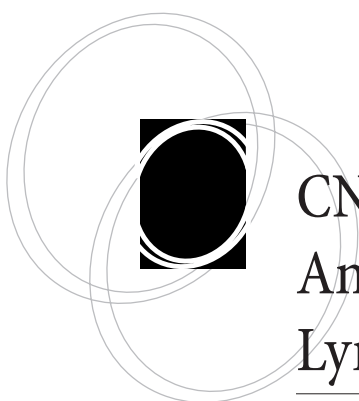


### **Editor's Note**

In the summer of 2024, Clifford Lynch announced his retirement as executive director of the Coalition for Networked Information (CNI) after 28 years at its helm. CNI quietly launched a project to create this Festschrift to document and honor his legacy. Authors began contributing articles in early 2025, with a planned publication date of July 2025. Since the final membership meeting of Cliff's tenure was April 7–8 in Milwaukee, the plan was to surprise him, surrounded by colleagues and friends, with a presentation of the table of contents of this special issue. However, just two weeks prior to the meeting, Cliff's health worsened; he was told about the Festschrift and received project details and articles. Though unable to attend in person, he participated in the CNI membership meeting via Zoom and also virtually joined his retirement reception, which included readings of excerpts from each article in this volume. Sadly, on April 10, 2025, Clifford Lynch passed away. Festschrift contributors wrote their articles prior to his passing, and we have chosen not to alter their original language.



# CNI as an Idea Factory: An Appreciation of Clifford Lynch

---

Donald J. Waters

**abstract:** This article offers an appreciation of the work of Clifford Lynch upon his retirement as the executive director of the Coalition for Networked Information (CNI). It begins by identifying Lynch's "superpowers"—his intellectual capacity, strategic vision, and collaborative spirit in advancing scholarship in the digital age. The article traces the development of these abilities from Clifford's early work on MELVYL, the University of California's online catalog system, through the early days of CNI. By the time he became executive director, Clifford had perfected a holistic approach of considering cultural and social as well as technological factors when addressing challenges in the networked information environment. He applied this approach to a bundle of complex and interrelated issues that affect scholarly work. CNI's work as a "factory of ideas" to address these issues will surely comprise a substantial part of Clifford's legacy.

## Introduction

Like many in the higher education community of librarians and information technology specialists, I have greatly benefited from my association with Clifford Lynch. In my first working relationship with him, we served on the Task Force on Archiving of Digital Information. Established in 1994 by the Commission on Preservation and Access and the Research Libraries Group, the task force issued its groundbreaking report in 1996.<sup>1</sup> A year later, I became the founding director of the Digital Library Federation, just as Clifford took office as the executive director of the Coalition for Networked Information (CNI), succeeding Paul Evan Peters. In 1999, after I became program officer for scholarly communications at the Andrew W. Mellon Foundation (now called just the Mellon Foundation), Clifford invited me to join CNI's Steering Committee as an at-large member, a role I held until 2022, when he appointed me as CNI's first senior scholar.



Innumerable times over this 30-year period, I have witnessed Clifford's superpowers: his capacious intellect; his extraordinary ability to identify and clearly communicate issues of strategic importance; and his unfailing generosity of spirit in working with others to generate ideas and stimulate efforts to address these issues. In this essay, I highlight some of the key issues on which I think CNI has been especially influential under Clifford's leadership. Context and history help explain this influence, and I begin this expression of my deep appreciation of Clifford as a friend and colleague by referring to this origin story, which he himself recounted in a rare moment of personal disclosure.

### The Lessons of MELVYL

In *Ubiquity*, a magazine published by the Association of Computing Machinery, Clifford discussed his intellectual journey from an undergraduate mathematics major at Columbia University to the director of CNI. For postgraduate study, he switched from math to computer science and completed his master's degree at Columbia. He began working full-time for Edwin Brownrigg on library automation projects at New York University. Then, in a key, formative moment during 1979, he followed Brownrigg to the University of California (UC) to help develop MELVYL. Named in part for the library pioneer Melvil Dewey, the system was an online catalog of the unified holdings of the libraries at all UC campuses. According to Clifford, it "was used all over the world by hundreds of thousands of people from the mid-'80s on."<sup>2</sup>

It is now nearly forgotten what a challenge the development of an online catalog for the campus library represented at the time. The technical and computational obstacles were formidable, and the implementations raised complex social and cultural issues. Early versions of the catalogs were difficult to use. Many faculty resented, and even actively opposed, how these systems disrupted scholarly work, which had long depended on their mastery of manual card catalogs and bibliographic indices and their ability to browse the stacks. Other faculty welcomed the potential advantages of library automation but complained that the systems did not go far enough, citing the massive amounts of older records that were absent because they had not yet been converted to online form. Faculty and students were also contending with the introduction of personal computers and the rise of email. Questions arose about whether and how library systems would be able to—or even need to—incorporate new, emerging forms of online scholarly products. It was an unruly period, at once thrilling and disconcerting, as the academy plunged headfirst, and not always enthusiastically, into the long, still-ongoing transition to a networked information environment.

Helping to lead this transition at UC, Clifford began honing his skill in sharing publicly the lessons learned from his work. During the 1980s, he produced an impressively long list of talks and articles. He placed MELVYL, and online catalogs generally, in the larger context of other emerging online technologies and highlighted the architectural and cultural choices that libraries and the wider academy needed to consider. The variety of topics he covered included an assessment of the telecommunications landscape; UC's choice of network infrastructure to connect terminals to MELVYL; faculty and student experience of using the online catalog; reports of his own dissertation research on how relational databases for online catalogs could better support high performance

retrieval; the integration of online catalogs with email systems, document delivery, and emerging forms of publication using CD-ROMs and electronic imaging; and ways that librarians could use the network to share bibliographic information and improve their services to faculty and students.<sup>3</sup>

While Clifford was writing on these various topics, I staffed the help desk at the Yale Computer Center and set up one of the first microcomputer labs on campus at Yale's School of Organization and Management. Then in 1987, I joined the Yale University Library with the charge to implement an integrated library system that included an online catalog of Yale's vast holdings. Faced with this challenge, I discovered Clifford's work and began devouring any articles of his that I could find. I also realized that I was just one of many colleagues in similar positions at colleges and universities around the country trying to comprehend and shape the rapid technological changes underway in our institutions. We turned to Clifford not only because his pioneering experience with MELVYL provided us a guiding light but also because Clifford's example challenged each of us to share our own experiences so that together we all could cast an even brighter light on the path forward.

### The Formation of CNI

Higher education has long relied on a variety of membership organizations to help individual colleges and universities collaborate in addressing difficult, shared issues. As the Internet grew in its reach and reliability during the late 1980s, three such organizations—the Association of Research Libraries (ARL); Educom, which brought together networking and academic computing specialists; and the College and University Systems Exchange (CAUSE), which focused on administrative systems—realized that their separate efforts were insufficient to help their member institutions effectively grapple with emerging digital technologies and content. In 1990, they jointly sponsored the creation of CNI, a new collaborative membership organization specifically designed to “promote the creation of and access to information resources in networked environments in order to enrich scholarship and to enhance intellectual productivity.”<sup>4</sup>

CNI filled a gap within the academy that was broad and deep. Within a year, 134 institutions and organizations had joined to pursue a vigorous agenda under the leadership of Paul Evan Peters, CNI's founding director. Among the early members, UC played a key role. Richard West, UC's associate vice president, chaired CNI's Steering Committee. CNI had also created a number of working groups. Clifford, then the director of the Division of Library Automation in UC's Office of the President, led the group focused on architectures and standards.

In its charter statement, this working group defined architectures as the “conceptual frameworks for how . . . to integrate and organize resources to accomplish the purposes that the Coalition has set out to achieve.”<sup>5</sup> To create such frameworks and promulgate the appropriate standards, the working group did not need to coordinate or otherwise interfere in the efforts of other CNI working groups, such as those on publishing, resource information services, and teaching and learning. It did, however, have to articulate and even anticipate the requirements that would be placed on the emerging systems of networked information. Through his work at UC in the 1980s, Clifford had proved



himself well able to undertake this kind of systems analysis and synthesis and apply it at the national level on which CNI was now operating.

Among its accomplishments, the Working Group on Architecture and Standards organized a national test bed to implement and refine the Z39.50 standard for the interchange of bibliographic records among libraries over the Internet. Then in 1994, the group launched a more comprehensive effort to produce a white paper on networked information resource discovery and retrieval. On these and other topics that deeply concerned the CNI membership, Clifford published widely through the mid-1990s.<sup>6</sup>

In a review of several volumes of collected essays published during this period of early CNI development, Gretchen Whitney and Stuart Glogoff emphasized that campus automation is not just about technology. Success also crucially depends on political, economic, and cultural factors that shape needs for and uses of the technology. They singled out Clifford's contributions to the volumes under review and captured the sentiments of many who appreciated the holistic approach that he provided. They wrote that "Lynch is comfortable speaking in terms of strengths as well as weaknesses, promises as well as impediments, and advances as well as delays." They continued:

Lynch possesses a gift for presenting material that is highly technical in clear, well-written prose that is equally suitable for students and practitioners. His vision and breadth of knowledge on libraries and networked information resources is remarkable. In his conclusion, Lynch portrays a future in which "the new enabling technologies and infrastructure will enable the library and information services community to deliver service of a quality previously unattainable and to allow many more people to exploit much more information" ... This is a banner under which we should all march.<sup>7</sup>

While giving Clifford due credit, Whitney and Glogoff's review nonetheless failed to note that CNI had been created to unfurl the very banner they endorsed. Following the inspired leadership of his good friend Paul Evan Peters, Clifford himself was marching under that banner, as were his CNI colleagues around the country.

The sudden death of Peters in 1996 shocked the CNI members, but the momentum of their collective march carried CNI through two membership meetings while the sponsoring organizations searched for a new executive director. Of course, the choice was not foreordained, but neither was it surprising that the sponsors selected Clifford to succeed Peters. Clifford had been deeply involved in CNI since its early days. He also had technical expertise, experience in carrying out large, complex projects, and a facility for conceptualizing, interpreting, and articulating how key factors fit together to shape the emerging networked environment. All these qualities combined to make him a natural candidate.

### CNI during the Lynch Era

The Lynch era of CNI began in 1997. In his opening address as executive director at the October membership meeting, Clifford promised to continue many of CNI's ongoing initiatives. However, he urged the membership to recast these activities and add others under three broad themes: (1) developing networked information content; (2) transforming organizations, professions, and individuals; and (3) building technology, standards, and infrastructure. In CNI's program plan, he suggested that these themes captured

“the essential foundations of the vision of advancing scholarship and intellectual productivity.”<sup>8</sup> In other words, the scholarly work of research and teaching in the emerging networked environment depended on—and would surely collapse if sufficient attention was not given to—key cultural (content) and social (organization and skill) factors as well as the underlying technology.

CNI has held fast to this holistic approach. In its 2019–2020 program plan, the last issued before COVID-19 wreaked havoc, CNI still organized its agenda around the same three themes that Clifford articulated 22 years earlier, in 1997. Each year, under these broad, enduring themes, CNI identified a set of targeted activities that it would pursue as a high priority. These activities might change from year to year as needs and opportunities in the academy arose. Some issues proved to be so intricate and yet so central to advancing scholarship in the networked environment that CNI would devote activities to them, or to aspects of them, over multiple years. Here, I focus on a cluster of four interrelated cultural and social issues. A substantial part of Clifford’s legacy is that he has relentlessly called attention to them, and especially to their interrelationships, and promoted efforts of CNI’s members to address them.

### Preservation

As the Task Force on Archiving of Digital Information observed in 1996, the life of content produced digitally threatens to be “nasty, brutish, and short.” Failure to take steps to preserve such content “will certainly exact a stiff, long-term cultural penalty.”<sup>9</sup> Because content is king in scholarship, one of the cultural penalties of such a failure would be to deter scholars from embracing the affordances of the networked digital environment to produce and share their work.

Thanks to the pioneering work of the TULIP (The University Licensing Program) project and JSTOR in the 1990s, scholarly journals quickly moved to the digital environment.<sup>10</sup> JSTOR created a funding model to ensure that the journal content it digitized and made available would be preserved. For journals published digitally, however, the means of preservation were more uncertain. After considerable experimentation and the airing of results in a variety of forums, including at CNI meetings, Portico and LOCKSS (Lots of Copies Keep Stuff Safe) both emerged as solutions. Together, they have provided a solid framework for digital journal preservation, but their coverage of the full range of journal publication is, as yet, far from comprehensive.<sup>11</sup>

From the beginning of his tenure at CNI, Clifford has regularly called attention to preservation as a weak link in the chain of scholarly communications. He has vigorously supported efforts such as Portico and LOCKSS, as well as the Internet Archive, to help preserve web pages. He has also regularly cautioned that these solutions are only partial. In the early days, he pointed out, these efforts neglected to include electronic books, and they especially failed to include materials from the popular press, social media, and other sources that scholars would regard as primary sources.<sup>12</sup>

### Primary Sources

Primary sources are the fuel of scholarship in nearly all disciplines. In the sciences and social sciences, numerical data drive much of the research. Clifford has devoted consider-





able energy to the requirements for collecting and stewarding such data in disciplinary and institutional repositories.<sup>13</sup> However, sources for research in the humanities and humanistic social sciences have been much slower to emerge in the digital environment. Access to born-digital sources, such as social media, as well as the digitization of published and archival materials are frequently entangled in intellectual property restrictions and privacy concerns. Recognizing these difficulties, Clifford has largely focused CNI on two types of efforts in these areas: collecting and preserving personal digital archives and such initiatives as the Social Networks and Archival Context (SNAC) Project, which seek to normalize the treatment of names and places in the cataloging of archival materials and make those materials easier for scholars to find.<sup>14</sup>

### **Analytical Support**

Another dependency for expanding the scholarly utility of networked information is support for the research process. Scholars will use the digital environment effectively only to the extent that they can master an array of digitally powered methodologies for the analyses of texts, audiovisual materials, geographic information, and numeric data. It is not sufficient for librarians and other information technology specialists to participate in the formation of data management plans at the beginning of a research project or to ensure the deposit of data in appropriate repositories at the end. As examples of the support needed during the research process, Clifford has called attention to the structures developed for high-performance computing and to the data carpentries and other training programs for less intensive computer work.<sup>15</sup> However, library and other campus information specialists need to provide much more.

### **Library Space**

In one of CNI's long-standing agenda items, Clifford and especially CNI's associate director emerita, Joan Lippincott, have worked with the CNI membership to explore the changing uses of campus library spaces. They have sought to identify the new services these changes enable and to promote the development of the advanced skills needed to provide these services. The growth of online catalogs and efficient delivery services has allowed libraries to move collections to off-campus shelving facilities, effectively treating these collections as networked information. This move has allowed libraries to reconfigure on-campus space and related services, shifting from a focus on collections to a focus on the research and learning needs of faculty and students. The new skill sets for these user-focused services have taken time to configure and fortify. Only now have they begun to take shape across the academy as much-needed support for digital scholarship.<sup>16</sup>

### **The Coalition and Its Legacy**

When Clifford first addressed CNI, he promised to ensure that it would serve as an incubator and disseminator of good ideas to help make the networked environment a hospitable and thriving place for scholarship.<sup>17</sup> During his long tenure as executive director, Clifford has carefully honed his abilities to infuse the coalition not only with ideas



but also with new skills and enthusiasm. He has established deep connections with a variety of organizations whose interests overlap and align with those of CNI, including the National Academies, funders like the National Science Foundation and the Mellon Foundation and Alfred P. Sloan Foundation, and the Digital Library Federation. He has also maintained a grueling travel schedule both in the United States and abroad to track developments that could inform, accelerate, or shift the direction of CNI activities. Overseas, he built especially productive relationships with the Deutsche Forschungsgemeinschaft (DFG), the German Research Foundation. In the United Kingdom, he regularly scheduled biannual meetings between CNI members and constituents of Jisc (formerly the Joint Information Systems Committee) to share developments of mutual interest.

Amid this wide range of activities, Clifford has devoted his primary attention to CNI's annual spring and fall membership meetings. With a small and extraordinarily dedicated staff, he has constructed these meetings with meticulously selected plenary speakers, well-curated briefing sessions, plenty of breaks, and a reception featuring a seemingly bottomless bowl of steamed shrimp—all designed to attract interest and stimulate discussion. In their reviews, participants regularly applaud these meetings as among the best and most generative that they attend.

In remarking on these various aspects of Clifford's leadership of CNI, I am reminded of Arthur C. Clarke, the science writer and futurist. Clarke wrote in the late 1950s that "when one comes upon it in its surprisingly rural setting, the Bell Telephone Laboratories' main New Jersey site looks like a large and up-to-date factory, which in a sense it is." Under Clifford's leadership, CNI has proved to be, as Clarke said about Bell Labs, "a factory for ideas."<sup>18</sup> Clifford has left a legacy of not only considerable accomplishment but also clear paths forward.

Chapeau, dear friend!

*Donald J. Waters previously served as associate university librarian at Yale University, the founding director of the Digital Library Federation, and senior program officer at the Andrew W. Mellon Foundation. He is currently the inaugural senior scholar at the Coalition for Networked Information and vice president of the Engineering Information Foundation; he may be reached by email at [djw@40overbrook.com](mailto:djw@40overbrook.com).*

## Notes

1. Donald Waters and John Garrett, eds., *Preserving Digital Information. Report of the Task Force on Archiving of Digital Information* (Mountain View, CA: Research Libraries Group, 1996, <https://clir.wordpress.clir.org/wp-content/uploads/sites/6/pub63watersgarrett.pdf>).
2. Clifford Lynch, "Check Out the New Library: Clifford Lynch on Information Creation, Management, and Organization in the Digital Environment," *Ubiquity* 4, 23 (2003), <https://ubiquity.acm.org/article.cfm?id=941398>.
3. For a selected bibliography of articles from the 1980s on these and other topics, see Clifford Lynch, "Pre-1997 Publications," Washington, DC: Coalition for Networked Information, <https://www.cni.org/about-cni/staff/clifford-a-lynch/publications/lynch-pubs-pre97>.
4. Coalition for Networked Information, "Mission, Themes, and Strategies," in "Report of the June 1990 Organizational Meeting," Washington, DC: Coalition for Networked Information, 1990, [https://www.cni.org/wp-content/uploads/2024/08/MM\\_CNI-Spring-1990-Membership-Meeting-Report.pdf](https://www.cni.org/wp-content/uploads/2024/08/MM_CNI-Spring-1990-Membership-Meeting-Report.pdf).





5. Coalition for Networked Information, "Working Group on Architectures and Standards," in "Report of the Fall 1990 Meeting of the Task Force," Washington, DC: Coalition for Networked Information, 1990, <https://www.cni.org/wp-content/uploads/2024/09/Membership-Meeting-Report-Fall-1990.pdf>.
6. See, for example: Clifford A. Lynch, "The Z39.50 Information Retrieval Protocol: An Overview and Status Report," *ACM SIGCOMM Computer Communication Review* 21, 1 (1991): 58–70, <https://doi.org/10.1145/116030.116035>; and Clifford A. Lynch, "Networked Information Resource Discovery: An Overview of Current Issues," *IEEE Journal on Selected Areas in Communications* 13, 8 (1995): 1505–22. For a more complete list, see Lynch, "Pre-1997 Publications."
7. Gretchen Whitney and Stuart Glogoff, "Automation for the Nineties: A Review Article," *Library Quarterly* 64, 3 (1994): 319–31.
8. Coalition for Networked Information, "Fall 1997 Meeting of the Task Force, Summary Report," 1997, [https://www.cni.org/wp-content/uploads/2024/07/MM\\_CNI-Fall-1997-Membership-Meeting\\_Report.pdf](https://www.cni.org/wp-content/uploads/2024/07/MM_CNI-Fall-1997-Membership-Meeting_Report.pdf); Coalition for Networked Information, "1997–1998 Program Plan," 1997, <https://www.cni.org/program/program-plan-archive/1997-1998-program-plan>.
9. Waters and Garrett, *Preserving Digital Information*.
10. Karen Hunter, "Publishing for a Digital Library—What Did TULIP Teach Us?" *Journal of Academic Librarianship* 22, 3 (1996): 209–11; Roger C. Schonfeld, *JSTOR: A History* (Princeton, NJ: Princeton University Press, 2003).
11. Martin Paul Eve, "Digital Scholarly Journals Are Poorly Preserved: A Study of 7 Million Articles," *Journal of Librarianship and Scholarly Communication* 12, 1 (2024), <https://doi.org/10.31274/jlsc.16288>.
12. See, for example, Clifford A. Lynch, "On the Threshold of Discontinuity: The New Genres of Scholarly Communication and the Role of the Research Library," in *Racing Toward Tomorrow: Proceedings of the Ninth National Conference of the Association of College and Research Libraries, April 8–11, Detroit, Michigan*, edited by Hugh A. Thompson (Chicago: Association of College and Research Libraries, 1999), 410–18; Clifford A. Lynch, "Preserving Digital Information to Support Scholarship," in *The Internet & the University: 2001 Forum*, edited by Maureen Devlin, Richard Larsen, and Joel Meyerson (Boulder, CO: EDUCAUSE, 2002); Clifford A. Lynch, "Ebooks in 2013: Promises Broken, Promises Kept, and Faustian Bargains," *American Libraries* (2013): 12–16; and Clifford Lynch, "Stewardship in the 'Age of Algorithms,'" *First Monday* 22, 12 (2017), <https://doi.org/10.5210/fm.v22i12.8097>.
13. See, for example: Clifford A. Lynch, "Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age," *portal: Libraries and the Academy* 3, 2 (2003): 327–36; Clifford A. Lynch, "How Do Your Data Grow?" *Nature* 455, 7209 (2008): 28–29, <https://doi.org/10.1038/455028a>; Clifford A. Lynch, "Jim Gray's Fourth Paradigm and the Construction of the Scientific Record," in *The Fourth Paradigm: Data-Intensive Scientific Discovery*, edited by Tony Hey, Stewart Tansley, and Kristen Tolle (Redmond, WA: Microsoft Research, 2009).
14. See, for example: Clifford A. Lynch, "The Future of Personal Digital Archiving: Defining the Research Agendas," in *Personal Archiving: Preserving Our Digital Heritage*, edited by Donald T. Hawkins (Medford, NJ: Information Today, 2013), 259–78; and Coalition for Networked Information, "The Coming Convergence of Identity Management, Biography, Bibliography and Social Discovery," *An Introduction & Program Plan 2016–2017*, 2016, <https://www.cni.org/program/program-plan-archive/building-technology-standards-infrastructure/the-coming-convergence-of-identity-management-biography-bibliography-and-social-discovery-15-16>.
15. See, for example: Shelly Knuth, "Becoming Part of the National Cyberinfrastructure Community," *Project Briefings Presented at the CNI Spring 2023 Membership Meeting April 3–4, 2023*, <https://www.cni.org/topics/ci/becoming-part-of-the-national-cyberinfrastructure-community>; and John Chodacki and Tim Dennis, "Taking the Carpentry Model to

Librarians: How to Build a Library Community for Data Intelligence and Better Collaboration Across Institutions," *Project Briefings Presented at the CNI Fall 2017 Membership Meeting, December 11–12, 2017*, <https://www.cni.org/topics/economic-models/taking-the-carpentry-model-to-librarians-how-to-build-a-library-community-for-data-intelligence-and-better-collaboration-across-institutions>.

16. See, for example, Clifford Lynch, "Where Do We Go from Here? The Next Decade for Digital Libraries," *D-Lib Magazine* 11, 7–8 (2005), <https://doi.org/10.1045/july2005-lynch>; H. Thomas Hickerson, Joan K. Lippincott, and Leonora Crema, eds., *Designing Libraries for the 21st Century* (Chicago: Association of College and Research Libraries, 2022), [https://www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/booksanddigitalresources/digital/9780838936726\\_OA.pdf](https://www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/booksanddigitalresources/digital/9780838936726_OA.pdf); and especially Joan Lippincott, *Directions in Digital Scholarship: Support for Digital, Data-Intensive, and Computational Research in Academic Libraries* (Washington, DC: Coalition for Networked Information, 2023), <https://doi.org/10.56561/ULHJ1168>.
17. Coalition for Networked Information, 1997–1998 *Program Plan*.
18. Arthur C. Clarke, *Voice across the Sea* (New York: Harper & Row, 1974), 152, quoted in Jon Gertner, *The Idea Factory: Bell Labs and the Great Age of American Invention* (New York: Penguin, 2012), 5.

This mss. is peer reviewed, copy edited, and accepted for publication, portal 25.3S.