, as traditional libraries do now, though those communities may be widely dispersed throughout the network.

- digital libraries will require both the skills of librarians and well as those of computer scientists to be viable.

Cleveland, 1998

"One thing digital libraries will not be is a single, completely digital system that provides instant access to all information, for all sectors of society, from anywhere in the world. This is simply unrealistic…:

Cleveland, 1998

- Instead, they will most likely be a collection of disparate resources and disparate systems, catering to specific communities and user groups, created for specific purposes. They also will include, perhaps indefinitely, paper-based collections.

Cleveland, Interoperability

- Further, interoperability across digital libraries-of technical architectures, metadata, and document formats-will also only likely be possible within relatively bounded systems developed for those specific purposes and communities.

Lynch on Hybrid Libraries

- "The comprehensiveness and value of the collection accessible through a digital library system can be strengthened by the ability to integrate materials in digital formats that have not been well-represented, easy to access, or effectively usable in traditional library collections, such as multimedia, geospatial data, or numerical datasets. There is, in reality, a very strong continuity between traditional library roles and missions and the objectives of digital library systems".

Lynch on Hybrid Libraries

- Digital libraries …, for the foreseeable future need to span both print and digital materials and that the central issue was to provide a coherent view of a very large collection of information.

Lynch

- In this sense, an emphasis on content solely in digital format is too limiting. Really, the objective is to develop information systems providing access to a coherent collection of material, more and more of which will be in digital format as time goes on, and to fully exploit the opportunities that are offered by the materials that are in digital formats.

DELOS 2001 Workshop
Digital Library Research Directions

- *Digital libraries should enable any citizen to access all human knowledge any time and anywhere, in a friendly, multi-modal, efficient, and effective way, by overcoming barriers of distance, language, and culture and by using multiple Internet-connected devices.*

Digicult Report, 2002

- A major question (mostly for scholars) therefore is, how far the concept of the "digital library" will expand into a digital information service centre, i.e. also include and come to terms with the emerging new toolboxes of knowledge workers and the new forms and relationships of their products.

No Preservation Dimension

- Only recently much work in the area of long-term preservation of digital libraries.
  - ERPANET
  - Invest to Save
  - It's About Time
  - DIGICULT.

Digital Preservation

- "Digital preservation is the ability to keep digital documents and files available for time periods that can transcend technological advances without concern for alteration or loss of readability."
(The Association for Information and Image Management)

Digital Preservation

- "Digital preservation refers to the series of managed activities necessary to ensure continued access to and preservation of digital materials." (RLG/OCLC Report)

Task Force on Digital Archiving, 1996

- "… to ensure that no valued digital information is lost to future generations, repositories claiming to serve an archival function must be able to prove that *they are who they say they are* by meeting or exceeding the standards and criteria of an independently-administered program for archival certification *[emphasis added]*"
- *-- ArchTF Report, p.8*

Trusted Digital Repositories

- May 2002 report by RLG and OCLC.
  http://www.rlg.org/longterm/repositories.pdf

- Sun Center of Excellence for Trusted Digital Repositories.
  http://www.coe.hu-berlin.de/

- Digital Curation Centre.
  http://www.dcc.ac.uk/about.html

OAIS

- Trusted digital repositories built on OAIS model.
- OAIS
  - Open Archival Information System
  - is a conceptual framework for an archival system dedicated to preserving and maintaining access to digital information over the long term.
  - Developed by NASA
    http://ssdoo.gsfc.nasa.gov/nost/isoas/

Institutional Repository Movement

- DSpace. http://www.dspace.org
  - "DSpace is a groundbreaking digital library system that captures, stores, indexes, preserves and redistributes the intellectual output of a university's research faculty in digital formats."
  - "Developed jointly by MIT Libraries and Hewlett-Packard (HP), DSpace is now freely available to research institutions worldwide as an open source system that can be customized and extended."

Institutional Repositories

- Fedora.
  - http://www.fedora.info
  - Flexible Extensible Digital Object and Repository Architecture;
  - Funded by Mellon Foundation;
  - Joint venture of Cornell University and the University of Virginia.
  - aimed at providing a repository that can handle one million objects efficiently using only open source software.

Minds of Carolina

- A search for means to provide access to the extensive and rich unpublished contributions of faculty to the Carolina community, the state of North Carolina, and the world and preserve this material for the foreseeable future.

- An exploration to produce a feasible way to capture the works that would otherwise die on individuals' digital desktops, in filing cabinets, or on rapidly aging media.

Challenges for Implementation

- Finding contributors.
- Living comfortably in a contributor-driven repository environment.
  - Messy
  - Unvetted
  - Policies

Challenges for Implementation

- Assisting contributors with resource limits.
- Developing deposit and presentation models.

What is a Digital Library?

- *Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities.*

  -Digital Library Federation

DLF Definition

- *Digital libraries are organizations that provide the resources, including the specialized staff to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works*

- *so that they are readily and economically available for use by a defined community or set of communities.*

DL Research

- US: NSF DL Initiatives; Primary Goal of building enabling technologies.

- UK: eLib Programme; involves more practitioners.

- Europe: EU 4th & 5th Frameworks & DELOS.

Trends

- More emphasis on users.
- Increased user instruction and instructional tools.
- Development of standards.
- Increased interoperability – OAI.
- Institutional repositories.

Trends

- Increased collaboration between librarians, archivists, technologists, and information scientists.

- Integration of resources across repositories.

- Increased complexity of systems and digital objects.

Trends

- A search for sustainability.
- More focus on preservation.
- Focus on intellection property rights management.
- Development of complex content management systems.
- Mobile access systems.