

Remaining Relevant: Critical Roles for Libraries in the Research Enterprise

Thomas Hickerson

Libraries and Cultural Resources, University of Calgary, Calgary, Canada
E-mail address: tom.hickerson@ucalgary.ca

John Brosz

Libraries and Cultural Resources, University of Calgary, Calgary, Canada
E-mail address: jdlbrosz@ucalgary.ca



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Abstract:

With the advent of the internet and the increasing effectiveness of search engines, libraries' contacts with researchers have steadily diminished. Moreover, the traditional disciplinary silos used to organize library collections and services have become less relevant to the multidisciplinary approaches required in addressing today's "grand challenges" research. Academic libraries have reached a point at which they must fundamentally reposition themselves within the campus research enterprise.

New research at the University of Calgary has identified a constellation of services and expertise that will be necessary to enable today's multidisciplinary and interdisciplinary research. With support from The Andrew W. Mellon Foundation, the University of Calgary's library undertook an evidence-based study of scholars' needs through direct partnerships with faculty research teams in twelve competitively selected sub-grant projects.

The study revealed new avenues by which libraries can become key collaborators in research. These include moving from disciplinary-based to functional, cross-disciplinary support; bringing together of digital media and analytical tools to offer a more integrated digital experience; enhancing data curation, visualization, digitization, and metadata services; providing collaborative lab spaces; and taking a partnership rather than transactional approach to working with researchers.

This new paradigm will demand fundamental changes in how libraries staff, fund, and organize their operations. But there are signs that libraries are responding, redirecting their focus and energies in order to remain essential participants in research success at their institutions.

Keywords: Academic Research, Academic Libraries, Multidisciplinary, Research Platform, Library Organization

1 INTRODUCTION

The last twenty-five years have been a remarkable period of fundamental change in academic libraries. With the arrival of the web in the mid-1990s, suddenly both scholars and students were able to access library resources from almost anywhere – and increasingly other information sources, as well. Almost immediately, there was a sense of panic about whether libraries would be needed in the future. In 2001, the *Chronicle of Higher Education* published an issue with the cover title, “The Deserted Library,” including photos of empty library spaces (Carlson, 2001). But they were wrong. Libraries responded quickly with Information Commons offering expanded student space with high-end technologies and began adapting to a new paradigm in which the library became more of a collaborative social and cultural space “owned by” students. But at the same time that students came back to the library, the faculty did not. With decreasing use of print collections and more information available at their desktops, faculty no longer found themselves visiting the library.

The diminished role of the library in academic research is now being further reduced. In the age of Open Science and Open Data, sources acquired or licensed by the library are less critical. Perhaps even more importantly, research methodologies themselves have changed. The traditional disciplinary silos used to organize library collections, services, and staffing are less relevant to the multidisciplinary and interdisciplinary approaches being employed by scholars in addressing today’s societal “grand challenges.”

Digital media and analytical tools are now essential elements of the research process across the academy, from the sciences to the humanities. Data curation and geospatial analysis are commonplace. For libraries to remain relevant in this research ecosystem requires a redefinition of roles and repositioning within the research enterprise.

2 PLANNING WORKSHOP

Recognizing the vital importance of these evolving changes led the library at the University of Calgary to initiate research in order to discern the principal support needs of researchers today. With the support of the Vice President for Research and funding from The Andrew W. Mellon Foundation, three days of workshops involving fifty researchers from fifteen different disciplines were conducted in November 2015. The disciplines represented included:

- Anthropology
- Archaeology
- Architecture
- Chemical and Petroleum Engineering
- Civil Engineering
- Computer Science
- Environmental Design
- Geography
- Geology
- History
- Military, Security and Strategic Studies
- Political Science
- Public Health
- Real Estate Studies
- Urban Planning

Workshops were led by outside facilitators from elsewhere in Canada, the United States, and Australia. Three researchers from other Canadian universities participated in order to broaden the scope of the discussions. A small number of library and Office of Research Services staff attended, but only as observers in order to remain at arms-length from the deliberations.

There was remarkable consensus among the participating scholars. The principal needs they identified included:

- Data Curation and Sharing
- Analytics and Visualization
- Metadata Services
- Digitization
- Rights Management and Dissemination
- Collaborative Spaces

Based on these findings, the next goal was to instantiate this constellation of services as a research platform capable of efficiently supporting a diversity of scholars and students.

Realizing this new paradigm was the focus of a new research grant, “Academic Research and University Libraries: Creating a New Collaborative Model,” funded by The Andrew W. Mellon Foundation in 2017.

3 THE ACADEMIC RESEARCH AND UNIVERSITY LIBRARIES PROJECT

The objective of this project was to identify a new platform of library research services, and do so in an evidence-based manner. Rather than theorizing on what scholars needed, the project made use of sub-grants funding scholars’ research to see how these supports were utilized by scholars when given the opportunity to do so.

Started in spring 2017, two rounds of competitive, internal grants (sub-grants) were issued to support University of Calgary research conducted in partnership with the library. Projects were required to employ multidisciplinary teams, actively engage with the library’s emerging research platform, and conduct research within one of three over-arching themes:

- Smart Cities: investigations of sustainable, resilient, secure, and culturally dynamic cities;
- Arctic Studies: research of the North American and the circumpolar Arctic through the environmental and social sciences, the arts, and the humanities; and
- Cultural Discourse: multidisciplinary inquiry into the various aspects of artistic expression, communication modes, and societal traditions and norms.

These themes were chosen to align with University of Calgary research priorities. The duration of the sub-grants was short term (six to eight months) to encourage an intense time of learning and exploration for the scholars, as well as to provide the library an opportunity to quickly learn and apply the findings from the experience.

After adjudications based on a letter of intent, library staff met with research teams to ensure they were aware of the variety of potential areas of engagement with the library, and to assist in development of the full proposal. In many cases these meetings led to increased engagement with areas such as Metadata Services (e.g., in training graduate students in metadata production and quality assurance); or making use of library resources in different ways (e.g., having trained student assistants digitize material with the library’s equipment rather than paying for outside technicians to complete this work); or drawing on new areas of library expertise in visualization or geospatial analysis. These same meetings led to the library providing web development as an additional platform service. Many projects required moderately complex websites. Rather than having research teams make use of student-

created sites (often with quality concerns or challenges in maintainability) or commercial developers (expensive and time-consuming), the library offered the opportunity to make use of the library’s web development team. Virtual reality was identified as another area where the library could provide useful enhancements to researcher capabilities.

Adjudication was overseen by a panel comprising senior library staff and senior researchers / research administrators from across campus. Projects were selected on the quality of their:

- Research concept (40%)
- Alignment with and support for the library research platform (30%)
- Methodology, feasibility, and budgeting (30%)

Successful projects were eligible for funding of up to \$40,000 (CAD). In the first round (2017-2018), five projects were completed; in the second (2018-2019), seven projects were funded. A total of \$400,000 was dedicated to funding the sub-grant research. Each project round was followed by an external review by academic research and library experts from the United States and Canada.

The coordination of this process, and of the project support within the library, was managed by a library Project Coordinator. The Coordinator served as central contact for scholars and library personnel to keep up-to-date or resolve problems within projects.

4 SUB-GRANT RESEARCH PROJECTS

Over two years twelve projects (from 31 applications) were funded. To provide a sense of the wide diversity of projects, this section provides a brief descriptions of each.¹

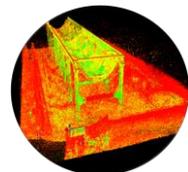
Open Data for a Smarter City: Creating a Data Infrastructure Pilot Initiative, led by Ryan Burns (Geography), created a data repository for local city data from researchers, community associations, non-profits, and others. While the City of Calgary operates an open data portal, this new repository targets data outside the city’s purview. <http://yyccdatacollective.ucalgary.ca/>



Paper Traces in Digital Environments: Enhancing Analysis and Representation of Content and Materiality in Digitized Print Collections, led by Stefania Forlini (English), explored enhancing the digitization process and metadata records of the Bob Gibson collection of early speculative fiction. Existing mass digitization techniques focus on the text at the expense of material properties that can be essential to scholars’ research (i.e., important for speculative fiction to differentiate low-cost “pulp” publications from high-cost “glossies”).



The *Digital Preserving Alberta’s Diverse Cultural Heritage* project, led by Peter Dawson (Archaeology), created an online repository for three-dimensional scans of cultural heritage sites. The resulting website, developed by library staff with its content created and controlled by the research team, links to deposited datasets in the library’s data repository.



¹ More information about the individual projects is available at <https://library.ucalgary.ca/libraryresearchplatform/project>.

The associated data includes building information models that provide means to monitor at-risk heritage sites, as well as 3D models within virtual reality applications for education and outreach. <https://preserve.ucalgary.ca/>



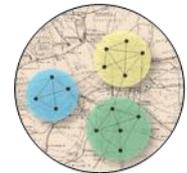
ArcticSensorWeb: A Research Platform for Real-Time Dissemination of Arctic Data, led by Brent Else (Geography), created a web portal to make scientists' weather and environmental sensor data available in real-time to local communities in the Arctic. This included consultation to ensure that the data and visualizations were useful as well as accessible with low-bandwidth internet access.

<https://sensors.arcticconnect.ca/>

Mapping Urban Healthscapes: Bringing Together Big Data and Empathic Cultural Maps in a Knowledge Transfer and Exchange Project was led by Suzanne Goopy (Nursing). This project developed empathic cultural maps to take accounts of qualitative immigrant experiences of city infrastructure and the health system and links these accounts to city and census data with the aim of more effectively communicating concerns to municipal and provincial policy-makers, community members, and educators. <http://bit.ly/storymapecm>



Mapping and Visualizing Victorian Literary Sociability, led by Karen Bourrier (English), examines how social networks influenced the careers of Victorian writers, artists, editors, and publishers, with a particular focus on women's careers. This team employed a variety of sources to compile geo-referenced data on the residences of Victorian writers, artists, editors, and publishers in a soon-to-be-open dataset. This will inform the team's in-depth analysis of propinquity's effect on the literary careers of women in nineteenth-century London.



<https://victorians.ucalgary.ca/>

The *Are Smart Cities Healthy?* project, led by Jennifer Godley (Sociology), explores how a variety of Canadian cities compare with each other in terms of economic, health, social, and infrastructural factors. In sociology and public health, there is a tradition of studying how socioeconomic factors influence individual health; this project extends this by incorporating economic factors pertinent to building smart, sustainable cities.



Visualizing a Canadian Author Archive: Alice Munro, led by Murray McGillivray (English) explores the enhancement of finding-aid metadata and TEI encoding in conjunction with data visualization to enhance exploration of this significant collection. Beyond gaining a greater understanding of how these techniques can enhance digital humanities' methodologies, the research team is specifically investigating Alice Munro's methods for refining her stories and the effects of publisher feedback on her work.



Soper's World: a Journey into the Canadian Arctic through Art, led by Maribeth Murray (Anthropology and Archaeology), explores naturalist and explorer Dewey Soper's multifaceted role in the Arctic and highlights Canadian Arctic exploration. Through digitization of his paintings and a virtual exhibit mapping Soper's explorations, this project combines geography, art, history, and biology to create an educational window on the Arctic for the public.



Making Specialized Natural History Collections Accessible to Diverse Users: A Case Study Involving the Bees of Alberta, led by Mindi Summers (Biology), seeks to address the need for biodiversity by developing an open-access platform providing data on Albertan bees, including project-created, high-resolution images, to scientists, city planners, and interested members of the public. The project also developed guides to support non-scientific users in exploring this collection and answering questions related to biodiversity, local bee populations, and resources on bio-inspired urban design. <https://biodiversity.ucalgary.ca/>



Preserving and Disseminating Maker Skills with Mixed-Reality Videos, led by Anthony Tang (Computer Science), seeks to assist learners in becoming effective users of Makerspaces by using mixed-reality videos that ease self-learning. To move beyond 1:1 teaching in Makerspaces, this project explores new communication modes -- specifically, how mixed reality technologies can be used to preserve knowledge of and to acquire skills with Makerspace tools.



SmartCampus: Interactive Visualizations for Data-driven Design, led by Wesley Willett (Computer Science), explores interactive data visualization of phone-GPS data from University students with the goal of providing tools for campus designers and architects. Four design sessions with practicing architects explored prototype visualizations, gathering insights on how these data and visualizations may answer and guide questions on building and campus design.



5 PROJECT FINDINGS AND EVALUATION

Several findings related to the experience of the library staff that contributed to the projects. One of the most notable observations was that staff enjoyed the opportunity to engage directly with researchers, employing their expertise and developing new skills. For example, the library's newly hired metadata librarian was surprised to have an opportunity to engage with a variety of research projects immediately upon starting the position. The manager of the metadata unit noted that her staff, a group with deep expertise working with bibliographic material but without much experience with datasets and other "born digital material", were highly engaged and concluded that this initiative led them to be more aligned with the University's purpose and goals. Despite sometimes stretching their expertise into new areas, library staff found researchers to be both comfortable and confident in their capacities.

Another important aspect of the staff experience was building relationships with researchers. The ability to engage with researchers in project meetings before the research proposal was finalized was unique, and contributed to the quality of the projects. It allowed library personnel to provide more fulsome support, often incorporating personnel, infrastructure, or services that the research team did not initially consider. There was also cross-learning within the library (e.g., personnel in data curation and visualization developing workshops and design sessions that integrated new knowledge into research projects).

For library units supporting these projects, a new style of collaboration developed. Whereas a digitization project formerly would be driven entirely by the digitization group, in this process they now shared responsibility for these projects with other units (e.g., metadata, web development, and copyright). This increase in cooperative efforts also highlighted some shortcomings in the library's project support infrastructure, particularly the lack of secure, short-term file storage and transfer capabilities and project tracking. In the second round of

projects, the library employed new systems (Trello² for tracking projects and a new file server for sharing files) to improve these processes.

5.1 Implementing the Platform

Figure 1 illustrates the components of the library research platform used by the research projects. Data curation, metadata services, and collaborative spaces were widely used throughout the majority of the projects; digitization, visualization, and web development were utilized by almost half of the projects.

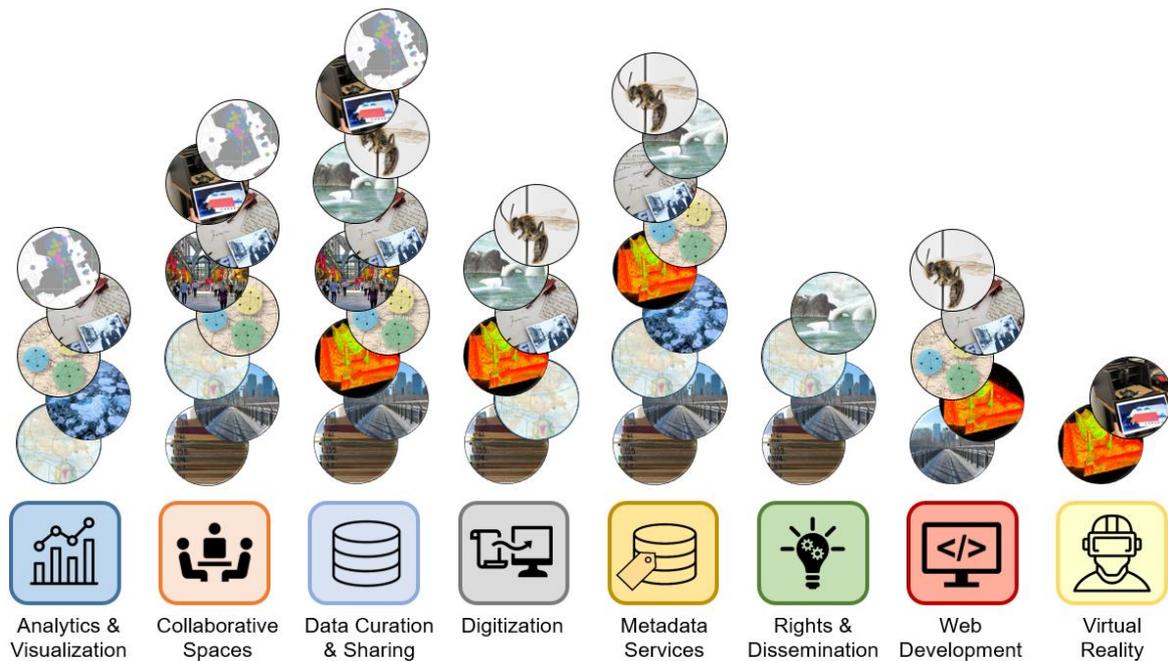


Figure 1 Use of library services across the twelve sub-grant projects. Circles represent the projects, squares represent the elements of the library’s research platform. Icons courtesy Ben Davis, Ramakrishna Venkatesan, Mahmure Alp, Yur, Shashank Singh, and AlfredoCreates.com.

Beyond demonstrating how the research platform complemented current research practices, this initiative also demonstrated how it could be useful across a wider variety of campus disciplines. Because the platform components are not tied to specific disciplines, they can provide efficiencies of scale benefiting a variety of campus scholars. The cross-campus involvement in these projects is shown in Figure 2.

Collaborative space is an important and a unique element within the research platform. Projects made use of space in different fashions. Some made use of the library’s newly launched Lab NEXT³ as a working space where students and scholars from different disciplines could gather when they did not have departmental space of their own. Others made use of library spaces such as the Visualization Studio, the Makerspace, and other areas for functions such as launch events, design sessions, meetings, and workshops.

² <https://trello.com/>

³ <https://library.ucalgary.ca/labnext>

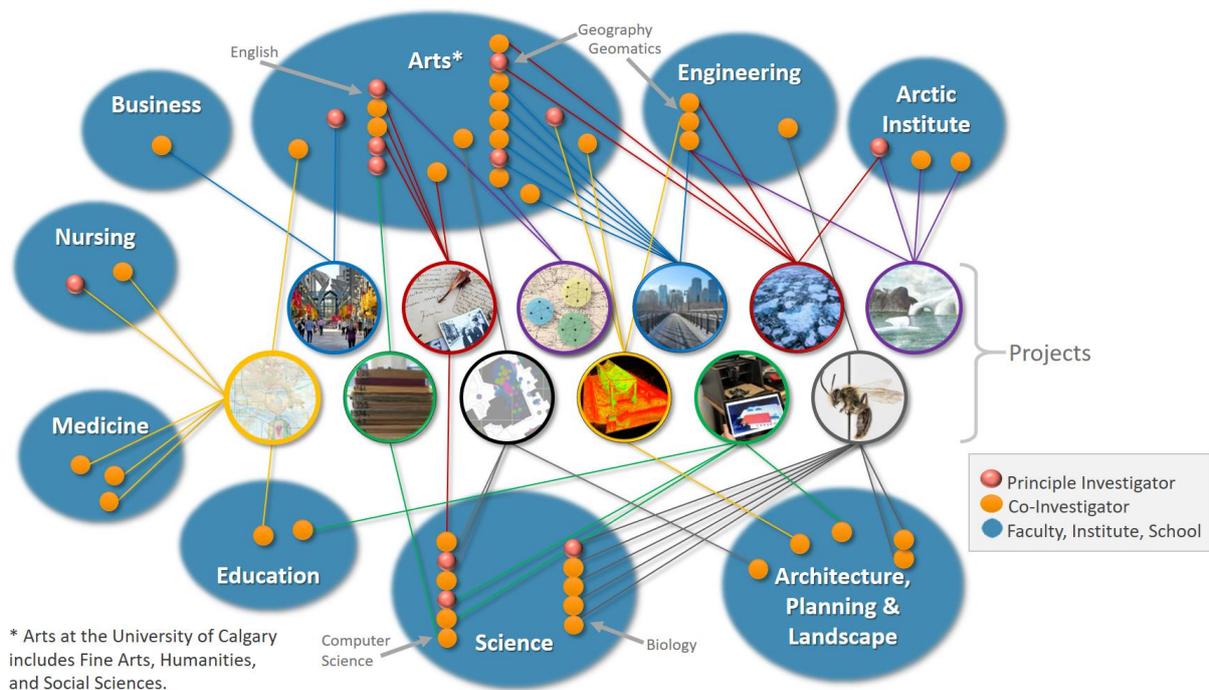


Figure 2 The sub-grant research projects (circles) involved scholars from a wide variety of disciplines and faculties.

An important consideration for establishing the research platform is the degree to which it builds upon services, infrastructure, and expertise that already exists within academic libraries. The approach taken was to craft these functions into a singular user-experience for researchers to make it possible for them to discover and more effectively use these resources in combination.

Feedback from both the research teams and library staff supported this process. Particularly appreciated was the Coordinator’s role acting as a central point of contact, in both directions, to resolve issues and ensure projects proceeded as planned. Research and library staff both noted that frequent meetings were essential to the success of the collaborative endeavour. The value of data management plans to encourage early discovery of infrastructure and service needs was also recognized.

5.2 External Review

Essential to validating the findings at Calgary was an External Review conducted at the conclusion of the first round of funded research projects. This team included Larry Alford (University of Toronto), Charles Eckman (University of Miami), Lorcan Dempsey (OCLC), Harriette Hemmasi (Brown University), Megan Meredith-Lobay (University of British Columbia), and Shan Sutton (University of Arizona). In May 2018 they met with the project researchers, library teams that had participated in the projects, and research administrators. Findings from the Review were very positive, and the reviewers encouraged broad dissemination of project findings. Their principal observations included:

- Critical importance of conveying the depth and breadth of library services and expertise to researchers;
- New models of collaboration are library-to-researcher but are also essential among library staff;

- Openness of librarians to redefining their understanding of researcher needs;
- Importance of the Project Coordinator, supported by a core team of advisors from the library and the Research Services Office, facilitating the work of all project participants;
- Interactions with research administrators in incorporating this redefinition of the library's role throughout the research lifecycle; and
- Issues of scalability and sustainability.

Another External Review will be conducted after the second series of research grants are completed.

6 PROFESSION-WIDE IMPLICATIONS

Conclusions aligning with the findings of the research being conducted at the University of Calgary are being recognized widely. In 2017, the Association of Research Libraries, the principal such body in the United States and Canada, initiated the development of new Membership Principles reflecting the primary “Elements for Success as a 21st Century Research Library” (Association of Research Libraries, 2018). In articulating new and evolving roles and responsibilities, the inclusion of criteria specifically addressing the role of libraries as “strategic and engaged partners in the research ecosystem” was among those mandated. The new Principles were adopted unanimously at the Spring 2018 ARL Membership Meeting.

6.1 Creating Sustainable Change

Libraries are recognizing the critical need to redefine, redirect, and reposition their presence in the research life-cycle on their campuses and beyond. The changes that will be required are fundamental, and will result in significant organizational and strategic realignments:

Disciplinary to Functional

Organizational structure and services should be redesigned to strengthen library functional capacities, with less focus on traditional disciplinary roles. Cross-disciplinary platforms can serve multiple disciplines.

Digital Media and Analytical Tools

The information sources scholars use today are increasingly valued in direct association with the analytical tools that enable research discovery. Libraries' choices about content should increasingly be linked to these analytical capacities. Directly linking these investments will create a New Synthesis driving collection decisions and expenditures.

Research Resources to Research Experiences

Focus attention on the nature of research today, rather than on acquisition of those resources that libraries have invested in historically. Today's research sources are often drawn from beyond what libraries purchase or licence, especially in an age of open science. Employ an evidence-based response to current research practice and needs.

Partnerships Rather than Transactions

Stop counting and start partnering. Libraries should be involved in all stages of the research life-cycle, not just capturing the end products of research. Library staff should pursue deep partnerships in the research process, offering expertise, infrastructure, and interdisciplinary connections.

Demonstrate Efficiency

Demonstrate the library's inherent efficiencies in applying shared resources - expertise, infrastructure, and services - to enhance the impact and value of research investments. One research project lead investigator, cultural anthropologist and Associate Professor of Nursing Suzanne Goopy, reported that using library services to support her research rather than other means cut the cost of her project from \$100,000 to \$30,000. These kinds of savings can make a significant difference in the scope of a project and have broad institutional implications.

Collaborative Spaces

Library spaces will become labs serving as hubs for discovery and creation. In response to these research findings, the library at Calgary designed a new innovation space, Lab NEXT, to serve as the centre for a constellation of research services, linking across the library and the campus.

7 REMAINING RELEVANT

In the coming years, libraries may remain valuable learning spaces, but their importance and financial support will decrease without a critical role in the research enterprise. "Search" is no longer a core function. For both scholars and students, Enabling Knowledge Creation has become our primary role.

A New Synthesis will provide a prism through which to systemically analyze which research sources are acquired in explicit combination with necessary infrastructure and expertise, rather than employing traditional budgeting models that are of decreasing applicability. Libraries must invest synergistically and must be engaged partners on campus and with other research organizations to collectively support the research life-cycle.

The required organizational changes will be transformative, but attainable. Much of the needed infrastructure and expertise is already present in libraries, and awaits rechannelling into new roles. Libraries already embody elements critical to success in addressing such challenges:

- Trust – A record of responsible stewardship,
- Neutrality – Exercising a campus-wide mission,
- Universality – Employing common methods and standards, and
- Economies-of-Scale – One solution/multiple uses.

Ongoing redesign of the library environment in ways responsive to evolving needs will be critical, seeking opportunities to reshape scholars' vision of the library and to have their experiences reshape the library.

Through this new paradigm, libraries will remain relevant in academic research and re-establish vital bonds with scholars. Concludes Professor Goopy, "I used to come to the library for the books and journals. These days, I come for the people."

Acknowledgments

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