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:
   b. Research streams that fed into early DL work
      i. Information Retrieval
      ii. High-performance computing & Cyberinfrastructure
      iii. OPACs and library automation
      iv. Electronic Publishing & Scholarly Publishing
      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):

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)
   ii. Institute of Museum and Library Services (IMLS)
   iii. Andrew W. Mellon Foundation
   iv. W.K. Kellogg Foundation

f. Major digital library projects
   i. Alexandria
   ii. American Memory
   iii. Perseus
iv. ibiblio

v. The National Science Digital Library (NSDL)
      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
      http://dx.doi.org/cnri.dlib/september97-fox

g. Evolution of services
   i. Architectural
         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
         http://dlib.org/dlib/july04/giersch/07giemersch.html

   iv. Support for community development
         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
a. Initial author: Jeffrey P. Pomerantz
b. Evaluators: Richard Furuta, Molly Dotson