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Coalition for Networked Information (CNI)

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OVERVIEW

The Coalition for Networked Information (CNI) is an organization designed to address the promise of networked information technology for the advancement of scholarly communication and the enrichment of intellectual productivity. (1) Founded in 1990, CNI works on a broad array of issues related to the development and use of networked information in the research and education communities. CNI's program has included projects in the areas of architectures and standards for networked information, scholarly communication, economics of networked information, Internet technology and infrastructure, teaching and learning, institutional and professional implications of the networked environment, and government information on the Internet. The best source for current information on CNI's program is the organization's website at www.cni.org and the annual Program Plan, which is one of the web resources. Membership in CNI is by institution and a variety of higher education and library institutions, professional and scholarly organizations, government agencies, funders, and publishing and information technology companies comprise its membership. CNI's semi-annual Task Force meetings serve as a bellwether for networked information issues and projects and bring together a number of important constituencies, including individuals from libraries, information technology, publishing, and network and telecommunications. CNI also hosts invitational conferences, sponsors professional development workshops, issues white papers, advises government agencies and funders, and supports a variety of networked information initiatives. Since its founding, CNI has been led by two highly regarded leaders -- the late Paul Evan Peters and Clifford A. Lynch.

HISTORY

In 1990, the Association of Research Libraries (ARL), Educom, and CAUSE joined together to form CNI to create a collaborative project focused on high speed networking that would integrate the interests of academic and research libraries (ARL) and computing in higher education (Educom and CAUSE). Educom and CAUSE consolidated their organizations in 1998 to form EDUCAUSE, which is now one half of the partnership that oversees CNI. Structurally, CNI is a program of its founding associations with administrative oversight provided by ARL; it is not a legally separate entity. CNI's oversight is

provided by the boards and CEOs of the founding organizations, and a Steering Committee guides its program.

Leading up to the formation of CNI, the Internet was beginning to be deployed in higher education institutions and some of the top information technology leaders in that community were seeking broader applications for the network, often referred to at that time as the National Research and Education Network (NREN). The transmission of large sets of data for computation, e-mail, and ftp (file transfer protocol) of text files were the commonly available applications on the Internet and they were used primarily by the scientific community. The information technology leaders in Educom and CAUSE sought a partnership with academic libraries, through ARL, since they saw them as a source of rich content that would benefit from the high speed transmission infrastructure of the Internet. In particular, the Educom Networking and Telecommunications Task Force (NTTF) and the ARL Information Policies Committee were primary drivers in the creation of CNI. The associations developed a business plan and recruited an executive director, Paul Evan Peters. Educom's President in 1990, Kenneth King, wrote about the newly created organization, "CNI will focus on creating information and services on the NREN and on all of the issues associated with management and access to information resources and services on networks." (2)

CNI's sponsoring associations conceived of the Coalition as a project with a questionable future. They mandated a three-year sunset review for the organization, at which time the sponsors would decide whether or not to continue CNI. In 1990, the Internet was not ubiquitous, the World Wide Web was not generally available, and the notion of digital libraries on the Internet seemed a distant and uncertain possibility. CNI was formally launched in March, 1990 and the first meeting of representatives of Task Force member institutions was held on June 5-6, 1990 in Washington, DC. Approximately 130 people from 75 institutions attended out of the 81 institutions that had joined CNI by that time. (3)

For the first three years of CNI's life, much time and energy were devoted to the promotion of the concept that high-speed networking, exemplified by the Internet, would transform scholarly communication and the access to and use of research and education information. Efforts were focused on reaching out to various communities, such as academic librarians and publishers, through presentations at conferences, publications, invitational meetings, and projects. CNI served as an important source of diffusion of information about networked information projects and promoted the use of open architectures and standards in the development of networked information products and systems. An important focus of the early years of CNI was the economics of scholarly information on the network, which will be further described below. In addition, CNI developed initiatives in navigating for information on the network, information policy, architectures and standards, teaching and learning, collaboration among professions, humanities information, and government information. These initiatives were often developed under the auspices of working groups set up in

the Task Force. The CNI staff remained lean and was not configured to serve as an entity that would develop and deliver networked services for its membership.

By 1993, at the time of the first three-year review, it was clear that the institutional members of CNI's Task Force wanted to continue their affiliation with the association and that the three sponsoring associations were benefiting by having CNI as an arm of their respective programs. CNI was renewed for an additional three years. In 1996, as a result of the review after the second three-year period, CNI was made a permanent program of its sponsoring associations and was no longer subject to sunset reviews.

Internet Presence

Another important development during CNI's first three years was its creation of a network presence through its Internet server and some listservs that featured up-to-date information on networked information. Cni-announce was developed as a listserv to disseminate information about CNI's program and important activities and initiatives of others in the arena of networked information. The cni-copyright listserv became a highly regarded source of peer communication on intellectual property law, regulations, and policy in the networked environment (the list was re-named PIJIP-COPYRIGHT when American University's Program on Information Justice and Intellectual Property assumed management responsibilities in 2007). CNI's Internet server was used by CNI and other organizations to post papers and reports on important networking topics. Among associations, CNI was an early implementor of Internet technology and hosted content and listservs for other related associations and projects that had not yet developed Internet strategies.

Programs

During its first six years, CNI developed a number of program initiatives in a wide variety of areas related to networked information, from economic models to technical standards to teaching and learning. CNI launched many institutionally based projects in which institutions (generally from higher education) volunteered cross-sector teams to become involved in projects related to some aspect of networked information. These projects, often developed under the auspices of one of CNI's working groups, generally stipulated that the campus put together a multi-disciplinary team composed, for example, of librarians, information technologists, media specialists, university press managers, instructional technologists, or others, depending on the nature of the project. CNI conceptualized and launched these projects with a team meeting, and then the work was carried out at the home institutions. At the conclusion of the project, CNI served as a dissemination vehicle through reports posted on its Internet server, presentations at Task Force meetings and other venues, and workshops where the "lessons learned" were presented to a broader group.

Policy Role

CNI has played a behind-the-scenes and advisory role in a number of policy areas involving networks and networked information. CNI has intentionally eschewed a lobbying role for the organization, preferring to provide advice and advocate for certain developments in a broad context rather than in assisting the shaping of specific pieces of legislation. CNI's leadership has frequently been involved in policy discussions related to intellectual property, preservation of digital information, and cyberinfrastructure, and has been invited to participate in policy groups convened by the National Research Council, Library of Congress, the National Science Foundation, the American Library Association, and others.

Leadership

CNI's founding Executive Director, Paul Evan Peters, died an untimely death in 1996. By mid-1997, CNI's second Executive Director, Clifford Lynch was appointed. He carried forward many of the program initiatives that had been developed previously and added some new projects. He reconceptualized CNI's program into three themes: developing and managing networked information content; transforming organizations, professions and individuals; and building technology, standards and infrastructure. Lynch also forged ties with the newly developed Internet2 initiative in the next generation of high performance computing, focusing on applications of interest to scholarly communication and the middleware needed for interoperability, navigation, and authentication.

ORGANIZATIONAL STRUCTURE

Task Force

CNI is an institutional membership organization, and membership dues are the primary financial resource for CNI's programs. The original business plan for CNI called for fifty members to join by the end of its first year. In actuality, over 100 institutions had joined by the end of the first year of CNI's existence. Membership grew rapidly in the first few years and has remained steady at approximately 200 institutions since the early 1990s. While the charter members were higher education institutions along with several leading technology companies, such as Apple Computer, Xerox, and IBM, CNI's Executive Director, Paul Evan Peters, quickly expanded the concept of the kinds of institutions that might join CNI. Major publishers such as Elsevier and John Wiley, scholarly associations such as the American Chemical Society and AAAS, library network services such as RLG and OCLC, Internet service providers such as Merit Network and SURANET, and public and state libraries such as New York Public and Connecticut State Library became members. As the potential importance of the Internet to publishing and libraries became clearer, more institutions and companies sought out CNI as a venue for developing partnerships and learning about the latest trends in networked information. Peters valued this rich mix of

members and believed that collaboration among a variety of sectors was the best route to rapid development of networked information resources.

Each member institution appoints two representatives to the CNI Task Force, which holds semi-annual meetings. Higher education institutions are encouraged to appoint the head of libraries and the head of information technology as the two institutional representatives, and other types of institutions generally appoint top administrators or directors of electronic publishing. All members of the Task Force have equal status; there are no separate membership categories, for example, for corporate members. Peters felt that this structure would create a level playing field where various types of institutions could come together as partners rather than as vendor and customer.

CNI collaborates with organizations in other countries that share our agenda. Strong ties between CNI and the UK's Joint Information Systems Committee (JISC) have led to regular joint conferences focusing on a range of networked information topics. CNI also works with the SURF Foundation, the Dutch higher education and research partnership organization for network services and information and communications technology, the German Research Foundation (DFG), and the German Initiative for Networked Information (DINI).

Steering Committee

Initially, the three sponsoring associations each appointed three members to the CNI Steering Committee and the Executive Director of CNI and the CEOs of ARL, Educom, and CAUSE served as *ex officio* members. After the consolidation of Educom and CAUSE into EDUCAUSE, the two remaining organizations appoint three members each to the Steering Committee and three additional "at large" members are also appointed. The Steering Committee guides program and organizational development but fiduciary responsibilities are vested in the CEOs and boards of the sponsoring associations. Richard West, of the University of California Office of the President and later of the California State University System, was the original chair of the Steering Committee and remains chair as of 2008.

Executive Directors

Founding executive director: Paul Evan Peters

As founding executive director of CNI, Paul Evan Peters had a formidable but exciting challenge to invent a new organization and provide its philosophy, vision, and direction. He had the primary responsibility for shaping a program to address the issues identified in CNI's mission and to recruit support for the organization, which was developed to be financially self-sustaining.

Peters received an undergraduate degree in computing and philosophy from the University of Dayton, and that combination of interests reflected well his expansive mind and his conceptual view of the education and technology environment. He received a Master's of Library Science (MLS) from the University of Pittsburgh and did further doctoral work at that institution. Peters joined the staff of the Columbia University library in the late 1970s and eventually became the Assistant University Librarian for Systems. In 1987 he became Systems Coordinator at the New York Public Library and was recruited to CNI in 1990 from that position. Peters was considered a charismatic speaker by many and his presentations at conferences were admired for their combination of inspiration and technical detail. He introduced many communities to the existence of the Internet and passionately described its importance for the communication of scholarly information.

Peters was active in the professional world and was a president of the Library and Information Technology Association, chair of the National Information Standards Organization, and served on the editorial boards of a number of networking, networked information, and library technology journals. He also served on the Council of the American Library Association.

Peters died in November, 1996 at the age of 48. Vinton Cerf, one of the founders of the Internet, wrote of Peters, "Paul was a source of inspiration, education and vision for many of us in the computer and communications community. He energized a segment of the academic population that often felt itself to be outside the glowing heart of a modern revolution and made them wholly a part of it. His puckish humor and zest for living will long be remembered and appreciated as much as his vision and drive will be missed." (4)

Second executive director: Clifford A. Lynch

Clifford A. Lynch, CNI's second executive director, had been active in developing the concept of the CNI organization as it was being formed prior to 1990 and he became a key figure, as a member volunteer in CNI's program, during its first six years. As chair of CNI's Architectures and Standards Working Group, he regularly briefed CNI member representatives on the latest Internet technology and evolving standards for digital libraries and electronic publications. He also played a key role in CNI's early work on the economics of information and the development of the first network-delivered electronic journal projects. He spearheaded a Z39.50 interoperability testbed project under the auspices of CNI.

Prior to Lynch joining CNI as executive director in 1997, he served for eighteen years at the University of California, Office of the President, where he was Director of Library Automation and also managed intercampus Internet for the University. Known internationally for his development of MELVYL, the information system for the University of California libraries, Lynch holds a Ph.D. in Computer Science from the University of California, Berkeley and is also an adjunct

professor in Berkeley's School of Information Management and Systems. He is a past president of the American Society for Information Science (ASIS) and a fellow of the American Association for the Advancement of Science (AAAS). He serves on the applications council of the Internet2 initiative and has served on a number of National Research Council committees. Lynch is a highly valued speaker at national and international conferences as he is known for his ability to synthesize complex technical information into understandable trends and issues. He has been prescient in identifying policy issues that will result from the implementation of emerging technologies in the networked environment. He has also been widely recognized for his contributions to standards work and was named a Fellow of the National Information Standards Organization (NISO) in 2000. He received the American Library Association's Lippincott Award in 2004 and the EDUCAUSE Award for Leadership in Public Policy and Practice in 2005. Lynch has published widely in the library and information technology literature.

PROGRAMS, PROJECTS, INITIATIVES

CNI played an early role in identifying a variety of areas of work that would be critical for the development of networked information and has continued to provide leadership to a broad community of digital library developers, networked information sites, and network infrastructure providers. CNI's initiatives in the economics of information, network navigation and metadata, and collaboration among professions, were groundbreaking. CNI's Task Force meetings, where progress on these projects was reported, provided a means for members and the broader community of Internet resource developers and users to keep abreast of the latest initiatives in the field. The program areas have covered a spectrum of topics, including economic issues, technical standards, technology infrastructure, organizational change, and information policy.

Economics of Networked Information and Scholarly Publication

In the early 1990s, neither the potential publishers of networked information products nor the potential buyers of that information had a framework for developing contracts for networked information products such as electronic journals. While CD-ROM products were ubiquitous in academic libraries, electronic journal publishing on the Internet was in its infancy.

READI

To assist in creating a market for networked information products, CNI developed a project, Rights for Electronic Access to and Delivery of Information (READI). CNI convened a series of three expert panels to explore whether and how licenses between creators and users of published works could be applied within the context of copyright law to ease the flow of networked information. The specific objective of the READI project was to determine whether it was possible to develop a common set of terms and conditions for managing relationships in

the emerging market for networked information. The panels of producers of content, buyers of content, and intermediaries (such as consolidators and database providers) were convened in 1992 and a report was issued late that year.

Through the READI project, CNI was a pioneer in developing a means to analyze the issues involved in contracts for networked information products and served a critical role in informing and educating the various constituencies of the issues involved. In 1992, very few publishers had any idea of the important role the Internet would play as a distribution channel for scholarly information and CNI alerted them to the impending development. CNI provided a forum for addressing the intricacies of licenses for networked information products, and in addition to the READI panels, sessions at CNI's Task Force meetings provided a broader and influential venue for these issues. (5) In 2008, organizations continue to grapple with the development of standard site license language for networked information products.

Cost centers and measures

CNI formally continued its work on the economic issues of networked information through its project, Cost Centers and Measures in the Networked Information Value Chain. The project sought to establish a widely accepted frame of reference for monitoring cost effects and managing cost claims for networked information and provide a foundation for addressing cost issues in the future. The project was conceptualized as a study to compare current cost centers for handling print information from creation by authors through preservation by libraries with the processes entailed in the life cycle for similar networked information products. For example, while shelving, which has important implications for costs of building maintenance and eventual new building structures, is an important cost component for print products, it is a minimal or non-existent factor for networked information. However, networked information has computer storage requirements that don't exist for print information. Institutions had no parameters for understanding how these cost center shifts, from the print to the networked environment, would impact them and this study proposed to address this. The resulting report made a detailed analysis of cost centers in the respective environments but was less successful in developing an economic analysis of the various environments.

Scholarly Communication

Elsevier's TULIP project

At an early CNI Task Force meeting, issues related to licensing and distributing networked information content, particularly for scholarly journals, were raised in an open session of the meeting. Karen Hunter of Elsevier Science Publishers stated that while she had an interest in exploring the delivery of the journals of

her company via the Internet, there was too little agreement among users, primarily higher education institutions in this case, of what standards and mechanisms should be used for the network delivery of their content. Immediately, a number of institutions volunteered to serve as sites to test some models of networked information distribution and the TULIP project was born. TULIP was a project of Elsevier, but the CNI meetings continued to serve as a meeting place for the project teams and as a reporting venue for progress and conclusions. The work of TULIP was seminal in determining some of the parameters for the development of Internet-based versions of scholarly journals.
(6)

Electronic theses and dissertations

In 1993, CNI, Virginia Polytechnic Institute and State University, the Council of Graduate Schools, and University Microfilms International (UMI) launched a project to examine issues related to software and standards for the writing of theses and dissertations, and the requirements for their storage and retrieval from an Internet server. The intention of this project was to improve the storage of and access to information in theses and dissertations, to acquaint future scholars with publishing electronically, to increase the amount of scholarly information on networks, and to foster development of new products and services which will evolve from electronic theses and dissertations. Institutional representatives participating in this initiative also engaged in discussions of issues of access, copyright, and usage fees in the networked information environment. The project was launched at a meeting hosted by CNI in 1993 and initiatives developed by two of the partners, Virginia Tech and UMI, were featured in subsequent Task Force meetings. CNI supports the Networked Digital Library of Theses and Dissertations (NDLTD), an international association that continues to develop standards and encourages higher education institutions to institute policies that encourage or require the submission of theses and dissertations in electronic form. University Microfilms, now Proquest, has made thousands of dissertations available on the Internet and has been an active participant in CNI.

University presses

The Association of American University Presses (AAUP) and CNI began a collaboration in 1993 through a joint initiative that provided a vehicle for framing and addressing the common problems and opportunities of projects involving university presses in the networked information environment. The project meetings covered such topics as the economics of Internet publishing, intellectual property, format standards, metadata, and user requirements. AAUP and CNI selected twenty-three institutional projects in two rounds in 1993 and 1995 and held institutional team meetings for the projects involved. The projects spanned a wide range of subjects from science to Shakespeare to cinema, and publishing formats such as maps databases, and images.

Some of the key outcomes of the initiative were improved working relationships among project partners, a new awareness of the importance of the Internet as a vehicle for scholarly communication, and an awareness of the complexities of the issues involved in preparing materials for Internet publication.

In the current decade, CNI has featured at its meetings new digital publishing initiatives being developed within universities, often under the auspices of the library. These initiatives have various purposes, such as publishing innovative “born digital” content or publishing high quality content, often in the humanities, that might not find a print outlet in the current marketplace.

Government information

CNI was involved in a number of initiatives related to federal information on the Internet. Beginning in the early 1990s, CNI served as a catalyst to encourage federal agencies to mount publications on the Internet through presentations at agency meetings, visits to agency offices, and informal advice given to federal agencies on request. When CNI was founded, there was little interest on the part of the President in moving federal agencies to the Internet. However, upon President Clinton’s election, the climate changed immediately and palpably, and CNI was frequently invited to provide background information and advice on a variety of issues related to information on the network. CNI also provided testimony before Congress on two occasions in support of legislation that would encourage more federal information to be freely accessible on the Internet. CNI produced two white papers on access to federal information, one that was policy related and focused on directions that agencies should take to make their information available, and one that was intended to guide higher education and other institutions in the development of strategies for providing access to networked federal information by their constituencies.

Humanities and arts information

In 1991, CNI began to work with the Getty Art History Information Project and the American Council of Learned Societies (ACLS) to address the lack of humanities and arts presence on the Internet. The high performance computing initiatives in the US were funded largely through the National Science Foundation, and scientists were generally the first academics to take advantage of the Internet for research communication. Humanities and arts departments in universities were frequently resource poor and lagged behind other fields in the adoption of technology. A meeting in 1992 brought together key constituencies and laid out the most important issues in a report *Technology, Scholarship, and the Humanities: The Implications of Electronic Information*. A subsequent meeting in 1994 added to the earlier foundation and served as a key document for making a case for extending the use of the Internet into the cultural community. The resulting report, *Humanities and Arts on the Information Highways: A Profile*

Report made a case for the importance of providing all people with electronic access to the nation's cultural heritage, and detailed the special challenges and opportunities associated with digitizing humanities and arts information.

As a result of these meetings and the desire to focus additional resources on humanities and arts on the Internet, CNI, ACLS, and the Getty founded the National Initiative for a Networked Cultural Heritage (NINCH) in 1996 to encourage the development of the National Information Infrastructure as a means to preserve, access and creatively build upon the nation's cultural legacy. NINCH was a diverse coalition of arts, humanities and social science organizations created to assure leadership from the cultural community in the evolution of the digital environment. While the NINCH organization was dismantled, CNI continues to play a strong role in arts and humanities information on the Internet. Executive Director Clifford Lynch served as an advisor to the American Council of Learned Societies' Commission on Cyberinfrastructure, which issued an influential report on cyberinfrastructure for the humanities and social sciences in 2006. (7)

Institutional Content Resources and Repositories

As the amount of important "born digital" content generated in all sectors of educational institutions increased, CNI focused on the emerging mission of libraries to provide stewardship for a wide array of resources. The notion of developing repositories had emerged primarily as a mechanism for providing freely available access to preprints of scholarly papers in certain disciplines. CNI's Executive Director Clifford Lynch expanded that notion to suggest that higher education institutions and their libraries needed to develop a strategy for the long-term stewardship of a wide array of digital content, developed as the products of teaching and learning and administrative activities, as well as research. (8) CNI has used its Task Force meetings to advance thinking about the role, structures, and policies of institutional repositories and has participated on advisory groups concerned with developing platforms for repositories. CNI co-sponsored, with its international partners JISC and SURF, an international meeting on repositories in 2005 and published some studies as a result. (9)

Content for E-Research

Researchers in areas of the sciences increasingly rely on large data sets, which may be shared by a disciplinary community. Social scientists have also relied on large data sets of economic, demographic, and other information. Increasingly, humanists are also using large sets of digital information, which may be related to ancient artifacts, use of words in texts, or historical geographical information. CNI is assisting its members in the exploration of the role of institutions, particularly libraries and computing centers, in the stewardship of these data sets used for scholarly research. The influential National Science Foundation report on cyberinfrastructure described the need for not only high performance

networks and tools, but mechanisms for access and storage of data and skilled information professionals to facilitate its use. (10)

Networked Information Discovery and Retrieval

Locating information on the Internet was a dominant issue in CNI's early program. Beginning with a meeting of key players in 1991 at Stanford University, CNI began to identify an agenda of issues related to navigating information on the Internet. CNI worked closely with a variety of related projects and companies to provide a framework for discovery and retrieval issues, such as the Internet Engineering Task Force (IETF), Bunyip Corporation (developers of an early navigation protocol Archie), Thinking Machines (developers of WAIS), MARBI, and university partners such as University of Minnesota (Gopher) and University of Illinois's NCSA (Mosaic). CNI featured developers of information retrieval systems for the Internet at its early Task Force meetings; presenters included Brewster Kahle (WAIS), Mark McCahill (Gopher), and representatives of NCSA (Mosaic). One of CNI's working groups focused its efforts on a TopNode Network Directories research and development project which was conceptualized to serve as a top level directory for networked information resources. When it was initially conceived, there were insufficient scholarly information resources available on the Internet to actually implement the vision, but in concept it was a forerunner of Internet directories such as Yahoo.

CNI worked with various communities to promote the development and adoption of standards to facilitate information retrieval from the Internet. Many projects took the form of dissemination activities. CNI developed a workshop with presenters from leading discovery and retrieval projects, and offered it as a preconference at meetings of Educom and the American Library Association, to begin to familiarize information professionals with the types of concerns involved in locating information on the Internet and the systems and standards being developed to improve network navigation and information retrieval.

CNI was also a co-sponsor of and active participant in the Dublin Core meetings and has been a proponent of developing standards for metadata for digital objects.

Institutional, Organizational, and Professional Initiatives

A variety of CNI initiatives have addressed organizational, institutional, and professional issues related to the challenges of the networked environment. These initiatives often brought together early adopters and pioneers in the integration of networks and networked information into the institutional infrastructure and programs and also disseminated best practices and lessons learned to those institutions who later were ready to move into the new environment. Among these programs were Assessing the Academic Networked Environment, New Learning Communities, Working Together, and Institution--

Wide Information Strategies. In recent years, this aspect of the CNI program has focused on new types of learning spaces and the needs of today's user communities. These program areas incorporate work on assessment, organizational development, teaching and learning, and user services.

Assessing the Academic Networked Environment

In early 1996, Charles McClure asked CNI to publish a study that he had completed with Cynthia Lopata, *Assessing the Academic Networked Environment: Strategies and Options*. CNI published the study, which provided a conceptual framework for assessing a variety of topics related to networks and networked information and proposed specific measures for those topics. McClure and Lopata were responding to the increasing importance of assessment in higher education and the fact that very few academic institutions were collecting data on such factors as the number of network users, cost of network access, and use of networked information resources even though such programs were consuming high levels of institutional resources.

As a follow up activity, CNI organized a project, with the assistance of McClure and Christopher Peebles of Indiana University, to encourage institutions to develop projects to measure some aspect of network or networked information use within their institutions. Seven institutions participated in the project and tested a variety of measures on topics such as use of networked information resources in the curriculum, electronic reserves, and access to online library catalogs and networked library resources. (11)

CNI, with the participation of McClure and the University of Washington team members involved in the assessment project, developed a workshop to disseminate methodology and lessons learned from the participating projects to a wider audience.

New Learning Communities

CNI's Teaching and Learning Working Group focused on recognizing leading edge examples of courses or curricula that were incorporating the use of networks and networked information. In the early 1990s, competitions were held for innovative examples of programs and winners were sponsored for a session at the annual Educom conference. Out of that effort, the co-leaders of the Working Group, Susan Perry and Philip Tompkins, and CNI Associate Executive Director Joan Lippincott, developed an initiative, New Learning Communities, that incorporated peer workshops for project teams, professional development workshops for those interested in developing programs, a website of project descriptions, a video of one of the peer workshops, and a workbook to be used in campus--based workshops. The first peer workshop, held in 1994, brought together campus teams who had developed innovative teaching and learning projects incorporating the use of networks and networked information. The

projects were developed collaboratively by faculty members, librarians, information technologists, instructional technologists, students, and others. By the time of the second workshop in 1996, the World Wide Web was a major impetus for the increased use of networked information in higher education curricula. CNI's contributions through this program were its identification of the need for cross-sector teams to effectively develop instructional materials and deliver instruction, the reporting of the phenomenon that lack of physical contact did not result in less communication or interaction in networked education settings, the identification of the intellectual property issues that would need to be solved to deliver education over the Internet, and the identification of the concern that a large investment of resources was required to develop these projects. (12)

Learning Spaces and Today's Users

As the use of technology in teaching and learning in higher education increased, many libraries found that they needed to adapt their physical spaces to accommodate computer equipment for their user communities and had to develop new services to support the use of digital information. Under the leadership of Joan Lippincott, CNI's associate executive director, CNI began to feature meeting sessions on innovations in spaces that facilitated the use of networked information in teaching and learning, such as information commons, and began developing a focus on this program area around 2000. In addition, CNI featured work on the changing needs of user communities, who were becoming more technologically sophisticated and who were both users of digital content and creators of new types of digital content. (13)

Working Together

Collaboration has been a theme of CNI's work since its inception. Many of its projects have assembled institutionally based cross-sector teams. CNI's Working Group on Management recognized that there was considerable tension between some groups, e.g. librarians and information technologists, when they came together to work on projects such as developing a campus-wide information system, providing technology workshops for faculty and students, or developing campus information policies. The Working Together workshop was launched to provide a venue for institutional teams to develop an understanding of what makes collaboration work, to practice collaboration in a structured environment, and to develop a plan for an institutional project which could be implemented at home. A series of these workshops were held in the mid to late 1990s. In 1998, CNI revamped the Working Together workshop to address issues related to electronic records and archives. Subsequent Working Together workshops have brought together institutional teams of archivists, records managers, information technologists, and librarians to develop institutional plans for long-term access to websites, access to student records, and institutional e-mail. (14)

Institution--Wide Information Strategies (IWIS)

The Institution--Wide Information Strategies (IWIS) initiative, led by the late Gerry Bernbom of Indiana University, was designed to address the questions of how an institution uses information and how it coordinates its activities and allocates its resources so that its use of information has a positive effect. This initiative also addressed the need for institutions to think about the integration of administrative information and academic information. It was a precursor to such concepts as course management systems, which combine course content with administrative information such as grades. The institutions that participated in the initiative in 1996-7 developed cross-sector teams that developed policies or implemented procedures involving information from more than one institutional unit. The teams met several times to share information and provide critiques of each other's activities, and a group of case studies resulting from their efforts is available on the CNI server. (15)

Technology, Standards, and Infrastructure

CNI's technical agenda has encompassed a wide variety of projects and initiatives. Frequently CNI has collaborated with other organizations, such as EDUCAUSE, the Internet2 Project, and the IMS Global Learning Consortium, to work on infrastructure and standards issues. CNI was an early member of the Internet Society and continues to participate in its activities. In addition to technical standards work in the library and information community, CNI was active in the Computer Interchange of Museum Information (CIMI) standards project. CNI has been a leader in projects on authentication, digital preservation, and standards for collections of content through the Open Archives Initiative (OAI).

Authentication, Authorization and Access Management

Institutions providing access to commercially available information resources via the Internet, such as electronic journals, are generally required to provide some mechanism for ensuring that only appropriate users have access to the resource, which is usually licensed from a vendor. CNI provided information on technical solutions and policy issues early in the implementation of electronic journal programs through presentations at Task Force meetings. CNI continued to both provide a venue where publishers and institutional buyers could discuss technical requirements and policy issues and also provided a framework for thinking about these issues through a white paper on authentication, authorization, and access management, written by Clifford Lynch in 1998. (16) CNI has also worked with other organizations such as EDUCAUSE and Internet2 and its Shibboleth project that are helping to create a framework for a distributed system for higher education.

Preservation

Long-term access to digital information is a key issue in the acceptance of electronic-only versions of scholarly publications. Within academe, researchers publish with the expectation that their works will be available well after their lifetime, preserved by academic and research libraries. CNI has worked and continues to partner with the Council on Library and Information Resources (CLIR), ARL, the Library of Congress, and others to find ways to address the long-term preservation of electronic materials. CNI and CLIR have issued papers and draft guidelines for preservation, and they have held meetings bringing together publishers, intermediaries, and buyers, to discuss roles, responsibilities, legal issues, technical issues, and policies. CNI has emphasized that solving the problems of long-term access to digital information will be more difficult to solve on the policy front than on the technical side.

Institutional Infrastructure to Support Research

CNI addresses both the content and technical issues related to the curation and preservation of large data sets and the need for informatics support. These needs are found in all disciplinary areas and have implications for policies, technical solutions, and resource allocation within institutions. CNI works closely with EDUCAUSE to identify and understand trends in this area and their implications for new collaborations involving libraries and computing centers.

Open Archives Initiative (OAI)

In 2000, CNI became a sponsor of the Open Archives Initiative (OAI) and a member of its steering committee. The Open Archives Initiative develops and promotes interoperability standards that aim to facilitate the efficient dissemination of content in order to enhance access to scholarly content. While rooted in the interoperability of e-print archives, the Open Archives standards are now being adopted by a wider community. The work of the OAI group has become a key underpinning for the development of and interoperability of institutional repositories. Starting in 2006, CNI became an early co-sponsor of the Open Archives Initiative Object Reuse and Exchange Program (OAI-ORE).

CONCLUSION

CNI has been a linchpin for converging interests of libraries, information technology, publishers, telecommunications providers, and others in the networked environment. By identifying early that a variety of sectors needed to collaborate to create a framework for research and education information on the network, CNI was able to pull together key constituencies and accelerate progress in the development of content for Internet users. CNI's importance has been its ability to encourage collaboration among sectors, its early identification of issues that needed to be addressed in order for scholarly content to flourish on the network, its introduction of the Internet as a scholarly communications vehicle

to a variety of constituencies such as university presses, scholarly societies, and the cultural community, and its showcasing of leading projects in networked information via its semi-annual Task Force meetings. Through the incisive leadership of its two executive directors, CNI has set an agenda for networked information, alerted its community to key issues, and provided a level playing field for the development of strategies and initiatives to address them.

REFERENCES

1. This article is based on a review of documents available on CNI's website at www.cni.org and in CNI's organizational files. The agenda books from Steering Committee meetings, Program Plans, articles in the sponsors' publications, and reports from CNI's projects provided background for this article.
2. King, Kenneth. The Higher Education Information Resources Alliance (HEIRA) and the Coalition for Networked Information (CNI). *Educom Review* 1990, 25 (3), 80.
3. Yavarkovsky, Jerome. A University--Based Electronic Publishing Network. *Educom Review* 1990, 25 (3) 14-20.
4. Cerf, Vinton. Paul Evan Peters Eulogies, <http://staff.cni.org/~paul/obitIndex.html>
5. Peters, Paul Evan. Making the Market for Networked Information: An Introduction to a Proposed Program for Licensing Electronic Uses. *Serials Review* 1992, 18 (1-2) 19-24.
6. Lynch, Clifford A. The TULIP Project: Context, History, and Perspective. *Library Hi Tech* 1995, 13 (4) 8-24.
7. American Council of Learned Societies Commission on Cyberinfrastructure for the Humanities and Social Sciences. *Our Cultural Commonwealth*. New York: ACLS, 2006.
<http://www.acls.org/programs/Default.aspx?id=164>
8. Lynch, Clifford A. Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age. *ARL Bimonthly Report* 2003, 226 (February) 1-7.
<http://www.arl.org/newsltr/226/ir.html>. Reprinted in *portal: Libraries and the Academy* 2003, 3 (2), pp. 327-336.
9. Lynch, Clifford A. and Joan K. Lippincott. Institutional Repository Deployment in the United States as of Early 2005. *D-Lib Magazine* 2005, 11 (9, September); Van Westrienen, Gerard and Clifford A. Lynch. Academic Institutional Repositories: Deployment Status in 13 Nations as of Mid 2005. *D-Lib Magazine* 2005, 11 (9, September).
10. *Revolutionizing Science and Engineering through Cyberinfrastructure*. Report of the National Science Foundation Blue Ribbon Advisory Panel on Cyberinfrastructure. Arlington, Virginia: National Science Foundation, 2003. <http://www.nsf.gov/od/oci/reports/toc.jsp>
11. Lippincott, Joan K. Assessing the Academic Networked Environment. In *Information Technology in Higher Education: Assessing Its Impact and Planning for the Future*; by Katz, R., Rudy, J. Eds.; *New Directions for Institutional Research*, Number 102. San Francisco, Jossey-Bass, 1999; 21-36.
12. Tompkins, Philip.; Perry, Susan, and Lippincott, Joan K. New Learning Communities: Collaboration, Networking, and Information Literacy. *Information Technology and Libraries* 1998, 17 (2) 100-106.

13. Lippincott, Joan K. Linking the Information Commons to Learning. In *Learning Spaces*. Diana G. Oblinger (Ed.) Boulder, CO: EDUCAUSE, August 2006. <http://www.educause.edu/learningspaces>; Lippincott, Joan K. Net Generation Students and Libraries. in *Educating the Net Generation*. Diana Oblinger and James Oblinger, Eds. Boulder, CO: EDUCAUSE, February 2005. <http://www.educause.edu/educatingthenetgen>; Lippincott, Joan K. Student Content Creators: Convergence of Literacies, E-Content column. *EDUCAUSE Review* 2007, (Nov/Dec). www.educause.edu/apps/er/erm07/erm07610.asp.
14. Bernbom, Gerry; Joan K. Lippincott, and Fynnette F. Eaton. Working Together: New Collaborations among Information Professionals. *CAUSE/EFFECT* 1999, 22 (2) 6-9.
15. Bernbom, Gerry. Institution--Wide Information Strategies. *CAUSE/EFFECT* 1997, 20 (1) 8-11.
16. Lynch, Clifford A. Access Management for Networked Information Resources. *ARL Newsletter* 1998, (201) 3-7. Also, *CAUSE/EFFECT* 1998-99, 21 (4) 4-9.