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Five Grand Challenges for Library Research.

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Abstract

Librarians have many and varied difficulties. For some library problems research is not the best remedy. Improved coordination, clarification of values, or drawing on existing research results may suffice. When research is indicated, it pays to be selective. Investing in research, like any other kind of investment, should be judged in terms of the probability of success, the likely delay before results are achieved, and the impact on the population of competent researchers, as well as the perceived importance of the problem. New technology permits new forms of service, generates new data for analysis, and supports new tools for researchers. Normal research is repetitious and progresses incrementally. A bolder strategy is to seek significant advances in library service by challenging researchers to achieve a deeper understanding of important, but inadequately understood library phenomena. Five Grand Challenges are proposed: Library service: Could library services be made more meaningful? Library theory: Who knew what when? Library design: Have digital libraries been designed backwards? Library values: How neutral can libraries be? and, Library communities: How do communities differ?

Introduction

Librarians, especially library administrators with difficult decisions to make, often call for more research and we would do well to ask them to compile a list of what they most need to know. But, before converting such a list into a research agenda, we need to ask two questions: First, is research really what is most needed? and, second, in which areas is research likely to be most productive? More research is often not the best option. Rather, some way to reduce uncertainty about what course of action to choose is needed and not all kinds of uncertainty are helped by research, at least not by academic research. Friend and Jessop (1969) provide a helpful analysis based on their observation of the reconstruction of the city of Coventry after the Second World War bombing. They distinguish three different kinds of uncertainty:

- *Uncertainty concerning the decisions of others*: As a practical matter, libraries are often interdependent with other agencies. If the city is revising its transportation and traffic plan, choosing a location for a new library building could be done better after the revised transportation plan has been decided. Meanwhile, those responsible for developing the transportation plan, could make a better plan if they knew where the new library was going to be located. The way to resolve such uncertainties is not

research but closer coordination. The librarian and the transportation planners should meet and decide jointly, or both decisions should be moved to a higher level in the administrative hierarchy.

- *Uncertainty concerning values*: Libraries serve multiple constituencies. A library director faced with a budget decrease can calculate alternative ways to reduce expenses and yet still not know what to do. A university library director could achieve the required economies by reducing science journal subscriptions or humanities bookfunds or library opening hours, and still be undecided because these cuts would affect different groups differently and so the decision becomes political, a matter of assigning priorities between different groups. It is a matter of clarifying values, rather then conducting research. A wise course of action would be to seek guidance from the Library Committee and the university president.

- *Uncertainty concerning the environment*: What would be the likely consequences of alternative decisions? This may require conventional research, such as a survey, a feasibility study, or the development of a new prototype. Yet, very often, unless preciseness is required, it is often sufficient to draw on existing research results by asking an experienced researcher or examining the research literature. And when that is not enough, some simple counting, measuring, or observing may suffice.

So, as far as library administrators are concerned, more research is often not really the best or only way to go. For the individual researcher, undertaking research can require a major commitment of time, attention, and resources, even if someone else is willing to supply funding. There is always an opportunity cost: One could have been researching something else instead. Because research requires a significant investment of time and attention, individual researchers' decisions concerning research resemble decisions concerning the investment of money. A good research project, like a good financial investment, is one that will yield a substantial return, on a small investment, with little risk, and in the short term. As with money, there are usually trade-offs. An Assistant Professor will find a research project more attractive if results can be expected before, not after, a tenure appraisal.

Funders and managers of research have some additional motivations. They too want an agenda that will provide a good return on their investment, but they also have, or should have, an additional goal: to develop and sustain a population of competent researchers, to encourage interactions among them, to keep them intellectually challenged, and to work with them to focus on research agendas deemed important and viable.

For all these reasons, composing a good research agenda involves more than the listing of significant problems and uncertainties. The questions to be researched should be non-trivial, intriguing to whoever is to work on them, and expected to have significant consequences for practical decisions and/or our understanding of our field. The advent of new technology is especially significant, not only for new ways to provide library services, but also, as a by-product, vastly increased data about the resources, the users, and usage--and, as well, more powerful tools for the researchers. The availability of new sources of data and new research tools means that there may now be new ways to address old problems.

We started with the assumption that a research agenda should be based on and driven by specific problems identified by librarians and library administrators. Certainly we should seek to help them in whatever way we can, but that is not the only option. What if we formulated the question differently and thought also in terms of the best possible use of researchers? What strategic investments of research funding could transform our understanding of librarianship and move the whole field to a higher plane? How could we make the next decade as richly formative for library service as the late nineteenth century was?

Researchers, being human, respond best to problems that are exciting, worthwhile, and, above all, challenging. They need, and we all need, Grand Challenges. So here are five. Each is a plea for a significant research front to be opened up and explored, rather than a single researchable question for which there is a known methodology.

Library service: Could library services be made more meaningful?

Everyone should want libraries to have a large and positive impact on the communities they serve. We should all want the benefits resulting from investment in library services to be high, and to be seen to be high. Richard Orr (1973) wrote a classic analysis of the notion of "library goodness" and there is a established tradition of research on output measures and cost-effectiveness (e.g. Baker & Lancaster 1991), including quite sophisticated analyses of how different communities might have differing preferences (e.g. McDonald & Micikas 1994; Talja 2001). These studies are mainly of aggregate usage and the impact assessments tend to indirect (e.g. measures of library use) or narrowly instrumental: After using library materials, John passed an examination and Jane was able to build a wall by herself, with imputable economic benefits for each. Yet the primary impact of library materials is through the meanings they have for our minds. They influence what we know, what we believe, and our attitudes. How could we understand better how *meaningful* library services are for the individual?

Children's librarians are interested in how appropriate books are for children of different ages and backgrounds. Bibliotherapists recognize the therapeutic potential of reading books and, decades ago, the library literature contained discussion of the effects of reading (e.g. Waples, Berelson & Bradshaw 1940). More recently there has been heightened sensitivity to the probable reactions by different cultural groups and the word "relevant" has been widely used in relation to library materials, library services, and retrieval performance. We all want collections, services, and retrieval results to be "relevant," a term that has remained problematic. Wilson's classic discussion of relevance concludes that it would be simpler to replace use of the word "relevance" by separate words for the three different meanings that he discusses: logical relevance; a suitable documentary means to ends; and of satisfactoriness (Wilson 1968, chapter 4). Only the last two matter for library purposes.

The process of learning is essentially and necessarily subjective and it is, therefore, to a greater or lesser extent emotional. We may react with shock, horror, joy, or suspicion to some claim, statement, or evidence. When we say of some experience that it was "meaningful" for us, we usually imply an emotional or esthetic response as much as a rational one. The technical term for this emotional reaction is "affect." We also tend to accept what we want to experience and to avoid or doubt what is unpalatable. Reading a book, viewing a film, or making a discovery can be a "moving" experience. A significant new insight is called an "epiphany." That learning is profounder when we are emotionally engaged is generally accepted. Since this is the case, what can we do to recognize, acknowledge, and incorporate affect into library service?

Discussion of what books are "relevant" tends to reduce rather quickly to what they are about, on the assumption that if a document is about the same topic as an enquiry, the document is "relevant" and there has been a satisfactory outcome. (Reliance on machines and formal systems and the need to be efficient are liable to reduce this process to looking for occurrences of matching strings of characters.)

Librarians know, however, that what a book is about is often a matter of perspective and that meaningful learning (as opposed to rote memorization) depends on whether the readers can relate what is read to what they already know.

What a book is about tends to viewed in literal and limited terms. At a literal level, Aesop's fables are about animals: the fox, the stork, frogs, and other creatures. But we read the fables because they are allegorical. They are really about the foibles of human beings, not zoology, and can be enjoyed at that level. And the purpose of each fable is at a third, higher, level of interpretation: to teach a moral lesson. Each fable is a brief lesson about morality. Taken as a group one could consider them inspirational: they are intended induce in us a more ethical attitude. Already in the European middle ages, these multiple levels of meaning were recognized. If meaning matters and if it is at multiple levels, how can modern library services catch up with the European middle ages? (A related issue is the very large difference between what an image depicts (a dove, maybe) and what a picture is about (peace, perhaps). Mechanized content analysis is not likely to rise above the literal level and present subject cataloging practice seems to slip very quickly from topical headings to genre headings.

People use libraries, so how could we achieve a deeper understanding of what makes the use of library services personally meaningful?

Library Theory: Who knew what when?

Library history is a well-developed field. Its strengths have been in the histories of libraries as institutions and the biographies of librarians, both very worthwhile undertakings. What is less well-developed is the intellectual history of the field. (The *Dictionary of American Library History* (1994) reflects this situation.) What ideas influenced which librarians? Where did the ideas come from? How and when were ideas adopted and adapted? How did ideas spread to other fields outside of librarianship. (A fine example of intellectual history is Johnson's *The Austrian Mind* (1972)). There are multiple reasons to do this kind of work, in addition to its intrinsic interest. We understand objects, individuals, and institutions better if we know about their past experiences, and we understand ideas and theories better if we know how they developed and what has already been said and done with them. Fortunately, in recent years there has been an increased interest in this kind of historical work in library and information science. We note the work of the Special Interest Group on the History and Foundations of Information Science in the American Society for Information Science and Technology (Hahn & Buckland (1998); Bowden, Hahn & Williams (1999)), the Conception of Library and Information Science conferences (esp. Conceptions (1992)), and a few, rather isolated scholars (e.g. Casey (1981), Day (2001), and Rayward (1994). More such research and more of a focus on the development of librarianship would be welcome. We need critical and historical analyses of our theories and assumptions.

Asking "Who knew what when?" opens up a major research front. A narrower, but rather central question, is "What has been the influence of technological modernism?" By technological modernism we mean the impact of positivism, scientific management, efficiency, and algorithms. Technology, standards, systems, and efficiency lead to engines for social progress. Melvil Dewey was famous for his interest in efficiency. Librarianship used to be called "Library Economy." The technological imperative to use equipment (cards, punch cards, digital computers) imposes requirements for standardization. The

"information science" end of Library-and-information-science has been largely about trying to base library service on algorithms. The premise behind this question is that what we call technological modernism was a dominant influence in Western society from the late nineteenth century to the present and that the influence on and in librarianship has been greatly underestimated.

Another intriguing line is to inquire how we have come to understand our history, and, thereby, ourselves. In the literatures on digital libraries and information retrieval, the iconic status of Vannevar Bush and his essay "As We May Think" is doubly interesting as a case-study: First as a cult phenomena in its own right, examined by Smith (1981, 1991); and, secondly, in showing how a lack of historical awareness results in an uncritical, mythic tradition, and the erasure of history (Buckland 1992).

The study of who knew what when has the additional benefit of drawing attention to the interactions within librarianship, and with other fields, and, in addition, giving us a fuller, richer sense of identity.

Library Design: Have digital libraries been designed backwards?

An enormous investment continues to be made in "digital libraries" and the automation of library files, library processes, and library services, and rightly so. But, perhaps inevitably, the program has been data-centric: How to create a database and how to enable individuals to search a database; then to do the same with another dataset. It has been a natural, sensible, and, perhaps, inevitable way to proceed from an engineering point of view. Yet it is backwards because library services should be user-centered rather than data-centered. Digital libraries have, in effect, adopted the approach of a publisher, producing one book after another, rather than of a librarian whose task it is to form a coherent collection of resources for library users. One could say that it reflects the difference between use of a single reference *work* and using a reference *collection*.

As one example, many inquiries relate to places. Users want to know about hiking in the Himalayas, the castles of Quercy, the birds of the Pacific northwest, and so on. Effective searching by place is a function that librarians do need to provide. In practice, library catalogs depend on place-names, primarily for geopolitical entities. Place-names are ambiguous, unstable, and exist in variant forms. Geopolitical entities are also unstable since boundaries and political structures both change. Searches involving regions that are areas other than geopolitical entities can be difficult. Yet places, unlike topics, persons, institutions, and events, have a system for objective specification: latitude and longitude. Further, there is a well-established tool for linking *place-names* with *places*: the gazetteer, most familiar as a list of place-names printed in the back of atlases, serving as an index to the maps. Coupling online gazetteers with online catalogs would not only provide place-name disambiguation, but also the data needed for visualizing queries and retrievals in map form, and the ability to extend searches to near-by places (Buckland, Gey, Larson 2002). When we then consider linking both catalogs and gazetteers to encyclopedias, bibliographies, biographical dictionaries, socioeconomic numeric data series, and more, a really exciting vision of library service emerges. For users to be able to search eclectically among many different and differing digital sources, as one could do in an old-fashioned reference library, would transform their ability to find out about a topic, an event, or an idea. Digital library development has simply not provided for this kind of service, not yet. A broad research agenda at two levels is needed:

1. At a detailed level, a patient working out of the practical details of linking specific pairs of resources or

genres is necessary. As one example, linking bibliographic databases with socioeconomic data series is difficult because the data series commonly have a geographic aspect and merely using place names is quite unsatisfactory in practice. Georeferencing, using spatial relationships defined by latitude and longitude, and maps for display, is much more effective.

2. At a broader level, better tools are needed for navigating multiple metadata, building crosswalks between different vocabularies, and integrating search results into personal computing environments.

These problems are not new, but solving them has become more pressing. Only when substantially more research and development has been completed from the library user's perspective can the digital library environment begin to have the look and feel of good library service.

Library values: How neutral can libraries be?

There is a deeply established belief in the United States that libraries, especially university libraries and public libraries are, or should be, politically and socially neutral. But, how far *can* libraries be neutral? It cannot be claimed convincingly that all libraries are neutral. Library services are always funded for a purpose and to say that they are purposive means that they exist to advance certain values. In principle, the selected purpose could be to be neutral. What would that mean in practice? How feasible, realistic, and verifiable would that be? There are contradictory indications.

Two factors argue for neutrality. First, libraries appear to be inherently pluralistic, in theory and in practice, even if only because bibliographies, citations, and reference works generally, tend lead to other works. However narrowly focused collection development in a particular library may have been intended to be, if trails are followed they will lead to many destinations. In that way, libraries seem inherently subversive of imposed control. Second, many librarians, their governing boards, and their professional associations, have a commitment to open inquiry, freedom to read, and "balanced" collections. In Britain it used to be said that the creed of the librarian was "no politics, no religion, no morals" (Foskett (1962)).

There are, however, several reasons to question not only how neutral libraries actually are, but also how far they could be. First, there is the source of funding. Even in the public sector, libraries are guided by the purposes of their funding bodies. Public funding is political funding. The funding bodies have agendas and are unlikely to be indifferent to the use and impact of the funding that they provide. They may have specific agendas, such as supporting the local economy, nurturing local history, or increasing adult literacy. Even if there is a generally liberal attitude there will be limits to what will be socially and, therefore, politically acceptable in the use of library funds. Second, librarians' commitment to neutrality tends not to be absolute. A major study of censorship in public and school libraries in California found widespread self-censorship by the librarians seeking to avoid censorship being imposed from outside (Lowenthal 1959). Third, both libraries and librarians unavoidably operate in cultural contexts, tending to impose limits on what is acceptable. The politics of identity, for example, and current concerns for security are powerful forces.

These issues have been discussed many times before, primarily from a principled, ideological perspective. What is suggested here is empirical investigation of how, and how far, inquiries are, or could be, diverted to, or away from, particular sources or bodies of knowledge. Our mission is to provide access to resources. How well do we understand the factors and mechanisms by which inquiries are steered towards or away from some sources? How, and in what ways, can librarians exercise effective influence,

given the powerful roles of publishers? New developments include the continued concentration of media publishing into fewer companies, the extreme fragmentation of special-interest publishing, and the difficulties both in principle and in practice of controlling or guiding library access to internet resources. Regardless of how neutral we may wish library services to be, we should seek to understand how far, and how best, degrees of neutrality in access to recorded knowledge are achieved. Thorough analysis of these issues is desirable on both theoretical and practical grounds. It would provide a better understanding of how library services are situated in this regard and of what the options are. It would provide us all with deeper insights into library service.

Understanding libraries' communities: How do communities differ?

There is a long-established tradition of library research on the communities being served, especially of demographic factors associated with library use or non-use. In several other fields there has been increased interest in the study of communities. Examples include the mapping of social networks, analysis of ethnic diasporas, and the formation of virtual communities over the internet. It would be interesting to see whether the analysis of library-related communities could now be advanced by drawing on these newer forms of community analysis and also incorporating some related library phenomena.

Libraries are, for example, engaged with communities in two different senses. First, they cater to their communities of readers. Second, as purchasers, libraries participate in the communities of writers, publishers, and readers that create specialist literatures. Scholarly literature, for example, is generated within scholarly specialties. Each such community has its own interests, methods, and terminology, and libraries selectively acquire, or provide access to, the published discourse of these specialties. Individual library users participate in these communities in both senses. They are, by definition, in the communities served by libraries, but also, by reading and, thereby, by justifying the purchase of publications, they participate in the communities of discourse. In universities, the writers, editors, referees, and readers of the publishing community are also part of the community of library users.

Scholarly communities of discourse have been analyzed with great sophistication by means of citation analysis. When libraries provide access to library materials, they are necessarily providing access to the literature of different communities, treating "literature" very loosely to cover any genre. But there is little acknowledgment that libraries are providing materials by and for multiple small communities. Since the formation of vocabulary evolves within communities, within domains of discourse, it would be logical and user-friendly to create separate catalogs and indexes for each specialist community, using the distinctive terminology of that specialty. Catalogs, however, have always been one single, procrustean index created for and from the entire collection. Bibliographies, like catalogs, cover an arbitrary range of more or less related specialties, with one unified index for all to share. In a pre-digital environment nothing else was feasible, but digital technology opens new options. Initial experiments indicate that creating multiple indexes to the same database, each prepared for a different community of users, would support significantly more successful searching, but only if users are matched to the right specialized index (Buckland, Jiang, Kim & Petras 2001). The conclusion that performance is best within specific domains and deteriorates as the coverage of the system expands to include additional domains is consistent with experience in artificial intelligence and machine translation.

Bibliometric analyses offer another basis for the comparative analysis of communities. Literatures are more or less obsolescent in the sense that older documents tend to be used less than more recent ones are and the rate of obsolescence is faster on some fields, notably Physics, than in others, such as History. Literatures are also more or less dispersed. Articles may be more or less heavily concentrated, with many articles in a few leading journals, others in a larger number of journals, and the remainder scattered over very many journal titles. The dispersion of articles on a topic across journal titles is highly skewed and this pattern is commonly known as Bradford's Law of Scattering. There have been disagreements over the best mathematical formulations, but these two bibliometric patterns are generally accepted. Unanswered questions are whether these two basic structural patterns are related to each other, as they seem to be, and, if so, what other systematic variations there are between specialist literatures (Buckland, 1972). One approach is to view obsolescence and scattering as surface phenomena reflecting differences in the nature of the discourse in different communities. How much do literatures differ on these dimensions? How stable are they? What causes the differences? Are there comparable analogous differences in patterns of internet usage?

As the technologies of publication change, the viability of highly specialized literatures can be expected to increase. One thinks of narrowly focused 'zines, websites, and e-journals, as well as specialized conventional publications. How and why do specialties arise, expand, and wither? What kinds of responses are then required in access and in bibliographic control to adapt to a changed situation? The definition of "community" is itself problematic. There are communities within communities and we are all members of multiple communities simultaneously. How are communities to be identified and their boundaries detected?

These examples support the argument that there should be more investment in the analysis of communities, especially comparative analysis. This reinforces the cogent arguments of Hjørland (2001) for domain-based approaches to library and information studies. The dramatic increases in available digital bibliographical data and in computing power mean that domain-based research has become more feasible.

Conclusion

Librarians face many difficult decisions and uncertainties and, for some of these, focused research projects can and should be undertaken. These studies will, cumulatively, edge us forward. But significant advances in library service are likely to depend on substantial advances in how we understand the phenomena involved. If we want research to transform our understanding of librarianship, if we want to discover how to provide more sophisticated library services, if something more than the minor incremental advances of normal research is wanted, then we need a different, bolder strategy. Areas within our interests that are important, but inadequately understood, need to be identified and researchers should be challenged to provide new insights using whatever techniques they can.

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