Digital Library Curriculum Development
Module 1-b: History of Digital Libraries and Library Automation

Draft: 08/27/2008

1. **Module name:** History of Digital Libraries and Library Automation

2. **Scope**:
    a. The origin of the DL research agenda, DLI, DLI-2, NSDL, the origin of other long-term DL projects.

3. **Learning objectives:**
    a. Students will be able to name areas of research and development that fed into early digital library work.
    b. Students will be able to describe early digital library initiatives.
    c. Students will be able to describe ways in which areas of research and development that fed into early digital library work affect current digital library work.

4. **5S characteristics of the module:**
    a. Societies: DLs have been and continue to be shaped by the communities of researchers and practitioners that have had a hand in their history, and DLs are developed in response to the needs of specific user communities.

5. **Level of effort required:**
    a. Prior to class: 3 hours for readings
    b. In class: 1.5 hours

6. **Relationships with other modules:**
    a. Necessary relationships:
        i. 10-a: Future of DLs: Module 10-a should follow module 1-b. Students should be able to trace progress through DL history to the present day to trends that may affect DL history.
        ii. 1-a (10-c): Conceptual frameworks, theories: Module 1-b and module 1-a (10-c) should be taught close together in time in a DL course, but the order is unimportant.
        iii. 10-d: DL research initiatives: Module 10-d could follow module 1-b closely in time in a DL course; module 10-d should have module 1-b as a prerequisite.

b. Weak relationships:
    i. 4-e: Object description and organization for a specific domain: Module 4e should follow module 1-b. Students should understand the historical development of domain-specific DLs.
    ii. 7-a: Indexing and searching: Students should understand that the field of IR was one of the fields that strongly influenced the early history of DLs.
    iii. 4-a: Information Architecture: Students should understand that the field of hypertext was one of the fields that strongly influenced the early history of DLs.

7. Prerequisite knowledge required:

a. In LIS programs: None
b. In CS programs: None

8. Introductory remedial instruction:

a. None

9. Body of knowledge:

a. Research streams that fed into early DL work
    i. Information Retrieval:
        1. DLI emerged largely out of the IR community
        2. First significant agenda-setting discussion of DLs was the NSF-sponsored Invitational Workshop on Future Directions in Text Analysis, Retrieval and Understanding in October 1991, held preceding the 1991 ACM Special Interest Group on Information Retrieval (SIGIR) conference.
    ii. High-performance computing & Cyberinfrastructure
        1. DLI was a subcomponent of the High-Performance Computing and Communications Initiative, established under the High-Performance Computing Act of 1991.
    iii. OPACs and library automation
    iv. Electronic publishing & Scholarly publishing
        1. Many DL projects began as publishing efforts. E.g.,
            a. Elsevier Science's The University Licensing Project (TULIP) project
            b. Association for Computing Machinery (ACM)'s digital library activities began with explorations into electronic publishing, including of hypertexts, and support of the NSF-funded Envision project at Virginia Tech
    v. Hypertext
    vi. Databases: text & multimedia

1. Some early DL projects were called databases before the term "digital library" came into widespread use.
2. DLs are now being proposed as one tool for solving problems involved in e-science large data sets.

vii. Humanities computing
1. Coordination between libraries, museums, and archives.
2. Development of tools for textual and data analysis (e.g., Perseus)

viii. User studies & evaluation

b. Digital Library Initiative (DLI)
i. DLI website: http://www.dli2.nsf.gov/dlione/
ii. Funded by multiple federal agencies, therefore the initiative had multiple agendas, which were served differently by the different projects.
iii. 6 projects at different universities: 5 CS programs (e.g., at Stanford, which led to a prototype of Google's systems), 1 LIS program
iv. Heavily motivated by the need to develop infrastructure
1. Collections were developed, but mostly as proof-of-concept.
2. This occurred simultaneously with WWW's early days.
v. Range of media: full text of periodical publications, images, maps, audio and video recordings, large data sets.

c. Digital Libraries Initiative Phase 2 (DLI-2)
i. Funded by even more federal agencies, therefore the initiative had multiple agendas, which were served differently by the different projects.
ii. Less emphasis than in DLI on the need to develop infrastructure
1. More emphasis on collection development and educational uses
2. Eight projects had a specifically undergraduate emphasis

d. NSDL
i. NSDL is under the NSF's Division for Undergraduate Education (DUE); DLI and DLI-2 were programs of the Information & Intelligent Systems (IIS) Division of the NSF's Computer and Information Science and Engineering Directorate
ii. Strong focus on undergraduate education
iii. Strong focus on evaluation

e. Funding agencies
i. National Science Foundation (NSF):
1. Move from infrastructure to education; see DLI, DLI-2, & NSDL sections.
ii. Institute of Museum and Library Services (IMLS)

1. Only federal agency with Congressionally-granted statutory authority to fund digitization projects
2. Emphasis on digitization in cultural institutions
    a. Libraries, museums, and archives

iii. Andrew W. Mellon Foundation
1. Funds DLs as part of their larger Higher Education and Scholarship program
2. Funded the beginning of JSTOR

iv. W.K. Kellogg Foundation
1. Funds DLs as part of their larger efforts to support the development of educational resources
2. Has supported curriculum development in LIS programs, and studies of the future of libraries

f. Major digital library projects
i. Education
1. Historical focus on undergraduate education
2. Increasing focus of K-12
3. E.g., National Science Digital Library (NSDL)
4. E.g., Networked Digital Library of Theses and Dissertations (NDLTD)

ii. Geographic data
1. E.g., Alexandria Digital Library (ADL) – later Alexandria Digital Earth ProtoType (ADEPT)

iii. Humanities
1. Coordination between libraries, museums, and archives as all being cultural heritage institutions
2. Focus on preservation
3. E.g., American Memory Project, Documenting the American South, Perseus Project

iv. Management approaches to collections of collections
1. Centralized control of standards & interoperability (e.g., NSDL) vs. decentralized (e.g., ibiblio)

v. Multimedia
1. Surrogation (e.g., Open Video Project)

g. Evolution of services
i. Architectural: Focus on infrastructure of the DL
ii. Library-style: Emulating library organization and services (e.g., Internet Public Library)
iii. Educational: Focus on educational uses of DL materials (e.g., NSDL)
iv. Support for community development
v. Convergence between DLs & physical libraries
1. Hybrid libraries

10. Resources

a. Required readings:
   i. Wattenberg, F. (1998). A National Digital Library for Science, Mathematics, Engineering, and Technology Education. D-Lib Magazine, 4(9). http://dx.doi.org/cnri.dlib/october98-wattenberg
   ii. Griffin, S. M. (1998). NSF/DARPA/NASA Digital Libraries Initiative: A Program Manager's Perspective. D-Lib Magazine (July/August). http://dx.doi.org/cnri.dlib/july98-griffin
   iii. Greenstein, D., & Thorin, S. E. (2002). The Digital Library: A Biography (No. 109). Washington, DC: Council on Library and Information Resources. http://www.clir.org/PUBS/reports/pub109/pub109.pdf

b. Research streams that fed into early DL work
   i. Information Retrieval
      1. Fox, E. A. (1993). Source Book on Digital Libraries, Version 1.0. Blacksburg, VA: Virginia Tech. http://fox.cs.vt.edu/DigitalLibrary/DLSB.pdf (Specifically chapters 1, 2, & 3)
   ii. High-performance computing & Cyberinfrastructure
      1. Kahn, R. E., & Cerf, V. G. (1988). The Digital Library Project Volume I: The World of Knowbots (DRAFT): An Open Architecture For a Digital Library System and a Plan For Its Development: Corporation for National Research Initiatives. http://hdl.handle.net/4263537/2091
      2. Atkins, D. E., Droegemeier, K. K., Feldman, S. I., Garcia-Molina, H., Klein, M. L., Messerschmitt, D. G., et al. (2003). Revolutionizing Science and Engineering Through Cyberinfrastructure: Report of the National Science Foundation Blue-Ribbon Advisory Panel on Cyberinfrastructure. Arlington, VA: National Science Foundation. http://www.nsf.gov/od/oci/reports/atkins.pdf.
   iii. OPACs and library automation
      1. Fenly, J. G., & Wiggins, B. (1988). The Linked Systems Project: a networking tool for libraries. Dublin, OH: OCLC Online Computer Library Center.
   iv. Electronic Publishing & Scholarly Publishing
      1. Bush, V. (1945). As We May Think. The Atlantic Monthly, 176(1), 101-108. http://www.theatlantic.com/doc/194507/bush
      2. Peek, R. P., & Pomerantz, J. P. (1998). Electronic Scholarly Journal Publishing. In M. E. Williams (Ed.), Annual Review of Information Science and Technology (Vol. 33, pp. 321-356). Medford, NJ: Information Today, Inc.
   v. Hypertext
   vi. Databases: text & multimedia
   vii. Humanities computing

viii. User studies & evaluation

c. Digital Library Initiative (DLI)
    i. Evaluation and critique (also for DLI-2):
        1. Saracevic, T., & Dalbello, M. (2003). Digital library research and digital library practice: How do they inform each other? http://www.scils.rutgers.edu/~tefko/Saracevic_Dalbello_DLib_02.doc

d. Digital Libraries Initiative Phase 2 (DLI-2)
    i. DLI-2 website: http://www.dli2.nsf.gov/

e. Funding agencies
    i. National Science Foundation (NSF)
        1. Wattenberg, F. (1998). See 10.a.i.
        2. Griffin, S. M. (1998). See 10.a.ii.
    ii. Institute of Museum and Library Services (IMLS)
        1. Ray, J. (2004). Connecting people and resources: Digital programs at the Institute of Museum and Library Services. Library Hi Tech, 22(3), 249-253.
    iii. Andrew W. Mellon Foundation
    iv. W.K. Kellogg Foundation

f. Major digital library projects
    i. Alexandria
    ii. American Memory
        1. About American Memory: Mission and History. http://memory.loc.gov/ammem/about/index.html
        2. Anonymous. (1995). LC, ARL Directors Collaborate on National Digital Library. Library of Congress Information Bulletin, 54(1). http://www.loc.gov/loc/lcib/9501/ndl.html
        3. Library of Congress. (1995). A periodic report from The National Digital Library Program, No. 2. http://www.loc.gov/ndl/sep-95.html
    iii. Perseus
        1. Crane, G. (1998). The Perseus Project and Beyond: How Building a Digital Library Challenges the Humanities and Technology. D-Lib Magazine, 4(1). http://dx.doi.org/cnri.dlib/january98-crane
        2. Marchionini, G. (2000). Evaluating Digital Libraries: A Longitudinal and Multifaceted View. Library Trends, 49(2), 304-333.

iv. ibiblio
    1. Jones, P. (2001). Open(source)ing the doors for contributor-run digital libraries. Communications of the ACM, 44(5), 45-6.
v. The National Science Digital Library (NSDL)
    1. Wattenberg, F. (1998). See 10.a.i.
    2. Zia, L. L. (2006). The NSF National Science, Technology, Engineering, and Mathematics Education Digital Library (NSDL) Program. D-Lib Magazine, 12(3). http://dx.doi.org/10.1045/march2006-inbrief
vi. The Networked Digital Library of Theses and Dissertations (NDLTD)
    1. NDLTD website: http://www.ndltd.org
    2. Fox, E. A., et al. (1997). Networked Digital Library of Theses and Dissertations: An International Effort Unlocking University Resources. D-Lib Magazine, 3(8). http://dx.doi.org/cnri.dlib/september97-fox

g. Evolution of services
    i. Architectural
        1. Kahn, R., & Wilensky, R. (1995). A Framework for Distributed Digital Object Services. http://dx.doi.org/cnri.dlib/tn95-01
    ii. Library-style
        1. Library Trends 49(2), Fall 2000: Special issue: Assessing Digital Library Services
    iii. Educational
        1. Giersch, S., Klotz, E. A., McMartin, F., Muramatsu, B., Renninger, K. A., Shumar, W., et al. (2004). If You Build It, Will They Come? Participant Involvement in Digital Libraries. D-Lib Magazine, 10(7/8). http://dlib.org/dlib/july04/giersch/07giersch.html.
    iv. Support for community development
        1. Marchionini, G. (1999, September 28-29). Augmenting Library Services: Toward the Sharium. Paper presented at the International Symposium on Digital Libraries, Tsukuba, Ibaraki, Japan. http://www.ils.unc.edu/~march/sharium/ISDL.pdf
    v. Convergence between DLs & physical libraries

11. Concept map

12. Exercises / Learning activities

a. Discussion questions: How has the research and development from the field of computer science influenced the evolution of DLs? From information and library science?
b. Small group discussion: Compare & contrast 2 projects from 2 different initiatives.
c. Write a 2-page case study of one specific project: What has that project contributed to DLs today?

13. Evaluation of learning outcomes

a. None

14. Glossary

a. DLI: Digital Libraries Initiative
b. DLI-2: Digital Libraries Initiative Phase 2
c. IMLS: The Institute of Museum and Library Services. imls.gov
d. NSDL: National Science Digital Library, created by the National Science Foundation. nsdl.org

15. Additional useful links

16. Contributors

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