NHPRC ELECTRONIC RECORDS AGENDA
EXECUTIVE SUMMARY

NATIONAL HISTORICAL PUBLICATIONS AND RECORDS COMMISSION GRANT 2002-024

June 2003
State Archives Department
Minnesota Historical Society

Executive summary

The challenges and opportunities that electronic records present are well known and eloquently described in a myriad of documents. For many years, the National Historical Publications and Records Commission (NHPRC) has encouraged and supported efforts to meet those challenges and realize the opportunities they represent. Its innovative work has greatly increased the potential to develop effective electronic records programs. To realize fully that potential, the NHPRC should encourage multiple, practical and collaborative engagements among the various communities and constituencies interested in electronic records and digital information resources, so they can work together and share what they learn.

This means a change in orientation from the 1991 agenda, which emphasized research. Analysis and evaluation of NHPRC-sponsored projects, feedback from the NHPRC's constituencies and review of the literature on electronic records indicate that there is now a foundation on which to build programs. As a result, a new electronic records agenda can build on the successful projects, while improving the chances for more and better work. The new emphasis should be on implementation and analysis, with particular encouragement of communication and education, so that all projects have an impact on the archival community.

First, the NHPRC can support the development of more electronic records programs by using targeted initiatives to create practical models for archivists. This will introduce more archivists to the issues and choices they face, giving them a starting point and the confidence with which to move forward. The targeted grants should focus on technological solutions that are practical and available. These need testing and further adaptation to ensure that they meet all archival needs and that they will support: a) further enhancement and improvement; and b) the development of collaborative and educational guidelines for archivists and their constituents. This will help archivists build their capacities to manage electronic records and to demonstrate their skills.

Second, the NHPRC can encourage applicants to build on the achievements of the targeted initiatives by supporting projects that echo four themes: a) new partners; b) education; c) technology as opportunity and; d) a common core of knowledge, skills and tools. These themes will encourage grant applicants to consider the factors that influence and determine the potential for the development of sustainable electronic records programs.

Success will not come as a matter of course. Any agenda for a topic as complex as the interaction of information technology with an established profession – complicated by an array of individuals and organizations of disparate skills and resources – will be problematic. In this framework, no single actor and no single approach will provide the answers. A new electronic records agenda will only provide a starting point. Moving forward, there will be challenges to the resources of the NHPRC and its abilities to fund the necessary work; challenges to the archival profession and its ability to assimilate new

concepts and technologies; and challenges to the abilities of individual archives and archivists to act on their opportunities and translate them into practical programs.

Further, information technology is dynamic: the challenges and the opportunities it presents to archives will change routinely and unexpectedly, so archivists have to learn and re-learn continually which options are available and practical. As well, bureaucracies and organizations are dynamic: as the current budget crises in state governments demonstrate, the missions and staffs of archives will change routinely and unexpectedly, so the archival responses to information technology have continually to be explored and examined. As a result, no single solution for electronic records management will exist, either for all places or all times.

As a result, this agenda aims to provide archivists with a significant amount of flexibility and latitude in determining the goals of their programs, while still ensuring that the investments of the NHPRC provide a return to the profession as a whole. Any agenda has to allow archivists to identify the factors that influence their individual environments and to develop the "local knowledge," as anthropologists put it, that will enable them to negotiate through their surroundings. At the same time, the agenda has to ensure that these local projects have a larger, national impact.

Certain threads can tie these efforts together. While different environments will offer different opportunities, archivists should recognize that content and access are important drivers for investment in information technology projects. The appraisal of records will be an especially important skill and one of the critical functions of archivists will be identifying and collecting records of value, and particularly records that lend themselves to re-use or re-purposing and to online access.

Over the longer term, the critical role for the NHPRC is fostering the continuing development of social and intellectual capital. As technology becomes practical and affordable, the unresolved questions about electronic records programs will be on the human side of the equation, addressing issues such as education, organization, culture, project management and governance. Many of these will best be explored through practical, hands-on training, followed by analysis and evaluation.

The executive summary of the 1991 electronic records research agenda closed with these words: "The working meeting strongly urged the NHPRC to exert leadership in the electronic records field by establishing specific priorities for electronic records research supported with NHPRC funds, by serving as a facilitator for multidisciplinary research with allied professions, and by encouraging other Federal funding agencies and private foundations to sponsor or support electronic records research."[1] After replacing "research" with "programs," that sentence could summarize this report as well. But a different context assigns this statement a different meaning. Building on the experience and the successes of the past ten years, the NHPRC and archivists can much more effectively itemize and prioritize specific steps to take to further those goals. As a result,

[1] "NHPRC: Research Issues in Electronic Records," http://www.archives.gov/grants/electronic_records/research_issues_summary.html#exec

more should be expected. Information technology presents a critical opportunity for archivists. They should take that opportunity to realize practical and sustainable electronic records programs at all levels of resources and among all types of organizations.

ELECTRONIC RECORDS AGENDA PROJECT
FINAL REPORT

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Many others generously contributed their time and attention to this effort; we cannot do justice here to their work, but we do list their names in the Appendices for this report, in Appendix 11, available on the project web site at http://www.mnhs.org/preserve/records/eragenda.html. The project's staff was Bob Horton and Shawn Rounds, of the Minnesota Historical Society, and Cal Lee, of the University of Michigan.

Table of contents

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electronic records programs at all levels of resources and among all types of organizations.

1. Background

The mission of the National Historical Publications and Records Commission (NHPRC) is "to ensure understanding of our nation's past by promoting, nationwide, the identification, preservation, and dissemination of essential historical documentation." This includes the support of "a wide range of activities to preserve, publish, and encourage the use of documentary sources relating to the history of the United States."[2] Relative to technology, the goal of the NHPRC is to "enable the nation's archivists, records managers, and documentary editors to overcome the obstacles and take advantage of the opportunities posed by electronic technologies by continuing to provide leadership in funding research and development on appraising, preserving, disseminating, and providing access to important documentary sources in electronic form."

While these statements date from 1996 and 1997, respectively, the NHPRC has actively supported work with electronic records for more than two decades. The first electronic records grant awarded by the Commission was in 1979, to the University of Wisconsin and the State Historical Society of Wisconsin, to schedule, accession and retrieve information from machine-readable records of state agencies.[3] Since 1991, the NHPRC has guided and evaluated electronic records projects using a formal research agenda, which was reviewed and revised in 1996. In that time, the NHPRC's work was path breaking; in its foresight, it supported work on electronic records well before the advances such as the World Wide Web and scandals such as Enron's brought the topic onto the public stage.

Since 1991, the NHPRC and archival programs have made great strides, particularly in terms of raising the levels of awareness and technological sophistication among archivists. The number of people who know about electronic records, who are concerned about electronic records and who are thinking about electronic records is much higher than it was in 1991.[4] Success in these areas has largely been the result of educational, promotional and research projects that have effectively reached archivists and their constituencies across the United States and the world. International interest in the work of the Pittsburgh Project and InterPARES testifies to the impact of the NHPRC's sponsorship.

But the number of archivists who are actually managing electronic records is still too small. Despite the technological advances and the intellectual achievements of the past decade, despite all that the profession has done to apply new information technologies in other areas of its work (e.g., administration, collection management, arrangement and description[5]), it appears as if the majority of archival programs have done little with born-digital records.[6]

At the same time, there has been enormous growth in the rate of adoption of information technology by allied disciplines (e.g., librarians, records managers, information management professionals) and archival constituencies (e.g., lawyers, auditors, managers, researchers). This situation has greatly increased the potential for electronic records programs, by creating new possibilities for collaboration and by

extending the reach and application of information technology to many new aspects of business and life. The situation has, as well, heightened the expectations of archivists' patrons and constituents; the increase in the sheer number of electronic records is inevitably accompanied by more opportunities to manage them.[7]

In sum, while archivists can duly celebrate their progress, they must at the same time aspire to do more. Much of the substance articulated in the 1991 and 1996 agendas still needs to be systematically explored. Many of the projects sponsored by the NHPRC over the past decade have documented their work through either print publications or the Web, but many others have not. The dissemination and long-term availability of such documentation is also quite mixed. Further evaluation and dissemination of this previous work would undoubtedly benefit future efforts.

2. Recommendations

One fundamental question for the NHPRC's electronic records agenda is the extent to which funds should be directed towards specific products and results, as opposed to leaving it up to grant applicants to explore their options. This report recommends a combination of these two approaches. Targeted grants will raise the level of understanding among archivists and put more archivists in a position to work with information technology. They will provide a foundation on which the profession can build.

What archivists can actually build will differ from place to place and over time; because of that, individual applicants need a broad latitude and flexibility to act more freely and creatively in determining what projects they can explore. But applicants need some guidance: in order to ensure that individual projects provide more general benefits, the NHPRC can point to particular directions to explore. The four themes identified in this report - new partners, education, technology as opportunity and a common core of knowledge, skills and tools - will provide that direction, as well as serve as criteria to evaluate grant applications and determine if they will contribute to a greater and better implementation of information technology.

This is especially noteworthy as the NHPRC does not mandate a "one size fits all" approach. For the purpose of evaluating proposals, it only asks applicants to define their own projects and their own conceptions of records in the context of previous intellectual and theoretical work. It does not require any applicant to adopt a particular definition or concept. This report can serve the purpose of underscoring the fact that no theoretical project has the official blessing of the NHPRC. But the report goes even further, suggesting that the NHPRC should encourage applicants to explore their own definitions of archival roles in order to take advantage of the opportunities in their particular locales. In this way, different programs could look first for what they hold in common with their constituents and likely partners in any information technology project.

This approach emphasizes what has already been recognized: information technology projects increasingly have such broad impact and demand such diverse skills that

archivists have to form and work in teams that cross organizational and professional boundaries in order to have any success. Increasingly, the implementation of information technology is built on standards, common architectures, interoperability and partnerships. To enter into these collaborations, archivists have to add value. To make that possible, an electronic records agenda should identify and build upon commonalities held across professions. That suggests moving the focus from defining an overarching and all-encompassing framework of "archival requirements," as suggested in the 1991 agenda, to supporting the proliferation of many archival engagements with information technology and ensuring that these productively inform the profession as a whole.

Along the same lines, there would be a certain hubris in defining any agenda solely in terms of beaten intellectual paths when there remains so much to explore. This is especially true in the area of information technology, where no one has accurately predicted its course over any significant length of time. It is an extraordinarily dynamic arena, remarkable in many ways for its continuing capacity to generate a seemingly endless parade of popular and scholarly monographs analyzing the mistakes and misconceptions of all the erstwhile leaders and thinkers. One such work, John Seely Brown's and Paul Duguid's *The Social Life of Information*, makes the important point that communication and education will mitigate the inevitability of mistakes. As some failures, in electronic records programs as in any other area of technology, are certain, it will be especially important to develop communities of learning that foster the sharing of knowledge, techniques and practices.[8] That anticipates the themes of this agenda; it also defines a role for the NHPRC. The more that archivists actively engage with electronic records and the more that the NHPRC supports the analysis, evaluation and dissemination of the results of those engagements, then the more potential archivists have for progress.

Emphasizing the development of communities of learning would result in a grants program that focuses on infrastructure and particularly human capital or intellectual capital, the knowledge, experience and contacts that can build up the assets that will make electronic records projects and programs succeed. The principal form this would take is a renewed and strengthened concern for education, with ancillary support for the development of a body of knowledge and expertise, embodied in readily available, practical and scalable tools and techniques. This report defines that concept in terms of four themes: new partners, education, technology as opportunity, and a common core set of knowledge, skills and tools. These define general orientations that could guide the NHPRC and individual projects towards the development of sustainable electronic records programs.

3. Targeted grants and focused initiatives

Some initial catalyst will be necessary if the NHPRC wants to encourage, facilitate and nurture the development of electronic records initiatives widely among the profession. In order to prepare the ground for future work, preliminary efforts could generate and distribute tangible products focused on particular needs, issues or groups. This work could take the form of collaborations that are of lower cost and shorter duration than the usual year or multi-year projects entertained by the NHPRC. While

these activities would take on relatively small, well-defined problems, the scope of applicability for their results could be broad, in that their express purpose would be to inform multiple organizations. These results would not be the final answers to any issue, but would instead provide the basis for further, incremental development and analysis. Perhaps even more importantly, they could serve as identifiable "wins" that both the NHPRC and its constituencies could use to justify increased funding in the future.

This work could address the following objectives:

- establish and/or promote standards
- test available technologies
- test collaborative funding and governance models
- establish educational standards for basic archival functions
- study and evaluate projects and model partnerships
- promote partnerships and collaboration across disciplines and boundaries
- develop business cases and economic models
- provide hands-on training opportunities
- foster the development of professional consensus

Some initiatives could be designed to focus primarily on just one of these objectives, while others might explicitly tackle two or three, though to varying degrees.

A key step would be to demonstrate that archivists do not have to do it all themselves. In fact, it is unlikely that the vast majority of archives will ever be in a position to install and manage the technology architectures they will need in order to preserve and provide access to electronic records. The more economical and more promising approach is for archives to organize around service providers, along the lines of models represented, for example, by the OCLC Digital Archive.[9] Archives can also explore the use of technology emerging from a number of other collaborations, including MIT's DSpace, the University of Virginia's and Cornell University's FEDORA and the San Diego Supercomputer Center's Storage Resource Broker (SRB).[10]

The focus should be on technologies that are practical and available. These will, in many cases, require testing and further adaptation to ensure that they meet all archival needs, so they should be the immediate focus of targeted grants that will lead to: a) further enhancement and improvement; and b) the development of collaborative and educational guidelines for archivists and their constituents. The applications noted are not the only potential solutions and obviously the NHPRC cannot anoint one or any of them as "the" technology to adopt, but they are the optimal possibilities to explore now, particularly as they are not mutually exclusive and do not rely on proprietary systems or formats. Instead, they are based on standards, could well be integrated and promise to be interoperable. Other technologies with similar promise can be explored as they develop.

In these collaborations, content and access will be important drivers for investment and partnerships. The appraisal of records will remain an important skill, as one of the critical functions of archivists will be to identify and collect records of value, particularly

records that lend themselves to re-use or re-purposing and to online access. There are a number of model projects integrating the collections of several institutions (e.g., the Colorado Digitization Program or the California Digital Library) that are worthy of study. [11] Archivists will also need to develop skills to enable appraisal of the technical aspects of electronic records. This includes ability to understand basic information technology (IT) concepts (networks, hardware and software platforms, storage, requirements analysis, systems development, etc.), as well as to understand the linkage between technological dependencies and long term sustainability.

In this context, most archivists will play a primary role as the connection between records creators and users, but they most likely will not have to develop the "back office" systems that store and preserve records. As a result, archivists will have to articulate business rules, not design, finance, build and run complex information management systems. Even so, that prospect still encompasses a substantive body of knowledge that is both technological and social, with an emphasis on the latter. It is especially critical to understand that, as the technology becomes practical and affordable, the unresolved questions about electronic records programs will often be on the human side of the equation, addressing issues such as education, organization, culture, project management and governance.

That point underscores the absolute importance of collaboration in all aspects of the agenda and its implementation. Collaboration encompasses more than the economic and organizational infrastructure of the consortium model. It assumes that the essential catalyst of collaboration is continuing communication and that everyone should share his or her knowledge and expertise. To facilitate that communication, the NHPRC should foster travel, meetings, discussion and evaluation as components of every project. If, as the consortium model portends, and there will be a few archives with far more technological capacity than most others, then the NHPRC should also extensively encourage the sharing of information and expertise in order to be sure that most archivists have the opportunity to gain from the progress made. The NHPRC could routinely make smaller grants to professional organizations (as, for example, the Midwest Archives Conference, etc.) or to state historic records advisory boards, which can reach smaller archives and lone arrangers on a regular basis and address their educational needs.

4. Themes

At its initial meeting, the project's advisory board decided to structure the new agenda around four themes: new partners, education, technology as opportunity and a common core set of skills. Overall, these define general orientations that build on successful models to guide individual projects towards better productivity. In that context, the themes could well serve as criteria to evaluate proposals; they point to directions individual applications should explore.

As such, the themes reflect an emphasis on programs. So there is a mix here both of topics to research and of the criteria that will differentiate grants, or the factors that will make them more likely to succeed and more likely to contribute to the national

conversation on electronic records. As noted, there is perhaps some hubris in precisely identifying topics in an area as complex and dynamic as electronic recordkeeping. But it is certainly possible to generalize from experience and point to what will foster better, sustainable collaborations and guide grant projects that will contribute to the profession as a whole.

To help applicants understand and apply these themes, each is broken down into several standard categories. These are: a definition; examples of possible proposals; references to what will help meet these goals; and references to what will present challenges to meeting these goals.

While each theme is defined separately, it is clear that they are conceptually and programmatically linked, so that any proposals or applications they inspire will touch on elements they share. To an extent, this situation also characterized the 1991 agenda, where many questions overlapped, usually because the terminology, despite its variations, led back to the same basic connotations and concepts.[12] Here the overlap lies in that these themes connote factors and issues that are inevitably part of an electronic records program. A comprehensive plan has to address them all in some fashion.

In section describing a theme, the first items listed are priorities identified by the participants in the review and approval meeting held in St. Paul in December 2002.

5. New partners

5.1 Definition

This is a very broad and inclusive concept. "New partners" could potentially include a number of different groups, such as:

- New grant applicants: members of the NHPRC's constituencies who have not applied for electronic records grants in the past. It is important to move beyond government archives and major universities to address college and university archivists, smaller shops and manuscript archivists.

- New collaborators: three of the usual suspects are lawyers, auditors and information technology (IT) administrators. As always, opportunities for partnerships will vary from one locale to another. Because technology increasingly demands a sophisticated infrastructure, IT expertise is necessary. One logical choice, especially in university settings and for smaller historical societies, is a partnership with libraries. Another, strongly recommended in discussions with ARMA members, is vendors, who are often best placed to implement records management functions in applications.[13]

- New users of electronic records: traditional records management and, consequently, many initial electronic records management efforts, stress the value of records as evidence. As a result, the primary partner of most such projects is

necessarily the records creator. Their perspective on the use value of records cannot be neglected, but other audiences of users should be explored for a whole variety of reasons.

- New records creators: the majority of research on electronic records has focused on those created within organizational contexts. In recent years, several authors have emphasized the importance of records created by individuals and loosely defined groups.[14] This consideration is closely connected with new users, since many communities have a potential interest in the documentation of activities that take place outside formal institutions.

- New professional groups: there is a plethora of organizations with whom archivists should work collectively. ARMA, with its emphasis on records management, is the most obvious; but also consider, for example, AACRAO, AAM, AAMD, AASLH, ABA, ACLS, ACM, AHA, AIIM, ALA, AMIA, APDU, ARL, ARSC, ASIST, BFMA, CENSA, CIC-UAG, CNI, CompTIA, CPSR, FGS, IASSIST, IEEE, ISKO, NASCIO, NECCC, NGS, NIRMA, OAH, SLA, TAWPIOAH, and all the standard-setting bodies.[15]

- New funding sources: given the limited resources of the NHPRC and the continuing, high costs of technology, archivists have to look for additional sources of funds and to partnerships that can generate financial support.

At the first advisory board meeting of this project, this theme was defined as "new audiences," but the participants in the meeting held in December 2002 felt that the emphasis should be on developing active collaborations, so the title was changed to "new partners." There was a profound consensus that archivists needed to reach new partners and that the NHPRC could undertake certain specific tasks to foster partnerships.

These are outlined below, but two general points are worth noting here. First, virtually everyone dealing with a significant investment in digital resources and wanting to realize some return on that investment has eventually to be concerned with preservation and access. If archivists can offer useful information on those topics, they could become welcome collaborators on almost any project. Second, as noted above, this is an area where successfully seeking and exploiting the commonalities between professions might well depend on a broader definition of records.

5.2 Examples of topics and areas of research

Preservation: everyone investing in information technology has to think about preservation. Given the increasing scale of investment and the ubiquity, through e-government, e-commerce and the like, of attention to the potential of the Internet, it will be especially important for archivists to explore how to preserve web sites and web-based resources.

Standards: the emergence of enterprise architectures, interoperability and infrastructure-independent digital resources all point to the importance of standards. Two options to pursue are XML and metadata, which currently offer the best potential to support long-term access to and use of electronic records.[16] One example would be learning how to manage and foster federations of records, where different collections are aggregated in common systems and technologies.

Standards are needed for the execution of archival processes that facilitate appraisal, accessioning, description, arrangement, preservation, and access. A range of processes is needed, from the minimally adequate process in each area, to the most sophisticated implementation that might be used by a very large repository.

Scalable and practical models: archivists have developed a variety of tools and techniques to manage electronic records more effectively. They need to evaluate these and present them as models that can be implemented at different institutions with different levels of resources and types of missions. For the archives that specialize in manuscript collections, working with individual donors and small organizations, guidelines and applications for preservation, description and access might be welcome.

New organizational roles: archivists working in collaborative relationships need to learn new tricks. These may demand new definitions of archival roles and organizational niches. Archivists have to understand the models and tools for distributed responsibilities. How will archivists manage partnerships? The more funds that are at stake, the harder it may be for an archives to play a significant part in decision making.

5.3 What will help?

Cost-benefit analyses: attracting partners, especially when those partners are expected or obliged to make significant investments to support archival needs, is contingent on demonstrating compelling need. Archivists need persuasive studies of costs and benefits that will justify expenditures on electronic records management.

Advocacy: building new partnerships will depend on defining what these new partners want and what archivists can offer them. To achieve that, archivists should study and meet with targeted audiences to identify the topics they want solved and what archivists can do to help. There has to be a quid for the quo: what products and expertise are archivists going to offer new partners? Such partnerships will be easier to build and sustain if there is some established track record of success and collaboration. This can include research on incentives and even marketing, whatever will help archivists make their case.

Broadening the definition of record: as noted, above, there is an ongoing debate among archivists over the definition of record and, consequently, the point of focus for archivists. This has contributed to the perception that the NHPRC leans towards the definition of electronic records as evidence of transactions.[17] Continuing to encourage the development of a more flexible definition, and particularly one that fosters exploring the

common concerns pertinent to managing digital collections would expand the possibilities of partnerships available to archivists. The management of records, whether born digital or digitized, is a legitimate concern of the NHPRC.

Addressing contemporary social and political concerns: even in times of scarcity, resources are available for social and political priorities. Currently, such disparate issues as privacy, homeland security and genealogy are opportunities for archivists to connect their program to broader trends.

5.4 What will be a challenge?

A one-size-fits-all process: the current review and approval process for grant applications can be time consuming. It can take up to a year or more to move from conception to implementation of a project. Certain opportunities demand faster responses. Some partnerships are contingent on a much smaller window of opportunity.

Indirect costs: many universities insist upon charging indirect costs to grant projects. The NHPRC's general policy of not supporting such funding may serve to limit the participation of some archivists, particularly in academic settings.[18]

Competition: changing an agenda could come at someone's cost. If the NHPRC decides to re-allocate its limited funds, that could have an impact on some established constituency. Certain projects might not be funded or funded at a lower level.

Sustainability: grant funding can initiate a partnership, but it cannot sustain it. Long-term collaboration will require archivists to devote more time and resources of their regular budgets to electronic records.

6. Education

6.1 Definition

Education will always be a concern. While many recognize that technological obsolescence is an issue, they should also recognize it is not just hardware and software at stake – the knowledge of technology and its implementation has a shelf date too. What people learned yesterday may have no relevance to what they have to do tomorrow.

Moreover, what archivists learn has to be interpreted and communicated to their partners and constituents. Given all the costs of technology and the absolute need for collaboration, archivists have to teach their potential partners why and how to assume responsibility for archival goals and functions. In the consequent division of labor in these partnerships, providing education is an important, manageable and sustainable role for archivists to undertake.

As a result, education should be a component of all programs. In order to ensure that NHPRC-sponsored projects have the maximum impact on a diverse profession, each

project should consider how to disseminate what it learns in the form of multiple products appropriate for multiple audiences.

6.2 Examples of topics and areas of research

Understanding the electronic recordkeeping ecosystem: archivists should understand electronic information systems and systems design. The basic techniques are systems design, business analysis, project management and modeling. Archivists need to understand how to apply these using existing functional tools.

Appropriate practices: especially on the technological side, there will be needs for different levels of knowledge and, consequently, different types of educational tools. At a minimum, there will be a distinction between basic and more intensive levels of technological expertise, that is, between archivists serving primarily as the collectors of information and archivists involved in the support and implementation of consortia which are providing services.

Educating partners and constituents: the key goals are to explain to others why they should collaborate, to identify what is in it for them and to persuade them that archives are important. Archivists need compelling ways to explain archival and electronic records concepts across disciplines. They need to acquire the necessary skills to collaborate with partners and to influence and work with information technology staff.

Training the trainers: there is more to training archivists about electronic records than identifying subjects and content. Archivists need to know how to deliver, and how to receive, education and training about electronic records. A principal component is learning how to manage change, which can involve learning how to retrofit archives and re-train archivists.

Using different tools for education: there are all sorts of media and approaches to education, including workshops, web delivery, publications and conferences. Archivists need to understand the costs and benefits of different tools. Since different groups learn differently, archivists need to identify their audiences and the technologies appropriate to them.

6.3 What will help?

An electronic records institute: there are a number of models for providing a standard introduction to electronic records that archivists can emulate: Camp Pitt, the NHPRC's own documentary editing workshops, and the University of Virginia's Rare Books School, to name a few.[19] One goal of an institute would be to inspire and improve leadership within the archival profession. To be effective, an institute would need a coherent and complete curriculum for the course of study. The NHPRC could support such proposals and provide scholarships to attend such an institute, but such a program should become self-sustaining as quickly as possible.

Integrating theory and practice: the NHPRC could provide incentives to bridge research projects to the actual implementation of programs and encourage the translation of research products into comprehensible and applicable terms. While the NHPRC could require an education module as part of every electronic records project, it is possible that the researchers are not the optimum choice to cross the gap to implementation. Some intermediary may be better placed to make the connections. Whatever the means, archivists can do a more consistently effective job of translating research projects into usable form and to make sure that what they learn in practice in turn refines research.

An intermediate form is the use of externships within NHPRC-funded projects to involve archival science students in the application and development of archival processes. As well, the NHPRC could encourage graduate student participation, where feasible, as a component of each project it funds.

Case studies: case studies and models for developing sustainable and practical educational programs will provide maps for others to follow. These efforts could expand upon existing instructional packets/modules on specific topics as well as build from future projects.

Learning from the past: the NHPRC can encourage efforts to review, categorize, synthesize and harmonize information from completed electronic records projects. It can support the development of repositories of available and authoritative information so that there is a reliable way to learn about the mistakes and successes of other electronic records projects. This might demand separating the institution/archivist/ego from the project through the use of external evaluators and more standardized procedures for outcome and performance measurement.

Sustained education programs: continuing education for those already in the profession will probably involve collaboration with professional groups. ARMA and SAA have established educational programs; NAGARA is developing one.[20] One option to take is to build on and refine already existing education curricula and modules so that they can be readily adapted and re-used.

6.4 What will be a challenge?

Making education a priority: this is not a new idea. The earlier agendas spoke eloquently of the need to use education to promote programs and the NHPRC has supported a special initiative to educate archivists about electronic records. Because of its importance, though, education has to be a continuing point of concern. Archivists must do more of it and do it better, especially by targeting specific audiences.

Costs: everything comes at a price, in money, staff and time. Many archives do not have budgets that support the costs of attending training. Collaborative educational products take a long time to create. Some altruistic individuals and organizations have to support the development of projects and products that are outside of their immediate missions.

7. Technology as opportunity

7.1 Definition

Archivists and their partners have often considered records management, and particularly electronic records management, to be a burden. Some electronic records programs have reinforced this attitude by imposing more costs than benefits on those directly involved. Future success depends on reframing the perception of new technologies both internally and externally.

First, it is important for archivists to recognize how new technologies can help them in their own work. Their mastery of new tools can not only contribute directly to the everyday operations of archival institutions, but also signal to their partners that archivists have unique skills and resources to offer.

Second, archivists must monitor (or ally themselves with others who do such monitoring) the external environment for technological innovations that archivists can exploit for their own purposes.[21] If a new industry or research area emerges that tackles issues related to electronic records (e.g., data mining, data warehousing, knowledge management, grid computing, software reengineering, content management, web portals), archivists can draw from and contribute to this work, rather than attempting to invent solutions entirely on their own.

Finally, archivists must convey to their partners how the adoption of certain new recordkeeping technologies can directly serve their business needs. This is especially important as most of the approaches that archivists advocate (e.g., implementation of records management applications (RMAs), building recordkeeping considerations into the design of new systems, application of retention schedules, exporting records to less software-dependent formats) require their partners to assume some or all of the costs of the technologies.

7.2 Examples of topics and areas of research

Development of web-based records management and archival services: such work could maximize a return on the large investments in web-based resources, address a problem where technical resources are most available (rather than within each separate archival institution), and potentially integrate with other web-based services. Some areas to explore are: digital libraries (information discovery); integration of the Metadata Encoding and Transmission Standard (METS)[22] and the Open Archival Information System's (OAIS) Archive Information Package (AIP)[23]; representation of the semantic web[24]; and grid technology.[25]

Build on existing efforts in business to develop ontologies, schemas and specifications: companies in a variety of industries have developed standards to facilitate their work across the enterprise and between enterprises. Rather than starting with a blank slate,

archivists can use this work as a foundation for advancing their own efforts to develop appropriate, sustainable systems for the long-term management of electronic records.[26]

Cost analyses for preservation: in planning for digital preservation, archivists could benefit from a tool that lays out the cost factors associated with various components of media migration and data transformation and then allows them to apply these costs factors in their own organizational contexts. Such a tool would need to be modular and revised over time. The OAIS model could be used for gap analysis.

Digital information as an asset: access and use are explicitly addressed in the current agenda, but the level of investment in information technology and the varied applications now being developed to exploit it, make this concept all the more important to stress.[27] Audience research would play an important role in determining value. To repurpose data, data structures, and collections, the technological needs would include building an ontology[28] into digital entities to describe internal relationships, defining operations that can be applied to digital entity ontologies and characterizing transformative migrations as operations on digital entity ontologies.

Emerging technologies and issues: technology is a moving target. Periodic studies of emerging possibilities can facilitate strategic planning within archival intuitions and the NHPRC. Where are the computer industry and electronic recordkeeping practices moving? By identifying current trends, archivists can better anticipate the electronic records issues that they will need to confront in the near future. Some current examples of emerging technologies might be XML[29], resource description framework (RDF)[30], grid computing, a standard for an archival version of PDF (PDF-A)[31], wireless networking, and a variety of devices made possible through the continuously decreasing costs of processing power and storage capacity. Currently emerging issues might include online collaborative work environments, privacy, surveillance, e-commerce, security and electronic discovery.

7.3 What will help?

Bring together experts to define requirements through workshops and working meetings: in order to guide investment in research and development, it is important for the NHPRC to have a clear understanding of the requirements of its constituencies. These workshops and working meetings could serve as meta-level initiatives, informing the priorities for funding future projects. They could also help to form professional partnerships and collaborative relationships.

Identify existing funding sources and projects upon which to build: as discussed in Section 4, the NHPRC could benefit from a continuing collaboration with other players supporting information technology research and development. If the NHPRC can foster work on promising technologies, that would be an opportunity to increase considerably the return on investment.

Monitoring the information technology environment: archivists are not likely on their own to keep up with all the innovations and developments in information technology, nor are they likely to understand all their potential ramifications. Monitoring can help the NHPRC manage some of the risks associated with leading-edge research and development. The NHPRC can learn from the technological leaps of others who have an incentive to take such risks, in order to invest its own limited resources most prudently.

Demonstration of repeatable successes, or re-use of technology: projects could include a second phase, in which the tools developed in the first phase are applied elsewhere. Some projects could specifically target the problem of technology transfer. The NHPRC could also encourage the demonstration of widely applicable solutions through presentations at conferences.

7.4 What will be a challenge?

Business case for electronic recordkeeping: business cases would ideally be in modular form, so different organizations could repackage them in different ways. Cost models are currently lacking, not only for the digital preservation concerns described above[32], but also for responsible management of records in live systems.[33] Benefits of electronic recordkeeping could also use much more detailed analysis, emphasizing such things as the repurposing of intellectual capital.

Bridge to the communities developing the technology: these social ties are difficult to form and sustain. Archivists must monitor the environment to identify the most appropriate allies and then convince them of the value that collaboration offers. Simply attending conferences would be a step in the right direction.

Development of literacy in information technology among archivists: this is thoroughly addressed in the theme on education. Without a basic level of understanding and vocabulary, it is unlikely that many archivists can serve as viable partners with those engaged in technological development. The ultimate expression of this would be developing the curriculum for and then actually training personnel with the expertise of "archival engineers."

Intellectual property: the legal aspects of this are still unfolding. Archivists collaborating with the myriad of groups interested in the repurposing of data must consider the liabilities attached to embedded objects, digital rights management in preservation environments, and policy enforcement.

Identification of demand: what exactly do archivists' partners and constituents want to support? Costs and benefits were a critical concern in the 1991 and 1996 research agendas. Few studies subsequently addressed these in hard terms. It is possible that those archival institutions that do not have electronic records programs identified many perceived costs, but few perceived benefits to developing such a program. By better understanding the business cases, the needs of these audiences and the technological

opportunities at hand, archivists may be able to reverse this perception and facilitate the development of more viable electronic records programs.

8. Common core of knowledge, skills and tools

8.1 Definition

The past decade has witnessed a revolution in the application of information technology to everyday life. Virtually every organization is on the Web, is using technology to do their work, is creating and using digital objects (including electronic records). As the use of technology continues to grow and as information and technology architectures continue to standardize, everyone can benefit from a common core of knowledge, skills and tools to meet the basic challenges of their work and to realize fully their investments.

In that framework, and at the most basic level, all digital objects are the same – information stored on a medium, in some particular format, requiring hardware and software to be intelligible. The management of digital objects demands a common core of functions such as description, location, evaluation, access and preservation. Archivists can best partner with and learn from other communities by exploring this shared context.[34]

8.2 Examples of topics and areas of research

Standards: there are specific areas where more work has to be done to understand and implement standards. These include: metadata, file formats, classification schemes, XML, naming conventions, media, etc. But archivists also have to understand which standards are appropriate for any given environment. With respect to organizations, both internal and external standards need to be considered and established.

Tools for analysis: every information technology project begins with certain analytical steps that frame the effort and the investment. These include developing business cases, understanding business requirements and mission for any given environment, usage analysis, cost-benefit analysis, risk analysis, and business process analysis.

Archives 101: to find common ground, archivists first have to map out the fundamental knowledge and skills for electronic records management. These should include defining record and electronic record as appropriate within their own programs, locating records in a system, making electronic records an accessible and comfortable topic for non-specialists, understanding the electronic records lifecycle, understanding legal and records management requirements, and knowing how to appraise records.

Systems: virtually everything that archivists know and want to achieve in a technological implementation has to be translated into some representation in a data model and the documentation of systems. All that knowledge has to be applied to the information

systems lifecycle and the information architecture. Overall, archivists need to learn IT's language and become comfortable in the IT environment.

Investing in the Internet: an extraordinary number of technology projects have some web base or aspect. Archivists can contribute to many of these efforts if they have the tools and expertise to preserve and provide access to web sites. They will need to understand subjects like web applications, web architecture, security, digital signature and encryption technologies, and XML.

Understanding the options: what are the differences and where are the overlaps among records management, content management, and document management systems and technologies? Some of the aspects to consider are return on investment, legal mandates, user needs and interoperability with other applications.

Access and preservation: access and preservation are the two basic functions of any investment in information technology, as well as the two keys to any long-term return on investment. Access encompasses metadata and description, with examples such as finding aids, standards and the documentation of systems. Preservation demands more information on media, media longevity, and format dependency on software and hardware.

8.3 What will help?

Documented models: these will include best practices and case studies for all pertinent topics. White papers targeted to the various audiences with whom archivists work would be valuable. These would document and demonstrate what archivists can offer.

A common language: the various professions do not all speak the same language. While a single, common and comprehensive vocabulary will never be a realistic possibility, archivists can learn how to speak to other professions, with special emphasis on learning how to speak to IT professionals. Archivists might then also serve in the role of translator, the intermediary between different groups. To achieve this, archivists have also to understand the cultural needs of both their organizations and their partners.

Collaborations: archivists need to work with the various professional organizations, such as AIIM, ARMA, etc., as well as other groups involved in the creation of standards, such as ANSI and ISO.[35] The goal is to provide the support for the continuing participation of archivists in development of standards and models.

8.4 What will be a challenge?

Keeping up: information technology is always changing and the amount of information to learn is overwhelming. There have to be some priorities. It is important to know what has been done and what has worked; it is also important to know how to keep theory and practice mutually informed.

A seat at the table: archivists have complained about being excluded from discussions and projects. But these affairs are potluck suppers: more often, the problem is that archivists need to bring along something useful. Archivists have to offer some benefit, not just increased costs, to a technology project or to attract the support of management. To be welcomed as a partner and invited to the table, archivists have to make a compelling case for their presence.

Costs: everything, of course, has a price, but joining professional societies and industry-related organizations is an additional expense. There are barriers for individuals and institutions – not all archives can provide the human resources and funds to play roles in standard-setting bodies.

Digital and digitized objects: there are differences which need to be explored in the management of born-digital and digitized objects. Archivists need to know how these are created, presented, preserved, described and federated. Hybrids of paper and electronic recordkeeping systems have similarly to be explored.

Rights: intellectual property rights issues are a complication. Licensing continues to be a challenge. The frontiers of the use and re-use of information are still being explored intellectually and in court.

9. Conclusion

Overall, this report has been designed to give voice to, as well as to address, multiple audiences: all the individuals, communities and organizations who contributed to its development and who must participate in the development of sustainable electronic records programs. The direct and immediate audience is the NHPRC, which has the opportunity to reflect on what response it will make. On the assumption that the report accurately reflects the considerable expertise and interests of the people who took part in the project, the report also seeks to inform archivists of the steps they can take to manage electronic records effectively. Further, it advises archivists on what they can do to help engage the collaboration of all those whom they need to support their programs.

These additional efforts are critically important. While the NHPRC has done much and has notably supported innovative and impressive work, much more remains for archivists to do. Building on its successes, the NHPRC can support that work and facilitate the successful implementation of electronic records programs by archivists in two ways. First, through targeted grants and focused initiatives, it can help prepare more archivists to make the leap from paper to electronic recordkeeping. That leap remains somewhat daunting; it is clear that many archivists are not positioned to work effectively with information technology. Yet models and tools, many developed with the NHPRC's support, are already available from a variety of sources, perhaps not in a perfect state, but useful enough for adaptation. To encourage the use of the resources at hand, this report recommends that the NHPRC act as a catalyst and support the immediate development and enhancement of more electronic records programs through targeted initiatives to create a model toolkit and knowledge base for archivists.

Second, by emphasizing these four themes - new partners, education, technology as opportunity, and a common core of knowledge, skills and tools, - the NHPRC can help ensure that what archivists explore on their own provides a return to the profession and its constituents as a whole. Over the longer term, the critical role for the NHPRC is to foster the continuing development of social and intellectual capital. As technology becomes practical and affordable, the unresolved questions about electronic records programs will be on the human side of the equation, addressing issues such as education, organization, culture, project management and governance.

With these two components, the new agenda would orient the NHPRC to invest in building assets that will help all its constituencies to use information technology more effectively. It would especially help the NHPRC to take an active role as a catalyst in the construction of an infrastructure for the continuing evolution of the archival profession.

Notes

[1] "NHPRC: Research Issues in Electronic Records," http://www.archives.gov/grants/electronic_records/research_issues_summary.html#exec
[2] NHPRC, "Strategic Plan," 19 June 1997, http://www.archives.gov/grants/about_nhprc/strategic_plan.html. The mission statement is quoted in this document.
[3] The $34,595 grant was awarded in June 1979 (NHPRC Project Grant 80-008).
[4] One indication of this interest is the considerable media coverage of issues ranging from the legal discovery of e-mail to concerns about long-term digital preservation. An excellent source for such coverage is "Records/Archives in the News (RAIN)" compiled by Peter Kurilecz, particularly the section called "Technology." RAIN is distributed through the following two mailing lists: ARCHIVES (http://listserv.muohio.edu/archives/archives.html) and RECMGMT-L (http://www.lists.ufl.edu/archives/recmgmt-l.html).
[5] Members of the archival profession have been using and writing about computers for several decades. According to Anne J. Gilliland-Swetland, "Archivy and the Computer: A Citation Analysis of North American Archival Periodical Literature," *Archival Issues* 17, no. 2 (1992): 95-112, "the first article relating to computers published in archival periodical literature" was Murray G. Lawson, "The Machine Age in Historical Research," *American Archivist* 11 (1948): 141-49. By the late 1970s and early 1980s, the archival literature included many reports on the actual and potential use of computers to support the internal operations of archives. See Thomas H. Hickerson, et al., *SPINDEX II at Cornell University and a Review of Archival Automation in the United States* (Ithaca, NY: Dept. of Manuscripts and University Archives, Cornell University Libraries, 1976); Thomas H. Hickerson, *Archives and Manuscripts: An Introduction to Automated Access*, *Basic Manual Series* (Chicago: Society of American Archivists, 1981); A. Arad and M.E. Olsen, "An Introduction to Archival Automation" (Koblenz, Germany: International Council on Archives Committee on Automation, 1981); Lawrence J. McCrank, ed., *Automating the Archives: Issues and Problems in Computer Applications* (White Plains, NY: Knowledge Industry Publications, 1981). Since the 1991 NHPRC agenda meeting, the archival profession has made many advances in the development and adoption of new information technologies, particularly in the area of standards for description.
[6] This is a general impression shared by many of the participants in this study. The project staff was not aware of any studies that have attempted to systematically identify the current state of electronic records activity within the profession as a whole. The NHPRC may wish to support such a baseline research effort, in order to inform future strategies and programs. For related studies, see Margaret Hedstrom and Sheon Montgomery, "Digital Preservation Needs and Requirements in RLG Member Institutions" (Research Libraries Group, 1998), http://www.rlg.org/preserv/digpres.html; Catherine Bailey, "Canadian Archivists Speak Out: Results of the Surveys Conducted by the ACA Select Committee on Electronic Records." *Archivaria* 36 (1993): 136-65.
[7] Peter Lyman and Hal R. Varian, "How Much Information?" 2000, http://www.sims.berkeley.edu/research/projects/how-much-info/; Gretel Johnston, "You've Got Mail: 60 Billion a Day by 2006," *InfoWorld*, 26 September 2002; Michael K. Bergman, "The Deep Web: Surfacing Hidden Value," *Journal of Electronic Publishing* 7, no. 1 (2001), http://www.press.umich.edu/jep/07-01/bergman.html; *Web Characterization,* Online Computer Library Center, http://wcp.oclc.org/; Inktomi Webmap, http://web.archive.org/web/20020124184249/http://www.inktomi.com/webmap. Consulting companies such as IDC, Jupiter Research (previously Jupiter Communications) and Gartner Group have also conducted studies of increasing e-mail volume.
[8] John Seely Brown and Paul Duguid, *The Social Life of Information* (Boston: Harvard Business School Press, 2000).
[9] For more information, see http://www.oclc.org/digitalpreservation/about/archive/.
[10] For DSpace, see http://ww.dspace.org; for FEDORA, http://www.fedora.org; and for the SRB, http://www.npaci.edu/DICE/SRB.
[11] Information on the Colorado Digitization Program is available online at http://www.cdpheritage.org. For the California Digital Library and the Online Archive of California, see http://www.cdlib.org.

[12] This is most evident in the ten research questions listed in the section entitled: "Research Issues in Electronic Records," at http://www.archives.gov/grants/electronic_records/research_issues_report.html#research.

[13] ARMA International is "the association for information management professionals." Its focus is on records management. http://www.arma.org/index.cfm

[14] Peter Botticelli, "Records Appraisal in Network Organizations," *Archivaria* 49 (2000): 161-91; Adrian Cunningham, "The Archival Management of Personal Records in Electronic Form: Some Suggestions," *Archives and Manuscripts* 22, no. 1 (1994): 94-105 and "Waiting for the Ghost Train: Strategies for Managing Personal Electronic Records Before it is Too Late," *Archival Issues* 24, no. 1 (1999): 55-64; Mark A. Greene, "The Power of Meaning: The Archival Mission in the Postmodern Age," *American Archivist* 65, no. 1 (2002): 42-55; .Margaret Hedstrom and David A. Wallace, "Expanding the Options: Strategies for Preserving Electronic Records of Collaborative Processes," Paper presented at the Conference for Research on Electronic Work (CREW) Lab Seminar, Ann Arbor, MI, 14 March 2002; Charles K. Humphrey, "Research for Building a Better Data Community," *IASSIST Quarterly* 25, no. 1 (2001): 21-24; Tom Hyry and Rachel Onuf, "The Personality of Electronic Records: The Impact of New Information Technology on Personal Papers," *Archival Issues* 22, no. 1 (1997): 37-44; Susan S. Lukesh, "E-Mail and Potential Loss to Future Archives and Scholarship or the Dog That Didn't Bark," *First Monday* 4, no. 9 (1999), http://www.firstmonday.org/issues/issue4_9/lukesh/index.html (In her recommendations for addressing the problem of preserving personal electronic correspondence, Lukesh specifically calls for the NHPRC to "continue and increase funding for research in the preservation of electronic records, including e-mail correspondence."); Sue McKemmish, "Evidence of Me," *Archives and Manuscripts* 24, no. 1 (1996); Lucie Paquet, "Appraisal, Acquisition and Control of Personal Electronic Records: From Myth to Reality," *Archives and Manuscripts* 28, no. 2 (2000): 71-91; Weston Thompson and Caryn Stein, "Using Electronic Manuscripts to Document Student Life," *Open Entry* 23, no. 1 (1995): 4-7.

[15] AACRAO (American Association of Collegiate Registrars and Admissions Officers), AAM (American Association of Museums), AAMD (Association of Art Museum Directors), AASLH (American Association for State and Local History), ABA (American Bar Association), ACLS (American Council of Learned Societies), ACM (Association for Computing Machinery), AHA (American Historical Association), AIIM International (formerly the Association for Image and Information Management), ALA (American Library Association), AMIA (Association of Moving Image Archivists), APDU (Association of Public Data Users), ARL (Association of Research Libraries), ARSC (Association for Recorded Sound Collections), ASIST (American Society for Information Science and Technology), BFMA (Business Forms Management Association), CENSA (Collaborative Electronic Notebook Systems Association), CIC-UAG (Committee on Institutional Cooperation - University Archivists Group), CNI (Coalition for Networked Information), CompTIA (Computing Technology Industry Association), CPSR (Computer Professionals for Social Responsibility), FGS (Federation of Genealogical Societies), IASSIST (International Association for Social Science Information Service and Technology), IEEE (Institute of Electrical and Electronics Engineers), ISKO (International Society for Knowledge Organization), NASCIO (National Association of State Chief Information Officers), NECCC (National Electronic Commerce Coordinating Committee), NGS (National Genealogical Society), NIRMA (Nuclear Information and Records Management Association), OAH (Organization of American Historians), SLA (Special Library Association), TAWPI (The Association for Work Process Improvement). Among standards-setting bodies, ANSI (American National Standards Institute), IETF (Internet Engineering Task Force), ISO (International Organization for Standardization), NISO (National Information Standards Organization), and W3C (World Wide Web Consortium) are the most widely known.

[16] Metadata is descriptive information (e.g., creator, date created, keywords, format) that facilitates the description, location, evaluation, and management of digital objects. XML is an international standard which allows the creation of customized syntaxes for describing and structuring information in an infrastructure-independent format. For a discussion of metadata in library-like environments, see Gail Hodge, *Metadata Made Simpler* (Bethesda, MD: NISO Press, 2001), available online at http://www.niso.org/news/Metadata_simpler.pdf. For more information about the XML, see http://www.w3.org/XML/

[17] In its published suggestions for electronic records grant applications, the NHPRC states, "'Electronic Records' means records originally created in electronic form. NHPRC uses the phrase to mean information originally created in electronic form during the course of business or conduct which documents the functions and activities institutions and individuals."
http://www.archives.gov/grants/electronic_records/suggestions.html
[18] "Indirect costs are costs incurred for common or joint objectives and therefore not attributable to a specific project or activity. Typically, indirect costs include such items as overhead for facilities maintenance and accounting services. The Commission prefers not to provide grant funds for indirect costs." NHPRC, *Grant Guidelines: How to Apply for NHPRC Grants, How to Administer NHPRC Grants* (Washington, D.C.: NHPRC, January 2000), p. 7.
[19] For a discussion of the Camp Pitt institutes, see David J. Olson, "'Camp Pitt' and the Continuing Education of Government Archivists: 1989-1996," *American Archivist* 60, no. 2 (Spring 1997): 202-214. The Institute for the Editing of Historical Documents, now in its 32nd year, is jointly sponsored by the NHPRC and the University of Wisconsin (http://www.archives.gov/grants/education_programs /education_programs.html#ins). The Rare Book School, hosted by the University of Virginia, is "an independent, non-profit educational institute supporting the study of the history of books and printing and related subjects." http://www.virginia.edu/oldbooks/
[20] The ARMA International Learning Center (http://www.arma.org/learning/welcome.cfm) centers around online and home-study courses, while the SAA Continuing Professional Education Program (http://www.archivists.org/prof-education/index.asp) focuses on workshops and seminars held around the country.
[21] "Archivists should strive to stay in the technological mainstream of information handling by monitoring developments in information technology innovation." Charles M. Dollar, *Archival Theory and Information Technologies: The Impact of Information Technologies on Archival Principles and Methods* (Macerata, Italy: Università degli studi di Macerata, 1992), 72.
[22] Metadata Encoding and Transmission Standard (METS), http://www.loc.gov/standards/mets/
[23] User Technology Associates, "Archival Information Package (AIP) Design Study," (Washington, D.C.: Library of Congress, 2001), http://lcweb.loc.gov/rr/mopic/avprot/AIP-Study_v19.pdf. For general information on the OAIS, see RLG, "Open Archival Information System (OAIS) Resources", http://www.rlg.org/longterm/oais.html.
[24] Tim Berners-Lee, et al., "The Semantic Web," *Scientific American* 284, no. 5 (2001): 35-43; Semantic Web, World Wide Web Consortium, http://www.w3.org/2001/sw/
[25] IEEE Mass Storage Systems Technical Committee, http://www.msstc.org/; International Symposium on High Performance Distributed Computing, http://www.hpdc.org/
[26] Several authors in the archival literature have argued for the importance of exploiting metadata from active recordkeeping systems. See the comments of Thomas Mills in Carolyn L. Geda, et al., *Archivists and Machine-Readable Records* (Chicago: Society of American Archivists, 1980); Charles M. Dollar, *Archival Theory and Information Technologies* and "Archivists and Records Managers in the Information Age," *Archivaria* 36 (1993): 37-52; David A. Wallace, "Managing the Present: Metadata as Archival Description," *Archivaria* 39 (1995): 22-32 and "Metadata and the Archival Management of Electronic Records: A Review," *Archivaria* 36 (1993): 87-110; Bearman, "Record-Keeping Systems"; Margaret Hedstrom, "Descriptive Practices for Electronic Records: Deciding What Is Essential and Imagining What Is Possible," *Archivaria* 36 (1993): 53-63.
[27] For one example, see http://www.lib.uconn.edu/DoddCenter/ASC/pages/records/StrategicPlan.htm (NHPRC Project Grant 2000-55).
[28] "An ontology defines the terms used to describe and represent an area of knowledge. Ontologies are used by people, databases, and applications that need to share domain information (a domain is just a specific subject area or area of knowledge, like medicine, tool manufacturing, real estate, automobile repair, financial management, etc.). Ontologies include computer-usable definitions of basic concepts in the domain and the relationships among them (note that here and throughout this document, definition is not used in the technical sense understood by logicians). They encode knowledge in a domain and also knowledge that spans domains. In this way, they make that knowledge reusable." Jeff Heflin, ed., "Web

Ontology Language (OWL) Use Cases and Requirements," World Wide Web Consortium, Working Draft, 3 February 2003, http://www.w3.org/TR/webont-req/

[29] eXtensible Markup Language (XML), http://www.w3.org/XML/

[30] Resource Description Framework (RDF), http://www.w3.org/RDF/

[31] PDF-Archive, AIIM International, http://www.aiim.org/standards.asp?ID=25013

[32] Many institutions find it difficult to factor digital preservation into their economic decisions, since there currently no well-defined model for identifying costs. See Simon Tanner and Marilyn Deegan, "Exploring Charging Models for Digital Cultural Heritage," Higher Education Digitisation Service, 2002, http://heds.herts.ac.uk/mellon/charging_models.html; Michael Day and Maggie Jones, "A Report on the Cedars Final Workshop," 2002, http://www.leeds.ac.uk/cedars/pubconf/umist/finalWorkshopRep.html. Some recent work has begun to address these issues. See Tony Hendley, "Comparison of Methods and Costs of Digital Preservation," London: Joint Information Systems Committee, The British Library, 1998, http://www.ukoln.ac.uk/services/elib/papers/tavistock/hendley/hendley.html; Claes Gränström, "Reformatting: Preservation of New Media and Data Migration," *Comma. International Journal on Archives* 2 (1998): 77-86; John C. Bennett, "A Framework of Data Types and Formats, and Issues Affecting the Long Term Preservation of Digital Material," British Library Research and Innovation Centre, 23 June 1999, http://www.ukoln.ac.uk/services/papers/bl/jisc-npo50/bennet.html; Kelly Russell and Ellis Weinberger, "Cost Elements of Digital Preservation," 2000, http://www.leeds.ac.uk/cedars/documents/CIW01r.html; Anne R. Kenney, et al., "Preservation Risk Management for Web Resources: Virtual Remote Control in Cornell's Project Prism," *D-Lib Magazine* 8, no. 1 (2002), http://www.dlib.org/dlib/january02/kenney/01kenney.html; Shelby Sanett, "Toward Developing a Framework of Cost Elements for Preserving Authentic Electronic Records into Perpetuity," *College and Research Libraries* 63, no. 5 (2002): 388-404; CAMiLEON, http://www.si.umich.edu/CAMILEON/.

[33] Several guidance documents and articles on electronic records present eloquent arguments for why electronic recordkeeping is important and some even fairly detailed lists of considerations. But sources are generally not presented in a way that can serve directly as a business case. There are a number of promising places to look outside of the archival literature for guidance in developing such models. See William Saffady, *Costs Analysis Concepts and Methods for Records Management Projects* (Prairie Village, KS: ARMA International, 1998); David O. Stephens and Roderick C. Wallace, *Electronic Records Retention: New Strategies for Data Life Cycle Management* (Prairie Village, KS: ARMA International, 2003); John S. Chandler, "A Multiple Criteria Approach for Evaluating Information Systems," *MIS Quarterly* 6, no. 1 (1982): 61-74; Martin, Kingsley, "Show Me the Money: Measuring the Return on Knowledge Management," *Law Library Resource Xchange: LLRX.com*, 15 October 2002, http://www.llrx.com/features/kmroi.htm; Richard T. Dué, "The Value of Information," *Information Strategy* 13 (1997): 36-41; "The Value of Information," *Information Systems Management* 13 (1996): 68-72; *Electronic Journal of Information Systems Evaluation*, http://www.iteva.rug.nl/ejise/; "Determining Economic Feasibility: Four Cost/Benefit Analysis Methods," *Journal of Information Systems Management* 4 (1989): 14-19; Tridas Mukhopadhyay, et al., "Business Value of Information Technology: A Study of Electronic Data Interchange," *MIS Quarterly* 19, no. 2 (1995): 137-56; George P. Schell, "Establishing the Value of Information Systems," *Interfaces* 16, no. 3 (1986): 82-89; Gordon V. Smith and Russell L. Parr, *Valuation of Intellectual Property and Intangible Assets,* 3rd ed (New York: J. Wiley & Sons, 2000); Matthias Schumann, "Methods of Quantifying the Value of Office Automation," *Journal of Information Systems Management* 6, no. 4 (1989): 20-29.

[34] For a comprehensive analysis of an analogous concept, see Mary Feeney (ed.), *Digital Culture: Maximizing the Nation's Investment* (London, 1999).

[35] Many organizations like the ISO and the W3C create standards through a work group process involving dues-paying members, although often there is a period of public comment. Unlike the W3C which accepts individual members, the ISO limits membership to one organization per country, ANSI/NISO in the case of the United States. Both AIIM and ARMA are members of ANSI.

ELECTRONIC RECORDS AGENDA PROJECT
APPENDICES

NATIONAL HISTORICAL PUBLICATIONS AND RECORDS COMMISSION GRANT 2002-024

June 2003
State Archives Department
Minnesota Historical Society

Table of contents

Appendix 1: Plan of work

In 2002, the Minnesota Historical Society undertook an effort to evaluate and revise the 1991 and 1996 agendas. In the process, the project completed a survey of the work done in electronic records over the past ten years, through research, meetings with interested parties and an online survey. All that information was reviewed and compared with the agendas from 1991 and 1996.

The final product, though, is not simply a research report. Although the recommendations of this report are based on an analysis of work done in electronic records since 1991, the point of the analysis was to determine where to go next. In order to achieve that, the project staff made a particular effort to canvas as broadly as possible the archival profession, the various communities interested in electronic records, experts in information technology and the stakeholders in the NHPRC. Every attempt was made to allow as many voices as possible to participate in the conversation about an electronic records agenda. After listening, the project staff engaged in an iterative process to translate what they heard into a set of practical recommendations to the NHPRC, repeatedly inviting responses and suggestions through presentations, meetings and the distribution of report drafts.

Obviously, that iterative effort was circumscribed by the usual constraints of time and budget, as well as the scope of the intellectual challenge. The project staff recognized that, but suggested that a perfect plan and complete certainty is beyond anyone's capacity and resources. Instead, in this and in the context of electronic records in general, the staff proposed not letting some chimera of the "best" stand in the way of just doing "better." In particular, it is a real virtue to keep an open mind, because the open-ended nature of any analysis of the dynamic of information technology suggests that the goal of a new agenda should be to initiate conversations, explore potential and provide flexibility.

But that will only succeed if archivists can, in fact, continually engage new audiences in conversation and collaboration. Reflecting on this project suggests that most archivists are not well placed to achieve that end. Rather, the immediate and challenging goal is just to get a critical mass of archivists engaged in the conversation.

For example, consider this project's online survey.[1] Despite the length of time and relatively wide publicity it received, only 73 people responded to it. There could be several explanations for this. First, the survey itself might not have appealed to people, either through its content and design or the length of time it took to complete. Second, some people might have felt that they did not have enough practical experience with electronic records or with the NHPRC to warrant their responding. Third, people might not be interested enough in electronic records and/or the NHPRC to bother.

All three factors likely played some part in the low survey response rate, but the second and third should be particular concerns in formulating a future agenda. They may also help to explain the relatively low turnout at the presentations the project staff made at the annual meeting of the Society of American Archivists (SAA). Whereas the "Archives Unplugged" session on electronic records attracted a packed house of some 200 people, the presentation on the NHPRC electronic records agenda brought in perhaps 25 people.[2] A significant portion of those present

was the handful of "usual suspects," who have been actively taking part in electronic records projects (many of them funded by the NHPRC) for many years. This seems to be consistent with the composition of those answering the online survey, with 57% of respondents indicating that they have worked with electronic records for more than five years and 27% claiming more than 15 years of such experience.[3] While the project does not have detailed baseline data, this level of experience probably does not reflect that of the archival profession as a whole. While many archivists express interest in basic training on electronic records, high-level planning and strategies appear to be concerns of only a select few.

That, too, informs this report. Comments from various participants in this project suggest that most archivists do not have the confidence, knowledge or tools to move forward effectively in addressing electronic records. Yet models and tools are already available from a variety of sources, perhaps not in a perfect state, but useful enough for adaptation. To encourage the use of the resources at hand, this report recommends that the NHPRC support the development of a foundation for better electronic records programs through targeted initiatives to create a model toolkit and knowledge base for archivists.

Overall, this report has been designed to give voice to, as well as to address, multiple audiences: all the individuals, communities and organizations who contributed to its development and who must participate in the development of sustainable electronic records programs. The direct and immediate audience is the NHPRC, which has the opportunity to reflect on what response it will make. On the assumption that the report accurately reflects the considerable expertise and interests of the people who took part in the project, the report also seeks to inform archivists of the steps they can take to manage electronic records effectively. Most importantly, it advises archivists on what they can do to help engage the collaboration of all those whom they need to support their programs.

Appendix 2: Process

In 2001, the staff of the NHPRC asked the Minnesota Historical Society (MHS) to submit a proposal to review and consider the revision of the 1991 electronic records research agenda. The State Archives Department of the MHS responded with a proposal for consideration at the November 2001 meeting of the Commission. Bob Horton, state archivist and head of the State Archives Department, and Shawn Rounds, government records specialist, composed the project staff.

While the members of the Commission looked favorably on the concept of reviewing the agenda, they wanted to ensure that all of the NHPRC's constituencies had a voice in the process. The project did not receive the NHPRC's approval until mid-February, when Commission members agreed that a larger advisory board would address their concerns.

The MHS staff began work immediately upon the approval of the grant. The original advisory board expanded to include representatives of most of the professional organizations with a seat on the Commission: the Society of American Archivists (SAA), National Association of Government Archivists and Records Administrators (NAGARA), Association for Documentary Editing (ADE), Organization of American Historians (OAH) and American Association for State and Local History (AASLH) each named a participant.[4] Once the additional advisory board members were identified, the MHS scheduled a meeting in St. Paul for late May, the earliest date when a critical mass of the board could attend. The MHS also hired Cal Lee as a consultant to work with the project staff. Lee had a wide range of experience in electronic records. He had worked as an electronic records project archivist on an NHPRC-sponsored effort at the Kansas State Historical Society. He also brought substantial additional expertise through his work and research in the doctoral program at the University of Michigan's School of Information.

From the very beginning, the project staff emphasized the need to give the various constituencies interested in electronic records every opportunity to communicate their ideas. The project utilized a variety of techniques for information gathering. Among these were an Internet-based survey, identification and review of electronic records literature, presentations and focus group meetings, and constant communication to the advisory board and other interested parties through a project web site.

The survey was launched in May and announced on a number of professional mailing lists, notably those for archivists and records managers. It was composed of a series of questions that asked about respondents' views on the 1991 research agenda; their experience with electronic records; and their views on the status quo of electronic records management and programs. The survey remained online until November. Despite that length of time and the relatively wide publicity it received, it prompted only 73 unique responses.[5]

At the May advisory board meeting, one topic of discussion was the modification of the project work plan. The late start and the slightly higher costs concomitant with adding more advisors had an impact on the project's schedule and budget. As a result, with the goal of completing the project by the original deadline, the advisory board and the NHPRC approved

some adjustments to the work plan. Instead of two general meetings, one to anticipate and one to review the rough draft of the project's report, the board recommended scheduling just one meeting towards the end of 2002, to review the work that the project staff had done.

This would decrease the amount of direct input different people could provide, but given the limited time available, it seemed impossible to schedule two meetings. As so much material on electronic records was available in print or online, the project staff could also cast the net widely through their research. Cal Lee's bibliography of works pertinent to the 1991 agenda, compiled in the course of this project, is confirmation of that.[6]

During the course of the project, Bob Horton and Cal Lee made presentations to two professional association meetings in order to disseminate information about the project, present preliminary findings and elicit feedback. They conducted a session at the NAGARA Annual Meeting on 11 July 2002 in Denver, Colorado and another at the SAA Annual Meeting on 24 August 2002 in Birmingham, Alabama. In both cases, the session was designed to first present the tentative themes and then provide ample time for the audience to comment. Horton and Lee took thorough notes of these discussions, which have informed the project's final products. The SAA session was available on audio tape, which enhanced the project staff's ability to further review the comments of participants. At the SAA meeting, Horton and Lee also held "office hours" at the International Archives and Information Technology Exposition on 23 August 2002 in order to gain additional feedback from conference attendees. Unfortunately, no one attended these office hours.[7]

In July of 2002, the project staff and advisory board settled on the dates of 8-10 December 2002 for the meeting to review the products of the project. The staff began to compile an invitation list, which it refined on the basis of the presentations at SAA and NAGARA's annual meetings. Invitations began to go out in September. It came as no surprise to discover that there were going to be conflicts with other meetings and with individuals' schedules, especially since the intent was to invite participants from a wide variety of organizations, disciplines and backgrounds.[8] There were some notable problems: the InterPARES II team was meeting in Rome at roughly the same time and digital librarians were meeting in Washington, D.C. the same days.

On the other hand, there were some very pleasant surprises. ARMA members and staff were extraordinarily generous with their time and attention. This took two forms: solid participation in the general December meeting and a focus group held at the MHS in November 2002. The latter was especially important not only as an opportunity to hear from an electronic records community that had not previously worked with the NHPRC, but also an avenue for the project staff to test some preliminary conclusions and techniques before the meeting in December. The MHS is profoundly grateful to the help from ARMA and particularly to ARMA board members Cheryl Pederson and Susan McKinney.

While planning the December meeting proved to be more challenging than originally supposed, a very experienced, knowledgeable and collaborative group attended. They met for two days. On the third day, the advisory board reviewed the discussions and made their recommendations to the project staff on the final products of the project.

The meeting was structured around a series of presentations and small group discussions. After a series of reports from the staff on the project and its tentative recommendations, the participants in the meeting separated into four groups, each with the responsibility to analyze and refine one of the four themes defined by the advisory board. After these discussions, the groups reported back to the whole and responded to questions and suggestions from other groups. The project staff summarized the results of the discussions and reported back to the group some provisional conclusions and suggestions for further research. These were reviewed, validated and targeted for inclusion in the draft report of the project.

In order to provide participants with a document that represented their ideas while the meeting and issues were still fresh in their minds, the project staff set immediately to translate the material they had into a coherent form. They completed a draft report and e-mailed it to the meeting participants on 21 December 2002, with a deadline of 10 January 2003 for responses. As could be expected, the comments received were focused on individual areas of expertise or concern. There were no suggestions from the participants that the report, either broadly or narrowly conceived, needed substantive revision; instead, there was a clear and favorable unanimity that the report accurately conveyed the discussions and decisions made in St. Paul. Of course, given the speed with which the report was composed, there was certainly room for improvement and there were many useful and well-appreciated suggestions on how many elements could be amplified or refined.

One suggestion of the advisory board at the December meeting was based on the idea that the themes called for more and active collaboration with a variety of different entities, institutions and technologies, not all of whom had been represented at the process so far. In order to address that and, as well, to provide for a final review of the project's reports, this time from a new and fresh set of eyes, the project staff scheduled a meeting with a small group, in Washington DC, on 7 May 2003. The particular goal was to engage representatives of funding agencies other than the NHPRC in a conversation with representatives of available technological solutions. This generated an extremely productive discussion, of which the salient points were incorporated into a substantial revision of the project report.

The revision was completed on 20 May and posted to the project web site for review. The final draft of the report and its accompanying appendices were submitted to the NHPRC in completion of the grant on 30 June 2003.

Appendix 3: General observations and assumptions

Several observations and assumptions have informed the project staff's research and analysis. All of these were reviewed, discussed, supported, and further refined in conversations with the project advisory board and in meetings with various groups during the project. Taken together, they generally indicate that the electronic records environment has changed markedly since 1991. Briefly, these observations and assumptions are:

- Although work on electronic records over the past decade may provide us with more refined concepts and vocabulary for discussing them, the issues raised by the research questions in earlier agendas remain relevant today. This is partly because the dynamic nature of information technology keeps basic issues alive, and partly because there are different schools of thought among archivists about how to address them.[9]

- Despite these persistent challenges, there have been some tremendous achievements in the field of electronic records, many due to support from the NHPRC. To name just a few, projects at the University of Pittsburgh, Indiana University, Delaware, New York, Kansas and Minnesota have widely influenced other programs. The dissemination of knowledge about metadata and eXtensible Markup Language (XML), along with the potential of grid technology, suggested practical answers for the long-term preservation of information resources. Many projects have yielded policies, organizational models and guidance documents that have been copied and reused by others. By forming and perpetuating personal connections between individuals with a professional interest in electronic records, NHPRC funding has also generated valuable social capital.[10] All of these efforts could serve as starting points for the development of electronic records programs.[11]

- Nonetheless, information dissemination is a major challenge. There are great gaps in what archivists and their constituents know. There is a demand for practical knowledge and models, particularly those that include some cost/benefit analysis and discussion of return on investment.[12]

- To complicate the challenge of information dissemination, there is, among some groups of archivists, a perception that technology and electronic records are alien to their missions, not a way to improve programs, not a means to add value to what they deem their primary responsibilities. Many archivists consider electronic records to be an additional and unwelcome burden marked by numerous controversies. As a result, there has been uneven progress among archivists in the area of electronic records. A significant percentage of work sponsored by the NHPRC has been carried out by archivists in government and universities and, even within that sub-group, by a small minority of programs. A number of archival sub-groups have not been involved to any marked degree in work with electronic records.[13]

- These gaps and their practical implications suggest it is likely that, at best, individual archives and programs will develop electronic records programs incrementally, at different rates, with emphases on different features and functions. The individual

environment and local knowledge will greatly influence the various forms and manifestations any program can take.[14]

- The importance of the intellectual, organizational, technological and professional context is clear. Archivists are not alone and electronic records programs cannot stand alone, isolated from other influences and factors. Many other professions and disciplines are working with information technology; what they know and what they can offer will be of critical importance to the implementation of any archival program.[15] The development of standards over the past decade and the advent of such aides to interoperability as XML testify to the recognized potential of collaboration.

- Funding is one significant factor to consider and an important reason why there are not more electronic records programs. Given that many archives do not have the resources to fulfill their traditional responsibilities, finding the additional and substantial resources for an electronic records program is daunting. It is entirely understandable that many programs are waiting for the dust to clear and a practical model to appear so that they can copy something that has proven useful, at the least risk and cost to themselves.

- The intellectual framework for archivists, against which practical models can define themselves, has begun to solidify. The 1990s witnessed substantive advances in archival education and professionalization. Archival theory and research are much more solidly based in university programs; graduate programs are more numerous, more sophisticated and more intensive.[16] This has fostered an intellectual context for electronic records, with an independent, institutional base, that all projects and programs need to take into account.

- The social and political framework has changed as well. The issues identified in the 1991 agenda covered a great deal of ground, with archivists staking out potential roles and partnerships with a variety of constituencies, such as lawyers, records managers, auditors and technology professionals. These groups have developed products and programs in parallel and autonomous efforts over the past decade, sometimes in front of, sometimes behind archivists, but seldom in concert.

- One manifestation of this is that, among these stakeholders of archives, the definition of a record is blurred. The Uniform Electronic Transactions Act (UETA) and the Electronic Signatures in Global and National Commerce Act (E-SIGN) have promulgated all-encompassing definitions.[17] The development of artificial and multi-media collections on the Web; the use of collections and content management tools; and the proliferation of born digital and "born again" digital information, all tend to emphasize the commonalities of digital objects as much as their disparities.

- As these different definitions imply, records have different use values, e.g., as evidence, information, history, heritage or memory. These potential values can be greatly augmented by information technology, whether the records are born digital or digitized retrospectively. They will also influence the level of investment in information technology in general and electronic records programs in particular.

- Digitization is one area of notable investment and, as a consequence, digital preservation is a particularly active area of recent research and development. This includes not only the work of the national archives in many countries, but also libraries and other institutions responsible for managing digital resources. One very prominent example is the National Digital Information Infrastructure and Preservation Program (NDIIPP) at the Library of Congress.[18] Others include the Digital Preservation Coalition in the UK,[19] and a variety of initiatives related the Reference Model for an Open Archival Information System (OAIS).[20]

- One compelling reason for such investment is the incredible growth of the Internet. This has made preservation and access key concerns of many people working with information technology. Everyone developing a web site or a web-based resource has an investment in information and, with that, a potentially persuasive motive to plan how to sustain its content and its value over time.

- Successfully making that argument will entail much more work on the appraisal of electronic records. For many reasons, economic, intellectual, professional, technological, practical etc., archivists need a far better understanding of and justification for selecting which electronic records to preserve.[21] There is a significant lack of concern about support for archives, records management and electronic records management among many people who are in a position to make decisions and allocate resources. State governments, in particular, are seeing a severe rollback in programs in the current economic climate.

- Even so, from every perspective, expectations are much higher. In 1991, much of what was discussed in the course of developing the research agenda was hypothetical. Now archivists must recognize the advent of the Web; the explosion in the use of personal computers; and the routinization of technological applications across government and commerce. These developments all make the challenges archivists face more immediate, more complex and more real.

- As a result, electronic records and collections of electronic records should not be viewed in isolation.[22] The growing appreciation for standards and enterprise-wide architectures focus attention on systems. Concomitantly, the value of records is notably increased by applications supporting data sharing, data mining, data federation and grid technologies.[23]

Appendix 4: Diffusion of information and innovation

Regardless of what form they take, the products of these efforts will be valuable only if they are widely disseminated and applied. One vital component is the presentation and publication of results.

The NHPRC could more actively promote such activity by encouraging applicants to build into grant proposals more travel funds and additional time for documenting and publishing results. Conferences, project reviews and working meetings are all opportunities for people to compare notes and share information. Several other funding organizations, such as the NSF and IMLS, integrate these activities into all the projects they are funding within a particular program area for a given year. Within the framework of evaluation and analysis grants, the NHPRC could also encourage small grants (perhaps around $1000) to projects that have demonstrated particularly noteworthy success, in order for participants to travel to and report on their project at professional conferences. It is important to recognize that exchanges at conferences flow in both directions; they are opportunities to learn as well as teach. While it is very important for grantees to report their work to groups of their peers, it could also be valuable for the NHPRC to support some travel to conferences of communities that are fostering work that could inform and improve electronic records programs.

Communication of results is not necessarily so straightforward and simple, though. Some participants at the December 2002 meeting in St. Paul pointed out that the best individuals to do the work might not always be the best individuals to disseminate the results. In some cases, it might be advisable to build into projects a third-party contractor who can take on the specific role of packaging and reporting project results. This could be particularly valuable when project participants were selected for their particular professional roles or domain expertise, rather than for their ability to write, speak or otherwise engage the intended audience of the work.

As well, even though the NHPRC currently and strongly encourages dissemination of project reports and publications, there are limitations to what it can achieve. Many of the projects sponsored by the NHPRC over the past decade have documented their work through either print publications or the Web, but many others have not. In October 2001, the US-InterPARES team compiled an annotated bibliography of many previous NHPRC electronic records projects.[24] In addition to serving as an excellent source of information about these projects, the bibliography also provides an indication of the extent to which projects have disseminated the results of their work. From the 41 grants and 35 projects listed,[25] the U.S. InterPARES team references the following resources:

Type	Number of References	Include Copies on the Web
Project web sites	15	15
Published articles	21	5
Project proposals	4	4
Project reports	15	13
Conference papers	2	2
Book chapters	1	0
Print books[26]	7	0

Meeting/conference reports	2	2
Other informational or guidance documents	36	35
TOTAL	**103**	**76**

The NHPRC bibliography notes that it "does not include all NHPRC electronic records projects. Consulting grants, for example, have been omitted." Because it was completed in October of 2001, it does not include the two rounds of projects recommended for funding in November 2001[27] and November 2002. Finally, excluded from the list is the work of InterPARES itself, which has produced dozens of articles, presentations and papers.

With these caveats in mind, it is interesting to note what has become of the 76 online resources. Thirty-six of them (approximately 47 percent) are no longer available at the locations identified in the bibliography.[28] In six of these cases, the Uniform Resource Locator (URL) has changed, but the resource is still available elsewhere on the Web. A more troubling finding is that 29 of them (more than 38 percent of the total resources cited) are no longer available on the current Web.[29] Four of the 14 project sites (approximately 27 percent) have disappeared, including those of Delaware, Indiana University (Phase I) and the University of Pittsburgh.

Several contributors to this project have strongly reiterated that the NHPRC should support a "clearinghouse" of information related to its electronic records projects, a recommendation that was also mentioned in the 1991 agenda. One question that this raises is the administration of such a service. Under its current regulations and guidelines, the NHPRC can neither create a standing contract with some third party nor directly commission a project to do this. As discussed elsewhere, a desirable model would be one in which some initial seed money from the NHPRC could result in a self-sustaining entity responsible for maintaining the clearinghouse. The Council of State Historic Records Coordinators (COSHRC) has discussed the possibility of establishing such a clearinghouse, although more in the form of a "portal" to resources than as a repository.[30]

The NHPRC has also promoted the publication of products in both print and electronic form, by either engaging in such publication itself or allying with professional associations (e.g., SAA or the American Historical Association) who are already in the business of publishing literature of interest to their members. There is a diversity of possible cooperative publishing arrangements involving professional associations. For example, both ARMA and SAA carry numerous publications in their catalogs that they have not published themselves.[31] The two organizations also recently cooperatively published a book.[32] The NHPRC engaged in such an arrangement several years ago by providing financial support for the SAA series of "Case Studies on Administration of Electronic Records." The sales of this series have been respectable, though somewhat lower than initially expected.[33] This may be due more to the format of the publications than a lack of demand for electronic records literature.

Rather than the NHPRC hosting one central repository of information, this approach would involve a more decentralized set of arrangements for the publication of targeted products. The SAA Electronic Publishing Task Force has advocated a more active exploration of genres such as white papers and reports, which are common ways to report timely information about electronic records and digital preservation.[34] Not only can publication promote the legitimacy

and dissemination of results, but it can also increase the chances that documents will remain available over time.[35] Such collaborations would not exclude the possibility of also exploring some sort of information clearinghouse. These two sets of activities could complement each other.

Focused efforts should also go beyond merely presenting or publishing information, both of which tend to be unidirectional activities. The ideal scenario is one in which audiences take action on what they learn. While these considerations directly address the concept of education, they are intimately connected with all three of the other themes promoted in this report and would have an impact on their successful realization. One of the relationships discussed at the December 2002 meeting is between program development and sustainable project results. The products of an electronic records project are more likely to be applied elsewhere if the institution that hosted the project continues to employ dedicated and technically proficient staff, who can foster and help to interpret those products. This, obviously, is beyond the power of the NHPRC to achieve, but potential applicants should always keep in mind the goal of sustainability.

Appendix 5: Survey

A major task in this project was soliciting reactions to the 1991 agenda from individuals in a variety of records-related professions. Budget constraints necessarily limited the number of people that could be brought together for meetings, so to reach as wide a group as possible in a cost-effective way, the project team developed an online survey.

Drafts of the survey were completed and circulated among the project's advisory board for comment in early 2002, with the final version opened to the general public on 1 May. People were asked to respond according to their individual experiences, not as a representative of an organization. As an incentive towards frankness, name and contact information were optional, and all were promised confidentiality and anonymity.

The survey consisted of 25 questions, some requiring an answer from a set of choices, others free text. All submitted responses were captured in a back-end database for later analysis. The questions were grouped into four categories.[36] Those under "Institutional Information" and "Education and Experience" sought to create a profile of the respondent's current professional work, past education, and experience with electronic records. Questions in the category of "Electronic Records Research Agenda" pointedly addressed whether the respondent had ever used the 1991 agenda in any way and solicited suggestions for revising it. Respondents were encouraged to submit further comments in the optional "Additional Information" section.

To garner the widest participation possible, the survey was publicized through printed publications and e-mail lists. A flyer promoting the project and the survey was inserted into on-site packets given to participants at the Midwest Archives Conference (MAC) annual Spring Meeting in Minneapolis, an event which drew over three hundred people. Announcements were also printed in the 2002-2 issue of *Crossroads*, the NAGARA electronic records publication, and in the September/October issue of *Archival Outlook*, SAA's bi-monthly newsletter. A number of other publications, both in print and online, were considered, but not successfully pursued due to publication deadlines and dates that conflicted with the timeline for the survey.

Announcements were also sent to over a dozen e-mail lists targeting archivists and records managers[37], historians[38], librarians[39], and others with an interest in electronic records management and use[40]. Through these electronic means, the announcement reached over 10,000 people.[41] The survey remained online through 31 October 2002. During the time it was available, 73 responses were submitted.

The 73 respondents, answering the question, "Which of the following best describes your current profession?" selected these categories:

Profession	Number	Percentage
Other	8	11
Archivist	26	36
Educator	7	10
Records manager	16	22
Student	1	1
Librarian	3	4

Editor	2	3
Information technology professional	8	11
Historian	2	3
Museum curator	0	0
Total	73	

The respondents further indicated that they had a substantial amount of experience working with electronic records. For the question "If you have worked with electronic records, please note for how long," the breakdown for the answers is:

	Number	**Percentage**
< 1 year	6	8
1-2 years	7	10
3-5 years	16	22
5-10 years	16	22
10-15 years	6	8
>15 years	20	27
Total	73	

But of these, only 30% had used the 1991 or 1996 agendas for a proposal to the NHPRC. Only 8% had used the agendas to develop an application to any other funding agency. When asked to note which of the issues in the ten questions on the 1991 research agenda had inspired or informed their work, 25% said, "None," but the rest indicated their interest evenly among the choices.

Everyone felt that much more work had to be done. Just over half felt that none of the questions from the 1991 agenda has been adequately addressed in the past ten years. The most "votes" noting that an issue was resolved were 25% for question 1 in the agenda, "What functions and data are required to manage electronic records in accord with archival requirements? Do data requirements and functions vary for different types of automated applications?" Given the very broad scope of that question, 25% seems surprising. Almost 70% of the respondents felt that none of the questions should be eliminated from further consideration.

Most interesting were the results of a series of questions on the constraints on and challenges to successful electronic records programs [the responses are listed as percentages.

Constraint or Challenge	**Unimportant**	**Important**	**Very Important**
E. Lack of funds inside the organization	7	18	75
M. Lack of management support inside the organization	1	2	7
K. Lack of trained personnel inside the organization	4	32	64
I. Lack of successful models inside the organization	4	34	62
O. Other priorities inside the organization	4	36	60
A. Lack of cooperation inside the organization	11	23	66
G. Lack of IT solutions inside the organization	5	36	59

C. Lack of IT experience and/or knowledge inside the organization	15	33	52
J. Lack of successful models outside the organization	22	36	42
H. Lack of information technology solutions outside the organization	18	47	36
L. Lack of trained personnel outside the organization	26	41	33
N. Lack of management support outside the organization	32	38	32
P. Other priorities outside the organization	32	38	30
B. Lack of cooperation outside the organization	37	32	32
F. Lack of funds outside the organization	37	34	29
D. Lack of IT experience and/or knowledge outside the organization	36	44	21

The general trend notable here is the clear acknowledgement of internal faults and problems. While the lack of external support, funds, cooperation etc., are clearly significant, the percentages of answers identifying the internal challenges as "very important" are materially higher.

It is, of course, dangerous to extrapolate too much from such a small sample, but certain conclusions appear justified. First, it is important to note that, despite diligent promotion and publicity about the survey, especially among archivists, relatively few people took the time to complete it. Of those who responded, most described themselves as having substantive and long term experience with electronic records, but few still had used the NHPRC's agendas. Last, it is safe to say that all the questions on the 1991 agenda are still pertinent and the general perception is that the lack of progress made in answering them could be directly tied to the problems archivists have had in re-directing their own energies and re-orienting their own programs.

5.1 Survey text

Background[42]

The State Archives Department of the Minnesota Historical Society is managing an effort to revisit and analyze the electronic records research agenda currently guiding the National Historical Publications and Records Commission. This survey is part of the information gathering phase. Your response will help us to identify priorities and set the direction for the rest of the project.

Instructions

This survey is primarily designed for archivists and records managers, but anyone interested in electronic records is encouraged to respond. Please answer as an individual, speaking from your own experience and knowledge, rather than as a representative of an organization. At the end of the survey, you have the opportunity to add whatever additional comments and suggestions you think pertinent.

All information you provide will be kept strictly confidential. Any reports on or products derived from the survey will only note aggregate data and unattributed comments. If you would like to provide contact information so that we might follow up on your suggestions or provide more on the project, please use the final section of the survey, entitled "Additional Information." Thank you for your time and attention.

Institutional Information (required)

1. Which of the following best describes your institution? Please choose one only.
{Government, Library, Archives, Business, College or University, Other}

2. If you selected other, please describe.

3. Which of the following best describes your current profession? Please choose one only.
{Archivist, Educator, Records Manager, Student, Librarian, Editor, Information Technology Professional, Historian, Museum Curator, Other}

4. If you selected other, please describe.

Electronic Records Research Agenda (required)

These are the ten questions identified as priorities in the 1991 NHPRC research agenda (http://www.nara.gov/nhprc):

1. What functions and data are required to manage electronic records in accord with archival requirements? Do data requirements and functions vary for different types of automated applications?

2. What are the technological, conceptual, and economic implications of capturing and retaining data, descriptive information, and contextual information in electronic form from a variety of applications?

3. How can software-dependent data objects be retained for future use?

4. How can data dictionaries, information resource directory systems, and other metadata systems be used to support electronic records management and archival requirements?

5. What archival requirements have been addressed in major systems development projects and why?

6. What policies best address archival concerns for the identification, retention, preservation, and research use of electronic records?

7. What functions and activities should be present in electronic records programs and how should they be evaluated?

8. What incentives can contribute to creator and user support for electronic records management concerns?

9. What barriers have prevented archivists from developing and implementing archival electronic records programs?

10. What do archivists need to know about electronic records?

5. Have you used the research agenda for an electronic records proposal to the NHPRC? {Yes, No}

6. Have you used the research agenda for an electronic records proposal to any other funding agency? {Yes, No}

7. Which of these questions has inspired or informed your work? (identify by number, check all that apply). {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, None/No opinion}

8. Which of these questions has been adequately addressed in the past ten years? (identify by number, check all that apply). {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, None/No opinion}

9. Which of these questions should be eliminated from further consideration? (identify by number, check all that apply). {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, None/No opinion}

10. Which of these questions needs further examination? (check all that apply). {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, None/No opinion}

11. Which new questions need to be asked? (please list in question form).

12. Please indicate the importance of the following groups as audiences to whom a revised research agenda should be addressed:

a. Electronic records archivists {very important, important, unimportant}
b. Government records archivists {very important, important, unimportant}
c. Documentary editors {very important, important, unimportant}
d. Manuscript archivists {very important, important, unimportant}
e. Librarians {very important, important, unimportant}
f. Funding sources {very important, important, unimportant}
g. University archivists {very important, important, unimportant}
h. Archival educators {very important, important, unimportant}
i. Records managers {very important, important, unimportant}
j. IT community {very important, important, unimportant}
k. Researchers {very important, important, unimportant}
l. Other {very important, important, unimportant}

13. If you selected other, please describe.

Education and Experience (required)

14. If you have worked with electronic records, please indicate in what capacity (choose all that apply). {Creation, Use, Management, Education, Preservation, Systems Design, Systems Administration, No experience with electronic records, Other}

15. If you selected other, please describe.

16. Which function best characterizes your interest in electronic records? Please choose one only. {Creation, Use, Management, Education, Preservation, Systems Design, Systems Administration, Other}

17. If you selected other, please describe.

18. If you have worked with electronic records, please note for how long. {<1 year, 1-2 years, 3-5 years, 5-10 years, 10-15 years, >15 years}

19. If you have worked with electronic records, please rate the importance of the following constraints or challenges you may have encountered.

a. Lack of cooperation inside the organization {very important, important, unimportant}
b. Lack of cooperation outside the organization {very important, important, unimportant}
c. Lack of IT experience and/or knowledge inside the organization {very important, important, unimportant}
d. Lack of IT experience and/or knowledge outside the organization {very important, important, unimportant}
e. Lack of funds inside the organization {very important, important, unimportant}
f. Lack of funds outside the organization {very important, important, unimportant}

g. Lack of information technology solutions inside the organization {very important, important, unimportant}
h. Lack of information technology solutions outside the organization {very important, important, unimportant}
i. Lack of successful models inside the organization {very important, important, unimportant}
j. Lack of successful models outside the organization {very important, important, unimportant}
k. Lack of trained personnel inside the organization {very important, important, unimportant}
l. Lack of trained personnel outside the organization {very important, important, unimportant}
m. Lack of management support inside the organization {very important, important, unimportant}
n. Lack of management support outside the organization {very important, important, unimportant}
o. Other priorities inside the organization {very important, important, unimportant}
p. Other priorities outside the organization {very important, important, unimportant}
q. Other {very important, important, unimportant}

20. If you selected other, please describe.

21. If you have worked with electronic records, what are your successes? (please list, optional)

22. Which resources/projects/articles have you found useful? (please list citations, optional)

23. To facilitate your work with electronic records, what would you like to know more about? (optional)

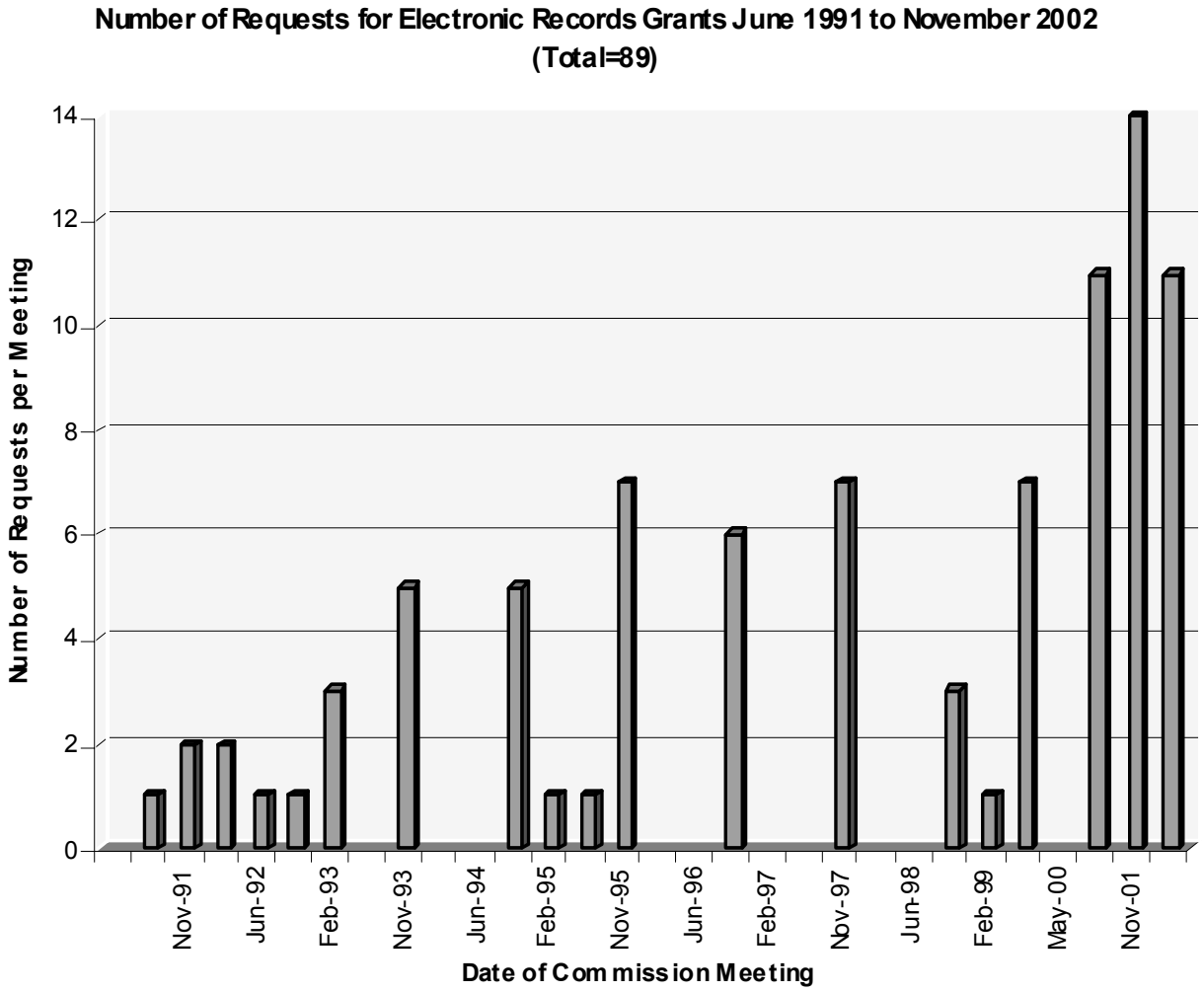
24. What is the single most important thing archivists must accomplish in their work with electronic records in the next five years? (optional)

Additional Information

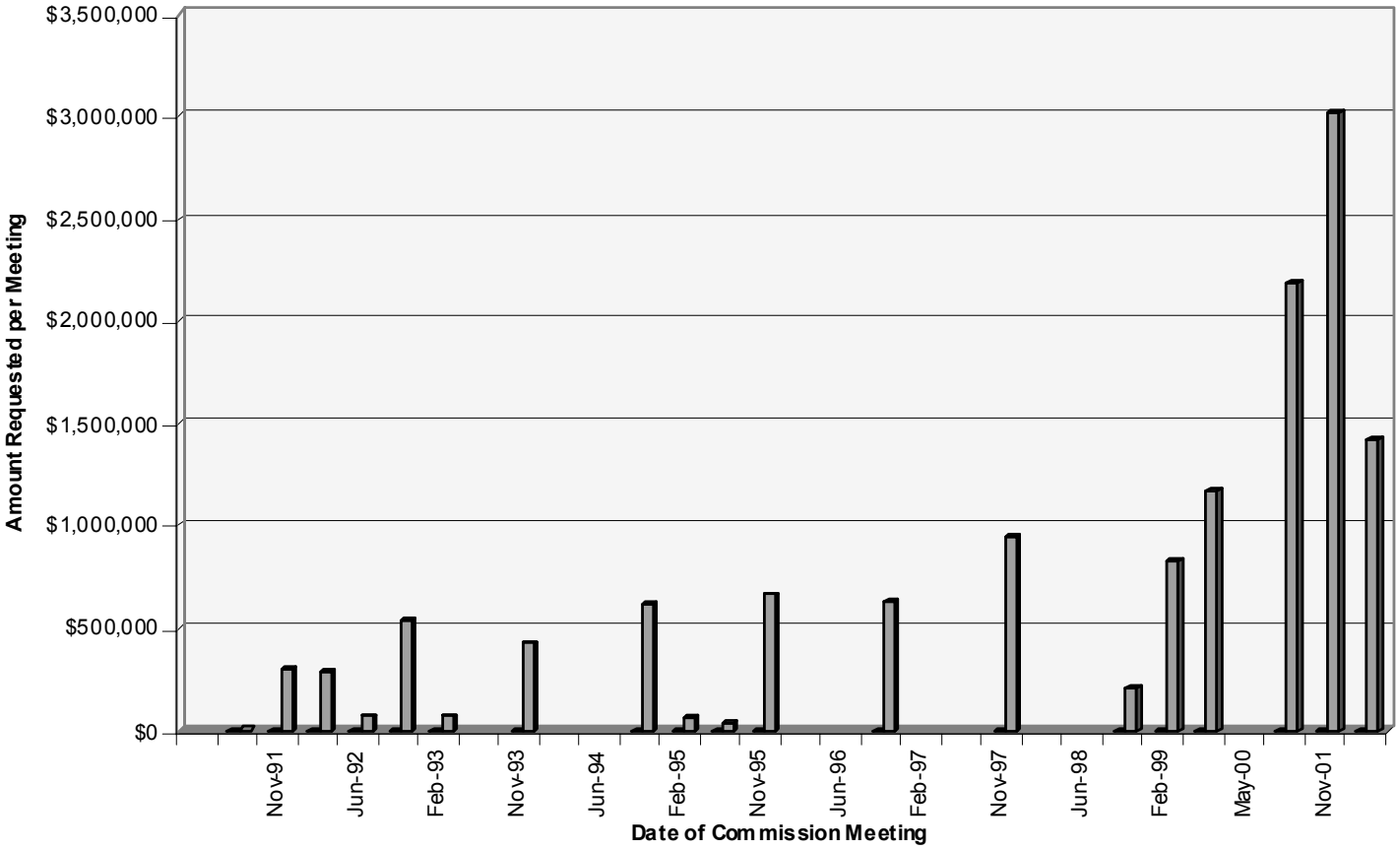
25. Please add any other ideas or suggestions that you think would be useful. Please include your contact information if you would like to supply any additional information or be included in any other project activities.

Appendix 6: Statistics on NHPRC electronic records grants and applications

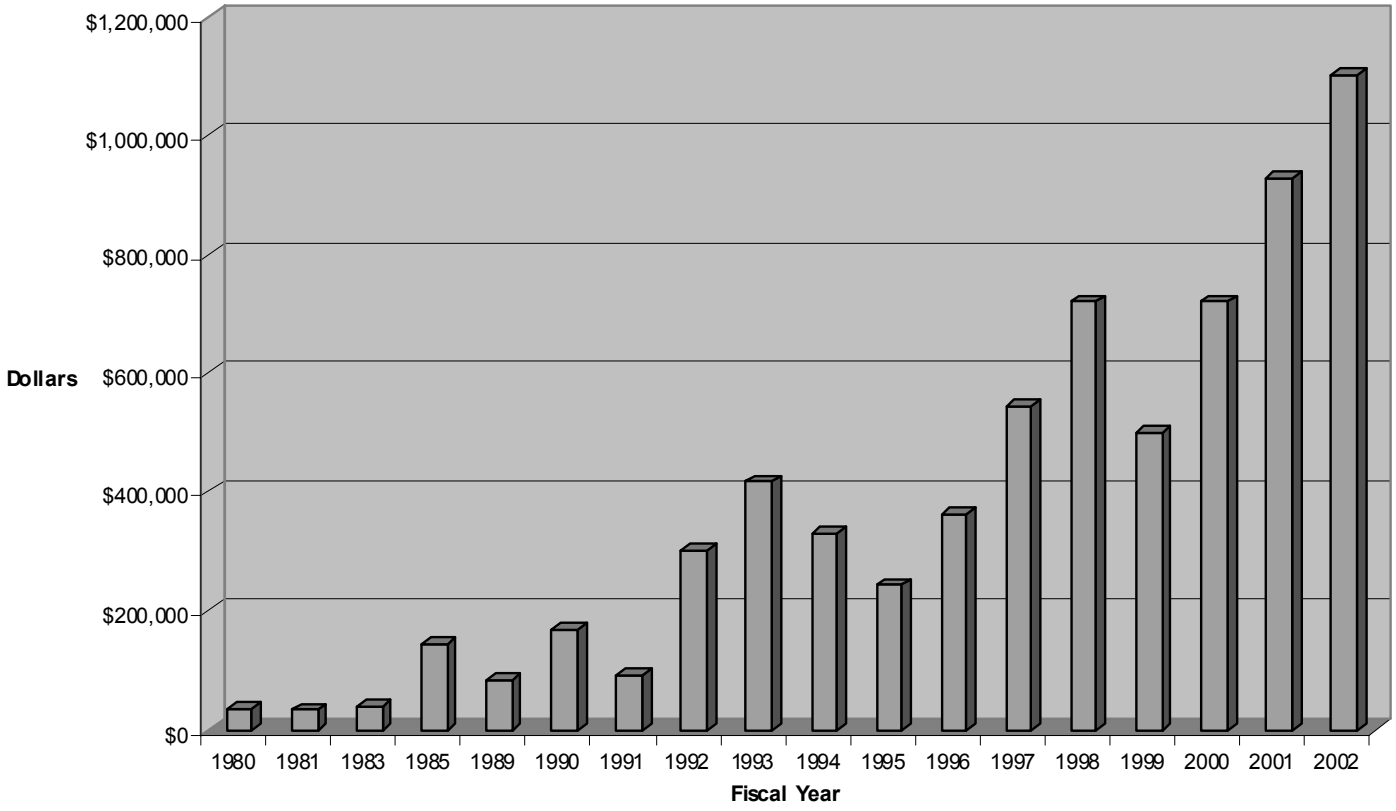
[Mark Conrad, of the NHPRC, generously compiled and supplied the graphs for this appendix.]

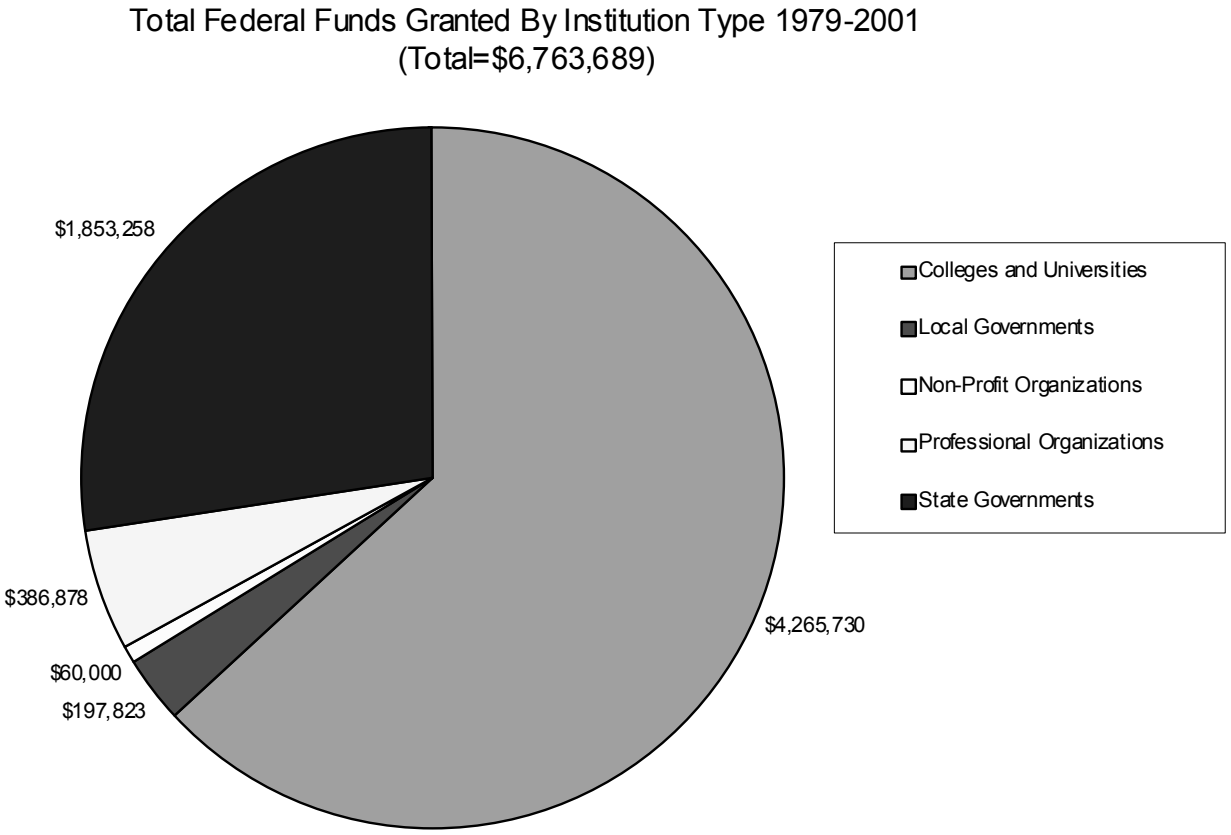


Amount Requested for Electronic Records Grants June 1991 to November 2002
(Total=$13,464,768)

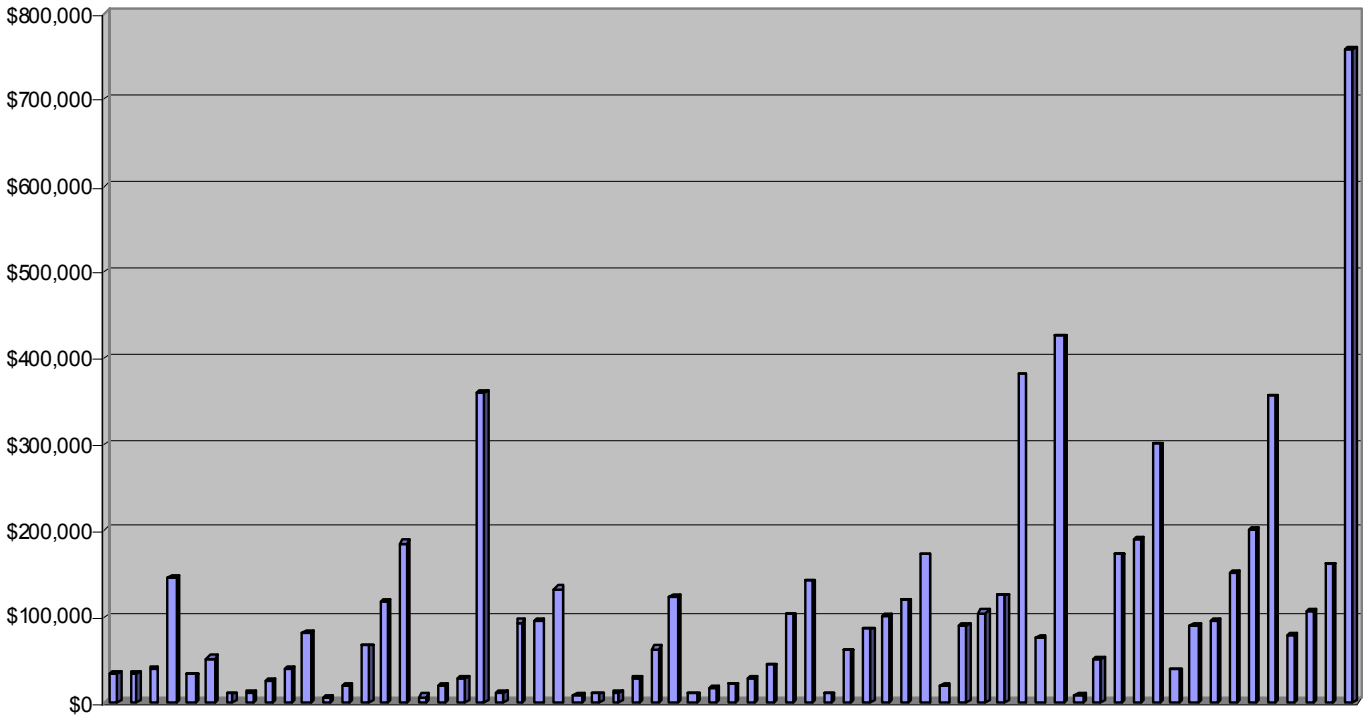


NHPRC Federal Funds Awarded for Electronic Records Projects 1979-2001 (Total=$6,763,689)




Total Federal Funds Granted By Institution Type 1979-2001
(Total=$6,763,689)
$1,853,258
$386,878
$60,000
$197,823
$4,265,730
Colleges and Universities
Local Governments
Non-Profit Organizations
Professional Organizations
State Governments

NHPRC Funds by Grant 1979-2001 (Total=$6,763,689)
(Average=$104,057) (Median=$74,996)



Appendix 7: Performance measurement

Archivists and the NHPRC have to consider performance measurement, not just of projects, but also of the agenda itself. How will the NHPRC define success? What should electronic records projects achieve? Are archivists interested in outputs or outcomes? Looking towards an endpoint, what should electronic records projects have accomplished in five years? Ten years? How will the NHPRC measure that progress? Or even, to take the most pessimistic perspective, what would be better than nothing, which would describe the current state of electronic records programs at too many archives?

While those questions are doubtless important, everyone should recognize that there is a risk in setting the bar too high for electronic records projects. Archivists and records managers cannot point to an unbroken and universal string of successes in any area of activity. After decades of work, managing paper records is still a challenge, so it would be unreasonable to expect electronic records management programs suddenly to build uniformly and successfully on such shaky foundations. As NARA's recent analysis of its records management programs indicates and as every survey COSHRC has done over the past decade proves, records and historical documentation, in whatever medium and of whatever value, are not the highest priorities for any organization anywhere.[43] Archivists can certainly do better work with electronic records following an agenda that emphasizes partnerships and the use value of information and information technology. They can make a better case for support with their stakeholders, but, in the process of promoting this, they and the NHPRC should be wary of establishing greater expectations for and of exacting a more rigorous analysis of electronic records proposals than that levied on others.

That is one reason the new agenda should be complemented with a series of projects that would act as catalysts to raise the level of expertise and knowledge among archivists: given the status quo, it would be unfair to demand too much, too soon of a new agenda. Another reason to urge some caution with performance measurement is that this project's research was unable to reveal a set of measurements that could reasonably be applied across the board. For program development especially, local concerns will be important; no single, national model for performance measurement will be an appropriate template for many, diverse organizations.

Of all the possible models to follow, the Institute of Museum and Library Services (IMLS) approach is probably most worthy of emulation since it puts the onus on the individual project to define the appropriate standards for measuring success; at the same time, it provides some training to ensure that the projects' staffs share their assumptions and methodologies. The IMLS emphasizes measuring outcomes. As its web site describes, "This system of measuring results replaces the question, 'What activities did we carry out?' with the question 'What changed as a result of our work?' A focus on measuring outcomes (the effect of an institution's activities and services on the people it serves) rather than on the services themselves (outputs) is an emerging keystone of library and museum programs."[44] Critically, the IMLS requires a joint meeting of all

grant recipients to learn the techniques for evaluation, but the recipients themselves identify the outcomes they want to effect.

The NHPRC could ensure some focus to the "do it yourself" approach to performance measurement by requiring applicants to consider the list of "desirable" qualities noted below as starting points. Those are likely to promote progress; the concepts they represent should be evident in the proposals. This may help the NHPRC deal with the tension between appearing overly prescriptive, while still requiring some meaningful estimation of performance. Among those qualities, sustainability and communication are critical. Again, it would be unreasonable to demand too much, too soon. Overall, it might be useful for those working with electronic records to keep in mind as an analogy Freud's explanation that psychoanalysis was not supposed to "cure" anyone; instead, its goal was to turn crippling neurosis into routine anxiety. Similar expectations for electronic records programs to do better than they have in the past, rather than to solve problems once and for all, would be appropriate.

In its own analysis of proposals, the NHPRC will have to weigh the value of promoting proven models against the importance of encouraging innovation. There is certainly no point to funding the ongoing invention and re-invention of the wheel, but the NHPRC must simultaneously recognize that all the factors that influence an electronic records program will continue to change and evolve. Archival programs will too, if they are to remain effective. Any adaptation of a proven model should involve some modification and improvement, to fit a different organizational framework or to reflect the progress of our knowledge and experience. Understanding and articulating those differences should be key features of a proposal and of a project's final report.

7.1 Desirable qualities

Any agenda can only do so much. First, it is only a starting point, an indication of interests and ideas to which archivists have to respond. Second, those responses are normally defined in terms framed by individual institutions, with a circumscribed mission, reach and impact. If the NHPRC follows the IMLS's model and encourages grant applicants to devise their own performance measures, most of those will inevitably address local concerns. Current NHPRC guidelines request that applicants identify performance objectives for their projects and indicate how the projects will be evaluated under the Government Performance and Results Act (GPRA). Even if the NHPRC were to stress program development only, that emphasis would have to fall within a larger context, as all projects should contribute to the ongoing national dialogue about electronic records. To have an overall and consistent effect on the archival profession as a whole, an agenda has to inspire proposals that have some larger impact.

There are probably many different ways to achieve this. One approach would be to ask grant applicants to identify explicitly, using standardized terminology, how project deliverables would contribute both to the local and national scenes. Applications might have a section similar to what is in many position descriptions, which are divided into "required" and "desirable" qualities. The required qualities could be a detailed plan for

performance measurement, appropriate to the individual organization and project. The desirable qualities could address larger national and professional needs. This approach would encourage applicants to develop more sophisticated proposals and also help the NHPRC as it confronts the dilemma of considering more proposals than it can fund, to identify and select the better ideas. The desirable qualities could include:

- Compelling: projects should persuade and demonstrate to archivists that they can benefit from doing more with technology and electronic records.

- Inclusive: as a whole, projects should address multiple audiences and identify how solutions provide useful information to all the NHPRC's constituencies.

- Dynamic: projects should provide feedback to the NHPRC, as issues, opportunities and priorities will change over time and the agenda (as well as its interpretation) should change with them.

- Professional: projects should be aware of and responsive to the intellectual constructs of the archival profession.

- Practical: projects are necessarily informed both by the agenda and an environment, so there should be some room for the interpretation and adaptation that make the agenda fit the local scene.

- Productive: projects should result in accessible, understandable and adaptable products.

- Innovative: keeping up with the potential of information technology demands creative ideas from archivists.

- Informative: education, communication and implementation considerations are necessary components of a worthwhile project.

- Sustainable: the work should have an impact beyond the length of the grant. This will often involve not only long-lived products, but also the mobilization of resources within the host institution toward a viable program for continuing the work.[45]

- Scalable: archivists will confront both large, heterogeneous and small ad hoc recordkeeping environments.[46] They will need a "spectrum of tools and methods that scale up to very large databases and scale down to personal archiving."[47]

7.2 Example

Any proposal entertained by the NHPRC in the context of the new agenda should reflect some critical mass of these qualities. Not every grant will be able to fulfill all of

them, but each should indicate that they were the objects of analysis and consideration as the grant was articulated.

For example, a project with a primary goal of educating the constituents of a university archives on electronic records management may feature small group workshops, as these could facilitate the development of partnerships. Its performance measures could include the number of workshops, the number of participants and a statistical analysis of its effects based on surveys and evaluations done over the course of the project. It could measure outcomes in terms of the number of programs that adopted the recommended best practices and policies; that supported the development of standards and enterprise architectures; and that collaborated with the archives subsequently to preserve electronic records of long-term value.

But to enhance its overall contribution to the archival profession, the project could also promise to analyze reactions to particular intellectual models and theories ("professional"); to develop standard curricula, resources and materials ("productive"); to make all those products widely available over a project web site ("informative"); and to continue to deliver workshops and to maintain the products beyond the life of the grant ("sustainable"). The net result would be a project that has both a local and a national impact. Many current projects sponsored by the NHPRC, especially within its education initiative, are already doing this. Examples are the Minnesota Historical Society's Educating Archivists and their Constituencies Project, the University of North Carolina's Managing the Digital Desktop Project and Indiana University's Education Project. All of these are models on which to build.

Appendix 8: Recent projects related to electronic records

Along with and in addition to the NHPRC, there are a number of other projects which are now or have been in the recent past doing work that relates in some way to electronic records. This list is provided as a rough and ready reference source., to indicate the variety of projects underway across the world.[48]

- Alexa Internet – contributes content to the Internet Archive
- Arts and Humanities Data Service – numerous publications
- The Asia Foundation – JSTOR
- Atlantic Philanthropies – New York Public Library Digital Library activities
- British Library – Digital Preservation Coalition
- Carnegie Corporation of New York – Vision 2010, symposia, conferences on computing and humanities
- Center for Research Libraries – Political Communications Web Archiving
- Coalition for Networked Information (CNI) – numerous projects, conferences and publications
- Collaborative Electronic Notebook Systems Association (CENSA)
- Consortium of University Research Libraries (CURL) – CURL Exemplars for Digital Archives (CEDARS), Digital Preservation Coalition
- Consultative Committee for Space Data Systems (CCSDS) – *Reference Model for an Open Archival Information System (OAIS)*
- Council on Library and Information Resources (CLIR) – numerous awards, projects and publications
- Defense Advanced Research Projects Agency (DARPA) – DLI2
- Gladys Krieble Delmas Foundation – CLIR projects
- Digital Library Federation (DLF)
- Digital Preservation Coalition
- Documentation Abstracts, Inc. – CLIR institutes and symposia, ISA Research Grant
- e-Science Core Programme – Digital Preservation Coalition
- The Eurasia Foundation – JSTOR
- European Commission – DLM-Forum
- Federal Bureau of Investigation (FBI) – DLI2
- Ford Foundation – support to Center for Technology in Government (CTG), RLG
- Bill and Melinda Gates Foundation – Access to Learning Award
- J. Paul Getty Trust, Getty Grant Program – NINCH Guide to Good Practice
- Harvard University Libraries
- Hewlett-Packard Company – DSpaceHumanities Technology and Information Institute (HATII), University of Glasgow – ERPANET
- IBM Almaden Research Center – Universal Virtual Computer
- Institute of Museum and Library Services (IMLS) – preservation, digitization, and collaboration projects, DLI2, CLIR projects
- International Records Management Trust (IRMT) – Evidence-Based Governance in the Electronic Age

- Joint Information Systems Committee (JISC), United Kingdom – Distributed National Electronic Resource (DNER), Arts and Humanities Data Service (AHDS), Digital Preservation Coalition
- Library of Congress – National Digital Information Infrastructure and Preservation Program (NDIIPP), DLI2, Internet ArchiveLong Now Foundation
- The Henry Luce Foundation John D. and Catherine T. MacArthur Foundation – JSTORMarkle Foundation – Internet Archive, Policy for a Networked Society Program Massachusetts Institute of Technology Libraries – DSpaceAndrew W. Mellon Foundation – various JSTOR activities, including the E-Archive, Political Communications Web Archiving, LOCKSSNational Aeronautics and Space Administration (NASA) – DLI2, OAIS National Agricultural Library
- Nationaal Archief van Nederland – ERPANET National Archives and Records Administration (NARA) – Center for Electronic Records (CER), Electronic Records Archive (ERA), DLI2National Archives of Australia
- National Archives of Scotland – Digital Preservation Coalition
- National Center for Preservation Technology and Training (NCPTT)
- National Endowment for the Arts (NEA) – Independent Media Arts Preservation (IMAP)
- National Endowment for the Humanities (NEH), Division of Preservation and Access – DLI2, workshops National Institute of Standards and Technology (NIST), Convergent Information Systems Division (CISD) – Digital Data Preservation, National Institutes of Health (NIH)National Library of Australia,
- National Library of Medicine – DLI2 National Telecommunications and Information Administration (NTIA)The Stavros S. Niarchos Foundation – New York Public Library digital library activities, JSTOR Online Computer Library Center (OCLC) – Digital and Preservation Resources, Digital Preservation Coalition, several working groups with RLG, William Penn Foundation – CLIR projects, Pew Charitable Trusts – to Princeton University for a "national data archive for policy and the arts," Congress Online Project, workshops Public Record Office Northern Ireland (PRONI) – Digital Preservation Coalition, Public Records Office Victoria – Victorian Electronic Records Strategy (VERS)
- RAND - electronic recordkeeping and emulation Research Libraries Group (RLG) – *RLG DigiNews*, "Long-term Retention of Digital Research Materials," several working groups with OCLC Resource: The Council for Museums, Archives and Libraries – Digital Preservation Coalition Rockefeller Foundation – Independent Media Arts Preservation (IMAP)
- Schweizerisches Bundesarchiv (Swiss Federal Archives) – ERPANET
- Alfred P. Sloan Foundation – September 11th Digital Archive
- Smithsonian Institution (SI) – DLI2, Internet Archive
- Social Sciences and Humanities Research Council of Canada (SSHRC) – InterPARES II
- Spencer Foundation – doctoral and postdoctoral fellowships, e.g., Eun Park's "Integrating Digital Resources Management Across the Curriculum"
- State Records Authority of New South Wales
- Sun Microsystems – Lots of Copies Keep Stuff Safe (LOCKSS)

- UK Public Record Office (PRO) – Digital Preservation Coalition
- United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage - Memory of the World Programme, E-Heritage, Archives Portal, Free Software Portal, Records and Archives Management Programme (RAMP)
- United States Patent and Trademark Office (USPTO) – Vital Electronic Record Archive (VERA)
- Università degli Studi di Urbino (Institute for Archival and Library Science) – ERPANET
- University of London Computer Centre – Digital Preservation Coalition
- H. W. Wilson Foundation – workshops, CLIR publications
- Robert W. Woodruff Foundation – CLIR projects
- The World Bank Group – Evidence-Based Governance in the Electronic Age

Some of these players are conducting work directly, rather than funding the work of others. The line between practitioner and funder often fluctuates, however, as organizations decide that an area of internal inquiry warrants financial support of work by others. In order to refine and advance the electronic records agenda in coming years, the NHPRC and its constituencies should continue to monitor the work of organizations such as those listed above. They can benefit from considerably more resources by offering to collaborate on such efforts.

Appendix 9: Resource list

"Appendix E: Key Reports Sponsored by SAA." In *Society of American Archivists Council Handbook*. N.d. Chicago: Society of American Archivists. http://www.archivists.org/governance/handbook/app_e.asp

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"Archival Issues Raised by Information Stored in Electronic Form." Society of American Archivists, 1995. http://www.archivists.org/statements/issues-infoelectronicform.asp

ARMA International Bookstore. http://www.arma.org/bookstore/

ARMA International Learning Center. http://www.arma.org/learning/

Bailey, Catherine. "Canadian Archivists Speak Out: Results of the Surveys Conducted by the ACA Select Committee on Electronic Records." *Archivaria* 36 (1993): 136-65.

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--------. "The Indiana University Electronic Records Project: Lessons Learned." *Information Management Journal* 35, no. 1 (2001): 16, 18-20, 22-24.

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Recordkeeping Systems – a Report on Methodology." *Archives and Museum Informatics* 10, no. 3 (1996): 246-66. http://web.archive.org/web/20010731035328/http://www.indiana.edu/~libarch/ER/NHPRC-1/article1.html

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Berners-Lee, Tim, James Hendler, and Ora Lassila. "The Semantic Web." *Scientific American* 284, no. 5 (2001): 35-43.

Boles, Frank. Review of *Society of American Archivists Case Study Series*. In *Archival Issues* 21, no. 2 (1996): 169-72.

Botticelli, Peter. "Records Appraisal in Network Organizations." *Archivaria* 49 (2000): 161-91.

Chandler, John S. "A Multiple Criteria Approach for Evaluating Information Systems." *MIS Quarterly* 6, no. 1 (1982): 61-74.

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Appendix 10: Advisors and participants in the process

Advisory board

Cynthia Bendroth, *Pennsylvania Historical and Museum Commission*
Mark Conrad, *National Historical Publications and Records Commission*
Anne Gilliland, *University of California, Los Angeles*
Mary-Jo Kline, *Association for Documentary Editing*
Gary Kornblith, *Oberlin College*
Reagan Moore, *San Diego Supercomputer Center*
Theresa Pardo, *Center for Technology in Government*
Tim Slavin, *Delaware Public Archives*
Lee Stout, *Pennsylvania State University*
Ken Thibodeau, *National Archives and Records Administration*
Bill Wallach, *Bentley Historical Library*

December review and approval meeting

Bruce Ambacher, *National Archives and Record Administration*
Charles Arp, *Ohio Historical Society*
Phil Bantin, *Indiana University Archives*
Cynthia Bendroth, *Pennsylvania Historical and Museum Commission*
Ben Bloom, *Minnesota Historical Society*
Brien Brothman, *Rhode Island State Archives*
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Chris Cialek, *Minnesota Land Management Information Center*
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Nancy McGovern, *Cornell University*
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Cheryl Pederson, *ARMA International*
Joyce Ray, *Institute of Museum and Library Services*

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Charles Rodgers, *Minnesota Historical Society*
Roy Rosenzweig, *George Mason University*
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Jason Roy, *Minnesota Historical Society*
Juanita Skillman, *ARMA International*
George Socha, *Halleland Lewis Nilan Sipkins & Johnson*
Carol Stainbrook, *Cohasset Associates, Inc.*
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Catherine Teti, *General Accounting Office*
Ken Thibodeau, *National Archives and Records Administration*
Kristi Tornquist, *St. Cloud State University*
Ciaran Trace, *University of California Los Angeles*
Anne Van Camp, *RLG*
William Wallach, *Bentley Historical Library*
Bradley Westbrook, *University of California San Diego*

May meeting in Washington, D.C.

Bonnie Curtin, *National Endowment for the Humanities*
Jeff Field, *National Endowment for the Humanities*
James French, *National Science Foundation*
Bob Horton, *Minnesota Historical Society*
William LeFurgy, *Library of Congress*
Reagan Moore**,** *San Diego Supercomputer Center*
Theresa Pardo, *Center for Technology in Government*
Joyce Ray, *Institute of Museum and Library Services*
MacKenzie Smith, *Massachusetts Institute of Technology*

Appendix 11: Contact information and acknowledgements

11.1 Project web site

http://www.mnhs.org/preserve/records/eragenda.html

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[1] For details, see Appendix 4: Survey.
[2] Another contributing factor could be the scheduling of the session for the afternoon of the final day of the conference, but the well-attended "Archives Unplugged" session took place even later that same afternoon.
[3] Only 30% of respondents reported having "used the research agenda for an electronic records proposal to the NHPRC." It is impossible from this data alone to determine how many of the respondents have actually applied for NHPRC funding for an electronic records project, since some may have applied for funding without using the agenda as guidance. This would seem to be supported by the fact that, of the 40 project proposals submitted to the NHPRC that the project staff were able to analyze, 12 of the proposals (30%) indicated none of the 1991 agenda items that the project would address.
[4] See Appendix 10: Advisors and Participants in the Process for the names of individuals on the advisory board.
[5] Appendix 5 provides more information about the survey process and some general findings.
[6] "NHPRC Electronic Records Research Agenda: 1991 Research Issues and Related References," February 2003, http://www.mnhs.org/preserve/records/erbibliography.pdf
[7] The office hours were at the same time as offer of reduced prices at the SAA publications table, which drew a very large crowd.
[8] See Appendix 10: Advisors and Participants in the Process for the names of December meeting attendees.
[9] Some of the most recurrent points of contention within the professional archival literature of relevance to electronic records have been custody, definition of record, disciplinary affiliations of archivists, appraisal professional education, and the appropriate relationship between research/theory and practice.
[10] For explanations of the concept of social capital, its importance and potential mechanisms for its promotion, see James S. Coleman, "Social Capital in the Creation of Human Capital," *American Journal of Sociology* 94, Supplement: Organizations and Institutions: Sociological and Economic Approaches to the Analysis of Social Structure (1988): S95-S120; Robert D. Putnam, *Bowling Alone: The Collapse and Revival of American Community* (New York: Simon & Schuster, 2000); and Paul Resnick, "Beyond Bowling Together: Sociotechnical Capital," In *HCI in the New Millenium*, edited by John M. Carroll, 247-72 (Addison-Wesley, 2001).
[11] The accompanying document "NHPRC Electronic Records Research Agenda: 1991 Research Issues and Related References" provides references to resources, organized according to the original ten questions. These include numerous products of NHPRC-funded projects.
[12] This point was brought up repeatedly during the meetings for this project. Participants representing ARMA were especially vocal on the need for such models.
[13] See the graphs in Appendix 6 for a breakdown of NHPRC grants by type of institution.
[14] See two recent collections of essays edited by Bruce Dearstyne, *Effective Approaches for Managing Electronic Records and Archives* (Lanham, MD: Scarecrow Press, 2002) and *Leadership and Administration of Successful Archival Programs* (Westport, CT: Greenwood Press, 2001).
[15] While recent developments have dramatically increased both the need and potential for drawing on the expertise of others outside of the archival profession, the call to do so is not new. For example, see Margaret Hedstrom, "Understanding Electronic Incunabula: A Framework for Research on Electronic Records," *American Archivist* 54 (1991): 334-54, and "Building Record-Keeping Systems: Archivists Are Not Alone on the Wild Frontier," *Archivaria* 44 (1997): 44-71; "Working Together," Coalition for Networked Information, 1998, http://www.cni.org/tfms/1999a.spring/handout/Lippincott99Stf.html; "Archival Issues Raised by Information Stored in Electronic Form," Society of American Archivists, 1995, http://www.archivists.org/statements/issues-infoelectronicform.asp; and Philip C. Bantin, "Strategies for Managing Electronic Records: A New Archival Paradigm? An Affirmation of Our Archival Traditions?" *Archival Issues* 23, no. 1 (1998): 17-34.
[16] See the special Graduate Archival Education Issue of *American Archivist* 63, no. 2 (2000). See also SAA's "Directory of Archival Education" (http://www.archivists.org/prof-education/edd-index.asp), which offers a discussion of archival education, guidelines for graduate programs in archival studies, and a state-by-state listing of educational programs.
[17] For E-SIGN and UETA, see http://thomas.loc.gov/cgi-bin/query/z?c106:S.761: and http://www.law.upenn.edu/bll/ulc/fnact99/1990s/ueta99.htm. The E-Government Act of 2002 is also

worthy of note, with its emphasis on information sharing and an enterprise architecture (http://thomas.loc.gov/cgi-bin/bdquery/z?d107:hr2458:).

[18] "Preserving Our Digital Heritage: Plan for the National Digital Information Infrastructure and Preservation Program" (Washington, DC: Library of Congress, 2002), http://www.digitalpreservation.gov/ndiipp/repor/repor_plan.html

[19] http://www.dpconline.org/

[20] *Reference Model for an Open Archival Information System* (Washington, D.C.: Consultative Committee for Space Data Systems, 2002), http://ssdoo.gsfc.nasa.gov/nost/isoas/ref_model.html.

[21] See, for example, Robert Horton, review of *The Myth of the Paperless Office* by Abigail J. Sellen and Richard H.R. Harper, In *American Archivist* 65, no. 1 (2002): 124-128, on the use-value of electronic records.

[22] For the importance of considering entire systems rather than isolated components, see David Bearman, "Record-Keeping Systems," *Archivaria* 36 (1993): 16-36; Philip C. Bantin and Gerald Bernbom, "The Indiana University Electronic Records Project: Analyzing Functions, Identifying Transactions, and Evaluating Recordkeeping Systems – a Report on Methodology," *Archives and Museum Informatics* 10, no. 3 (1996): 246-66; Susan Myburgh, "Information Systems and Records Management," *Records and Information Management Report* 15, no. 2 (1999): 1-12; Shawn P. Rounds and Mary P. Klauda, *Trustworthy Information Systems Handbook*. (Saint Paul, Minnesota: State Archives Department, Minnesota Historical Society, 2002), Version 4, http://www.mnhs.org/preserve/records/tis/tis.html

[23] National Partnership for Advanced Computational Infrastructure (NPACI), http://www.npaci.edu/; DigitalGovernment.org (dg.o), Digital Government Research Center and University of Southern California Information Sciences Institute, http://www.digitalgovernment.org/; "NSF Workshop on Research Challenges in Digital Archiving," 12-13 April 2002, Warrenton, Virginia, http://www.si.umich.edu/digarch/

[24] According to personal correspondence with Kevin Glick, who was a member of the US-InterPARES team, the bibliography was initially completed in May 2000 and then updated in October 2001. Glick also indicated that some links in the bibliography may already have been broken by the latter date. US-InterPARES, "NHPRC Bibliography," 2001, http://is.gseis.ucla.edu/us-interpares/bib_NHPRC.htm

[25] Five of the projects span more than one NHPRC grant.

[26] These are all part of the SAA electronic records case studies series, which actually included eight total works.

[27] Of the six grants approved in November 2001, five have web sites associated with their efforts.

[28] These numbers are accurate as of 8 February 2003.

[29] Many of these pages are still available through the Internet Archive. One can access a resource by either copying its original URL into the query box of the WayBack Machine (http://web.archive.org) or entering an address of the following form into a browser's location window, where "ORIGINAL_URL" should be replaced with the URL where the page previously could be found: http://web.archive.org/web/*/ORIGINAL_URL

[30] See www.coshrc.org. Alternatively, NARA's Archives Library Information Center (ALIC) seems logically suited and prepared to manage this function. As its web site explains, "ALIC provides access to information on American history and government, *archival administration, information management* [italics added], and government documents to NARA staff, archives and records management professionals, and the general public." http://www.archives.gov/research_room/alic/about_alic.html

[31] See ARMA International Bookstore, http://www.arma.org/bookstore/ and SAA Publications Catalog & Online Resources, http://www.archivists.org/catalog/

[32] *Sample Forms for Archival and Records Management Programs* (Lenexa, KA: ARMA International and Society of American Archivists, 2002).

[33] The cumulative number of copies sold for the series through fiscal year 2002 is 1,544. In 2002, all eight case studies together sold 89 copies. The NHPRC funded a print run of 700 for each title. The project staff would like to thank Teresa Brinati, SAA Director of Publications, for compiling and sharing these sales figures.

[34] See SAA Task Force on Electronic Publishing, "Exposure Draft for Public Comment," 9 August 2002, http://www.archivists.org/governance/tfep-report2.asp

[35] While there is some irony to a report on electronic records noting the importance of print publications, there is a disappointing history even to the short-term preservation of project results. Although appropriate

strategies for their long-term preservation are being actively debated, there is good reason to believe that printed reports and electronic publications from well-established organizations will be accessible for much longer periods than the typical project web site.

[36] See Appendix 5 for the complete text of the survey.

[37] ARCHIVES, ERECS-L, GOVERNMENT RECORDS (SAA), NAGARA-TALK, RECMGMT-L, MN-GRIN (Minnesota Government Records and Information Network), TCART (Twin Cities Archives Round Table)

[38] H-LOCAL, H-NET Announcements, MNLOCALHISTORY

[39] DIGLIB, E-DOCS

[40] GMIS-DISCUSSION (Government Management Information Sciences)

[41] The ARCHIVES, ERECS-L, and RECMGMT-L lists alone claim almost 7,000 members.

[42] This survey was originally presented online from 1 May through 31 October 2002. Questions 2, 4, 11, 13, 15, 17, 20-25 allowed respondents to enter free-text answers. All other questions (those asking for a choice among given options) featured check boxes. At the end, respondents were given the choice of submitting the survey as completed or re-setting the form to start over.

[43] For NARA, the various components of its records management redesign initiative are online at http://www.archives.gov/records_management/initiatives/rm_redesign_project.html. COSHRC's products from 1996 to the present are online at http://www.coshrc.org/reports/index.htm.

[44] IMLS, "Outcome Based Evaluation," http://www.imls.gov/grants/current/crnt_obe.htm.

[45] Several years ago, Richard E. Barry argued about electronic records management specialists that the "NHPRC cannot fund very many such positions or any one of them indefinitely. There is therefore a lesson for other organizations expecting to undertake projects of this kind. It is that there is a prima facie case for the establishment of positions for information management and technology specialists within the archives and records management organization." "Making a Difference: Comments on Electronic Records Management R&D Projects at Ohio State University, Indiana University and City of Philadelphia," paper presented at the Society of American Archivists (SAA) Annual Meeting, 29 August 1996, http://www.mybestdocs.com/SAA-PAP.html

[46] For a discussion of the need for an architecture that can scale to large collections of data, see the work of the San Diego Supercomputer Center, at http://www.sdsc.edu/NARA, and "It's About Time," National Science Foundation and Library of Congress, 2002,p. 67, http://www.si.umich.edu/digarch/Report.DFt.2.doc.

[47] "It's About Time," p. 41. The designers of individual tools and methods should be attentive to issues of scalability. Those implementing systems should also recognize the limitations of particular technologies and seek creative ways to combine components in ways that are appropriate to their particular environments. See http://www.sdsc.edu/NHPRC for further discussion of the issues.

[48] Further detail on the activities can be found in the accompanying document, "NHPRC Electronic Records Research Agenda: 1991 Research Issues and Related References." The identification of organizations and the examples of work they have funded are meant simply to be illustrative, not exhaustive of all activities related to electronic records. Future investigation would undoubtedly add many items to the list.