Digital Reference Research

Fusing Research and Practice

This article presents the Digital Reference Research agenda developed as a result of a three-day symposium at Harvard University. It shows how the research agenda ties directly to digital reference and library practice and argues that research and practice must connect on a meaningful level in order to prevent unusable research and untestable practice.

Background

Digital reference is one of the hottest issues in libraries today. Academic, public, and special libraries are rushing to offer human intermediation services over the Internet. Conference sessions on the topic are filled, workshops are well-attended, and major library organizations, including the Reference and User Services Association, the Association of College and Research Libraries, and OCLC, are developing digital reference training programs and products. However, unlike the research interest associated with digital libraries, there has been relatively little in the way of research interest in the study of digital reference. Aside from the work of a small group of researchers such as the author, Joe Janes, Charles McClure, Marilyn White, and Eileen Abels, digital reference has remained primarily in the province of the practitioner.

Practitioner orientation can be seen when one examines the annual Virtual Reference Desk (VRD) Conference (www.vrd.org/conf-train.shtml), a central locus for digital reference. A series of initiatives, from the development of quality metrics to technical standards to education was developed each year as the result of the VRD conferences. The emphasis on research and scholarly participation in these conferences, however, has been small.\(^1\) For the third conference, organizers received nearly eighty proposals for presentations, but only two of them were submitted by library and information science (LIS) faculty members.

The separation between research and practice is resulting in very real consequences. Large amounts of money are being invested in digital reference services by universities, public libraries, governmental agencies, and foundations. These monies are being invested in services, software, and planning without benefit of clear empirical research pointing to best practices and without benefit of clear understanding of the advantages and shortcomings of these reference services.

A further consequence relates to the lack of interaction between the digital reference and digital library communities. While digital reference can be seen as a subfield of digital libraries, few instances exist where research and development in these areas has been coordinated, although each of these communities is beginning to understand the importance of the other.

The goal of a three-day research symposium held in August 2002 at Harvard University was to rectify the lack of interaction between the digital reference...
and digital library communities. The symposium leaders wanted to engage the information science and digital library research communities in an examination of digital reference by building on existing research and lessons learned from practice. The leaders also wanted to develop a digital reference research agenda. The research agenda resulting from the symposium is presented in this article. The research agenda presented here is a reference document that outlines:

- the scope and scale of the digital reference phenomena;
- current knowledge about the phenomena under investigation;
- recognized gaps in the understanding of the phenomena; and
- a common belief of the priorities necessary to fill the gaps in understanding.

By creating and promoting a research agenda, a clearer picture of the field of digital reference can be developed. This clearer picture of the field, with its research priorities and shared knowledge, can provide benefit to funding agencies as they attempt to support development in the reference practitioner community. The picture can also inform the preparation of library professionals for the digital reference environment and inform the development of anticipated standards in digital reference.

The initial list of topics discussed at the symposium (and later incorporated into the final research agenda) was presented by Dr. Charles McClure in his closing session at the 2001 Virtual Reference Desk Conference. The topics were:

- Question negotiation in an electronic environment
- Education for digital reference services
- Standards, systems and software for digital reference
- Policies and standards for digital reference in consortia
- Fit of digital reference into the digital library arena

Lead authors currently active in digital reference research were commissioned to write white papers on one of the listed topics. The authors were instructed to:

- Define the topic under consideration.
- Review the current state of the art in the area.
- Interview key informants in each area or otherwise obtain some empirical data regarding the issues and strategies.
- Clarify the issues or challenges that need to be addressed.
- Offer options and specific recommendations for how best to resolve the issues and make progress in the particular area under consideration.
- Float these ideas by reviewers before writing the final paper.

The lead authors introduced their topics for debate and discussion at the symposium. The debate and discussion were then used to inform a final research agenda document, which in turn resulted in the creation of the Digital Reference Research Agenda presented here.

The lead authors were also encouraged to organize a track which would center on their particular topics at the fourth annual VRD conference. In this way, the research outcomes of the symposium could be linked to practice.

The digital reference research agenda is presented here as a mechanism by which research can be coordinated better, and also as a milestone by which the digital reference community can measure the progress of digital reference knowledge.

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**The Digital Reference Research Agenda**

The digital reference research agenda consists of:

1. A definition of digital reference
2. A central, driving question
3. A series of lenses, or approaches to the central question

Each of these areas is discussed briefly below.

### 1. A Definition of Digital Reference

There has been much discussion devoted to the language and meaning of terms used in digital reference. The terms virtual reference, electronic reference, live reference, and e-reference have all been used by the library community to denote a single concept—the provision of reference services on the Internet. For the purposes of this article, the author uses the term “digital reference.” This term is chosen as a parallelism to digital libraries, and as an overall term that spans modes of delivery (chat, e-mail, and so on). For the purposes of the research agenda, digital reference is defined by the author as the use of human intermediation to answer questions in a digital environment.

A definition is necessary but is insufficient to create a research agenda. A definition is sufficient to identify a field or practice, but does not include the analysis necessary to define the shape and direction of the field. Any domain of inquiry is predicated on a central question.

### 2. A Central, Driving Question

The central, driving question provides boundaries for the unique nature of a discipline and situates the domain in the realm of other streams of exploration. In the specific case of digital reference, the central question must center on why
digital reference is different from traditional library-based reference research and from digital library research. It must also, of course, define how digital reference is related to these domains, as well as to information retrieval and computer-mediated communication. The digital reference research agenda described in this article poses the central question in digital reference as:

how can human expertise be incorporated effectively and efficiently into information systems to answer information seekers’ questions?

This central, driving question comes with several components and assumptions that form the basic framework of the research agenda.

2.1. Question Components

Question components are defined here as the key areas of understanding needed to explore digital reference, and from which deeper understanding can be drawn and studies conducted to further the understanding of the central question. They are the atomic units of inquiry that may be shared by many disciplines, but in special combination are unique to the study of digital reference. The agenda presented in this article defines five question components:

1. Human Expertise: What is the nature of human expertise in a system? It is proposed, for further exploration, that human expertise exists in a continuum from subject knowledge to process knowledge. Subject knowledge is the understanding of a core collection of facts and their interrelations, such as in the field of chemistry where the facts range from natural laws to molecular structures. Process knowledge is defined as the ability to manipulate a system to achieve a desired result where core understanding of the system’s content is not required.

2. Efficiency and Effectiveness: How can the costs and benefits of digital reference be measured and assessed? In this context, efficiency and effectiveness are defined in economic terms where an ideal state (the most effective service) may be defined as the most parsimonious use of available resources (for example, time, money, staff, and so forth).

3. Information Systems: What is the proper configuration of technologies and resources needed to produce a required output? The concept of “information system” used in the digital reference definition can be characterized as a special case of a general system where the input to the system is a user question, the process involves human expertise, and the output is an answer.

4. Questions: What is the nature of user input to a digital reference system? The examination of “questions” as expressions of a user’s need or a user’s cognitive gap introduces a rich area for exploration. The question component refers specifically to the identification, classification, and use of questions.

5. Answers: What set of information, and in what form, can information be bundled to satisfy an information need? Like questions, answers are imperfect mediums used to transfer knowledge from a recognized source of expertise to a recognized point of information need.

2.2. Assumptions

Underlying these explicit question components are implicit assumptions. Assumptions are necessary conditions for asking a question, or at the very least, for seeing the question itself as significant. Just as with question components, assumptions should be both testable and provocative. They should be susceptible to theoretical and empirical scrutiny, and they should be able to provide a departure point for further research and examination. The digital reference research agenda identifies two significant assumptions:

1. It is useful to incorporate human expertise into information systems: If human expertise is not necessary in the ongoing functions of an information system, then there is no need for the exploration of digital reference.

2. The digital nature of digital reference systems provides a significant differentiating context: There is a close relationship between the domain of digital reference and other allied domains such as information retrieval, digital libraries, and reference theory. In many ways, digital reference was born as a result of the marriage between several lines of investigation and practice. Assumption 2, however, implies that digital reference provides a unique set of questions, components, and approaches. In essence, the whole of digital reference is greater than, or in this case different from, its component progenitors.

The digital reference research agenda adopts the metaphor of “conceptual lenses” to discuss how different researchers and different communities might reflect and build upon the core framework of question components and assumptions.

3. A Series of Lenses, or Approaches to the Central Question

The term “lens” can be used to denote the values and concerns through which action occurs in a given community. The action may be in research, systems building, or simply in discussion. The lenses presented in this article are meant to be significant, but they are by no means complete. There may be a limitless number of lenses that may be defined by
the nature of concern or preoccupation in a community—where the community may well be a single person. There may be geographical lenses ("How does this question component work in Canada?"); institution lenses ("What is the relationship of these assumptions to the work of Syracuse University?"); and personal lenses ("How can I incorporate these research questions in my study?"), among others.

Significant lenses described in this article represent a set of clear and pressing issues (and values) in digital reference (as expressed by researchers and the practice community). The lenses also represent broad concerns encompassing a large potential audience of scholars, funding institutions, and practitioners. The digital reference research agenda incorporates four lenses:

1. **Policy**: The policy lens focuses on both the process and effect of organizational decision-making and the actual products in digital reference.

2. **Systems**: The systems lens focuses on the means by which technologies can be used to improve both the efficiency and effectiveness of digital reference. One should note that this lens differs from the evaluation lens in that efficiency and effectiveness measures are often seen as secondary to the actual implementation of systems, standards, and procedures.

3. **Evaluation**: The evaluation lens focuses on the means of determining success in digital reference. Evaluations are assumed to be 1) behavioral as they attempt to assess the impact of human behavior and change in both user and expert abilities; 2) technical as they assess the ability of a system to perform as designed and expected; and 3) economic as they assess digital reference systems' ability to account for and be effective stewards of the resources used in delivering service.

4. **Behavior**: The behavioral lens focuses on human attitudes and interactions with and within a digital reference system.

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**Representing the Agenda**

The digital reference research agenda can be seen several different ways. There are a number of ways the framework of question components, assumptions, and lenses can be presented. Two representations are chosen. The first is seen graphically in Figure 1. In this figure digital reference is shown with question components and assumptions on the bottom and lenses on the top.

Perhaps more usefully, the framework can be presented as a matrix where the horizontal axis represents lenses and the vertical axis represents question components. The research questions are organized into a matrix drawn from the framework outlined previously. While domain interconnections are not explicitly stated, the author maint-

![Figure 1. Digital Reference Research Framework](image_url)

ains that these domains will aid in the determination of methodology, reporting, and—potentially—theory development. This matrix is seen in Table 1.

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**Driving Research to Practice**

The answers to the questions in Table 1 have more than academic interest. This matrix can be recast. In Table 2, the research matrix is repeated with lenses across the horizontal axis and question components down the vertical axis. However, in this table, the cells of the matrix have been replaced with practical outcomes of research. In essence, the table depicts how the answers can be used in practice. While Table 2 attempts to illustrate some practical outcomes of digital reference research, it does not purport to be exhaustive.

The ready linkage between research and practice is not coincidental. The tie between research and practice was at the core in the creation of the digital reference research agenda. The guiding philosophy in crafting the symposium and the agenda itself was that research without practice is ineffective, and practice without research is inefficient.

Research without linkage to practice limits research's utility to academics. This is the classic complaint of those who speak of a division between LIS practice and LIS schools. The more theoretical the research, it is said, the less impact it will have on the day-to-day operations of a library. While the author does not wish to further this ongoing debate in this article, there are two facts about LIS research that should be mentioned. The first is that research occurs outside of LIS schools. Some of the best research conducted in library science is a product of the work of reflective librarians. The second is that in the professional context of information and library science, it is impossible to truly verify results without application in the world of practice.

Librarianship is not a purely theoretical endeavor. In fact, real libraries provide large, general research settings.
Table 1

<table>
<thead>
<tr>
<th>Policy</th>
<th>Systems</th>
<th>Evaluation</th>
<th>Behavior</th>
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<tbody>
<tr>
<td>Human Expertise</td>
<td>What are the necessary staffing levels, expertise, and training?</td>
<td>How is human output incorporated into systems components (such as a knowledge base)?</td>
<td>Do users ask questions differently when they know a human intermediary is involved?</td>
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<tr>
<td>Efficiency and</td>
<td>What limits should be placed on a service and how are they determined?</td>
<td>What level of automation can be used in digital reference?</td>
<td>Does knowledge of cost in digital reference effect behavior?</td>
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<tr>
<td>Effectiveness</td>
<td></td>
<td>What metrics are needed to determine cost/value in digital reference? Does knowledge of cost in digital reference effect behavior?</td>
<td></td>
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<tr>
<td>Information Systems</td>
<td>How can digital reference systems be constructed to protect individual privacy, and licensing while achieving maximum benefit for an intended community?</td>
<td>What are the required components of a digital reference system?</td>
<td>How do experts and users interact in a digital reference system?</td>
</tr>
<tr>
<td>Questions</td>
<td></td>
<td>What are appropriate performance metrics for system evaluation?</td>
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<tr>
<td>Answers</td>
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<td></td>
<td>How do services determine out-of-bound questions?</td>
<td>Have questions qualitatively changed over time in digital reference (gotten harder)?</td>
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<td>What systems work best as an interface to get at user questions?</td>
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<td>Can knowledge bases be better used to provide answers to some types of questions?</td>
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Table 2

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<th>Policy</th>
<th>Systems</th>
<th>Evaluation</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Expertise</td>
<td>Staffing Requirements</td>
<td>Specifications for Knowledge Bases</td>
<td>Staffing and Marketing</td>
</tr>
<tr>
<td>Efficiency and</td>
<td>Service Level Policies</td>
<td>Greater Scale</td>
<td>Marketing</td>
</tr>
<tr>
<td>Effectiveness</td>
<td></td>
<td>Better Software Options</td>
<td>Better Interfaces</td>
</tr>
<tr>
<td>Information Systems</td>
<td>Automated Policy Enforcement Protection</td>
<td>Better Software Options</td>
<td>Better Interfaces</td>
</tr>
<tr>
<td>Questions</td>
<td>Consortia Specifications</td>
<td>Better Interfaces</td>
<td>Better Websites</td>
</tr>
<tr>
<td>Answers</td>
<td>Consortia Rules</td>
<td>Greater Scale</td>
<td>Better Answers</td>
</tr>
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To ignore the truth that LIS research is testable is to ignore reality. As has been said about physics, theory without experimentation is more philosophy than science. Therefore, the author postulates that any research hypothesis in digital reference, no matter how abstract or conceptual, should be able to be tested in libraries.

Practice without research, on the other hand, risks constant reinvention and avoids economies of scale that build communal knowledge across organizations. Without empirical and theoretical guidance from systematic inquiry, the field cannot develop benchmarks or best practices.

Multiple disconnected experiments have been the norm in the digital reference practice arena for many years. Many digital reference services began as Library Service and Technology Act grants. When grant funding ran out, there was little in the way of data or generalized findings to substantiate continued support for software costs. Many services switched to lower-cost digital reference packages and modes. There has yet to be an empirical study that demonstrates real differences in outcomes between real-time services that incorporate high-end features (such as page pushing, remote computer control, and video chat).

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and those that do not. In fact, the only published study coming close to it showed that asynchronous e-mail systems can lead to high user satisfaction.  

Just as researchers have an obligation to ground their work in the community of practice, so does practice have an obligation to strive for larger and empirically based understandings. Communal knowledge, based on both theory and empirical data, will help drive the field of digital reference forward and better justify costs (and existence). A library community that has stretched and leveraged scarce resources through openness and cooperation (such as in copy cataloging, shared collection development, interlibrary loan, and so on) should be able to grasp the need for communal research.

Methods of Integrating Research and Practice

To operationalize the practice—research linkage in digital reference—the development of the research agenda included the following specific strategies:

1. Practitioners and academics were invited to be participants in the symposium.
2. Practitioners and researchers wrote the white papers that served as the foundation of the symposium.
3. The lead authors were asked to organize a track at the fourth VRD conference on their particular topic. In this way, the research outcomes of the symposium could be better linked to practice.
4. Publication and dissemination of the agenda would be in both research and practice venues such as JASIS&T, ACRL’s Publication in Librarianship series, and in this article.  

Including both practitioners and researchers as participants in the symposium went smoothly. Both sides contributed to the discussion and paid little regard to status issues. It became very clear in the planning stages of the symposium that the terms research and practice did not provide an altogether clear conceptual distinction. Many practitioners conduct research, and not all researchers are part of the academy (colleges and universities). The symposium clearly showed that people oriented to practice and operations had much to contribute to researchers oriented to larger generalizations and theory.

The Digital Reference Community as a Model

In eight short years, the digital reference community has questioned its role in the Internet age, created mechanisms for discussing this question (the annual Virtual Reference Desk Conference, now in its sixth year; the Dig_Ref electronic discussion list), and formed cooperatives to test concepts (the Collaborative Digital Reference service, now QuestionPoint, 24/7 Reference, and numerous statewide initiatives). The digital reference community also pooled resources for a series of joint initiatives that have created common quality metrics, a research agenda, NISO standards, and an education initiative. In eight years, the reference community has gone from fear of losing relevance in an Internet era to redefining the basics of reference and making answering questions on the Internet a common—and core—service.

The advancement, not only of digital reference, but of reference as a whole was in large part a result of the academic and practice communities working together. A cycle has developed, as seen in figure 2.

To be sure, this could be construed as a simplified view of the world. Much research is conducted within the community of practice. There is also a fuzzy line between some members of, say, an academic library and a research faculty. However, at least in the digital reference community, the above cycle has been both effective and efficient. Aided by the Internet and by a large number of library conferences (national, regional, subject specific, etc.) the dialog between a core set of researchers and practitioners has resulted in rapid development of data, hypotheses, and actionable knowledge.

Already, the formation of a large digital reference movement has changed LIS curriculum and impacted the hard-core computer-science driven digital library community. Likewise, a responsive academy has delivered to the practice community quality standards, technical standards, and large-scale data.  

As the research agenda attempts to point out, there is still a long way to go. There is every reason to believe, however, that the field of reference will continue to advance and that practice and research will move forward hand-in-hand.
Conclusion

The digital reference research agenda outlined in this article is part of a living process. It represents the artifact of a point in time—a beginning—as well as an implied promise to innovate and understand. Research in digital reference had been dominated by isolated ad hoc case studies, and there were few scholarly and research-oriented participants in digital reference conferences and activities. The digital reference research agenda grew out of the digital reference community’s realization that there was a compelling need for empirical research in its field.

Digital reference is a wide-scale and still-expanding practice. As it moves from an experiment in technology to an increasing core mode for the delivery of reference services, there is an increased need for systematic, rigorous research that can provide sound evidence for the wise investment of time and resources. Research has an equal obligation to provide support to practice and an objective voice in the evolution of digital reference.

The research agenda for digital reference is now open for evolution. It is time for scholars and practitioners in the academy, libraries, and other information settings to begin to fill the research matrix with answers.

References


