

**Information Infrastructure to Address Societal Grand Challenges**

**A Proposal to the Coalition for Networked Information  
to serve as a CNI Senior Scholar**

Submitted by

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# Information Infrastructure to Address Societal Grand Challenges

## A Proposal to the Coalition for Networked Information

The Coalition for Networked Information (CNI) plans to support the appointment of a series of term-limited Senior Scholars. The CNI Senior Scholars would undertake research projects targeted to the needs and interests of CNI's member institutions and the larger research community. In this proposal, I request support as a CNI Senior Scholar over a period of approximately 15 months. I offer a plan for a research project that would help identify the information infrastructure, including the standards, expertise, tools, and content, that research universities would need in place over the next decade to establish and expand programs in which faculty across multiple disciplines would be able to join members of the public in concerted efforts to address climate change and related societal grand challenges.

### Rationale

The United States and other nations around the world face a complex set of interrelated and increasingly urgent issues that impede human flourishing. These issues are generally characterized as grand challenges or “wicked” problems. Climate change often heads the list of these problems. Desertification, flooding, species extinction, and other effects of climate change often, but not always, play a role in causing or exacerbating some of the other big issues, which include forced migration, food scarcity, and pandemics. These, in turn, tend to expose and amplify still other problems, such as inequality and racism.

The nation's research universities offer considerable expertise and other resources to help the public confront these grand challenges, both at a global level and within local communities. A recent study by Ithaka S+R indicates that university leaders do recognize as one of their top priorities the need for their institutions to engage more deeply with the interests of the public, particularly in their home states.<sup>1</sup> Moreover, the Ithaka authors reported that another top priority for research universities is to increase their investment in the STEM fields of science, technology, engineering, and medicine. This goal is crucially important to the public interest, not least because it helped guide universities in their support of research efforts designed to protect the health of the citizenry during the COVID pandemic. Academic researchers, particularly in biomedicine, stepped up by joining in large-scale, international efforts. They collaborated to gather samples of the pathogen, fully sequence its genome, and conduct experiments leading to the rapid development of vaccines, treatments, and other ways to control and prevent COVID infections.

However, the pandemic has also revealed substantial weaknesses in how research universities have targeted their priorities toward the wicked, complex problems that confront the nation and the world. Almost as soon as COVID began spreading, members of historically marginalized groups began suffering bad outcomes at much higher rates than other groups in the United States and

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<sup>1</sup> Cooper, Danielle, Catherine Bond Hill, and Roger C. Schonfeld. *Aligning the Research Library to Organizational Strategy*. New York: Association of Research Libraries, Canadian Association of Research Libraries, Ithaka S+R, April 2022. <https://sr.ithaka.org/publications/aligning-the-research-library-to-organizational-strategy/>.

elsewhere. With the rollout of the new vaccines, these differential outcomes compounded and extended to other groups. Despite the impressive contributions that STEM researchers offered during COVID, their success extended only so far. In this case, as in so many other attempts to address complex human problems, STEM research inevitably falters in its impact because it fails to engage fully with the practical experience of members of the public and with the relevant political, economic, organizational, historical, linguistic, philosophical, religious, and other cultural knowledge researchers in the social sciences and humanities have accumulated.

Research universities might have helped shape the nation's pandemic response to better and less divisive ends if their priorities did not so openly favor expertise in STEM fields at the expense of the prodigious resources they have also accumulated in humanities and social science disciplines. Of course, the deep, structural bias toward STEM is largely the result of long-term patterns of federal and state support for research universities. The reliance of research institutions on funding from these sources makes it difficult for university leaders to change course. However, recent evidence of growing public dissatisfaction with the ability of their universities to effectively serve the common good may spur them to try. For example, a recent New America study, which the Bill & Melinda Gates Foundation supported, examined the percentage of Americans who believe that the colleges and universities are leading America in a positive direction. The report showed that the proportion fell alarmingly during the pandemic from 69 percent in 2020 to 55 percent in 2022.<sup>2</sup>

Given the scope, complexity, and urgency of pressing grand challenges, and the public's growing frustration with the role of higher education institutions, university leaders will surely need to reconsider and recalibrate their current priorities. As they do, most will almost certainly continue to call for major investments in STEM fields while also recognizing that such a commitment is insufficient to serve the public interest in addressing the complex set of grand challenge issues. As they focus on shaping a more responsive set of strategic priorities, many university leaders will likely look for ways to mobilize academic expertise across their institutions and to foster deep, extensive, problem-oriented collaborations that join researchers from the social sciences, humanities, and STEM with interested members of the public.

University leaders who elect to reorient their institutions in these ways will almost certainly rely on faculty who have already established—or have begun to establish—substantial, cross-disciplinary collaborations focused on climate change and other grand challenge questions. As leaders promote these existing research efforts and sponsor new ones, faculty will surely press them for support in creating, expanding, and sustaining the necessary information infrastructure. Campus libraries and the information technology (IT) organizations are generally well positioned to provide such support and both groups could accelerate the effects of strategic changes in institutional priorities if they were prepared and actively involved. The initiative proposed here and described in more detail below would explore the information infrastructure needed for interdisciplinary collaborations and

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<sup>2</sup> Fishman, Rachel, Sophie Nguyen, and Louisa Woodhouse. *Varying Degrees 2022: New America's Sixth Annual Survey on Higher Education*. Washington, DC: New America, 2022. <https://www.newamerica.org/education-policy/reports/various-degrees-2022/>. See also Fischer, Karin. "Americans' Confidence in Higher Ed Drops Sharply." *The Chronicle of Higher Education*. July 26, 2022. <https://www.chronicle.com/article/americans-confidence-in-higher-ed-drops-sharply>.

help chart a path for campus libraries and IT organizations to contribute to and enhance the quality of research on climate change and other societal grand challenges.

### **Proposed Activities**

For purposes of this proposal, I define information infrastructure as the collection of standards, expertise, tools, and primary sources and other content needed for research. To help research universities and their libraries and IT organizations understand the information infrastructure needed for climate change and other grand challenge research, I propose to take these four steps:

First, I would spend a concentrated but relatively brief period on background research. I would review the general literature on university research priorities, organization, and funding, dig deeper into the writings on the relative status of the disciplines in higher education, and probe the literature for summaries of the state and organization of climate change and other grand challenge research in universities. I could not hope to master the vast literature in each of these areas, but what I would learn will help me frame the overall project more clearly and effectively and become more conversant in the issues.

Second, I would seek to identify a broad, diverse set of existing university centers and other initiatives, such as public humanities programs, which are already undertaking grand challenge research. I have already identified several possible projects, including the Keller Center for Innovation in Engineering Education at Princeton University and the Center for Social Solutions at the University of Michigan. To locate other efforts, I would scan recent publications and university and project websites. I would also post general requests for referrals on social media and CNI-ANNOUNCE. As I compile this initial list, I would note for each project the scope of the problem focus, the extent of interdisciplinary collaboration, and the involvement of library and other information system experts. I would then use these factors as a guide in creating a subset of approximately 20 initiatives that promise to yield the most useful and general information about information infrastructure requirements.

Third, once I have a shortlist of projects, I would study each in more detail. I would seek telephone or Zoom interviews with faculty leaders and, where necessary and appropriate, undertake a site visit. My objective would be to compile details about the staffing, the nature of the research and collaborative activity, the results achieved, and the difficulties encountered. These details would serve as a basis for a series of case studies that illustrate specific information infrastructure needs and support general recommendations for further action.

Finally, I would prepare written reports and, as appropriate, present the results of my work at conferences and other forums. In the early stages of the project, the writings would be in the form of progress reports that summarize preliminary findings. At later stages, I would prepare a draft report that I would circulate to the CNI community and other interested parties for comment. I would then incorporate the feedback from the draft report and my conference presentations into a final written report to CNI.

## **Deliverables**

At the end of approximately 15 months, the proposed research project would result in a final report of approximately 40 pages. The report would include: an executive summary; an introduction outlining the context and rationale for the research study and the methods followed; a series of brief case studies of university centers, projects, and other interdisciplinary, collaborative efforts to address societal grand challenges; an analysis of the information systems requirements for these efforts to succeed; and recommendations for university libraries and information technology organizations to help address these needs. I would make a draft report available to CNI for public comment within approximately 12 months. At the discretion and with the approval of the CNI Executive Director, I would also report on the progress of the project at CNI membership meetings, in CNI webinars or through other CNI-sponsored venues. Finally, approximately every four weeks after the project begins and until the draft report is available, I would provide brief, written progress reports to the CNI Executive Director followed by a brief phone or zoom call.

## **Expected Outcomes**

Through the proposed research project, I seek to achieve the following three beneficial outcomes:

First, the project would highlight substantial efforts with research universities that serve the public interest and engage the public by undertaking interdisciplinary research designed address climate change and related complex societal problems.

Second, the project would anticipate a realignment within research universities that would give greater priority to these types of interdisciplinary efforts. It would also help facilitate those changes by outlining the information infrastructure requirements that campus libraries and IT organizations would need to support in these efforts.

Third, and perhaps more speculatively, the project would emphasize the contributions of researchers from various disciplines, especially in humanities, and demonstrate the specific value of both the basic and applied research in their fields.