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Education in a New Key:
The Emerging Digital Environment for Teaching and Research

Background

New partnerships have begun to flourish within higher education that, if successful, would create genuine interdependencies on other schools: deep collaborations that could redefine our academic environment. Traditional organizational structures of libraries and our educational institutions are incompatible, or at least antagonistic, to the digital tools, resources, networks, and virtual clouds upon which we have come to rely so pervasively.

Universities and colleges often define themselves by exclusivity and singularity of purpose. They compete one against the other; they measure themselves in comparison and contrast with one another; and they hold tightly to their idiosyncrasies as defining elements of their status. In this respect the tension between these inherited conceptual notions of separate, particular, and solitary and a networked infrastructure of information that has no 'place' is palpable. As presently conceived, neither libraries nor universities are structured, organized, or funded to achieve the kind of federated and collaborative enterprise that the digital environment can provide. These are at heart methods of organizing knowledge very difficult to reconcile.

In 2011, we find ourselves in a constellation of academic villages that is redundant and expensive; in light of, and in response to, this realization, CLIR will devote considerable time and talent in the coming years to identify the larger-scale consortial models that can effectively reduce costs while enhancing the infrastructure and service provision for scholarship and teaching. Common to these efforts will be strong regional coalitions that bring together diverse institutions within a national framework; federating shared resources and interests, including collections, technology, and expertise; and a genuine, volitional dependency on other, participating institutions for the provision of what was once a locally owned and managed asset.

These projects of deep collaboration, coherent and coordinated, we are calling '**macro solutions**.' From a strategic vantage point, there is no ambiguity: the future of academic libraries and higher education rests on the ability to

reconceive ourselves holistically, with the various components of scholarly information-- discovering, reconstituting, publishing, and sharing knowledge, and keeping its various manifestations securely preserved and accessible -- understood as interrelated and interdependent. The inherited norms, customs, traditions, and institutions that have structured research and teaching now need to be constructively challenged, redefined, and subsequently reassembled. The next two decades could witness an extraordinary fluorescence of activity among universities and colleges focused on repositioning, consolidation, and convergence. Higher education could make enormous contributions to assure its vitality, expanding its capacity for future discovery and reimagining of our cultural heritage while not compromising its exactitude and rigor; the prized idiosyncracies and powerful identities would remain intact. The substrate of support would become a true system.

Much of CLIR's acitivity in the coming three years will be to seek partners to develop methods, guidelines, and recommendations that would allow academic leaders to instantiate sustainable communities of practice that would in concert produce a new, more logical and rational system of higher education. CLIR's guidance and coordination of efforts would promote standardization and more rapid systemic adoption of tools and applications. In some respects, this work will involve the creation of new communities. These can be construed in a variety of ways; usually a virtual community is structured to facilitate new research and teaching in an environment that is simultaneously locally grounded and independent but cooperative across the entire disciplinary enterprise. These communities are essentially virtual organizations that transcend geographic and institutional boundaries, an interlocking of technical and social elements.

There is no question that we are at a turning point. As with so many aspects of the digital revolution, our future will turn less on technological innovation than on informed and empathetic leadership. CLIR, working with its constituency, will continue to define its leadership role as our highest priority as we seek together lasting solutions that are efficient, effective, and elegant.

Projects

The following are projects, some established and some nascent, that when taken in aggregate could become a new and vital digital environment for research, teaching and the public good. All facets of scholarly communication are represented in this list: original research, including new forms of enquiry and expression; new methods of investigation; the creation and curation of large datasets and the relationship of data to publication and authentication of research; teaching, including new pedagogies, the influence of technology on the classroom and extra-classroom experience; preservation; collection development; archives and special collections and their manifestation; new modes of

publication; interoperability and linkages of global resources; digitization of new content within accepted parameters of metadata and protocols; and the interrelated aspects of all of these facets as they come to be seen as a coherent managed ecology.

1. **Hidden Collections**
A national program that catalogs heretofore previously concealed materials of exceptional value to teaching and research. Libraries, archives, and cultural institutions hold millions of items that have never been adequately described. This represents a staggering volume of items of potentially substantive intellectual value that are unknown and inaccessible to scholars. This program seeks to address this problem by awarding grants for supporting innovative, efficient description of large volumes of material of high value to scholars.

The primary criterion used to evaluate projects is their potential national impact on scholarship and teaching. The second and third criteria are: innovative and/or highly efficient approaches to description that could serve as models for others, and the adoption of workflow and outreach practices that maximize connections to scholarly and other user communities. In addition, the panel requires application of description standards that would provide interoperability and long-term sustainability for project data in the online environment. Most U.S.-based not-for-profit cultural heritage institutions are eligible for the program.

2. **Digging into Data**
A groundbreaking NEH program co-funded by four (beginning in 2011, eight) agencies in the U.S., Canada, and Europe, focused on collaborations with humanists and engineers/computer scientists to explore new ways of using and conducting research against large datasets. This program represents a leading edge of the digital humanities; research often entails new methodologies and intellectual strategies that are nonetheless grounded in traditional humanistic areas of focus (the nature of authorship, continuity of concepts over time, the social context of artistic expression). These projects often create tremendous amounts of data, with questions about the preservation, maintenance, and curation of that data identical to issues currently challenging the sciences.

3. **Digital Public Library of America** (DPLA)
The concept of a Digital Public Library of America is succinctly described on its wiki:

"The Digital Public Library of America (DPLA) will make the cultural and scientific heritage of humanity available, free of charge, to all. By adhering to the fundamental principle of free and universal access to knowledge, it will promote

education in the broadest sense of the term. That is, it will function as an online library for students of all ages, from grades K-12 to postdoctoral researchers and anyone seeking self-instruction; it will be a deep resource for community colleges, vocational schools, colleges, universities, and adult education programs; it will supplement the services of public libraries in every corner of the country; and it will satisfy other needs as well—the need for data related to employment, for practical information of all kinds, and for enrichment in the use of leisure."

The DPLA is currently organized by six workstreams that are defined and coordinated through the steering committee. The workstreams include audience and participation; financial/business models; governance; legal issues; and technical aspects; and content and scope. CLIR recently received a Mellon grant to build a prototype for the DPLA, using core content developed under a major IMLS grant (Opening History).

4. **Data Curation: building a new profession**
A major Sloan Foundation grant to CLIR and DLF will provide research into the current state of data curation training and methods, and thereafter build a new profession based on specific current and projected needs of the scientific, social science, and humanities communities, also providing paths of development that allows for greater utility to this data, regardless of Digital data are fundamentally changing the nature of scholarship—the exponential increase in the volume of scholarly work, the heterogeneity of forms this work now takes, and the ephemeral nature of many of these forms are more widely appreciated and understood as one of the most salient challenges in higher education. New modes of inquiry have emerged; digital data afford investigations across large corpora of text, as well as visual, aural, audiovisual, sensory, neurological and even kinesthetic forms of information. None of this research is possible unless the data on which it relies are well managed.

5. **Linked Data**
This project consists of reports and meetings that contribute to a rigorous review and analysis of existing projects and programs that use Semantic Web, Linked Data, and RDF Triples Technologies—elements critical to a Linked Data environment that will enable improved discovery and navigation across multiple information genres and formats. Linked Data makes use of the Resource Description Framework (RDF) as a tool to *share*, *connect*, and *reuse* knowledge on the Semantic Web.

The findings will help focus the national agenda for developing Linked Data environments, reduce redundancy of effort, and create a more sophisticated context in which practitioners and planners can develop future projects, with the

aim to develop specifications, requirements, and a basic technical design for a multinational, multi-institutional prototype demonstrating the viability and efficacy of a Linked Data environment for improving discovery and navigation.

6. **Federated Research and Educational Depository System**
The Federated Research and Education Depository System will ensure continued generation of knowledge by providing secure digital preservation of the scholarly and cultural record in all formats, by and for higher education, now and into the future. Its strategic objectives include: to ensure higher education's ownership and control of scholarly production by engaging the community's intellectual, personnel, and financial resources in the creation, curation, and stewardship of human knowledge in service to education and research; to achieve efficiencies by leveraging current expertise and investments of higher education in the preservation of and access to the scholarly record in all formats ; and to build and maintain robust infrastructure at-scale for long-term data management, including preservation and access systems able to keep pace with innovations in content, technology, and scholarly practices over time

This new system will achieve this by leveraging the collective expertise of higher education and achieve sustainability by including institutions with geographical, organizational, technical, and academic diversity; federating at least three diverse open-source based technical and organizational approaches to ensure fault-tolerant, secure replication of content; ensuring reliable streams of dedicated R&D funding to enable an iterative approach to technical development ; and developing light-weight institutional governance that ensures nimbleness, adaptability, and responsiveness

In order to maintain full accountability to its community, the depository system will develop standards that guarantee transparency of operations at all levels and engage disinterested professional auditors to implement the auditing procedures.

7. **Centers for Digital Humanities and The Liberal Arts**
A national effort to study and better integrate digital humanities into the undergraduate curriculum, emphasizing pedagogy. Focus on common challenges in liberal arts colleges and research universities, which include: low faculty turnover at small institutions, which inhibits engagement with new methodologies; inhibitions to the brightest graduate students and junior colleagues that discourage them from pursuing innovative research and teaching in the digital humanities; uneven access to resources and projects, many of which are developed in local institutional silos; lack of full scale testing and implementation; and a current reward system for reappointment that does not

encourage faculty to engage in build-out, testing, implementation of projects that have already been launched.

Key objectives include a response to the need to prepare students to be citizens, professionals and scholars in networked world—how do we transform institutions and people to meet this need? What kinds of expertise can different disciplines engage with and convey? How to address a persistently low level of engagement with this challenge by faculty at small institutions, and the near-invisibility of undergraduates as both learners and knowledge-producers in digital humanities initiatives.

8. **Medical Heritage Digital Collaborative**
The Medical Heritage Digital Collaborative (MHDC) is a partnership of nine institutions striving to connect history of medicine collections in an open access digital environment. This distinguished group of institutions possesses a wealth of physicians' papers, correspondence, institutional records, books, and images integral to understanding the history and social context of western medicine. These collections have been geographically and technologically isolated from one another, which has presented significant obstacles for researchers in the study of the medical humanities. Digitally linking collections across institutions will increase efficiency in discovery and expand access to under-utilized materials, creating a partnership model for engaging scholars in a multi-institutional collaboration.

The Medical Heritage Digital Collaborative will bridge institutional and professional boundaries to support changing scholarly needs in response to emerging technologies. This innovative collaboration will make it possible to engage scholars in platform design and selection of content, rationalize and manage collections across institutions, and provide the support necessary to engage smaller organizations and specialized collections.

9. **National Humanities Press**
The press is driven by the needs of humanities scholars and will be largely devoted to publishing new forms of scholarly expression, and research produced through new methodologies and intellectual strategies. The cycle of scholarly communication—from inception of ideas, through original research, the products of that research, the relationship of data to publishing, and the preservation of the scholarly record will be taken up by the new press.

10. **CLIR/Mellon Fellowships: Dissertations in Original Sources**
The purposes of this fellowship program are to help junior scholars in the humanities and related social-science fields gain skill and creativity in developing knowledge from original sources; enable dissertation writers to do

research wherever relevant sources may be, rather than just where financial support is available; encourage more extensive and innovative uses of original sources in libraries, archives, museums, historical societies, and related repositories in the U.S. and abroad; and provide insight from the viewpoint of doctoral candidates into how scholarly resources can be developed for access most helpfully in the future.

New Opportunities

The array of macro-scale projects offer an enormous opportunity for educational organizations and institutions to build new bases of support, reach new constituencies, cultivate funding agencies, and build connections between the public and private sectors. The multitude of stakeholders represented by these projects include: young scholars conducting new modes of research; advanced programs in preservation and interpretation; creators of new digital tools and resources; national libraries of Europe; national libraries of Asia; corporations and industry; university publishers; data curation centers; scholarly societies; liberal arts centers; programs in support of pedagogy; foundations; university presidents and provosts; public libraries; government document centers; science centers; social science centers; and library schools.