The Center of Excellence Model for Information Services
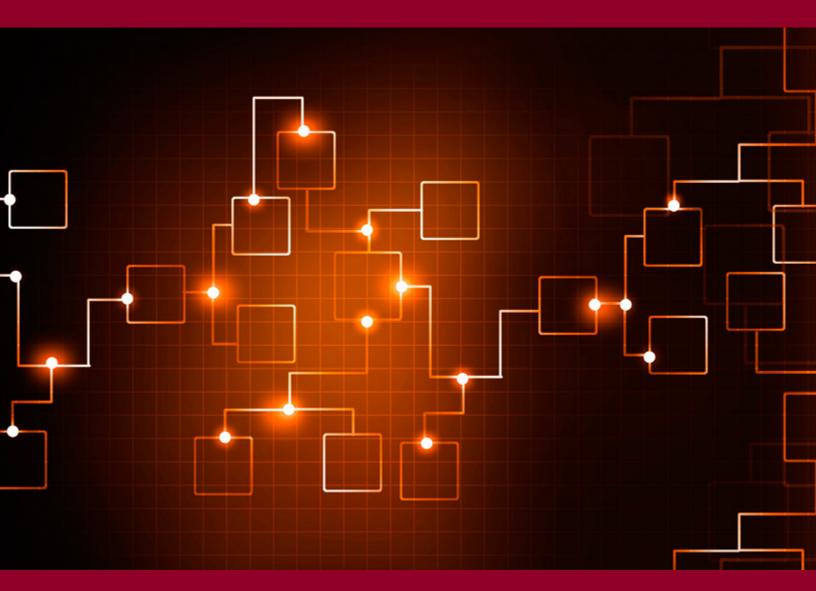
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February 2015

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Acknowledgments

GENESIS OF THE PROJECT

In 2013, The Andrew W. Mellon Foundation awarded a group of seven librarians from the Research Library Leadership Fellows program of the Association of Research Libraries (ARL) a planning grant to examine the center of excellence (CoE) model for information services. Used in a variety of industries, CoEs are designed to attract the most talented researchers in a particular field, enhance collaboration, and improve access to the resources needed for their research. The planning grant was awarded to determine whether the CoE model could serve as a means to provide the new services required for the effective use of digital information.

Over the past 20 years, the widespread adoption of the web for disseminating and sharing information has changed the ways that people do research. As a result, the demands for information services requiring specialized expertise have increased. Examples of this new specialized expertise include, but are not limited to, digitization of print, image, audio, video, and 3D objects; the design and utilization of next generation discovery tools, including text and image search, data visualization, document clustering, and topic modeling; self-archiving and long-term preservation of digital assets; and digital humanities research support. The following service areas requiring this expertise are emerging more frequently on campuses, most often in the library, though very few institutions are in a position to fully support them:

- **Digital archiving and preservation.** Platforms and services are needed to support long-term archiving and preservation of digital content (e.g., text, audio, image, moving image, software—both born digital and digitized from analog or print objects), computer forensics for working with born-digital archival items (e.g., computer hard drives), and methods for migrating digital information over time while preserving its integrity.
- **Data management.** Managing data in all formats, both structured (e.g., spreadsheets) and unstructured (e.g., text) requires attention at every stage of the data life cycle. This includes the initial planning process, data collection, quality assurance, description, preservation, discoverability, integration with other data, analysis, and re-use.
- **Use of multimedia resources.** The integration of multimedia resources such as audio and video into teaching, learning, and research; scholars' use of digital tools such as Zotero for managing research resources; and the adoption of new information delivery

strategies such as digital storytelling are positioning libraries as centers for providing training, support, and collaboration in teaching, learning, and research.

- **Information discovery.** Techniques for discovering information across large quantities of content include search and browse strategies, metadata approaches, data/text mining, document clustering, topic modeling, information harvesting across distributed platforms, and visualization approaches (e.g., geospatial presentation, timelines, 3D immersion visualizations). These approaches to discovering new information were not possible with print-only information.

- **Scholarly communications.** Questions have emerged around publishing approaches, both formal (e.g., books, journal articles, theses) and informal (e.g., blogs, wikis, social media); author identification; intellectual property rights; international collaborative authoring; and international compliance with information use/re-use policies. People are turning to libraries for help with the broad and complex set of issues around the Internet and society.

- **Digital humanities.** Long regarded as the research lab for the humanities, libraries in the twenty-first century are poised to be partners with humanities scholars and leaders in helping them identify and use tools that enable them to make new discoveries in digital works. Examples of ways in which libraries work with scholars include maintaining tools for and providing training in applying text markup to digitized text, identifying relevant repositories of massive digitization resources and assisting scholars with using visualization tools to discover new information in these repositories, and helping scholars with publishing their research in a variety of media.

University research and teaching communities increasingly expect their campus libraries to deploy these new services; offer the necessary training to students, faculty, and staff; and maintain an acceptable level of support for traditional library services and functions. Such high expectations are both flattering and impractical.

Most academic libraries do not have staff members with the technical expertise necessary to meet these demands. Furthermore, the growth of digital resources and the need for support come at a time when university budgets are stretched thin and many libraries face pressures to reduce staff size rather than to create new positions. As librarians retire or leave the profession, their salary lines are not sufficient to attract the information scientists with the specialized knowledge needed to provide the newer services. Information technology organizations sometimes step in to provide some of these services, but they often lack the service orientation, larger perspective, and connections to faculty that libraries and librarians bring to information management. With overall staff attrition low in most libraries, reorganizations become a priority in local campus environments, while collaboration across institutions still presents challenges. What is the solution?

When approaching this study, our group's initial assumption was simple: if CoEs have provided successful models in academia, industry, government, and health care organizations for new approaches to advance discoveries, then CoEs for information services could offer libraries access to the skill sets needed to meet new demands. The expectation was that libraries, like other organizations that have embraced CoEs, could benefit by pooling scarce knowledge about new information services and technologies in centers that would serve many libraries. Experts, drawn from various locations, could concentrate on providing libraries with the services that they need. Such an approach would make it unnecessary for each library to develop that knowledge in-house and would allow them to draw on this expertise when needed without affecting their current services, activities, and budgets.

RESEARCH DESIGN

The widespread use of CoEs among institutions of higher learning fueled our initial assumptions. Centers of excellence aim to attract the most talented researchers in a particular field and to enhance collaboration and improve access to the resources needed for research. We decided to test this initial premise—the feasibility of CoEs in the library setting—by interviewing leaders at several CoEs.

Our team conducted preliminary investigations of more than 100 centers. We narrowed our in-depth research to 35 centers. Each offered a unique service, design, history, or funding model that could show how elements of the center might inform a CoE for information services. We created profiles for the centers, identifying characteristics such as how they had been formed, what their focus of expertise was, whether they were located in a single geographic location or worked virtually, the size and scope of their staffing, how they served their communities, what their governance models looked like, how they assessed their work, and how they planned to sustain the center past the initial grant funding. As funding became an important theme, we also included 10 funders in our research. This initial analysis resulted in interviews with staff at 19 centers and 7 funders (a list is provided in Appendix A). Their answers to our inquiries form the basis of this report (see Appendix B for the questionnaires used with each).

Our team's first challenge was to agree on a working definition of the term *center of excellence*. After concluding that there is no commonly accepted definition of what constitutes a CoE, we decided that the definition offered by the Software Engineering Institute at Carnegie Mellon University adequately captured the broad intent for such an entity:

> A center of excellence is a premier organization providing an exceptional product or service in an assigned sphere of expertise and within a specific field of technology, business, or government, consistent with the unique requirements and capabilities of the CoE organization (Craig et al. 2009, 7).

Jon Strickler's blog, "What is a Center of Excellence," aided our quest by identifying five basic needs that a CoE should meet: (1) support for the CoE's area of focus; (2) guidance for the types of standards, methodologies, and tools used for the focus area; (3) shared learning, which includes training, skill assessments, and team building; (4) measurements that provide metrics demonstrating the value provided by the CoE; and (5) governance, including management and allocation of resources, as well as coordination across multiple organizations (Strickler 2008).

Armed with these descriptions and observations, our group began an investigation of existing centers and of funders that either have already supported centers or would be likely to in the future. Our questionnaire asked about the reasons for developing the centers, their characteristics, their effectiveness in carrying out their mission, and their long-term plans and expectations for their continuity.

MOTIVATIONS TO FORM CENTERS OF EXCELLENCE

Determining what prompted individuals or groups to create CoEs was one of our earliest concerns. The leaders we interviewed shared stories of what drew teams together and how centers came into existence. Each story offered different insights into the formation of a center. Bill Michener from Data Observation Network for Earth (DataONE) saw the birth of his center as the result of good timing coupled with the right people. "We happened to be in the right place in the right time." According to Michener, no less important was the presence of people who "understood the landscape," showed collegiality, and had a willingness to work through a great many challenges.

While timing, people, and a shared vision were frequently cited as the most common elements in the formation of a center, there were some notable differences. Interviewees at the Roy Rosenzweig Center for History and New Media at George Mason University acknowledged that their center is a "single person's vision." Others, such as individuals associated with the Electronic Cultural Atlas Initiative and the Humanities, Arts, Science, and Technology Alliance and Collaboratory (HASTAC), spoke more broadly about a "collaboration" or "confluence" that helped large humanities organizations recognize the interconnection between the future of humanities and the future of technology. The future of humanities, our interviewees contended, resides in the transformation of scholarship and publishing through technology.

Many centers are created with the explicit goal of transforming scholarship. The Public Knowledge Project launched its initiative in order to create an avenue that would make all scholarly publishing "into an open form of communication" and improve public access to knowledge. Likewise, a desire to create a sanctuary for scholars, reduce siloed organizational structures, reach a variety of audiences, and provide an environment for collaborators to react to joint requests for proposals were common motivating principles that the

centers shared. For example, the leadership of the National Humanities Center spoke of the need to create conditions of freedom that afford scholars "no responsibilities, only opportunities." Similarly, the director of the Renaissance Computing Institute (RENCI) summed up the advantages of being a center by stating that "not being a department has a certain freedom-giving aspect to it."

Regardless of discipline, most leaders' initial assumptions were similar: The nature of research has changed, and collaboration, not isolation, is the key to harnessing these changes. All had high aspirations and considered the formation of a center as a way to make a significant contribution that would not be possible by continuing to work solely within their existing organizations.

Whatever the funding model and its source, all leaders agreed that the development of a funding strategy that leads to financial sustainability is central to any center's ability to increase its impact and reach. They agreed that fundraising is challenging and requires patience. Funders want to see commitment, optimism, and results. That is the kind of enterprise they will support.

Centers of excellence, however, are not without controversy. Their formation can be seen as a reaction to an academic culture considered by many as too deferential to a tradition of independence, rigidity, and bureaucratically stifling operations. Their ability to thrive—or even survive—is often uncertain. The physical survival of these centers, ultimately, may lie in their ability to find a sustainable fiscal model that will support their program of research and operations beyond the initial grant funding. Their intellectual survival will be ensured, as the president and director of the National Humanities Center elegantly stated, by their ability to sustain scholars in their efforts to "imagine [their] way out of an impasse, and see the problem from a different perspective that might provide a breakthrough."

RESEARCH FINDINGS AND OUTCOMES

Our examination of CoEs extended beyond their origins and initial investment. We queried the leadership at centers and funders about several issues that are generally associated with the formation of a CoE, starting with whether they perceived their organization as a CoE. We then probed to understand how they innovate, what their business models look like, how they assessed their operations and successes, how they partnered with those outside of the center, and where they faced the most significant challenges. Their answers were both insightful and surprising.

To Be or Not to Be a Center of Excellence

To gain reactions from respondents about the term *center of excellence*, our team's initial question centered on whether the respondents perceived their organization as a CoE; funders were also asked if they perceived the centers that they funded as CoEs. Significantly, the term *center of excellence* was not well received by staff interviewed at

many of the centers. Several felt it was pretentious, exclusionist, or oddly self-proclaiming. They did not feel that the term reflected their center's values of sharing knowledge and expertise to serve others or to collectively solve a challenge or issue. Following their remarks, we then offered our working definition of a CoE and a follow-up question: "Does this definition [Carnegie Mellon's] change your perception of your activities as a center of excellence?" The Carnegie Mellon definition elicited a slightly more positive reaction. Although some objected to the implied focus on technology, most agreed that their center fit well within that definition.

Funders of science and engineering centers seemed more comfortable with the Carnegie Mellon definition of a CoE than did those who funded humanities- or information-focused centers. For science funders, a CoE assembles expertise in a given field around a particular topic and uses that expertise to have an impact in the world. Funders expect centers to be national or global leaders or "exemplars for their fields." They should be world-known, agile, and multidisciplinary. Their personnel may shift slightly to make sure they stay fresh and are bringing in new researchers and partners.

Terminology aside, common elements emerged in how respondents viewed CoEs. Both funders and staff at centers see CoEs as associated with some, if not all, of the following descriptors: a community of scholars or individuals interested in expanding knowledge and solving problems across institutional boundaries; a think tank or an engine of innovation; a mechanism for sharing lessons; an evolving, adaptable, and agile entity; a network of expertise; a network of CoEs rather than a single site; a node rather than a place. Respondents at several centers either described their organization as a participant in a network of centers or expressed interest in the benefit of establishing a network of CoEs. The concept of a center as a node within a network of excellence highlights the values of collaborating and sharing knowledge and expertise across a network.

Shared features and agreement on a definition, however, do not guarantee a center's success. We learned much from our interviews about the perils and promises of creating, running, and funding these institutions. Whether creating or funding a center, all participants in this study agreed that successful centers generate impact and innovation, have engaged leadership, offer the chance for broad participation and networking, present a distributive model, and offer regular assessment; they also agreed that centers should have a sustainability plan and their work should be in harmony with the funders' goals. The presence of these qualities enhances the likelihood of a viable and successful organization.

On Fostering Innovation and Entrepreneurship

Centers of excellence are generally regarded as places where innovation happens on a regular basis with staff and researchers who have an entrepreneurial spirit. Center directors, however, had a difficult time explaining how they instigate innovation or entrepreneurship.

Their institutions, they contended, are not entrepreneurial; rather, they are *enablers* of innovation among the members of the community. One director stated this quite clearly, suggesting that entrepreneurship or innovation is "a consequence of our mission and not a core part of our mission." Several other directors shared the spirit of this statement.

Enabling collaboration was the most common theme that emerged during the interviews. Without exception, center directors called out communication and sharing as among the most important benefits of a center model. Centers of excellence enable community members to build relationships as well as to discuss and debate common topics. Some centers promote communication and sharing by providing online mechanisms for participatory idea generation, including blogs, websites, or a virtual community network. Others have physical spaces that allow for water cooler or hallway conversations that encourage interaction or even serendipitous work.

It is critical for CoEs to foster a culture of participation among the group. Openness and willingness to experiment are values that were often mentioned as key to successful center culture. It is also important to select the right people to participate in a center. Individual members are not members for life. Center directors pointed to the value of bringing in new members regularly to introduce new ideas and thinking into the community. Some community members have other responsibilities or roles outside the center, so it is important to offer them appropriate incentives to devote their attention to the work of the center. Establishing working groups among members of a center was also described as a quick way to bring new perspectives to address common problems.

To have an impact, innovation must reach a wide audience. A CoE can play a critical role in this regard by building awareness and attracting attention to the work of the community. For example, the center can coordinate the synthesis and sharing of research results broadly both within and outside the community. Innovation attracts funding, so broadly sharing the outcome of a center's projects can strategically build an awareness of need and a sense of excitement in potential funders. As a single institution is not likely to have all of the expertise required to meet the needs of the communities they serve, it is important to establish networks where expertise can be shared. Public-private partnerships may create synergies between companies and universities, helping both to spur and to share innovations with more diverse constituents.

Business Models

The establishment of a successful business model is critical to sustaining any organization. Although staff at the centers we interviewed identified advantages in being institutionally based, both in terms of faculty appointments and their physical space, the centers in this situation are also somewhat vulnerable in that they are not funded through the institution's long-term operational budgets. Core

institutional infrastructure costs such as financial services, human resources support, and utilities are not the responsibility of the CoEs, but of the institutions where they are based. Access to students, especially graduate students, is an advantage as these people provide research and other staffing support at a manageable cost. Most CoEs face challenges of sustainability, however, because they are largely dependent on limited-term grant funding to support the staff and resources. Under these conditions, the effort to retain staff becomes one of a center's main activities.

More established centers organized their funding model by identifying funds needed for core support and funds needed for innovation, research and development, or experimental projects. Core funding was generally obtained through multiyear grants, endowments, and state funds (generally about one-third of incoming funds); shorter-term funds (e.g., grants, sponsored research, state funds) were used to support investigative, experimental, or project-driven initiatives (generally about two-thirds of incoming funds). Some centers also offered fee-based services that included publishing or open access services, tool development, managed servers/hosting, or training programs (summer programs, workshops, hosted conferences, or in-house training).

Memberships or sponsorships are another common means to bring in revenue to support a CoE. Membership fees were typically structured as a partnership fee or consortium membership fee. Some centers constructed tiered memberships or sponsorships. One center, for instance, had an industrial membership tier that committed companies to $50,000 a year for three years. It is notable that this is a humanities center.

When asked about the amount of time they allocated to fundraising, few respondents could cite specific numbers, but all emphasized the significant investment in time dedicated to this activity. Many directors said that this work was all encompassing; others said that the average amount of time spent on fundraising was 30–50 percent for the director or principal investigator. Some used a distributed fundraising approach in which the director, the managing director, and others dedicated 10–15 percent of their time to this activity weekly. While acknowledging the intense workload for this effort, directors uniformly noted the importance of seeking grant funds as a driver for innovation and competition. As one director said, "I think it is really important to have a grant funding model to keep us hungry and innovative."

The leadership at several of the established centers recognized the need for a strong development approach and a director who understands that fundraising success is highly dependent on the ability to champion the center and on strong relationship-building skills to ignite interest from both funders and partners. As one director noted, fundraising is a deeply personal activity. Donors want to hear stories that awaken their own convictions, which requires a personal message. When working with donors, it takes years to establish credibility and develop a relationship of trust.

To be effective in fundraising, a CoE needs a successful track record with a clear purpose, strong vision and leadership, and the ability to demonstrate a need for the services or resources that the center provides. A director with much success in fundraising encapsulated these values well:

> Nobody gives you money because you need it. What they want to hear is that you're doing great things, you're confident, you're optimistic, you're committed, and they support that.

In our discussions with funders, they described attributes of successful centers that were quite similar to those identified by the center directors we interviewed. Funders look for evidence that the center leadership has an understanding and awareness of the complexity of the process involved with establishing a center, along with past successful performance and collaboration with others. A strong business plan and a clear governance model are important for success. Centers of excellence that have established advisory boards or committees show funders that they recognize the need for external insights and review, strengthening funders' confidence in the center's ability to succeed. Financial commitments from host institutions and evidence of long-range sustainability planning assure funders that their investment in a center will be a shared risk that will not become a continued burden for them in the future.

Funders valued blended revenue schemes or diversified funding rather than permanent dependence on grant funding as an indication of a center's stability. One funder specifically looked for centers that instigated profit-based businesses, such as the creation of knowledge products that could be sold, to cross-subsidize the work of the center. Funders also made it clear that they are not interested in forever funding and are generally more interested in starting up an innovative center or in encouraging the innovative ideas that may emerge from a center. As one funding agency program officer said:

> We're willing to go several rounds for a good idea, and make sure that it's well established, but it's got to stand on its own, whether that means other foundations are picking up the funding or that there's some kind of business model where the organization is generating funding—and that could be from its own institution, it could be from members, it could be from sale of services of various kinds. But the idea has to be that there's not a permanent dependence on us.

They also wanted to see clearly why a center is needed and where there is community synergy for a center.

The Assessment Piece

Leaders at healthy CoEs continually assess their programs and operations to ensure that they are fulfilling their mission and meeting the needs of the communities they serve. Such assessments help the leaders determine if their center is no longer needed or unable to

sustain itself any longer and thus to recognize if it is time to close the center.

The two main motivations for centers to conduct assessments of their organizations were (1) to fulfill requirements set by funding agencies, and (2) to serve as "checks and balances" that help center staff keep things on track. Annual reports were regularly cited as an avenue for analyzing and reporting the impact of centers to both external and internal audiences. One center's staff mentioned that they publish white papers on the ways in which their center serves their target audience.

Some center staff spoke of an increase in recent years in requests from funders for reports that measure the impacts that centers have had on the communities served. One center director commented that impact measures, such as those illustrating how the center has transformed scholarship, are difficult to gather. Two of the centers included in this study received special funding to assess how their services and tools are being used. One center director expressed an interest in organizing a small working group of center leaders to develop metrics that could be used across larger groups of similar centers, thereby creating a community of practice for the assessment of centers:

> It's very difficult to assess a lot of what the humanities do, because what you're looking at is long-range, indirect, qualitative transformations that don't . . . correspond to any box that you can check.

Funding agencies like to see "markers" or baseline indicators identified that both their staff and center staff can easily assess. Funders may also look for factors that indicate risk mitigation, such as the sharing of infrastructure, indications of collaboration, evidence of policy and governance, and evidence that centers have moved outside their institutional framework. One funding agency program officer noted:

> If I was a university president and a group of my faculty members came to me and said, "I want to start a digital humanities center," my first questions would be, "Okay, great, what are you going to do there? How are you going to differentiate yourself from other digital humanities centers?... How are you going to leverage the strengths of our university at your DH [digital humanities] center? What are we good at or what do we want to be good at?"

Nearly every center's leaders agreed on the importance of a sunset plan, yet few have addressed it from an organizational perspective. Most blamed this oversight on scarce staff and the reality that a plan for closing their center is not a priority.

Partnerships

Forming partnerships is often a strategy for broadening a center's sustainability while pulling together the expertise needed to fully address its mission and goals. In our interviews with funders, they viewed partnerships in a CoE as a demonstration of its ability to sustain the enterprise with a broader base of support. Partnerships also send a signal of collaboration that will enable a center to address a greater scope of issues around its area of focus, thus giving funders more confidence that they are investing in a strong organization.

Many of the center leaders we interviewed regarded partnerships as essential for their center. They identified several types of partnerships, including

- Partnerships with peers who are local, national, or international to bring geographic breadth to the center
- Research or education partnerships to strengthen the disciplinary depth of the center
- Industry partnerships to help bridge research between academia and industry
- Partnerships with sponsors and affiliates who support the work of the center

Successful partnerships were characterized as enabling CoEs to do what they could never accomplish as a single organization. They contributed more resources that could be shared by all participants. By having partners, CoEs can achieve a higher level of quality and have a greater impact at a relatively lower cost than they could alone.

Not all partnerships are successful; it is critical to identify partners who will actually help with the center's success. As one of our interviewees noted, "Obstructive partners can really bring down a project. So I think the main thing that we really expect from partnerships is … to have that kind of collaborative spirit." The ability to work together is an element that all center leaders cited as crucial. They noted that expertise alone, without a willingness to cooperate with the rest of the center staff or without a shared vision, can create more work for the center directors and impede progress. One center director noted:

> What makes for a successful partnership is collegial and visionary individuals that share a common vision for what needs to take place. A recognition that they can share resources and leverage each other's activities, and end up with basically a win-win solution for everyone.

Some of the directors we interviewed indicated that others generally seek them out for partnerships because of their center's known expertise and because the center itself is less active in seeking partnerships. In these instances, they are very clear about defining the scope of the partnership. The roles and responsibilities, as well as the expected outcomes, are defined at the start of any collaborative project as partners are generally not co-located with each other. Clear definitions help minimize risk and disappointment as work

progresses. Sometimes very frank conversations are necessary to clarify scope. As one center director noted,

> I'm pretty good at being pretty blunt at a certain point and saying, "Look, we're not going to do anything more unless you do this. And we're in it for this." . . . Just cynically speaking, "I want publications" or "I want X," you know? If that doesn't fit, let's go our separate ways.

Those who are seeking partnerships must realize that all partners have their own agendas and any potential partners must be convinced that a partnership is in alignment with their agenda.

Assessing potential partnerships involves not only an evaluation of the partner, but, more importantly, a review of the feasibility of the project. Understanding what people are looking for or expecting is an important first step in this assessment. For a well established center, there is occasionally a perception that the center has a great deal of funding available and is willing to form a partnership with an organization that has no funding; this is rarely the case. Because very successful CoEs are often sought after as partners, it is important that their leaders recognize the limits of their center's bandwidth and the need to set priorities. They need to look for opportunities that will be the most productive and worth the investment of time, personnel, and sometimes money. There must be an assurance of shared sustainability when building partnerships, along with the shared work in developing something new. When the responsibility for the ongoing maintenance and upkeep of a project falls to one partner, the overall success is less likely.

When forming partnerships, it is also important to consider the additional capabilities that a partner brings to the CoE, in terms of both talent and geographic representation. These factors are also critical for obtaining grants to fund CoEs. Sometimes funders will recommend partnerships, but these recommendations need to be viewed with the same assessment criteria used to view other potential partners. Although these suggested collaborations can often create win-win situations and strengthen the likelihood of receiving a grant, a funder's vision of how the partnership will work may not result in a payoff for many, many years. As one center director commented,

> A lot of times, for example, NSF [National Science Foundation] will say, you know, "Have you thought about working with this group?" And in some cases, it's a clear win-win for us to do that. So we follow through. In other cases, particularly in some of the international endeavors, the payoff might not be for … many, many years from now.

In Canada, there are particular challenges to forming partnerships when provincial governments are providing the funding. The creation of partnerships between institutions across provinces requires additional work to align the provinces in supporting the proposed activity. Because provincial governments do not like to

fund organizations outside of their own territory, leaders of these cross-provincial partnerships often try to define the work to be done very clearly so that each institution receives funding from its own province.

Interviewees from Canadian centers seemed to place more emphasis on including industry partners than their counterparts in the United States. The advantage of partnerships between academic research and industry is twofold. First, research can be translated to implementation more readily, demonstrating outcomes with tangible, measurable impact. This implementation, in turn, provides researchers with important feedback that allows them to improve and shape the research that they are doing. Second, the research can cross multiple fields, allowing synergistic growth in many areas. For example, the development of computerized games for different medical disorders allowed the technology to provide therapeutic interventions in each area that would otherwise have been difficult to do.

Partnerships also provide a means for transforming traditional areas of study. In the humanities, the incorporation of digital technology is providing new means for scholarship. Reaching out to partners to incorporate digital humanities into their research and teaching helps broaden knowledge about the new types of research enabled by information technologies and changes the way in which humanities scholarship is viewed.

Some center leaders we spoke with have partners who do not provide direct funding, but can offer in-kind support, such as staffing. For example, a partner might have programmers on staff who can devote a portion of their time to the center. This form of partnership can be valuable when a center does not have the funding available to hire someone with the needed expertise. One of the challenges with this model, however, is that such an arrangement is not typically covered by a contract, so the expectations and accountability can be ambiguous.

Partnerships do require ongoing cultivation; thus, there is a limit to the number of partners with which a CoE can fruitfully engage. It is critical for the center's staff to prioritize the objectives of the partnership and to assess the overall fit of these objectives with the center's mission. It is also important to recognize that some of the partnerships formed will fail, so center leaders need to be prepared to end those relationships if they are unsuccessful. One center director summarized the challenge of this evaluation as follows:

> There are a number of times we've asked ourselves, "Is the maintenance of this partnership producing anything beyond the maintenance of this partnership?" And so there is some question about that. The partnership is seen as an—as an unmitigated good, and it's not always the case.

Challenges

It comes as no surprise that the most challenging issue facing centers is funding. One center director summed up the challenge this way: "We're like the proverbial shark that has to keep swimming to avoid drowning." Clearly, defining the mission and scope is incredibly important and closely related to funding. Almost every center director we interviewed commented on the challenges of convincing funders and their home institutions that their centers are worthwhile investments. As another center director noted,

> Centers can help universities understand that this isn't simply another burden with costs associated, but that it's actually something—if they play it right—… that maximizes the value of their research, it will lead to their research being more highly cited…. Doing research data management properly actually reduces their costs in the long term, even if it requires a significant investment in the short term. …Gathering evidence to help convince the senior management who have to sanction the investment necessary is probably [our center's] next biggest challenge.

Factors affecting the development of a center's funding include internal organizational disruptions, such as hiring a new center leader; reviewing the mission; and contending with the shifting priorities of the funders. According to center directors, funders want innovations and are less concerned about continuity with what has been done in the past. This means that a center must use institutional resources to continue work initially supported by grant funding. The fiscal approach is impractical and, in the words of one director, leads to collision between "the center's short-term projects and its desire to generate the biggest innovation in each round of funding." Perhaps more critical, such an approach is contrary to what another director claimed the field needs, "the presence of a stable infrastructure support that they can build and innovate on top of."

Directors noted that a close connection with an institution may, in fact, make CoEs targets for elimination. There may be a lack of institutional support in an environment where there is more competition for funds. Other funding models, such as becoming a 501(c)(3) nonprofit organization or using a fee structure, are not completely sustainable. When independent, stand-alone centers have stable funding models, directors said that they are able to operate without the need to justify every decision and without the limitations imposed by university structure. Another advantage of the independent center is the leaders' ability to set and maintain the center's intellectual course. Although centers make it easier for faculty to connect with scholars beyond their own schools and departments, the rigidity of the university structures, as well as their promotion and tenure guidelines, often put those who do such interdisciplinary work at a disadvantage.

Ideally, the directors see a CoE as a vehicle for communication, collaboration, innovation, partnerships, and interdisciplinary

work—a place that turns aspiration into action. Some directors cited the impact of public perception that the mission of centers is driving benefits to society, thereby helping centers in their ability to obtain funding. One director said that education is becoming vocational, focusing on job skills and moving away from liberal arts. In the future, if academia continues to resist change, faculty must become connectors and collaborators in addressing a particular issue or problem, especially in emerging fields (e.g., water resources, digital media, digital humanities), and they are likely to use CoEs because centers can more easily connect them across institutions.

Another significant challenge facing centers is the need to attract and hire the right people. Center staff and funders agreed that a strong, trustworthy, and determined leader is critical to the creation and longevity of a CoE. But what is necessary to develop a "super leader"? To create the right mix of talent to serve the center's mission, the directors suggest hiring multidisciplined, multiskilled people and then finding the right work-life balance. In the words of one center director,

> It's hard to find the right people for certain types of work, especially as this is this kind of unique environment and you need to be generalist, but a specialist at the same time. But . . . that's not uniquely for [our center]. I think that's good—it's all about people. Right? We're in the people's business, and so the quest for talent. That's obviously a constant need and a constant work in progress.

Directors cited the need to invest time in recruiting, interviewing, and hiring new talent. With the success of a service, a center can easily be overrun with requests, thus becoming difficult to manage. Directors continually evaluate their resources in hope of maintaining sustainability.

CONCLUSIONS AND RECOMMENDATIONS

This planning grant's original intent was to explore one question: Can the CoE model help research libraries cope with ever-increasing demands for support of information services? The answer seemed almost obvious in view of the model's popularity, longevity, institutional investment, and preeminence in higher education. Our study, however, found that the environment is far more complex and led us to additional and different questions.

The CoE model faces multiple challenges. Nearly all centers and their funders appeared to be facing issues of purpose, sustainability, funding, assessment, leadership, and succession planning, among others. Additionally, if centers are being created because of the difficulty of getting certain tasks done within the traditional academic paradigm, perhaps librarians should look at ways to modify and work within existing organizations rather than try to develop yet another structure. The task ahead for librarians is to think creatively about ways in which they can organize and actively collaborate to provide support across institutions.

We, therefore, recommend the development of "networks of expertise" or "expert networks" as a way to implement and sustain new information services for research. This approach can leverage institutional strengths and help library leaders consider solutions beyond local environments. Rather than consolidating expertise in a separate center, this approach will keep experts at local institutions and rely instead on an active network to address issues across a wider spectrum of institutions. Through this method, existing organizations will start to change as they integrate experts more fully into the daily work and as a greater number of information professionals share knowledge. Both growth and sustainability will increase as organizations evolve to meet current needs.

Previous studies that also suggest an alternative approach to the formation of CoEs include a study of digital humanities (DH) centers by Diane Zorich (2008) and a study of collaboratories (i.e., scientific collaborative organizations) by Nathan Bos and associates (2007). Zorich provides a detailed overview of the factors leading to the formation of DH centers, along with a review of their governance approaches, administration, operations, sustainability, and partnerships and collaborations. Significantly, Zorich's study showed that many centers, whether they are created as location-centric organizations or resource-focused virtual organizations, are vulnerable in their ability to sustain their operations over the long term. In addition to the challenges of ongoing financial sustainability, they often find it difficult to establish new partnerships and collaborations beyond their initial ones, making continued growth another challenge. Bos and associates looked more broadly at various forms of collaboratories to better understand how well scientists can sustain a collaborative working relationship. Their findings showed that sharing tools and data was more feasible than co-creating and sharing knowledge. "It is generally more difficult to share knowledge than data or tools, and it is generally more difficult to co-create than to aggregate" (Bos et al. 2007, 668).

To employ the concept of integrated and collaborative expertise that will enable successful and transformative networks, we specifically recommend the following approaches and considerations.

Identify opportunities to test the notion of "networks of expertise"

Center leaders strongly identified the concept of a network as a preferred structural approach that warrants further study. Several described their organization as a participant in a network of centers or as a node within a network; others expressed interest in establishing a network of experts to expand expertise and knowledge in a more sustainable way, to foster collaboration, and to share knowledge. Among the centers that were the focus of our interviews, some were model structures that were particularly noteworthy and demonstrated elements of the network approach that we are recommending. Some centers had established networks or distributed expertise as part of the center (e.g., DataONE, Text Analysis Portal for Research

[TAPoR], Berkman Center for Internet and Society); others operated in a consortia structure (e.g., Biodiversity Heritage Library, HAS-TAC, Digital Curation Centre); and still others maintained a membership network with partner collaborations (e.g., RENCI) and "tiger teams" (i.e., groups of experts assembled to fix specific systemic or technical issues such as software bugs, a common approach in computing and scientific communities).

To test the value of a network of expertise, the research team recommends a pilot project in which experts at multiple institutions consciously create a shared approach to address specialized information needs or to solve a common problem.

Create networks of expertise with careful consideration of environments that foster collaboration and growth

Our study revealed several elements that are worth considering in creating environments where networks of expertise can thrive. First, creating networks of expertise in existing institutions allows these nascent bodies to leverage the economic benefits of being institutionally based (e.g., reliance on existing human resources services, availability of financial support structures, the potential for covering administrative salaries, the presence of graduate students) rather than standalone. Second, expertise should be integrated throughout the organization rather than existing in a silo within it. Expertise that is woven into and across the entire organization has greater success. Third, libraries can be a catalyst for helping to create a diverse network of expertise that include participants from across the campus and across institutions, including faculty, students, and other partners since libraries are a natural interdisciplinary network for their institutions. This diversity will ensure that the networks bring a breadth of expertise and academic values to the participating institutions.

Networks of expertise should be introduced as natural extensions of a growing organization engaged in its traditional mission of sharing knowledge. Engagement and participation need to be emphasized. These networks can contribute to building a culture of experimentation in the academic world and could forge a structure that encourages collaboration and partnerships with a broad set of external players (e.g., ARL, Association of College & Research Libraries, EDUCAUSE, The Oberlin Group, iSchool/library school community). Leaders should take the best from the traditional CoE model to blend and form networks within existing organizations, developing new approaches to partnering and sharing people with expertise, especially across institutions.

Develop mechanisms for ongoing and regular assessment and analysis of program deliverables and services

A clear assessment strategy is vital to address issues of feasibility, scale, and sustainability. Our investigation revealed a lack of systematic forms of assessment in most of the centers. At many centers, success was measured in terms of length of existence, number of

publications or papers issued, number of conferences held, or the acquisition of additional grant monies. We believe it is critical to create and use assessment strategies for future decision-making. When developing metrics to inform future decisions, keep in mind that these metrics will drive not only the networks, but also the libraries and the organizations that fund libraries.

Develop a community-building strategy

The creation of a forum for broader community engagement can help support new role development and provide a mechanism to support and manage a new expert distribution model. In addition to serving as a resource, the forum can also help to anchor, sustain, and foster a strong outreach focus by encouraging purposeful connection with other community activities and strategic initiatives that intersect with the work of the pilot network of expertise.

Create a pilot innovation team (e.g., tiger teams) to engage on an urgent issue affecting the library community

We recommend bringing together experts with complementary skill sets for a limited time to address a particular issue as a way of piloting the network of expertise model. For example, CLIR Fellows or librarians from different institutions could be assembled to work for a limited term on the solution to a data management problem in biology or another disciplinary area. This approach would likely require a virtual space and an expectation that collaborators come with their own funding in return for deeply enriching collaborations and the avoidance of extensive administrative infrastructure. Although limited-term collaborators come and go, they spread their knowledge more widely and could potentially serve as thought provokers and change agents.

Develop a taxonomy for collaborative activities for library and information services

To identify projects on which tiger teams could focus, we recommend developing a list of collaborative activities that would benefit from targeted attention.

Suggestions for future research and investigation

Finally, if an agile network of expertise is the way for libraries to proceed, then much remains to be done. What should the management structure look like? For a center or network node of expertise in information services, a faculty member might serve as the director, and a librarian might serve as the executive director, either part- or full-time. In our experience, the centers led by faculty who can "shine" were most successful. Bringing in library staff to the network connects the library of the institution to the network. What role, if any, should information schools have in these structures? Our study did not include investigation of iSchools, but several center directors observed that iSchools are not fostering the most useful skill sets. We therefore recommend further study on iSchool curricula.

The role librarians play in a network of expertise or in the new economics of information also deserves further examination. Respondents who addressed the topic agreed that it is up to libraries to transform themselves and figure out a suitable role. For example, the director of RENCI commented that libraries must find a way to "assert governance" over newly created data, become "less receiving and more influencing," "inject [themselves] into the scientific workflow of the future," and become "data stewards." Clearly, the profession is currently grappling with a multiplicity of issues. Addressing them remains a challenge. Our hope is that structures such as a network of expertise can help the profession to jettison outmoded roles and functions and open the possibilities for new skills, attitudes, and outcomes. If the profession can forge networks of expertise that can transform our research libraries and retool our workforce, then library services that are agile and responsive to the rapidly changing information landscape will be within reach.

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APPENDIX A:
Centers and Funders Interviewed

The following centers and funders were interviewed during this study.

Centers interviewed:

Berkman Center for Internet and Society
Biodiversity Heritage Library
Center of Excellence for Learning in Education, Science, and Technology (CELEST)
Center for Next Generation of Teaching and Learning
Center for Studies in Higher Education
DataONE: Data Observation Network for Earth
Digital Curation Centre (UK)
Electronic Cultural Atlas Initiative
GRAND NCE (Graphics, Animation and New Media / Graphisme, animation et nouveaux médias NCE Inc.)
HASTAC: Humanities, Arts, Science, and Technology Alliance and Collaboratory
Interuniversity Consortium for Political and Social Research (ICPSR)
Institute for Advanced Technologies in the Humanities (IATH)
MATRIX Center for Digital Humanities and Social Sciences
National Humanities Center
Public Knowledge Project (PKP)
RENCI (Renaissance Computing Institute)
Roy Rosenzweig Center for History and New Media
Scholars' Lab
TAPoR: Text Analysis Portal for Research

Funders interviewed:

The Alfred P. Sloan Foundation
The Andrew W. Mellon Foundation
The Institute for Museum and Library Services
The National Endowment for the Humanities
The National Science Foundation
The Rockefeller Foundation
The William and Flora Hewlett Foundation

APPENDIX B:
Questions for Interviews

Center Questions:

[Name of center] Interview – [Name, title]
[For Skype interviews: Skype user name: phone number:]

Introduction - 5 minutes
Thanks for meeting with us. [Introduce yourselves.] This is our group's first interview with a center of excellence. We identified [name of center] as a pioneer and are happy you agreed to talk with us today. The results from this and other interviews that we're conducting with funders and center directors will help us develop a set of generalized criteria and an evaluation methodology that could be used by funders for funding CoEs. If you need to stop at any time, please just let us know. Our goal is to keep this interview to about an hour. If we feel we need to move on to the next question, we may interrupt. We may want to be in touch again after the interview to get clarification on anything you said during the interview. We will also share a copy of our group's final report with you.
[For Skype interviews: If we get disconnected, hang on and I will call you back on Skype.]

Let's get started.
1. **Main Question**: Could you describe for us the genesis of [name of center], the desired impacts of [name of center]'s work, and your role?
   Prompts:
   - What were the motivations for its creation?
   - Who were the key players in its creation?
   - How have the *<name of center>*'s goals changed over time?

2. **Main Question**: In what ways does the center foster and/or instigate innovation or entrepreneurship?

3. **Main Question**: What kinds of assessments do you conduct to measure the performance and impact of the center?
   Prompts:
   - Are any assessments required?
   - How do you share the results of your assessments? How do you benchmark your value? What metrics do you use?
   - How often do you assess the center?
   - Do you use external assessors, or do you do it yourselves?
   - In what cases are you required to conduct assessments?
   - How are your assessments used internally within the center?

4. **Main Question**: What would you say are the biggest challenges facing the center currently?
   Prompts:
   - What are some of the needs the *<name of center>* has difficulty meeting and why?

- What are the advantages and disadvantages to being a stand-alone center (or center affiliated with an institution)?

5. **Main Question**: When the center encounters internally initiatives or projects that are not working as expected, how does the center bring this forward and address the areas of challenge?

6. **Main Question**: My understanding is that the <*name of center*> partners with _____. Are there other partners? Now, thinking of an example when a successful partnership was established, what contributed to its development, and what were its benefits?
   Prompts:
   - In what cases do you seek partnerships and why?
   - If you were to increase partnership, what would that look like?
   - What kinds of partnerships do you seek? What attributes do you look for?
   - What should center partners bring to the table?
   - What expectations do you have of center partners?

7. **Main Question**: What is your current model for funding and for seeking funding?
   Prompts:
   - Roughly how much time do you spend securing ongoing funding for <name of center>?
   - What are your current staffing levels for fundraising and grant writing?
   - Do your funding sources influence or dictate membership in the center?
   - What funding sources are shorter term? What funding sources are longer term?
     - Roughly what percentage of each supports the center at this time?

8. **Main Question**: What would you consider an ideal business model for a CoE?
   Prompts:
   - What sources of funding would you recommend for a new center of excellence and why?
   - When do you think it is appropriate for a center to have a "sunset plan" in place?
   - Does this center have a sunset plan in place?

9. **Main Question**: We have been using the label *center of excellence* in our study. Do you perceive <*name of center*> to be a "center of excellence"? Why or why not?
   Part 2 of Question: The definition of a "center of excellence" that we have initially used to guide our study is borrowed from the Software Engineering Institute at Carnegie Mellon:

   A center of excellence is a premier organization providing an exceptional product or service in an assigned sphere of expertise and within a specific field of technology, business, or government, consistent with the unique requirements and capabilities of the COE organization.

   Does our definition change your perception of CoEs in any way?
   Prompts:
   - How broad or narrow do you think the scope of a CoE should be defined?
   - What range of constituents do you think a CoE should serve?

10. **Main Question**: Could you talk a little bit about future directions for the center?
    - What are some of your biggest "lessons learned" with running the center?

11. **Exit Question**: We covered a lot of ground today. Is there anything else you would like to share with us?

Thanks for talking with us today. We'll follow up with any questions.

Funder Questions:

Introduction

Thanks for meeting with us. [Introduce yourselves.] We are here to talk with you about the funding of centers of excellence by funding agencies like yours—both existing and potential funding. The results from this and other interviews that we're conducting with funders and center directors will help us develop a set of generalized criteria and an evaluation methodology that could be used by funders for funding centers of excellence for information services. If you need to stop at any time, please just let us know. Our goal is to keep this interview to between an hour and 90 minutes.

1. **Warm-Up Question**: To warm up, could you please describe for us the role you play in *<name of funder>*?

2. **Main Question**: We are familiar with [the funding agency] and its priorities. Could you talk a little bit about what are the desired impacts of the *<name of funder>* work?
   Prompts:
   - What kinds of effects do you hope to see, broadly speaking, in the work of the projects and programs that *<name of funder>* funds?

3. **Main Question**: The definition of a "center of excellence" that we have initially used to guide our study is borrowed from the Software Engineering Institute at Carnegie Mellon:

   "A center of excellence is a premier organization providing an exceptional product or service in an assigned sphere of expertise and within a specific field of technology, business, or government, consistent with the unique requirements and capabilities of the COE organization."
   [PRINT THIS OUT TO HAND TO INTERVIEWEE]

   What do you think of this description? Does it fit your ideas about centers of excellence?
   Prompts:
   - How broad or narrow in scope do you think a center of excellence should be defined?
   - Is this the right focus?

4. **Main Question**: Based on the definition of centers of excellence that we just discussed, does the [funding agency] currently or has it previously funded these types of "centers" or something similar?
   [If no]: Why not?
   [If yes, go to Main Question 5.]

5. **Main Question**: When you review a funding proposal, what factors do you look for that indicate whether or not it would be successful? [If they said they do fund CoEs, focus on that as an example.]
   Prompts:
   - What trends do you see that might influence what types of centers you fund or might fund in the future?
   - Would there be a disciplinary focus?
   - Would interdisciplinary or cross-disciplinary focus be a consideration?
   - Is it important to have a lead institution? What do you think would be the qualifications for a center's lead institution?

6. **Main Question**: When considering proposals for new or existing centers or projects, what do you look for in the specific organizational models or governance structures?
   Prompts:
   - What qualifications of PIs and Co-PIs are important to you?

- To what extent does <*name of funder*> influence or dictate who is involved in the centers or projects being funded?
- Do you require [centers] or [projects] to be multi-institutional? Do you proactively form or suggest partnerships between institutions?
   - [If yes]: In what ways do you go about doing that?
- Do you recommend advisory boards, external reviewers, etc., as part of the governance structure that your centers have?

7. **Main Question**: What would you consider an ideal business model for a center or project?
   Prompts:
   - For what length of time would you typically fund a center or project, and what factors would influence that decision?
   - For sustainability do you expect the grantees to obtain additional funding outside of the funding this organization provides?
   - What signs do you look for in terms of knowing when a center or project is ready to be sustained on its own or with less funding from this organization?

8. **Main Question**: Here is a list of information services that our group has identified.
   Do any of the centers or projects the agency has funded have an "information services" focus?
   [If no]:
   - Is this an area that you might be interested in funding? Why or why not?
   [If yes]:
   - Are there any information services that are not on this list?
   - What information services do you prioritize over others in terms of consideration for funding?
      - **Digital Archiving and Preservation**. This includes archiving and preservation of text, audio, image, moving image, software and other digital content, both born-digital and digitized from analog or print objects. Platforms and services needed to support long-term archiving and preservation of digital content, computer forensics for working with born-digital archival items such as computer hard drives, and methods for migrating digital information over time while preserving its integrity are examples of areas that digital archiving and preservation must address.
      - **Data Management**. Managing data in all formats, both structured (e.g., spreadsheets) and unstructured (e.g., text) requires attention at all stages of the data life cycle. This includes the initial planning process, data collection, quality assurance, description, preservation, discoverability, integration with other data, analysis, and re-use.
      - **Use of Multimedia in Teaching, Learning, and Research**. Integration of multimedia resources such as audio and video, use of digital tools such as Zotero for managing research resources, and adoption of new information delivery strategies such as digital storytelling are positioning libraries as centers for providing training, support, and collaboration in teaching, learning and research.
      - **Information Discovery**. Techniques for discovering information across large quantities of content include search and browse strategies, metadata approaches, data/text mining, document clustering, topic modeling, information harvesting across distributed platforms and visualization approaches (e.g., geospatial presentation, timelines, 3D immersion visualizations). These approaches to discovering new information were not previously possible with print-only information.
      - **Scholarly Communications**. Issues have emerged around publishing approaches, both formal (e.g., books, journal articles, theses) and informal (e.g., blogs, wikis, social media), author identification, intellectual property rights, international collaborative authoring and international compliance with information use/re-use policies. People are turning to libraries to assist with the broad and complex set of issues around the Internet and society.

○   **Digital Humanities**. Long regarded as the research lab for the humanities, the transformation of libraries in the 21st century positions them to be partners with and leaders in helping humanities scholars identify and use tools that enable them to make new discoveries in digital works. Examples include using new information discovery tools with mass digitization resources, applying text markup to digitized text, support for using visualization tools, and multimedia publishing of scholarship.

9. **Main Question**: How do you assess funded centers or projects? Please describe that process for us.
    Prompts:
    - What are the conditions/expectations for continued funding?
    - When you review proposals, what factors do you look for that indicate whether or not it would be a successful center or project?

10. **Main Question**: When do you think it is appropriate for centers or projects to have a sunset plan in place?
    Prompts:
    - Does your funding model specify a "sunset plan"?

11. **Main Question**: What are the risks in funding centers?
    Prompts:
    - Are there criteria you use to identify the risks in funding a center?
    - What limitations do you face in funding these types of centers?
    - How have you partnered with other funders to support or fund centers or projects as a way of sharing the risk?

12. **Exit Question**: To conclude, could you share with us some of your "lessons learned" with funding centers or projects?

Thank you for talking with us today. We'll follow up with any questions.