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CNI Executive Roundtable Report
Beyond the Pandemic: The Future of the Research Enterprise in Academic Year 2021-22 and Beyond
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Introduction

In early June 2021, representatives from a number of CNI member institutions gathered for the third in a series of Executive Roundtable discussions that began in spring 2020, during the early days of the COVID-19 emergency. The conversations were intended to inform our understanding of how the pandemic had impacted the research enterprise and to share information about how institutions were planning to shape investments and strategies surrounding the research enterprise going forward. Previous Roundtables were held in April and September 2020 and reports from those conversations are available from https://www.cni.org/tag/executive-roundtable-report.

As with the earlier Roundtables on this topic, June participants primarily included senior library administrators, directors of research computing and information technology, and chief research officers from a variety of higher education institutions across the US and Canada; most participating member institutions were public universities with high research activity, though some mid-sized and private institutions participated as well. The June Roundtable took place in a single convening, supplemented by an additional conversation with a key institution unable to join the group meeting due to last-minute scheduling conflicts.

As before, we urged participants to think about research broadly, encompassing the humanities, social sciences, and fieldwork activities, as well as the work that takes place in campus laboratories or facilities shared by broader research communities; indeed, the discussions occasionally considered adjacent areas such as the performing arts.

The discussion was wide-ranging, including, but not limited to: the challenges involving undergraduate, graduate and international students; labs and core instrumentation; access to physical collections (libraries, museums, herbaria, etc.) and digital materials; patterns of impact on various disciplines and mitigation strategies; and institutional approaches to improving research resilience. We sensed a growing understanding and sensitivity to the human toll the pandemic has taken on the research community. There were several consistent themes throughout the Roundtable series, but shifts in assumptions, planning, and preparation have been evident as vaccination rates have increased and as organizations have grown somewhat more confident in their ability to sustain largely in-person operations by fall 2021. Still, uncertainties abound and considerable notes of tentativeness remain, and indeed, events subsequent to the Roundtable, such as the large-scale spread of the Delta variant of COVID-19 in the US, have eroded much of the confidence we heard in June 2021, though probably more around instructional strategies than the continuity of the research enterprise. The events of the past 18 months, combined with a growing series of climate change-driven disruptions, have infused a certain level of humility into institutional planning, and they continue to underscore the importance of approaches that emphasize resilience and flexibility.

Synthesis and Institutional Perspectives

Here is our attempt to summarize the key themes from our latest discussions; we focus both on short-term strategies for the 2021-22 academic year, as well as longer-term objectives among our member institutions.

One lesson that we learned in our first convenings on this topic, and that we have been reminded of repeatedly, is that institutions are moving forward from very different places, and that there's a great tendency for institutions to assume (erroneously) that their peers have followed the same trajectory that they have encountered locally. Among our members, we've learned that there are institutions where the research enterprise never shut down (though there might have been some short-term constraints), and others where the entire campus was shut down abruptly for a sustained period, only accommodating some animal welfare considerations (which were often limited, with many animals being euthanized, with devastating consequences for research groups[1]), medical trials involving critical human welfare considerations, urgent national security-related work, and perhaps some major equipment requiring critical time-sensitive maintenance. At some institutions, the decisions were made by institutional leadership; in other cases, they were externally imposed by state or county government or public health officials (sometimes with very little nuance or flexibility). It's important to keep this in mind as we discuss both current understandings and prospective strategies.

- Most US participants reported that laboratory spaces have either fully reopened or are expected to do so in the near term, in some cases with continued de-densification policies often paired with extended hours of operation with lab workers being scheduled across multiple shifts. We also heard reports of discontinued or greatly reduced COVID-19 protocols (e.g., physical distancing requirements to permit instrumentation training) put in place at many campuses starting in spring 2021. While graduate students are back in most labs, undergraduate students at most US institutions are not expected to return to labs until fall 2021. As institutions reconsider some decisions related to instruction in mid-August 2021, lab practices don't seem to be on the current agenda for review.
- High-performance computing centers and regional research networks have seen (and facilitated) more collaboration across groups of researchers at multiple institutions. They have functioned as something of a remote lab for some researchers who previously might not have considered the use of computational and simulation software, and perhaps reuse of existing data from other sources, as opportunities to expand the scope of their research.
- Many institutions have begun lifting travel restrictions imposed on their own researchers, but other difficulties may still constrain travel for research or collaboration purposes. Budgets are an issue for some, although unspent travel funds are incorporated into many grant-funded projects. International travel restrictions or quarantine requirements, as well as visitation restrictions by facilities, represent other major barriers and points of friction. One huge area of ambiguity and uncertainty at many institutions is the set of rules and constraints

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[1] See David Grimm, "'It absolutely wrecked me.' How a lab came back from the pandemic," Science, Aug. 11, 2021, https://www.sciencemag.org/news/2021/08/it-absolutely-wrecked-me-how-lab-came-back- pandemic.

related to visitors to campus (for example, vaccination status and testing requirements); some campuses are largely banning visitors for the fall.

- We heard from at least one institution that pandemic restrictions catalyzed institution-wide adoption of electronic lab notebooks (ELNs), which are expected to help with data management and reproducibility issues, particularly in conjunction with remote access. This initiative was led by the office of research in collaboration with the libraries and with central IT. CNI has heard similar reports outside the Roundtable, suggesting that institution-wide ELN adoption is becoming increasingly common, and that the use of these systems helps with research resilience. More broadly, there is clearly a trend towards common, shared, standardized computational research infrastructure extending across the laboratory-based research enterprise (and perhaps beyond this), with the presumption that this will be more resilient (and also more secure) than locally-supported (and more ad hoc, less professional) facilities developed and managed by individual research groups. A key question is where the borders of this computational research infrastructure are; we'll return to this question later.

- Most institutions reported an increase in both grant proposals submitted and research funding awards received during the pandemic period, either in the sheer number of grants received, or in the total amount awarded, or both; some organizations reported receiving record-breaking amounts and indicated that researchers had ramped up proposal submissions during the pandemic. Some of this is because the investigators have had time to write the additional grant proposals while other research activities were constrained; also, the larger number of awards may be tracking with increased federal funding for research. It remains to be seen how these trends reshape the next few research award and funding cycles, and the competition for research funds from key government agencies. Some institutions report that they are emphasizing larger, multi-principal investigator (PI) grants going forward. It's clear that the transition of university-based grant application workflows entirely to the virtual environment has been very successful.

- Early in the pandemic, we heard that researchers were interested in identifying available data sets relevant to their research projects, and, with data repositories continuing to experience increased usage rates, this trend appears to be holding. A participant remarked that researchers are recognizing that it is possible to conduct, good, solid research output with others' data and that generating one's own primary data is not necessarily a requirement for high-quality scholarly productivity. It will be important to understand whether this is genuinely a trend at scale going forward, and how it can be supported and advanced.

- Several libraries that had enabled the HathiTrust Emergency Temporary Access Service (ETAS), to permit access to digital versions of materials when physical collections are inaccessible, reported plans to drop the service for the fall 2021 term, if it had not been discontinued already because access to their physical collections had reopened. Other libraries, however, reported considering a hybrid approach between physical and digital collections access, depending upon constituent requests and preferences. Services and practices that have been in place during physical library closures and that are now being re-assessed, including ETAS and controlled digital lending, are sources of friction at many

institutions where the user community does not want to make simple choices between one or another approach.

- Some organizations reported that the level of comfort with e-books has substantially increased among their faculty and that there is a general consensus among faculty and library leadership to accelerate digital text acquisitions. Faculty also seem to have a better understanding of the constraints that publishers and other content rightsholders are imposing on libraries around various kinds of digital content, ranging from e-textbooks to e-books broadly to a wide range of streaming audio and video materials that have become important in teaching as well as research. Libraries are facing difficult decisions and substantially increased costs in this area, though perhaps more associated with instruction than the research enterprise. Overall, it's clear that there is an emerging crisis around libraries and born-digital (and exclusively digital) commercial content to support both research and instruction.

- Physical access to archives and special collections throughout the US is expected to be substantially restored in the fall (at least as of the June discussion and prior to the dominance of the COVID-19 Delta variant; but see also the comments on-campus visitors above), yet interest in collection digitization and online (remote) accessibility on an ongoing basis remains very strong. The concerns raised by adopting a tool like Sourcery, a sharing economy app designed to help researchers access to not-yet-digitized documents held within archives and special collections, are clearly a harbinger of future challenges.[2]

- Organizations are grappling with how to prioritize collection digitization and how those decisions should be made. Hidden histories, missing or marginalized voices, non-custodial and collaborative archives, and related issues are commanding much attention in this area, with emphasis on establishing partnerships and building relationships with communities whose archival materials may eventually be a collection focal point for a university's special collections efforts.

- Museums are beginning to reopen, which is an important development for some humanities research, and far beyond – herbaria, natural history and anthropology museums, etc., are important resources that have been closed for the past year. The terms of these reopenings, however, remain unclear, particularly beyond the immediate campus community. The arts have been significantly impacted, with many organizations reporting that there was little they could do to help the performing arts, though a few determined, well-resourced institutions have done some fascinating (and expensive) things with latency-minimizing, isolated, virtual group musical rehearsal spaces, for example.[3]

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[2] Some of the issues here were discussed during a CNI Spring 2021 Membership Meeting plenary session on remote access to archives and special collections and the Sourcery Project; a video is available at https://www.cni.org/mm/spring-2021/plenary-sessions-s21/remote-access-to-archives-and-sourcery. See also the April 21, 2021 blog post by Mark Matienzo on issues raised by Sourcery: https://matienzo.org/2021/on-sourcery-or-the-enclosure-of-remote-access/.

[3] For some information on related issues, see videos from the April 2021 Network Performing Arts Production Virtual Workshop, https://npapws.org/?page_id=1659 (an event summary is at https://internet2.edu/highlights-from-the-2021-network-performing-arts-production-virtual-workshop/). Ann Doyle's March 30, 2021 blog post, "The Use of Low-Latency, High-Quality Technology in the Performing Arts Hits Home During Pandemic," https://internet2.edu/the-use-of-low-latency-high-quality-technology-in-the-performing-arts-hits-home-during-pandemic/, may also be of interest.

- Field research in areas like anthropology, biodiversity, and others was significantly impacted as well, with travel restrictions impeding access to places and populations. Some of those conditions are improving, however, as some communities, such as tribal lands, begin to allow researchers access anew.
- Density within enclosed spaces – collaboration spaces, computer labs, experimental labs, performance areas, large classrooms, special collections reading rooms, etc., – remains a major question for future planning, and current practices vary widely. In some cases, selected spaces have been re-densified, and institutions are assuming that remaining restrictions likely will be lifted in the fall. At other institutions, density restrictions are planned through the end of 2021. There is significant uncertainty about these density restrictions, which are generally externally imposed on higher education institutions by regional public health administrations. A key concern across organizations is how quickly students will feel comfortable being grouped closely in large numbers, and the shape of new collaboration and socialization patterns as they emerge. Where new library building or renovation planning is underway, great uncertainty remains about what collections will look like and how to prepare accordingly. In-person library traffic patterns, which have varied widely during the pandemic, are another planning factor organizations are monitoring closely; assumptions about behavior feel highly speculative at this point as much larger numbers of students are expected to attend classes in person this fall.
- Many institutions reported elevated student enrollment numbers, some only within graduate programs. International students and their ability to gain in-person access to North American campuses is an area of particular uncertainty. We heard that visa processing times are beginning to improve and there is hope that many overseas students will arrive in time for fall classes. The large number of international students who deferred during the 2020-21 school year is now impacting the number of students schools can admit for the 2021-22 academic year. In planning for ongoing travel difficulties in the coming academic year, some institutions are making use of their own international campuses to better support overseas students who cannot get to North American campuses, where time differentials for synchronous remote classes might be more hospitable, for example. There are also a series of difficult logistical issues for those students who can attend in person, ranging from where and how to buffer large numbers of international students who need to quarantine until they move to fully vaccinated status through what vaccines to accept under vaccine mandates (for example, Oxford-AstraZeneca is not, as of this writing, approved in the US, but it has been widely deployed in the UK, and it is likely to be widely accepted). Some campuses are using criteria that specify US Food and Drug Administration or World Health Organization (WHO) approval. But what of the Chinese vaccines, which seem to have a poor efficacy record but are WHO-approved, or of the Russian Sputnik vaccine?
- The higher education sector is experiencing a high leadership turnover (at a number of levels, from presidents to organizational leaders like chief information officers or university librarians, which has resulted in a huge loss of institutional knowledge and real challenges in onboarding new leaders into complex organizations with little or no physical interaction. Another wave of retirements

is very likely as some in-place leaders conclude their work leading their organizations through the pandemic.

- Several institutions reported substantial challenges in navigating staff recruitment and retention within the context of shifting employee expectations and desires about remote working arrangements on one side, evolving personnel and management policies on the other, and the added complexities of balancing objectives in diversity, equity and inclusion, or supporting state and local economies further complicating strategy development. Personnel policy development is very slow at many institutions, creating further problems. Longer term, choices and strategies in this area will also have substantial implications for other areas, such as space allocation and utilization.

We also wanted to know more about what organizations have learned as a result of the pandemic, and what they may do differently going forward. Here is some of what we heard:

- The process of preparing researchers involves the transfer of a vast amount of informal and tacit knowledge at all levels; the importance of this process has not been recognized sufficiently, and these mechanisms have broken down significantly during the pandemic. For example, under normal circumstances, senior graduate students and post-docs teach new graduate students about the idiosyncrasies of experimental equipment and techniques and junior graduate students introduce undergraduates to some of this same knowledge. Many of these chains have been disrupted; senior graduate students have completed their PhDs and moved on without being able to pass along what they know to the next generation of graduate students. Recovering from this setback is going to be very challenging, particularly because the problem is not well understood, recognized or documented.

- Under the broader social pressures of the pandemic, issues around evaluation criteria and timelines for junior faculty, but also for doctoral candidates and postdocs more broadly, and predominately involving women, have reached a crisis point; the conflicts between caregiving responsibilities and academic appointments have become overwhelming.[4] Institutions are trying to address this challenge with greater flexibility in tenure and promotion timelines and expectations, but it's unclear if these measures will be sufficient.

- New kinds of virtual collaborations, based on tools like Zoom and Slack, have evolved and become more normalized; these will likely persist post-pandemic. Many of these relationships have little precedent, they are not building on pre-established social capital from earlier times, and they are often based on interactions between research groups rather than individuals; furthermore, they are often international in character. Our evidence of what's changed here is very spotty and anecdotal; some systematic analysis would be useful. It's also worth noting that internal operations within research groups have also largely moved virtual using similar tools which facilitates multi-shift and geographically distributed operations.

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[4] For more information on this issue, see the 2021 report by the National Academies of Sciences, Engineering, and Medicine, The Impact of COVID-19 on the Careers of Women in Academic Sciences, Engineering, and Medicine, https://doi.org/10.17226/26061.

- Inter-organizational interactions have also changed: we are seeing growing collaborations that involve not just research-intensive institutions, but also community colleges, regional institutions, historically black colleges and universities, other minority-serving institutions, and the like. It's unclear how much of this has to do with research resilience or the pandemic, as opposed to other societal developments.

- Internally, cooperation across various institutional units has strengthened: connections between the research office, the library, central IT, and academic/research computing was a thread that ran throughout all research continuity Roundtables. We believe this will persist.

- Asynchronous learning across organizations was widely adopted during the pandemic as a means of scaling up in response to demand for a range of non-credit training courses aimed at various parts of the university community. This will likely continue, with units like the library, research computing, and the office of research using this mode heavily to complement synchronous (online or in-person) offerings.

- The COVID-19 crisis has been a catalyst for thinking about digital-first, especially around libraries, which are realizing that much of their work can be done effectively remotely, particularly for organizations that have traditionally emphasized technology. Accessibility improvements have accelerated during the pandemic, including services like online research consultations, curbside pickup, and postal delivery of books. The shift to digital-first also emphasizes online services can be provided by remote workers and creates demand for service availability 24/7. There is an increased sense of bringing the library to the user leading to a new reconsideration of library as place.

- There is clearly a growing commitment to open scholarly communication by researchers, but the precise contours of this are poorly documented and understood. It's clear that research communities that have been historically reluctant to use pre-print servers have now embraced them, but also that there's a growing understanding of the challenges that researchers face when pre-print servers are used by the popular press for high-stakes public health research, for example. Opening up commercially-published and paywalled scholarly articles in areas related to COVID-19 has been very welcome, and has advanced support for open-access agendas. In parallel with the pandemic, but not fundamentally driven by it, various funders such as Plan S participants have been trying to advance agendas related to transformative agreements. It will be important to try to disentangle the various trends in this area, and the factors driving them.

- Communication within organizations, including among faculty and between faculty and the administration, has reportedly benefited from virtual modes, which seem to be much more inclusive and effective. Recorded virtual town halls, for example, have most likely helped spread information more quickly and efficiently. Virtual faculty meetings are experiencing higher attendance rates than in-person convenings. Again, this seems likely to persist.

- A key part of the research enterprise lives on conferences, colloquia, and symposia. The nature of these events has changed, perhaps permanently, in the virtual environment. There are unresolved tradeoffs between breadth of participation and quality of interaction here. Ongoing constraints on travel and

campus visitors may help to shape the further evolution of these developments. We are struck by the fact that there seems to be no data beyond sparse anecdote related to this issue, and that, at least among our member institutions, no one even seems to be collecting local anecdotes by department. We think this is a hugely overlooked potential shift.

- The research enterprise has proven itself to be adaptable. One participant observed that the research community has traditionally been resistant to change and that, generally, transitions would be slow to emerge. The demands of the pandemic have illustrated that the research community is capable of adapting to changing circumstances quickly and effectively, at least when absolutely necessary.

Concluding Thoughts

While it's relatively easy to develop at least a starter agenda of principles and investments that institutions might use to increase instructional resilience based on experience during the pandemic, a similar effort for research resilience is much more challenging.

Part of the challenge is that much research depends on national and international, rather than mostly local, infrastructure and investment. Ensuring good remote access to museums and special collections is a collective problem rather than a purely local decision, for example. Libraries, both locally and collectively, are doing a lot of important, forward-thinking work to improve research resilience, either as a direct objective or an important byproduct to work driven by other priorities. It is very concerning that we are not seeing much similar thinking by governments, funding agencies or specific disciplinary communities of scholars.

One of the few parts of the research enterprise where universities have (at least potentially) a lot of local control is the ways in which their local (on-campus or otherwise) research facilities operate.

An area that we asked about very specifically dealt with efforts to move research labs and research instrumentation to more automated and remotely accessible operations. CNI has been conducting ongoing investigations to learn about such efforts, with very little success. We've also been frustrated in understanding what units within organizations have been given lead responsibility to address this issue, if any.

What we've learned, through both the Roundtables and other discussions, is that there is little organized work going on in this area, and what does exist has focused primarily on so-called "core" or "shared" instrumentation which is housed on a campus, funded primarily by a research funder and utilized by multiple research groups, including groups beyond the campus housing the core facilities. In the efforts to restart research operations following abrupt spring 2020 shutdowns, these operations were often given priority because of the size of the research communities relying on them. While these have been a focus of attention, it's hard to tell exactly what's being done differently. Clearly, they are operating more hours, and workflows have been redesigned to involve fewer people being physically present; it's easier for researchers to exploit these

instruments remotely, by shipping samples and receiving data over the network. But it's not clear how much is procedural and based on more efficient facilities utilization, and how much is based on real automation and network interconnection. Currently, various research computing groups and research networks are working with diverse organizations to support collaborations and partnerships. The Eastern Regional Network (ERN), a consortium of universities, network providers and industry partners, is one example of this model.[5] Reports by the Central European Research Infrastructure Consortium on the impact of COVID-19 on the operations of analytical facilities help shed some light on changing instrumentation practices.[6] We would welcome more examples of this kind of work. We feel that this area urgently requires detailed analysis; we are considering how best to facilitate focused attention on this topic and potential partners.

We've heard about attempts at the campus level to increase centralization of research computing support, including some lab automation and data capture (research lab notebooks are also part of this), but it is also not systematic. It's also unclear where the locus of responsibility for advancing these efforts should reside.
The one exception to this overall picture we have been able to identify is Carnegie Mellon University (CMU), who, at an earlier CNI research enterprise Roundtable, reported on their work with Emerald Cloud Labs (founded by CMU graduates). The CMU-Cloud Labs initiative has now scaled up to a major strategic investment in centralized, internet-accessible research instrumentation by CMU. To keep this in perspective, this model is not intended as a panacea, nor will it serve as a universal solution; it will be helpful to perhaps half of the experimental researchers in the relevant disciplines. It's also very important to recognize the questions that this work frames about interfaces and boundaries between the control and specification of the experimental infrastructure for science on one hand, and the data management, curation, and analysis environments for the outputs from this experimentally oriented infrastructure on the other.

CMU representatives were unable to attend CNI's June Roundtable, but we held a separate conversation with them, and have subsequently been tracking this extremely important initiative in detail. For an information webinar on CMU's new Academic Cloud Lab and the broader institutional strategy, see https://vimeo.com/568995673; more about Emerald Cloud Lab is at https://www.emeraldcloudlab.com/. We include this information with the explicit permission of CMU (in contravention to the usual institutional anonymity that is part of the Roundtables); CNI will continue to track this work carefully and you can expect to hear more about it at our upcoming meetings. We believe this development could be a major game-changer, and we would really welcome hearing from other universities pursuing similar initiatives.

As we look at these developments, particularly from the perspective of August 2021 rather than June 2021, our sense is that most of our member institutions are being

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[5] See the Internet2 video, "The Eastern Regional Network – Simplifying Multi-Campus Research Collaborations," June 22, 2020, https://youtu.be/FAtpH69dY44.
[6] See Jana Kolar, Andrew Harrison, & Florian Gliksohn, "Effect of the COVID-19 Pandemic on the Working Practices of Analytical Facilities II," 2021, https://doi.org/10.5281/zenodo.4431748, as well as the previous report on this topic, Jana Kolar, Andrew Harrison, & Florian Gliksohn, "ERF's Review of Working Practices of Analytical Facilities During the Pandemic," May 6, 2020, Zenodo, http://doi.org/10.5281/zenodo.381349

increasingly overwhelmed by uncertainties and operational concerns related to the 2021-22 academic year; the vast majority of the questions surround how instruction will be delivered and the safety of the institutional community. In the near term, much of the research enterprise has been restarted, and is now operational, and seems less vulnerable than instruction patterns to pandemic resurgences.

For the last 18 months, member institutions have been very understandably focused on more tactical, near-term operational issues rather than strategic questions. In June 2021 there was some evidence that willingness and capacity to address longer-term strategy was increasing, but this has seemingly collapsed in August 2021. So, it's appropriate to conclude with a few questions for the coming year:

- When, and to what extent, will institutions prioritize research resilience?
- Where will the locus of leadership responsibility for this work reside?
- Will funders incorporate research resilience into their strategic priorities?
- How will responsibility be devolved here? Will institutions or individual PIs be expected to lead this work and these investments?
- How will funders of stewardship communities and scholarly communication infrastructure investors become engaged in this work?
- Will anyone step up to measure progress and vulnerabilities in this area?

We will continue to monitor developments in these areas and to advocate for the importance of factoring research resilience into ongoing strategic planning. Our current thinking is that it will be useful to revisit institutional views on these issues towards the end of the current academic year, in late spring 2022.

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CNI Executive Roundtables bring together a group of campus partners to discuss a key digital information issues and their strategic implications. The roundtables build on the theme of collaboration that is at the foundation of the Coalition; they serve as a forum for frank, unattributed intra- and inter-institutional dialogue on digital information issues and their organizational and strategic implications. In addition, CNI uses roundtable discussions to inform our ongoing program planning process.

The Coalition for Networked Information (CNI) is a joint program of the Association of Research Libraries (ARL) and EDUCAUSE that promotes the use of information technology to advance scholarship and education. Over 200 institutions representing higher education, publishing, information technology, scholarly and professional organizations, foundations, and libraries and library organizations, make up CNI's members. Learn more at cni.org.

Addendum I

CNI Executive Roundtable
Call for Expressions of Interest
June 10, 2021, 1:00-3:30 PM EDT
(additional dates may be added)

Beyond the Pandemic: The Future of the Research Enterprise
in Academic Year 2021-22 and Beyond
Virtual Meeting
Deadline: May 14

As the COVID-19 pandemic emerged in March 2020, CNI added a last-minute, extraordinary Executive Roundtable on the implications of the pandemic shutdown for the research enterprise to its spring member meeting. We were concerned that while there was a great focus on the move to remote instruction, much less attention was being paid to what what was happening to the research enterprise in the response to the pandemic; a major commitment to research is one of the distinguishing and unique characteristics of the majority of CNI's member institutions. Demand for participation was unprecedented, ultimately leading to four separate Roundtable sessions on the topic, made up collectively of about 60 participants representing around 30 organizations. The discussions took place in mid to late April 2020, and a report of those conversations was published in May 2020: https://www.cni.org/go/what-happens-to-continuity-and-future-of-research.

Most of the spring Roundtable participants represented the perspectives of the primary drivers behind research support on college and university campuses: offices of research, libraries, and campus IT and/or research computing divisions. There was more variability than we initially expected in the extent to which research operations actually shut down: some campuses had managed to keep research activities somewhat open while the rest of the campus had shut down, other campuses experienced only partial shutdowns, and some went into complete lockdown except for certain critical research (defined in various ways by different institutions) and maintenance of research facilities. Not all research happens in physical labs; there is also a large fieldwork component for many kinds of scholarly work, and the fate of these activities was also complex and variable. Since libraries, along with museums and archives, are reasonably considered to be the laboratories of many humanists and social scientists, continuity of access to collections both physically and through digital alternatives figured prominently in our discussions. For many other disciplines, almost all of the critical content was already accessible electronically, and thus the impact of shutting down physical libraries was minimal.

Although we heard from a wide range of institutions, several common threads permeated our conversations. For example, it was clear, from the earliest days of the shutdown, that the decades of investment (largely driven by libraries) in building and investing in digital infrastructure for scholarly communications and collections access were serving their institutions well and offering a great deal of leverage to insure both research and

instructional continuity. Investments in research computing, high performance networking, and instructional technology were also critical.

We followed up this work with an additional series of stand-alone Executive Roundtables in September 2020, primarily intended to update what we learned in the spring of 2020, and focusing on the efforts to restart the parts of the research enterprise that had been abruptly shut down when the pandemic hit. With participation from about 50 member representatives from some two dozen member organizations, we learned that the research enterprise had substantially resumed across most institutions in one form or another, though at reduced capacity, with various institutional policies and strategies to facilitate return but to mitigate risk. The report from those discussions was published in October 2020: https://www.cni.org/go/research-continuity-sept-2020-update.

It is time to revisit these issues; virtually all US institutions are planning for the return to large-scale, in-person instruction in academic year 2021-22, though of course with contingency plans and some restrictions. (The situation with our non-US members is even more complex and varied). It seems likely, though far from certain, that as we move into summer and fall 2021, many (but certainly not all) of the restrictions on research that shaped the early restart of the research enterprise will be eased. Substantial new US federal funding appears to be planned to support research. We want to understand how our institutions are planning for research in 2021-22 and what assumptions they are making, as well as where they feel the critical uncertainties lie.

In addition, the pandemic has taught us hard lessons about the importance of research resilience. What have we learned? What ongoing investments do our members intend to continue to make in research resilience as we (hopefully) move beyond the immediate COVID-19 crisis?

Data is beginning to emerge on the impact of the pandemic on various sectors and participants in the research enterprise; some of the reports coming from groups like the US National Academies indicate a devastating toll on specific groups, notably women (and particularly women from under-represented groups in STEMM; see National Academies of Sciences, Engineering, and Medicine, 2021, *Impact of COVID-19 on the Careers of Women in Academic Sciences, Engineering, and Medicine,* Washington, DC: The National Academies Press. https://doi.org/10.17226/26061). How are institutions going to address these challenges? Data on uneven disciplinary impacts seems to be less clear, but is certainly going to be important as well.

We'll take a broad view of the research enterprise in these roundtables, considering the humanities and social sciences, fieldwork activities, and the work that takes place in campus laboratories. We are also particularly eager to look at key infrastructure, such as libraries, research networks, and core instrumentation facilities.

Any CNI institutional representative may apply to participate in this Roundtable, and either one individual or a team of up to three individuals who have different roles (e.g. a library director, a CIO, a head of research computing, or a chief research officer) can represent the institution. We particularly welcome the participation of such teams. If you would like to have more than three people participate please be in touch with us. In order to have an in-depth discussion, participation in the Roundtable will be limited to approximately 15 institutions; if there is sufficient interest, we'll offer additional Roundtables. **We'd**

particularly welcome returning teams who have participated in earlier roundtables on this topic.

Cliff Lynch, CNI executive director, will moderate this session and provide some framing remarks, and then participants will have an opportunity to discuss issues with peers from other institutions. The Roundtables build on the theme of collaboration that is at CNI's foundation. We want to promote institutional dialogue and inter- and intra-institutional information exchange on digital information issues while informing CNI's planning process. We will disseminate a summary of the issues that emerge from the Roundtable, but in order to encourage frank discussion, there will be no individual or institutional attribution of statements without prior explicit permission from the relevant party. Reports from previous Executive Roundtables are available: cni.org/tag/executive-roundtable-report.

Among the specific topics we might explore:

- What are your current plans for the 2021-22 academic year? What are you doing about lab access for various groups (faculty, graduate and undergraduate students)?
- How are you thinking about the relationships between graduate instruction on campus (and graduate students coming back to campus) and research continuity? Are you making special accomodations for your doctoral students and post-docs in light of the pandemic? What are your plans for international graduate students that you have admitted for 2021-22 (or 2020-21, for that matter)? To what extent are you supporting fully remote graduate students?
- What are your plans for library collections access in 2021-22? Are you continuing to limit access to library collections (including special collections and archives) or returning to "business as usual"? What are you continuing to do about students that cannot or will not come to campus? Are you continuing with the HathiTrust Emergency Temporary Access Service (ETAS), and if so, on what basis?
- Are you investing more heavily in digitizing collections, and if so what material? Special or general collections? Are you purchasing new digital materials that you wouldn't have chosen in the past? Are you still acquiring print materials? Have you put new on-demand digitization programs in place?
- How are you thinking about research fieldwork, and national or international collaboration efforts?
- Have you done anything to map or assess the (clearly very uneven) impacts of COVID-19 on various disciplines and various scholarly practices within those disciplines? On various demographics among faculty, post-docs and graduate students? What have you learned? What are you doing about it?
- How has the experience since March 2020 changed the way you are thinking about research computing support and research data management, if at all?
- Has your thinking about lab computing support infrastructure changed? Has your thinking about electronic lab notebooks changed? If so, what organizational structures and mechanisms are you using to address this?
- Are you doing anything in the area of remote lab operations, automation of experimental apparatus, and the like (the "internet of research things")? If so, how are you organizing this effort? Has your thinking about core facilities and instrumentation changed? Are you considering outsourcing any functions to off-campus groups? We are tracking substantial investments by other sectors, notably commercial big pharma

and biotech, in networked and distributed lab facilities, and in some cases also in outsourcing.

- Most campuses in the US seem to be planning to be back to in-person instruction in fall, with contingency plans to rapidly switch to remote instruction if necessary. How are you thinking about research in this context, and in particular the need for contingency planning to move back to more heavily remote operations and perhaps close down the campus again? How has your thinking on this changed over the past year, and why? To what extent are you factoring potential new disruptions (California wildfires, climate change driven events) into your planning?
- What accommodations have the funders (federal and private) been making to help with the situation, and is this flexibility continuing into the 2021-22 academic year? What else might the research funders do to help your situation?
- What decision-making, planning and consultative organizational structures is your campus using to address research support, continuity and resilience on an ongoing basis?

To express interest in participating, please complete the form at:
https://cni.formstack.com/forms/beyond_the_pandemic by end of day May 14, 2021 (if more than one person per institution wishes to participate, please coordinate and complete only one form). We will choose approximately 20 individuals for each Roundtable session, using the criteria of position, experience, and balance of institutions (type, geographic area, etc.) to determine who will attend. **We will notify you by May 21 as to whether you have been accepted or whether you will be on a waiting list for participation.** We apologize in advance that we may have to turn away some individuals who express interest. If you have any questions about the Roundtable, please contact Diane Goldenberg-Hart at diane@cni.org.