International Research on Permanent Authentic Records in Electronic Systems (InterPARES): Experiential, Interactive and Dynamic Records

Society preserves its memory in its art and architecture, in its books and other printed material, and in the traces of its endeavours captured in the form of records. Records are unique documents that participate in or result from the activities of individuals and organizations, and constitute the primary source of knowledge about those activities. Records are increasingly generated in electronic form and their preservation is complicated by the rapid obsolescence of hardware and software, the fragility of digital storage media, and the ease with which digital information can be manipulated. A portion of our society's documentary memory created and preserved digitally has already been compromised, and, although the extent to which valuable digital information has been lost or has become retrievable only at great expense has yet to be adequately quantified, it is already apparent that the threat is real and widespread. Moreover, as we address this threat, we must remember that preserved records are of little value unless we can be sure they are authentic, that is, that they can be trusted as sources. For centuries, our presumption of the authenticity of records has been premised on the presence in them of visible formal elements such as seals and signatures, on the existence of controls on the procedures by which records are generated, transmitted, used and maintained, and on an uninterrupted line of legitimate custody. The use of digital technology to create records has reconfigured the traditional formal elements by which records were recognized as authentic, allowed for the bypassing of procedural controls, and made of physical custody an elusive concept.

A previous research initiative, known as the InterPARES project, has investigated the issues surrounding the creation and preservation of authentic administrative and legal electronic records in databases and document management systems. In the course of this research new questions arose. What strategies are necessary for the creation and preservation of electronic records generated in the course of artistic and scientific activities? How vulnerable are electronic records created outside of regulated administrative environments? How does the use of interactive, experiential and dynamic systems affect the reliability, accuracy and authenticity of the records from creation to long-term preservation? How can all of these questions be addressed while respecting cultural diversity and pluralism?

This new project assembles a team of researchers from twenty countries and five continents, comprising scholars from both the private and public sectors, affiliated with archival and other government institutions, universities, and cultural institutions, with expertise in several artistic, scientific and administrative disciplines and in the archival and computer sciences, to address these questions. Its aim is to develop a theoretical understanding of new record types and record-creation processes across a variety of activities, and strategies for the appraisal and long-term preservation of these records. Researchers will undertake case studies within each discipline to gather information about new record types and creation practices. The significance of the concepts of reliability, accuracy, and authenticity to records creation and preservation in each discipline will be explored, and models capable of reconciling and transcending the individual disciplines will subsequently be developed to assist in the prototyping and testing of appraisal and preservation strategies. The project will also examine the descriptive requirements of new record types and aggregations, so that they will not only be preserved but remain accessible over the long term, develop an international and interdisciplinary glossary, and lay out the principles and criteria that should guide the formulation of policies and guidelines at various levels.

Archival institutions regard this project as the locus where the knowledge necessary to design and implement effective electronic records preservation systems will be developed. Records creators regard it as the source of information on how specific records creation practices can promote the long-term preservation of their records as trusted evidence of past activities and valued cultural expressions. Moreover, both records creators and preservers are concerned with the protection of patents, copyright, and other forms of intellectual property and trust that InterPARES 2 will provide the thorough and well-tested theoretical understanding necessary to cope with these and other challenges posed to the preservation of authentic records by the rapid evolution of technology.

I. Research Background and Focus

Ongoing technological change is causing widespread concern in Canada and around the world regarding the preservation of cultural heritage produced or stored using digital technologies. To address this challenge, in January 2000, the Council on Library and Information Resources convened a workshop in Washington, D.C. with a group of experts from different domains, including government and private sector archivists, librarians, historians, publishers, conservation specialists from the moving picture and recording industries, computer scientists, sociologists and heads of foundations financing scholarly research in the humanities and social sciences.[1] In May 2000 in Spain, UNESCO and the European Commission hosted a forum on the impact of technological change on the audio-visual industry. Four months later in Greece, an NGO conference and a meeting of the Ministers' Network[2] were held to discuss its impact on all media industries. These authorities have acknowledged the threat that is posed by the rapid obsolescence of hardware and software, the fragility of digital storage media, and the ease with which digital information can be manipulated, compounded by the prevailing patchwork of preservation policies and standards that have been implemented without regard for cultural diversity.

Society preserves its memory in its art and architecture, in its books and other printed material, and in the traces of its endeavours captured in the form of records. Unlike publications, which are by definition produced in multiple copies for purposes of dissemination, records are unique documents that participate in or result from action. They are produced by individuals and organizations as a natural by-product of their activities, and constitute the primary source of knowledge about those activities. Records are more than data, information or even documents,[3] in that they embody the process of their creation, the requirements of the body making or receiving them and setting them aside for reference or further action, and the intellectual relationships, or 'archival bond', with the other records of the person or organization producing them.

A portion of our society's documentary memory created and preserved digitally has already been compromised,[4] and there are enormous costs associated with recovering electronic records that have become inaccessible.[5] While the extent to which valuable digital information has been lost or has become retrievable only at great expense has yet to be adequately quantified,[6] it is already apparent that the threat is real and widespread. Moreover, even if we could ensure the preservation of electronic records and overcome media fragility and technological obsolescence, preserved records are of little value unless we

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[1] Three of the co-investigators of the MCRI "InterPARES " project, including myself, as its director, were invited. Papers from this workshop are published in Authenticity in a Digital Environment (Washington, D.C.: CLIR, 2000).

[2] The Ministers Network was formed in 1998 at the initiative of the Canadian Minister of Culture, Sheila Copps, and it affiliates the official cultural representatives of approximately forty countries, all of them members of UNESCO.

[3] In archival science, documents are defined as recorded information, information as an aggregate of data meant for communication, and data as the smallest meaningful unit of information.

[4] Prominent examples include the loss of a substantial share of the administrative records of the former East Germany due to the absence of effective records management policy [Wettengel, 1999; Ross, 2000], satellite observations of the defoliation of the Brazilian rainforest in the 1970s [Waters and Garrett, 1996], much of the early data gathered by NASA (including 20% of the data generated by the 1976 Viking exploration of Mars) [Cook, 1995; Harvey, 2000], and the near loss of the 1960 U.S. census data due to the obsolescence of the tape drive needed to read the data [Waters and Garrett, 1996]. Further, a frantic search for records pertaining to the purchase of equipment at a nuclear power plant operated by Ontario hydro revealed the inadequacy of an electronic records management system introduced without taking into account the inevitable transformation in records creation practices within the institution. [Cook, 1995]

[5] The most well-known example is the PROFS case in the United States, in which a Supreme Court ruling necessitated the restoration of the electronic correspondence of the Executive Office of the President in the late 1980s and early 1990s [Brown, 2000]. Other examples include data gathered by the Landsat system in the 1970s [Ross, 2000] and an early geographic information system (GIS) known as LUNR (Land Use and Natural Resources Inventory Project) undertaken in the 1960s whose data had to be reconstructed from hard copies at considerable expense when the electronic version proved unrecoverable. [Waters and Garrett, 1996]

[6] Anecdotal evidence abounds: individuals and organizations who have been working in a digital environment for any length of time are all too familiar with corrupted tapes and diskettes, the unavailability of antiquated hardware and software, and of the expertise needed to make an older system operable. Some recent efforts have attempted to measure the degree to which the loss of digitally preserved materials is widespread: a study of library and archival institutions conducted in 1998, for example, found that nearly half of the institutions interviewed reported losses of digital holdings due to media fragility and technological obsolescence [Hedstrom and Montgomery, 1998].

can be sure they are authentic, that is, that they can be trusted as sources. For centuries, our presumption of the authenticity of records has been premised on the presence or absence of visible formal elements such as seals and signatures and of controls on the procedures by which records are generated, transmitted, used and maintained, and on an uninterrupted line of legitimate custody. The use of digital technology to create records has reconfigured the traditional formal elements by which records were recognized as authentic, allowed for the bypassing of procedural controls, and made of physical custody an elusive concept.

If electronic records will ever be as trustworthy as records on traditional media, the practices by which they are created, maintained, and used must be analyzed, and strategies and standards for their authentic preservation must be developed. This was the mission of our first MCRI project, known as InterPARES (International research on Permanent Authentic Records in Electronic Systems),[7] a research endeavour that set out to deal with records mandated for accountability and administrative needs. In most countries, such records are the majority of those selected for permanent preservation, and constitute a high priority for both the public and the private sector. When in electronic form, they are usually created in databases and document management systems. The authenticity of these records on traditional media has been a concern of most juridical systems, which have explicitly stated requirements for their authenticity that could be used as a starting point for developing new requirements for their electronic counterparts. The creation, maintenance and use of these records by their creators are highly controlled, thus the InterPARES research--hereinafter called InterPARES 1, to distinguish it from the proposed research--has been able to focus on the preservation of the authenticity of records that are no longer needed by the creating body to fulfill its own mission or purposes, presuming the authenticity of the records either used by the creating body in the usual and ordinary course of business or kept by it for reference. This choice was also supported by the fact that a previous research project, co-directed by Terry Eastwood and myself, and carried out in collaboration with the U. S. Department of Defense,[8] had formulated the requirements for the creation, maintenance and use of these types of electronic records by the creating body. This work provided a theoretical foundation for the InterPARES 1 project.

However, in the course of InterPARES 1, it became apparent that technological developments are beginning to interfere even with the procedures and forms prescribed for legal records, that decision making is increasingly based on records whose creation and form are discretionary, and that great concern is developing about preserving and verifying the authenticity of new record types that are more and more common worldwide. One specific topic that the Canadian team of co-investigators decided to pursue was that of records incorporating sound. This topic opened a series of issues and concerns and convinced the team that it would be necessary to use the knowledge developed in achieving the objectives of InterPARES 1 as the starting point for an in-depth study of other types of records, especially those produced by the creative industries, the scientific community, and the electronic government in its open-ended interactions.[9]

In the last few years, record types have increased in number and complexity, raising several new issues. Previously, most electronic records produced in the course of administrative activities of any kind were textual,[10] allowing for storage in a non-proprietary format (such as ASCII), and demanding a relatively unsophisticated software and hardware configuration for copies to be produced in a form close

[7] For information about InterPARES see the project's web site at http://www.interpares.org.

[8] This project, funded by a SSHRC Standard Research Grant, and entitled "The Protection of the Integrity of Electronic Records," will be hereinafter referred to as the 'UBC-MAS Project'. On the InterPARES web site, under Resources, there is a direct link to the web sites containing the findings of this project and to the records management standard derived from it, DoD 5015.2 STD.

[9] Examples of the issues and concerns resulting from the Canadian Team case studies include: 1) Unpublished music recordings created in digital form have a very short life-expectancy. These recordings are often created using file formats that are short-lived, that are not in widespread use, and that are proprietary and expensive to migrate. 2) The lack of a profiling standard consistently followed (especially outside of institutions) has meant that many music recordings are unidentifiable (especially as to composer, performer, date and place of recording, etc.).

[10] "Textual" is defined by in InterPARES 1 as containing words, numbers, or symbols. [InterPARES Glossary, 2001]

enough to the original. Increasingly, however, organizations and individuals have been generating records of an experiential, interactive or dynamic nature, which will require different, and perhaps record-type specific, preservation strategies.

Clifford Lynch, director of the Coalition for Networked Information, describes experiential digital objects as objects whose essence goes beyond the bits that constitute the object to incorporate the behaviour of the rendering system, or at least the interaction between the object and the rendering system [Lynch, 2000a]. He also maintains that defining the authenticity of such objects is a much more complex issue than with raw data or traditional documents, because it is dependent not on the ability to reproduce a copy of the object's original bit-stream, but on the ability to recreate the environment in which that object was experienced. Examples of experiential digital objects range from audio and moving images embedded in a web page to virtual reality systems to databases that link geo-spatial coordinates to specific smells.[11]

An interactive system is one in which each user entry causes a response from or an action by the system [IEEE, 1997]. To generate preservable records in such systems, we need to ascertain a) how user input affects the creation and form of electronic records (as is the case with much on-line commerce); and b) if and when the interactive system and its inherent functionality need to be preserved for those records to remain meaningful and authentic. Examples of interactive systems range from web pages delivering government services online to musical performances based on human-computer interaction to commercial video games.

Seamus Ross has defined dynamic documents as documents that are "dependent upon data that might have variable instantiations and be held in databases and spreadsheets" [Ross, 2000]. Examples range from simple hyperlinked web pages to complex systems where information is stored and updated to be shared via wireless transmission by multiple mobile users in diverse ways [Kaashoek, Pinckney, and Tauber, 1995]. The increasing reliance on such documents by individuals and institutions will necessitate their preservation over the long term: how the information they contain is captured and set aside for preservation raises both practical and philosophical issues.

Whether experiential, interactive, and dynamic digital objects are indeed records depends on their relationship to the activity of their creator [Duranti, 1994; Duranti, 1997; Barry, 1994]. Cultural, scientific, and manufacturing industries have a long history of creating such objects in the course of their practical activities, and while the term 'record' in the archival sense has not been typically applied to these objects within those sectors, clearly the professionals charged with the preservation of those archives may have to face the concrete challenge of maintaining the functionality of interactive and dynamic records and recreating the environment of experiential records. It is important both to know to what extent the requirements, methods and strategies developed by the InterPARES 1 project to preserve authentic electronic records produced in databases and document management systems apply to these new situations, and to develop new ones where they do not. These issues are further compounded when individual creators lack the knowledge and tools to generate electronic records that can be preserved over the long term. InterPARES 1 research has indicated that record-making and record-keeping processes that have ensured the creation of reliable textual electronic records and the maintenance of their authenticity are likely inadequate for more complex record types of the kind just described.

The point made above can be illustrated by considering the special challenges for making and keeping reliable records and preserving authentic records the most salient characteristic of which is the lack of a stable form and content (that is, of fixity), as is the case with experiential, interactive and dynamic records. Ironically, the ease with which their form and content can be manipulated has given those who generate them, particularly in the creative and research sectors, a new reason for keeping

[11] Lynch likewise asserts in his article "Experiential Documents and the Technologies of Remembrance" that "[t]he retention , reuse, management and control of this new cornucopia of recorded experience and synthesized content in the digital environment will...become a matter of great controversy. This will include, but not be limited to, privacy, accountability and intellectual property rights in their broadest senses." [Lynch, 2000b]

them: 'repurposing'. Makers and distributors of digital music and art works, as well as designers and architects, for example, often obscure the meaning and cultural value of their records by treating their form and content merely as digital data to be manipulated to generate new records, decontextualizing them from the activity by which they were produced. The potentially wide dissemination of repurposed documents threatens the authenticity of the original materials, as well as their authors' moral rights. The records created in the course of scientific activities, such as geo-spatial records, while prone to more stringent record-keeping requirements, are also subject to the re-purposing of their content. For these reasons, it is necessary to develop an understanding of these new records not only in the later phases of their life cycle, but from the moment of their creation. While InterPARES 1 was concerned with developing knowledge and strategies for electronic records preservers, it is now necessary to develop knowledge and strategies beneficial for both the creators and preservers of these complex new records.

Technological obsolescence, which poses a continual challenge to the accessibility, readability and intelligibility of electronic records, is of even more concern in the context of artistic and scientific activities than in that of administrative activities. Inadequate record-management practices have already precipitated the disappearance of many records pertaining to artworks that depended upon now obsolete software and hardware for their continued existence, including interactive musical materials, art works situated in virtual environments, and other performance works whose essential parameters were insufficiently documented to allow for their recreation. This has created enormous difficulties for artists concerned with the long-term preservation of the unique and authoritative version of their work, requiring them to devote valuable time and resources to preservation efforts[12] and engendering an urgent demand for effective and tested strategies.

Many of the issues surrounding the management of electronic records in the arts and sciences are becoming relevant to government archives, as administrative bodies employ increasing complex multimedia systems in the creation of their records [Ross, 2000]. In Canada, for example, the Government On-line initiative has mandated that the most common transactions between the government and its citizens be possible on the Internet by 2004. The Italian government has set the same deadline. This raises considerable questions for the creation and management of the electronic records generated by such interaction, in part because the making of the record will no longer be the sole responsibility of the body responsible for the electronic system (in this case, the government), but also of the user. Further, when the terms and conditions that govern the recorded transactions between government and citizens are articulated on web pages, those pages may need to be preserved with their functionality for purposes of accountability.

To meet these challenges requires an understanding of the nature of the new electronic records and record-creating processes in the creative and performing arts, in the social and physical sciences, and in the on-line interaction of citizens and government and of consumers and businesses. For our society to fulfill the legal, social and cultural imperative of preserving these records as authentic over the long term, research must be done into their characteristics and development, the requirements for their reliability, accuracy, and verifiable authenticity, and methods and strategies for their selection and preservation.

It is critical that the research needed to address the issues outlined above be undertaken collaboratively by those with the requisite insight and experience. To this end, the international team of researchers formed for InterPARES 1, together with additional researchers with discipline-specific knowledge, intend to draw upon their collective expertise to address these issues. The singular nature of the research team, comprising leading scholars in archival science, the social and physical sciences, and the creative and performing arts, as well as representatives from archival institutions and other government bodies from twenty countries and five continents, will ensure that this research, so important

[12] For example, internet artists Kit Galloway and Sherrie Rabinowitz have temporarily shut down their groundbreaking ecafe.com website for two years in an attempt to create an archive of their activities since they began the project in 1984. See <http://www.ecafe.com/about.html>, current as of 2001/07/26.

for the preservation of our societal memory, will remain focused on 'records' rather than on all digital objects, on the preservation of their trustworthiness both as meaningful content and as records rather than on all issues related to digital preservation, and on the protection of their cultural character rather than on imposing uniform models and applications. This crucial perspective is unique.

As with InterPARES 1, the results of this research will have benefits extending beyond the archival and academic communities into the business community, more specifically where scientific research records are relied upon for the protection of patents and other forms of intellectual property. A number of short-term and small-scale research projects have been undertaken in the private sector, but are limited by an impatience for quick results, the lack of the necessary theoretical knowledge surrounding authenticity and long-term preservation, and a narrowness of disciplinary perspective. Because of this, the Collaborative Electronic Notebook Systems Association (CENSA), a consortium of pharmaceutical, chemical, and information technology companies, will once again fully participate in InterPARES research, bringing important expertise in the records creation processes in science-related industries. CENSA and its member corporations are looking to us to provide the long-term perspective and expertise demanded by the issues at hand.

Thus the proposed research project, hereinafter called InterPARES 2, aims at developing a theoretical understanding of the records generated by interactive, dynamic, and experiential systems, of their process of creation, and of their present and potential use in the artistic, scientific and government sectors.[13] On the basis of this understanding, the project will formulate methodologies for ensuring that the records created using these systems can be trusted as to their content (that is, are reliable and accurate) and as records (that is, are authentic) while used by the creator; for selecting those that have to be kept for legal, administrative, social or cultural reasons after they are no longer needed by the creator; for preserving them in authentic form over the long term; and for analyzing and evaluating advanced technologies for the implementation of these methodologies in a way that respects cultural diversity and pluralism.

Previous research into the preservation of digital documents in the creative and performing arts has focused on the products of artistic activities: sound recordings, films, photographs, etc. Such research concerns autonomous works rather than records, and ignores a significant portion of an artist's output in the form of sketches, storyboards, out-takes, drafts, notes, and so on. The importance of preserving these records in order to understand, reconstruct and verify the authenticity of the works of an artist is indisputable, but one has also to consider that the records of artistic activities have strong legal status and provide information that needs to be preserved for reasons additional to their cultural value. Because of its focus, the research conducted on the digital preservation of works of art tends to look at purely technological solutions, and ignores the issues surrounding the preservation of the documentary and procedural context of each record, the maintenance of intellectual accessibility, and the protection of its authenticity over time.[14]

This is also the case with research into digital preservation in the social, natural, and physical sciences. The preservation of scientific data has been of great concern for its value to new scientific research, but the preservation of the records of scientific activities is also crucial to the protection of intellectual property, especially patents. Scientific records require specific metadata description for their

[13] This research will not address specifically electronic commerce, not because there are already research projects dealing with it, as they take very different perspectives, but because we believe that any finding concerning electronic government would be readily applicable to electronic commerce as well. However, we will test this hypothesis in the course of the research.

[14] To illustrate, the largest ongoing international project addressing issues relating to digital music is the Harmonica Project; this project is based in The Netherlands and includes the participation of prominent music libraries from across Europe. As librarians, the researchers of the Harmonica Project are principally interested in using digital technology to increase access to published music in the form of scores, recordings, and multimedia works. Similarly, the IDEAMA (International Digital Electroacoustic Music Archive) project is an international collaborative effort aiming to "collect, preserve and disseminate historically significant electroacoustic music." [Bauman, 1995]. While this project focuses on unpublished electroacoustic music compositions, the compositions collected in the "archive" are digitized recordings of completed works, not the records created in the process of making those works.

identification, retrieval, and intact preservation; where the data contained within those records are primarily a concern of scientific disciplines, the metadata that articulate their attributes and are necessary for their authenticity are primarily an archival concern. Research projects in the scientific community have neglected to address the issues of the authenticity of records and of their accessibility as trustworthy evidence of past endeavours and of the evolution of thought in the sciences, as the expertise needed to do so resides in the records and archival management research communities.[15] For these reasons, research into the preservation of the records of artistic an scientific activities is properly within the purview of archival science, and as such needs to draw financial support from agencies and institutions mandated to support research in this area. Much of the research activity on digital preservation undertaken across disciplines, but especially by library scholars, is focused on the digitization and dissemination of analogue and paper resources.[16] While considerable efforts continue within the disciplines represented in InterPARES 2 to develop the knowledge necessary to preserve publications of all types, including those born digital and those digitized, the responsibility for developing the theory necessary for the authentic preservation of reliable and accurate electronic records falls on the archival research community, working in a collaborative and interdisciplinary manner with representatives of the various artistic and scientific communities. Moreover, this shared interest offers a unique opportunity for cross-fertilization also in the area of government, which has always been the central concern of the archival community. As electronic government moves more and more towards the creation of records that increasingly resemble those generated by the artistic and scientific communities, the expertise of scholars from those disciplines will complement that of archivists and government representatives in ensuring the authentic preservation of reliable and accurate electronic government records.

InterPARES 2, although strongly rooted on the findings of InterPARES 1, is dramatically innovative in several ways: 1) it focuses on records produced in new digital environments, experiential, dynamic, and interactive, where InterPARES 1 was concerned with records generated in databases and document management systems; 2) it examines records resulting from artistic, scientific and government activities, where InterPARES 1 was concerned with records resulting from administrative and legal activities; 3) it deals with the records' entire life-cycle (from creation to permanent preservation), where InterPARES 1 was concerned with non-current records destined to permanent preservation; and 4) it addresses issues of reliability and accuracy in addition to issues of authenticity, where InterPARES 1 was only concerned with authenticity.

II. The Organization of the Project, the Research Questions and the Methodology

II. 1 Introduction

InterPARES 2 is scheduled to begin on January 1, 2002 and to conclude on December 31, 2006. It will adopt the skeletal organizational structure of InterPARES 1, and extend this structure to allow for the more broadly interdisciplinary nature of the research.

The central organizational principles used to guide InterPARES 1 were the grouping of research questions into domains of inquiry, the establishment of task forces to address those questions, and the formation of national teams to contextualize the findings of the research. An international team chaired by the project director and comprising the chairs of the task forces and national and multinational teams and the representatives of the test sites (that is, archival institutions) directed the work of the units, which included also a Glossary Committee, responsible for consistency in terminology among disciplines and

[15] For example, the report of the U.S. National Research Council Commission on Physical Sciences, Mathematics, and Applications entitled "Preserving Scientific Data on Our Physical Universe: A New Strategy for Archiving the Nation's Scientific Information Resources" discussed at length the need for long-term access to historical scientific data without addressing the issue of their authenticity as a record of scientific activity among its fundamental principles for long-term data retention. Likewise, this report does not address the intellectual property implications for data gathered outside of government agencies.

[16] Examples include the National Library of Canada's "The Virtual Gramophone," the "American Memory Project" at the U.S. Library of Congress, and the Alexandria Digital Library Project.

cultures. Key to the successful completion of the work of each of these units was the opportunity to meet several times face-to-face for intense and prolonged periods of work. The international team and the task forces met three times per year, with the task forces meeting additionally once or twice each year independently of the international team. The national and multinational teams have met according to their individual schedules.

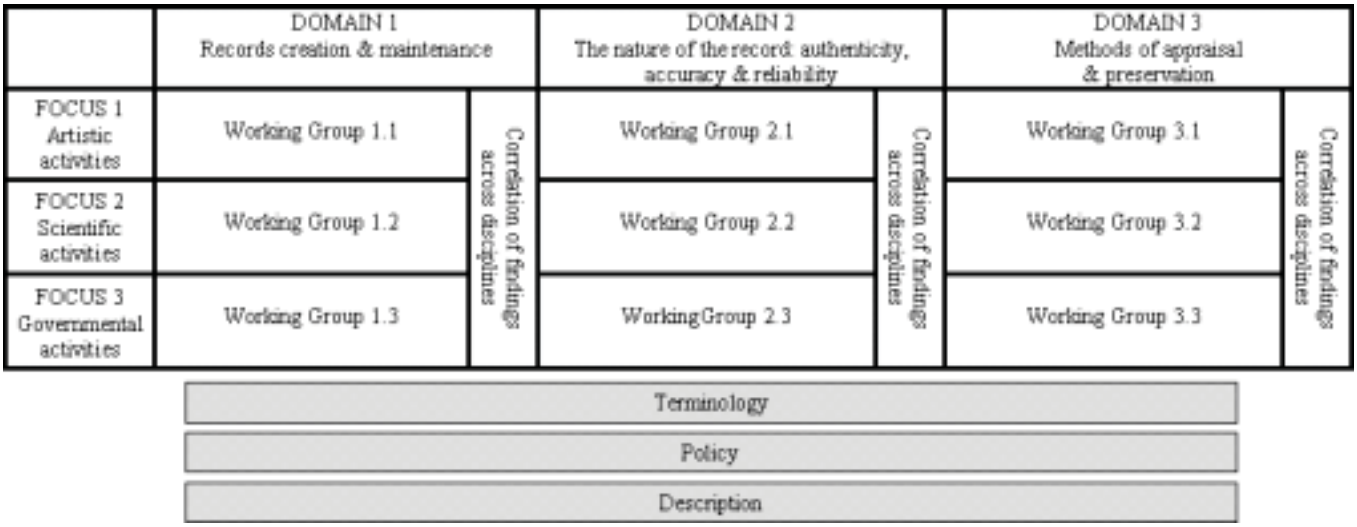
II. 2 Organization

InterPARES 2 has assembled national and multinational teams of co-investigators, including both individual and institutional researchers, not only to maximize funding, as each team has access to distinct resources, but also and foremost to contextualize the findings of the research in each participating jurisdiction, respecting cultural diversity and pluralism. In addition, it will adopt the organizational principles and procedures that proved effective for InterPARES 1, but adapt them to allow for ample interaction among the diverse participants while enabling those same participants to bring their specific expertise to bear on clearly identified and circumscribed areas of research. As shown on the attached matrix, the research project will be divided into three domains of inquiry, each addressing a different set of questions. The first domain will investigate the nature of the records under examination and the process of their creation. The second domain will study the concepts of reliability, accuracy and authenticity as they are understood in the various disciplinary areas involved in the research. The third domain will test existing appraisal and preservation methods on the records in question and develop and test new ones.

Each domain will be subdivided into the three focuses of research discussed in the research background and focus: the records of artistic activities, the records of scientific activities, and the records of electronic government (hereinafter “e-government”) activities. Thus, the matrix is constituted of three domains represented vertically and three focuses represented horizontally, for a total of nine areas. Each area will be the responsibility of a group of investigators with diversity of expertise. The areas of the same focus will be studied by groups including specialists in the activities of the focus. For example, the group of co-investigators conducting research on the records of artistic activities will comprise, in addition to experts in archival and computer science, experts in music, dance, photography, e-literature, theatre, film, multimedia, visual art and the design of multimedia software and hardware. Consequently, the areas of the same domain, spanning three focuses, as well as the areas of the same focus, spanning three domains, will be studied by highly interdisciplinary teams of investigators. The collection of all experts working on a given domain will constitute the "domain task force", while the collection of all experts working on the same focus will constitute the "focus task force". Thus, inter-disciplinarity is fostered in three dimensions: within each working group, within each domain task force, and within each focus task force. The basic research is carried out at working group level, with the working groups of the same domain and of the same focus meeting as task forces during weeklong research workshops in February and September. In between face-to-face meetings, the working groups will work as individual units through electronic communication or *ad hoc* meetings that they will organize as needed.

Three additional cross-domain research units will be struck for the duration of the project. The Terminology Research Team will control the use of terms in all areas of the research. This research team will establish formal procedures for the proposal and adoption of specific terms, and meet in conjunction with International Team workshops to approve the official terms of the project and related definitions, ensuring consistency among the various research units and keeping into account disciplinary and cultural differences. The Policy Research Team will analyze the existing policies and strategies in each domain and focus of inquiry in light of the work being done by the working groups and then distill from the findings and products of the working groups policies, strategies and guidelines for the reliable and accurate creation and maintenance of the records under examination, and their authentic preservation within the context of each activity and culture generating them. The Description Research Team will

develop guidelines for the intellectual control and archival description of all types of records studied. These three cross-domain research teams will meet concurrently with the task forces, twice a year.



An Advisory Committee comprising international experts not directly involved in the research will monitor the project throughout its duration, offering criticisms and suggestions. The Advisory Committee, composed of the presidents of national and international professional archival associations and of representatives of bodies having a direct competence and interest in the subject of the research, such as NASA, will meet with the International Team once per year.

An International Team, chaired by the Project Director and comprising the chairs of the nine working groups, of the three cross-domain research groups, and of the national and multinational teams, will meet for a four-day research workshop twice a year (in June and November) to share the findings, reconcile them, direct the research, and decide on dissemination activities.

The project will begin with a meeting in Vancouver in February 2002 in the course of which the constitution of the nine working groups (and therefore of the three domain task forces and the three focus task forces), three cross-domain research teams, and the Advisory Committee will be determined, and all working groups', task forces' and cross-domain research teams' chairs will be named. Upon their formation, the research units will determine the specific objectives to be accomplished before the first International Team workshop in June, refine their methodology, and assign tasks to each member. Each unit, on the basis of its composition, will decide how to carry out the work till the next research units' workshop, whether only through electronic communication or also through face-to-face meetings.

The work of the first two domain task forces should take approximately three years to yield substantial and reliable results, but the feedback from the working groups of the third domain will likely make necessary additional investigations and verifications. Thus, it is expected that the research of all units will be carried out over the full five years of the project, with an increasing activity of the cross-domain research teams over the last two years of the project. Some movement of investigators among units is both expected and auspicious.

II.3 Research Questions, Methodology, and Outcomes

DOMAIN 1: The Nature of the Records and of the Processes that Create and Maintain Them.

The first research domain explores the records described in Section I, Research Background and Focus, and the processes that create and maintain them. An understanding of the meaning of a record rests upon an understanding of its process of creation and of the function of the record within the activity in which it participates. In order to preserve such a record in authentic form over time, it is necessary not

only to know its characteristics, process of creation, and function, the purposes for which it is kept by its creator, and which of its features will allow its authenticity to be determined, but also to ensure that the record is generated in such a way that it is possible to carry it forward for the use of future generations. This knowledge needs to be acquired and developed across the wide spectrum of electronic records identified in each focus area of this project.

Although the creation process and documentary form of the records created by governments tend to be regulated and controlled, thus making it easier for a preserver to carry such records forward, the electronic delivery of government services, which is redefining the processes by which transactions between a government and its citizens are conducted, may be changing not only the form of the resulting records, but also their other salient characteristics (for example, their fixity). The very nature of the records created in the course of online interaction may be very different from that of the electronic records presently generated in databases and document management systems, and their function may significantly differ from that of the records examined in InterPARES 1.

Records generated outside of government are largely the product of unregulated processes, and have already posed interesting challenges to those responsible for their preservation. Visual artists, musicians, and choreographers accumulate material with great cultural value (for example, sketches and drafts) that correspond to the traditional definition of a record, and so do organizations and individual scholars who carry out scientific research. When these materials are on paper, they pose few problems for preservation, because they are kept in their original immutable form, which remains equally accessible through time and allows the determination of their identity and integrity nearly regardless of labeling conventions, archival descriptions, etc. In the last two decades, digital environments have changed the practices of artists and scientists. In some cases, these environments provide fuller traces of creative processes that used to go undocumented, so that we now have records of activities that were never recorded before. In other cases, the opposite has occurred. For example, it is rarer and rarer to see the creation process of a poet through the sequence of edited drafts, which are now usually overwritten. More seriously, however, few of the documents produced using new information technologies have properties that allow us to determine their identity and integrity, to arrange and describe them, and to ensure that they can be kept accessible and authentic and that their authenticity can be verified later. It is important to understand how digital work environments have changed the process of record creation in each of the activities in question, how the identity of the various types of records created can be established as to provenance, authorship, function and relation to the records participating in the same activity, if and when records created in such environments can be considered complete and/or capable of accomplishing the purposes for which they were generated, and what are the criteria and practices of their creator in maintaining them.

Domain 1 Research Questions:

- What types of documents are traditionally made or received and set aside (that is, created) in the course of artistic, scientific, and governmental activities that are expected to be carried out on-line? For what purposes? What types of electronic documents are currently being created to accomplish those same activities? Have the purposes for which these documents are created changed?
- What are the nature and the characteristics of the traditional process of document creation in each activity? Have they been altered by the use of digital technology and, if yes, how?
- What are the formal elements and attributes of the documents generated by these processes in both a traditional and a digital environment? What is the function of each element and the significance of each attribute? Specifically, what is the manifestation of authorship in the records of each activity and its implications for the exercise of intellectual property rights and the attribution of responsibilities?
- Does the definition of a record adopted by InterPARES 1 apply to all or part of the documents generated by these processes? If yes, given the different manifestations of the record's nature in such

documents, how do we recognize and demonstrate the necessary components that the definition identifies? If not, is it possible to change the definition maintaining theoretical consistency in the identification of documents as records across the spectrum of human activities? In other words, should we be looking at other factors that make of a document a record than those that diplomatics and archival science have considered so far?

- As government and businesses deliver services electronically and enter into transactions based on more dynamic web-based presentations and exchanges of information, are they neglecting to capture adequate documentary evidence of the occurrence of these transactions?
- Is the move to more dynamic and open-ended exchanges of information blurring the responsibilities and altering the legal liabilities of the participants in electronic transactions?
- How do record creators traditionally determine the retention of their records and implement this determination in the context of each activity? How do record retention decisions and practices differ for individual and institutional creators? How has the use of digital technology affected their decisions and practices?

Domain 1 Methodologies:

The central concepts relating to records and to the record-creation and maintenance processes will be defined by the working groups within the Domain 1 task force. Using grounded theory, the Domain 1 task force will conduct case studies across a wide spectrum of activities to gather information about record-making and -keeping processes and the records resulting from them. To achieve this purpose, it will develop the necessary tools (for example, questionnaires). While the case studies will be conducted within the context of Domain 1, data will be gathered that is relevant to the work of all three domains. Diplomatic analysis will be used to describe the formal elements of the records and their process of creation and to identify the pertinent contextual information that needs to be preserved. In InterPARES 1, diplomatic analysis was used to identify the records among all types of recorded information present in each case study, and to ascertain the extent to which traditional record elements continue to appear in electronic records, by bouncing unknown realities against the known one, that is, against the ideal template of the traditional record. In InterPARES 2, the approach will be that of the original diplomatists: an examination of a wide variety of records will serve to identify elements, attributes, and their function and to generate templates reflecting the abstract forms of experiential, dynamic and interactive records by identifying the necessary characteristics of each of those records, that is, all the possible elements and attributes distinguishing each. In addition, we will represent the records observed during the case studies in models in order to test the templates against them. The modeling technique to be used will be selected at the first research workshop. In addition to representing records types in templates and testing them against the models of the records generated by each type of activity to see whether the characteristics key to their authentic preservation are consistent across activities, this study will represent abstractly the processes of creation and maintenance of each type of record reflected by each template using activity modeling and then generating work-flows that will also be tested against the processes typical of each activity. This work of collection of data, analysis, and representation and testing of the findings will coalesce with the research conducted in the second domain and result in the development and testing of guidelines that can be used by the various kinds of records creators to produce and maintain records that can be authentically preserved over the long term.

Domain 1: Outcomes

The expected outcomes of the research conducted in Domain 1 are: questionnaires, case studies overviews, templates for analysis, entity and activity models, work-flows, and methodology statements. These research tools and products will be posted on the web site and further communicated in presentations, lectures, and scholarly writings.

DOMAIN 2: The Concepts of Reliability, Accuracy, and Authenticity

The concepts of reliability, accuracy and authenticity of records are at the root of records and archives management decisions. **Reliability** refers to the trustworthiness of a record as a statement of fact. It exists when a record can stand for the fact it is about, and is established by examining the completeness of the record's form and the amount of control exercised on the process of its creation. The records forms generated using new information technologies make increasingly difficult to determine when a record is complete and whether the controls established on its creation are either sufficient or effective for anyone to be able to assume its reliability. **Accuracy** refers to the truthfulness of the content of the record and can only be established through content analysis. With administrative and legal records, it is usually inferred on the basis of the degree of the records' reliability and is only verified when such degree is very low. The volatility of the digital medium, the ease of change, editing, and the difficulty of version control, all make it harder to presume accuracy on the traditional bases. **Authenticity** refers to the trustworthiness of a record as a record. An authentic record is one that is what it purports to be and has not been tampered with or otherwise corrupted. Authenticity is established by assessing the identity and the integrity of the record. It must be possible to ascertain at all times what a record is, when it was created, by whom, what action or matter it participated in, and what its juridical/administrative, cultural, and documentary contexts were. It must also be possible to ascertain the wholeness and soundness of the record: whether it is intact or, if not, what is missing. Reliance on the authenticity of records is at the root of decision-making and of scholarly endeavours. It is vital to know that the records we use for action and reference or as sources for research are trustworthy as records. However, the pervasiveness of increasingly complex, fast-changing computer technology is making the authenticity of electronic records very hard to demonstrate and to preserve on the face of incompatibility and obsolescence. These concepts require in-depth exploration because all disciplines involved in InterPARES 2 use the terms reliability, accuracy and authenticity, but with different meanings, and it is essential to reconcile such meanings if we wish to take a consistent approach to the reliable and accurate creation and to the authentic maintenance and preservation of the records generated by the whole spectrum of activities examined by this project.

Domain 2 Research Questions:

- What does record reliability mean in the context of artistic, scientific and government activities? To what extent can the electronic records created in the course of each type of activity be considered reliable and why? What requirements on their form and controls on their creation would make us presume that they are reliable?
- What does record accuracy mean in the context of each activity? To what extent can the electronic records created in the course of each type of activity be considered accurate and why? What controls on their creation would make us presume that these records are accurate?
- What does authenticity mean in the context of each activity? To what extent is the definition of record authenticity adopted by InterPARES 1 relevant to the records resulting from each type of activity and from the use of increasingly complex digital technology?
- On what basis can the records created in the course of each activity be presumed authentic? How, in the absence of such presumption, can their authenticity be verified?
- How is the authenticity of these records affected by their transmission across space and time? What controls on the process of transmission would ensure that these records will continue to be recognized as authentic?
- Are the conceptual requirements for reliability and authenticity developed by the UBC-MAS project [Duranti and MacNeil, 1999] and InterPARES 1 for administrative and legal records generated within databases and document management systems applicable to the records studied by InterPARES 2?
- Do the participants in electronic transactions have shared access to reliable and accurate information

about the terms and effects of the transactions? What would constitute reliable and accurate records of transactions in current electronic service delivery initiatives?
- What would be the consequence of issuing guidelines for record creation on the nature of the records of each activity?
- How can cultural differences, freedom of expression, freedom of inquiry, and right to privacy be reflected in those guidelines?
- What technological and intellectual tools would assist creators to generate records that can be authentically preserved over time?
- What legal or moral obligations exist regarding the creation, use and preservation of the records under investigation?

Domain 2 Methodologies:

The Domain 2 task force will begin by testing the applicability of the archival concepts of reliability, accuracy and authenticity as defined above to the records studied by this project. The working groups within Domain 2 will research the literature of each discipline and draw on the case study research to form an understanding of the significance of the terms reliability, accuracy and authenticity in each focus area. From this understanding, a theory of ideal record-making and keeping processes in the context of each activity will be devised that takes into consideration the diverse cultural and disciplinary environments in which the records under investigation are created, maintained, and preserved. On the basis of this theory, selected processes (either hypothetical or drawn from case studies) will be constituted as test cases in order to 1) study records and record-making and keeping i*n situ*, 2) observe the effects of hardware and software evolution on the records, and 3) establish a set of records on which to test the guideline for creation, maintenance and use. High-level activity models will be developed to reflect commonalities and variations in record-making and keeping processes across disciplines. Guidelines for records creators will be drafted, tested, made available on the web site for comments, and then issued.

Domain 2: Outcomes

The expected outcomes of the research conducted in Domain 2 are: scholarly papers discussing the meanings of the concepts in question in each discipline, comparing and reconciling them; scholarly papers presenting a theory of reliable record-making and keeping in each activity and contextualizing it; and guidelines for records creators outlining methods for the reliable production and maintenance of records that can be authentically preserved.

DOMAIN 3: The Methods of Appraisal and Preservation

One of the key findings of InterPARES 1 is that, for electronic records, several of the actions undertaken during the process of records appraisal and selection are absolutely vital to their long-term preservation. Appraisal assesses the continuing value of the records but it also assembles evidence for the presumption of their authenticity, and identifies the digital components or objects that need to be stored and reproduced to ensure the preservation of authentic records. Appraisal also establishes the feasibility of preserving a given body of electronic records in light of the existing and expected preservation capabilities of the preserver. Because appraisal and preservation are so interdependent, although they constituted two separate domains in InterPARES 1, InterPARES 2 brings them together in one domain. The main aim of this domain will be to test whether the concepts and methods of appraisal and preservation developed by InterPARES 1 apply in the digital environments examined by InterPARES 2, which produce records that have no obvious analog in the traditional environment. From a study of the research that has been undertaken on the subject of appraisal, it appears that the nature and method of appraisal have not been examined in the realms of records creation that we plan to investigate. Thus, we expect to have much to consider, develop and test also with regard to *criteria* for appraisal,

which were not addressed by InterPARES 1. Similarly, it is very likely that the research will have to develop new technological solutions for the records created in the systems under investigation, and therefore re-examine, test, and adapt as necessary the concepts, methods, and strategies for long-term preservation developed by InterPARES 1 for earlier generations of electronic records.

Domain 3 Research Questions:

- How do the appraisal concepts, methods and models developed by InterPARES 1 for the administrative and legal records created in databases and document management systems apply to the appraisal of the records of artistic, scientific and government activities resulting from the use of the technology examined by InterPARES 2?
- How do the preservation concepts, methods and models developed by InterPARES 1 for the administrative and legal records created in databases and document management systems apply to the preservation of the records of artistic, scientific, and government activities resulting from the use of the technologies examined by InterPARES 2?
- What preservation paradigms can be applied across activities and technologies? What preservation paradigms are required for specific types of records resulting from each activity?
- What metadata are necessary to support appraisal and preservation of authentic digital records resulting from each activity?

Domain 3 Methodologies:

The Domain 3 task force will use the knowledge gained in the course of the case studies to test the applicability of the appraisal and preservation guidelines proposed by InterPARES 1. A methodology of particular advantage here is that of rapid prototyping [Pressman, 2001], which allows systems designers to quickly implement system requirements as articulated by potential users. Each working group in Domain 3 will analyze case study data to articulate guidelines for systems design, defining the overall objectives of each system and its known requirements. Subsequently, evolutionary development [Sommerville, 2001] of each system can test the workability of the proposed guidelines in stages, allowing for modifications where necessary. A complementary methodology will be that of activity modeling, which will link conceptually the system proposed and the guidelines.

Domain 3: Outcomes

The expected outcomes of the research conducted in Domain 3 are: prototypes of appraisal and preservation systems, activity models, and guidelines for records preservers. These tools will be posted on the web site and communicated in presentations, lectures, and scholarly writings.

POLICY CROSS-DOMAIN:

The Policy Cross Domain Research Team will be responsible for the formulation of policies, strategies and procedures for the creation, maintenance, appraisal and preservation of the records generated in the technological environments studied by this project.

Policy Research Questions:

- To what extent do policies, procedures, and standards currently control records creation, maintenance, preservation and use in each focus area? Do these policies, procedures, and standards need to be modified or augmented?
- Can an intellectual framework or frameworks be developed to facilitate the translation of policies, procedures, and standards into different national environments, sectors, and domains?
- How can enhanced control over and standardization of records creation, maintenance, preservation, access and use be balanced against cultural and juridical differences and perspectives on issues such as freedom of expression, moral rights, privacy, and national security?

- What legal or moral obligations exist regarding the creation, maintenance, preservation, and use of the records of artistic and scientific activities?
- What principles should guide the formulation of policies, strategies and standards related to the creation of reliable, accurate and authentic records in the digital environments under investigation? What principles should guide the formulation of policies, strategies and standards related to the appraisal of those records?
- What principles should guide the formulation of policies, strategies and standards related to the long-term preservation of those records?
- What should be the criteria for developing national policies, strategies and standards?
- What should be the criteria for developing organizational policies, strategies and standards?

Policy Methodologies:

The Policy Research Team will research and analyze the existing policies, strategies, guidelines, and standards in each of the focus areas in relation to each of the domains, examine how they may apply to the digital environments under investigation, compare them to recognize commonalities and differences, and identify gaps, especially in relation to the new issues arising from the accessibility, use, manipulability and fragility of the types of records being studied. It will then examine the results of the case studies and of the work carried out in the three domains. On the basis of this analysis, it will articulate principles that should guide the development of policies, strategies and standards for the creation, maintenance, appraisal and preservation of the records in question and give them to the national and multinational teams for contextualization. Upon receiving the requested feedback, the Team will produce guidelines for those responsible for developing policies, strategies and standards at the international, national and organizational level.

Policy Outcomes:

The expected outcomes of this research are papers outlining and critically examining existing standards, scholarly works addressing the research questions, and guidelines for developing policies, strategies and standards at the international, national and organizational level.

DESCRIPTION CROSS-DOMAIN:

Given the importance of descriptive practices for ensuring the reliability, accuracy and authenticity of electronic records, for inferring or verifying it overtime, and for carrying out a proper appraisal and successful preservation of any such record, a Description Research Team will analyze the characteristics (elements and attributes) of the records in question, their process of creation, and the implications of the findings of the Appraisal and Preservation Task Force to write guidelines for the development of standards for the intellectual control of the records from the moment of their creation throughout their appraisal and preservation, including standards directed to the records creators and standards directed to records preservers.

Description Research Questions:

- What is the role of descriptive schemas and instruments in records creation, control, maintenance, appraisal, preservation, and use in traditional record-keeping systems in the three focus areas?
- What is the role of descriptive schemas and instruments in records creation, control, maintenance, appraisal, preservation, and use in emerging record-keeping systems in digital and web-based environments in the three focus areas? Do new tools need to be developed, and if so, what should they be? If not, should present instruments be broadened, enriched, adapted?
- What is the role of descriptive schemas and instruments in addressing reliability, accuracy and authenticity requirements (including the InterPARES 1 Benchmark and Baseline Authenticity Requirements) concerning the records investigated by InterPARES 2?

- What is the role of descriptive schemas and instruments in archival processes concerned with the long-term preservation of the records in question?
- Do current interoperable frameworks support the interoperability of descriptive schema and instruments across the three focus areas? If not, what kinds of frameworks are needed?
- What are the implications of the answers to the above questions for traditional archival descriptive standards, systems and strategies? Will they need to be modified to enable archival programs to meet new requirements, or will new ones need to be developed? If so, what should they be?
- To what extent do existing descriptive schemas and instruments used in the sectors concerned with the focus areas addressed by this project (for example, the geo-spatial data community) support and inform requirements such as those developed by InterPARES 1? Will they need to be modified to enable these sectors to meet these requirements, or will new ones need to be developed? If so, what should they be?
- What is the relationship between the role of descriptive schemas and instruments needed by the creator and those required by the preserver to support the archival processes of appraisal, preservation and dissemination? What tools are needed to support the export/import/exchange of descriptive data between systems?
- What is the role of descriptive schemas and instruments in rights management and in identifying and tracking records components, versions, expressions, performances, and other manifestations, and derivative works?
- Is it important to be able to relate the record of artistic and scientific activity to the associated expression, performance, product, work, or other manifestation of it, and, if so, in what ways can descriptive activities facilitate it?

Description Methodologies:

After an investigation, analysis and comparison of existing standards and practices within each focus areas, the Research Team will distill the essential findings and examine them in relation to the results of the case studies and of the findings of the three domain task forces. On the basis of this study, the Team will issue principles and guidelines for the development of descriptive standards that allow for the intellectual control of the records created in the three focus areas throughout their existence. This work will be done in ongoing interaction with the national/multinational team to take into account cultural traditions and specific types of uses in different contexts.

Description Outcomes:

The expected outcomes of this research are scholarly comparative discussions of existing descriptive standards, and an intellectual framework for the development of descriptive standards for the records under examination. It is possible that actual standards will begin to be drafted, but this is not an objective of the research at this time.

TERMINOLOGY CROSS DOMAIN

When research is carried out by a multidisciplinary and multicultural team that spans fifteen fields of inquiry and twenty countries, the precision and consistency of the terminology used in the course of the project is vital to the success of the research. Several terms that are key to this research project refer to different concepts in each disciplinary and/or cultural environment involved, while similar concepts are expressed by different terms. The Terminology Team is responsible for researching all terms proposed for official use by each research unit within InterPARES 2 and accepting or rejecting them on the basis of clarity, consistency with the other adopted terms, and validity in the various disciplinary and cultural contexts.

Terminology Research Questions

- Is the term proposed specific to a field? If so, is its definition agreed upon in such field? If other definitions exist, how does the definition proposed relate to the others used? If the term is not specific to a field, is it a term in common usage or a neologism? How is its use justifiable in the context of the research?
- Is the term proposed used in other fields as well? If so, is its definition consistent across such fields? If not, what are the justifications for using one definition over another?
- Is the term used in several languages/traditions? If so, are the definitions consistent? If not, what are the justifications for using one definition over another?
- Is the term proposed consistent with the terms already used by the project? If so, does such inconsistency warrant a review of the already accepted terms in light of the new findings?
- Does the term express a concept that is already wholly or partially expressed by other already accepted terms or more appropriate terms?

Terminology methodologies

The Terminology Team will receive the proposed term from the research unit, together with a proposed definition. It will then research the term according to the research questions listed above, by examining the relevant dictionaries and literature of the fields and countries involved. On the basis of the result of such research, it will either accept the term with its definition, return it to the unit with proposed changes in definition or a proposed alternate term, or reject the term.

Terminology outcomes

The expected major outcome of the work of this team is the Project Glossary. In the process of building it, there will be opportunities for the members of the team and the research assistants to publish scholarly papers on the evolution of terms, and on concepts across disciplines and cultures.

III. The Research Team

Like InterPARES 1, the InterPARES 2 project will be enriched by the contributions of scholars affiliated with a large variety of archival and other research institutions and projects. These institutions and projects will either entirely or partially sponsor their members' participation in the activities of InterPARES 2 research units and International Team. For example, national and provincial archives of each country involved in the research, as well as several foreign universities, will be responsible for all expenses of their participation, the Italian Authority for Informatics in the Public Administration will support the expenses involved in the contribution of its employees, and the San Diego Supercomputer Centre and the David Project have targeted part of their grant money to sponsor their researchers' work on InterPARES 2.

The International Team will provide the overall direction of the InterPARES 2 research. It comprises the chairs of the eight national and multinational teams, of the six domain and focus task forces and of the three cross-domain research teams, plus the Project Director, who chairs the team. International Team members share the responsibility of determining the overall policy governing the various activities involved in the project and ensuring that it is respected by all parties, directing the units' action plans, reconciling the findings of the domain and focus task forces and of the cross-domain research teams and issuing them as 'the project's findings', reviewing the activities of the national and multinational teams and providing them with further input, deciding on networking, dissemination and training initiatives, presenting the InterPARES 2 work to the Advisory Committee and receiving and acting upon its comments and suggestions, and making any other decision that may affect the project as a whole. However, the primary contributions of the International Team members will be the synthesis of the research units' findings into new knowledge and the direction of their contextualization and

dissemination in the several cultural environments represented by the national and multinational teams.

The Project Director, Luciana Duranti, will be responsible for the intellectual and administrative direction of the InterPARES 2 project, by ensuring that the International Team and its members work effectively in a cooperative, interdisciplinary and multicultural fashion to meet the project goal, formally accepting new research affiliates, and acting as the official spokesperson for the InterPARES 2 Project.

The eight national and multinational research teams in which the InterPARES 2 co-investigators are grouped will be responsible for coordinating their own members, research partners, and the InterPARES-related research activities occurring within their jurisdiction. These teams will also be responsible for contextualizing and disseminating InterPARES findings within their jurisdiction(s) and for obtaining financial support from the appropriate local, national and multinational institutions, organizations and funding agencies. Each team will have a chair, whose responsibilities will include the calling, chairing and organizing of team research workshops, as well as coordinating the documentation of research findings and presentation of those findings to the International Team. These chairs will further ensure the representation and full participation of their team members in the various research units of InterPARES 2. The chair of the Canadian Team will be Terry Eastwood.

The research units described earlier and reflected in the attached matrix are composed of co-investigators[17] from various jurisdictions and disciplines. It will be the responsibility of each Working Group (WG) and Cross-Domain Research Team (CDRT) to determine the methodology, develop the research tools, and conduct the research necessary to address its own research questions, as assigned to it by the relevant Domain Task Force (DTF). Much of the research work will occur in the context of WGs' and CDRTs' face-to-face workshops and take the form of analysis and discussions of information collected and hypotheses developed by their members in the periods of time between workshops with the help of research partners' affiliates (e.g., archivists employed by the institution of a WG member) and research assistants, especially in the gathering and preliminary analysis of data. It should be emphasized that the work of the co-investigators will be almost entirely collaborative in nature and that only in exceptional cases will individual co-investigators be assigned specific tasks on the basis of their expertise. In addition, although in the beginning the co-investigators will be assigned to WGs on the basis of their specific interests, in time they will move to different WGs as deemed appropriate according to the development of the research. All co-investigators are expected to report on the findings of their unit at national and international conferences and symposia and in public lectures, and to publish those findings in scholarly journals. Researchers representing the various archival institutions involved in InterPARES 2 will be responsible for testing the prototypes of appraisal and preservation systems developed by the WGs of the Domain III Task Force. The chairs of all WGs and CDRTs will organize workshops and coordinate the documentation of findings within their sphere. A further responsibility of one of the three WGs' chairs within each Focus Task Force (FTF) or DTF will be to act as the chair of that task force, coordinating the analysis and documentation of research findings within the domain or focus as a whole.

A post-doctoral fellow will conduct research as directed by one or more of the research units, and assist in the development of research tools. The gathering of data through case studies and its preliminary analysis will be performed by the post-doctoral fellow and research assistants under the supervision of members of the research units. Like all researchers involved in the project, the post-doctoral fellow will report on the activities of InterPARES 2 at national and international conferences. Each of these activities represents a profound training opportunity; as it has been the case in InterPARES 1, the post-doctoral fellow will profit from the guidance of the Project Coordinator and co-investigators in these endeavours.

Students of various disciplines will be hired as research assistants at all academic institutions

[17] The term co-investigators comprises applicants, co-applicants, partners and collaborators.

involved.[18] In order to maximize the benefits of this training opportunity, the research assistants will participate in the research in a variety of capacities: gathering and preliminary analysis of case study data, presenting findings both within InterPARES 2 and at conferences, facilitating the modeling exercises, and recording the proceedings of the International Team and the research units' workshops. For each of these undertakings, the students will receive adequate training in the form of workshops and tutorials, and will work under the close supervision of the co-investigators. Students will receive timely and effective evaluation of their work, and will be frequently assigned new tasks in the interest of broadening their educational experience. They will be encouraged to develop their own research interests from the work they will be doing, to use their research to write papers for their courses of studies, and to identify significant topics for their dissertations. They will be invited to co-author refereed articles with the co-investigators, and, when appropriate, to write their own. They will be involved in essay competitions and in international forums for graduate students involved in research.

IV. Management of the Project

The responsibility for the management and direction of the project will rest with the Project Director. She will be assisted by a Project Coordinator, a Technical Coordinator, and a part-time Project Assistant.

The Project Coordinator will work under the direct supervision of the Project Director. Her duties will include the drafting, editing, and posting to the web site of workshop agenda and proceedings, coordinating the work of the research assistants (including recruitment, scheduling, and supervision), supervising the Technical Coordinator and the Project Assistant, overseeing the preparation and publication of project findings, developing and writing content for the InterPARES website descriptive and promotional documents, and developing, implementing, and maintaining the records management infrastructure for the InterPARES Project. Further responsibilities include the management of the financial records of the InterPARES Project by developing, implementing, and monitoring the project budget, tracking time and resources devoted to various projects against the budgets, and authorizing all InterPARES-related expenditures with the exception of travel.

The Technical coordinator will be responsible for the designing, developing and maintaining customized, web-accessible information systems to support the project's research activities, including a multi-lingual, controlled vocabulary system, a case study management system, software-based case study tools, a team activity database, a workflow management system and a project record-keeping system. The Technical Coordinator will manage projects to develop digital creation and preservation system prototypes based on the project findings. Additional duties will include facilitating modeling sessions for research units, maintaining information models, and reviewing, purchasing and maintaining needed computer equipment and business applications.

A part-time Project Assistant will support the work of the Project Coordinator by processing financial forms, including travel requisitions, travel cash advances, requisitions for payment, payroll timesheets, and journal vouchers. The Project Assistant will make travel arrangements for the Project Director, other co-investigators, and graduate academic assistants to participate in InterPARES workshops and in conferences, seminars, symposia, and other dissemination events. The Project Assistant will further assist in organizing and facilitating InterPARES workshops and other events, and will perform other administrative and clerical duties as required.

Responsibility for the efficient management of the project will remain with the Project Director. She will approve financial expenditures, supervise the Project Coordinator, and prepare financial reports.

[18] The number of research assistants indicated in the budget only refers to the Canadian ones, but, as in InterPARES 1, it is expected that each university of each participating country will involve a significant number of its students in the research. In addition, as it has been the case in InterPARES 1, the Global Industry Team will hire students enrolled in various graduate programs to assist its co-investigators in their research responsibilities.

She will chair the International Team meetings and workshops, coordinate the dissemination activities of the project, approve the formal release of documents, and assist in the administration of the various research units in collaboration with their respective chairs.

The InterPARES 2 Project is in the privileged position of having in place an effective management team who works well together and is committed to the goals of the project and their efficient realization.

V. Dissemination of Findings

The InterPARES 1 project has been extremely successful in establishing a network throughout the international archival community. The participation of its director and/or co-investigators in international standards development (such as the Model Requirements for the Management of Electronic Records, a European Commission's standard) and in the formulation of policies and strategies within national archival institutions and in other complementary research projects (e.g., the San Diego Supercomputer Centre) has ensured that policy makers and the international research community at large, as well as relevant businesses and information industries are well-acquainted with InterPARES 1, its aims, and its findings to date. The formation of this network has engendered other forms of collaboration such as ERPANET, an association of archival science professionals and researchers dedicated to electronic records research. This organization would not have existed or received European Union funding were its organizers (Hofman, Ross, Horsman and Guercio) not members of InterPARES 1 and 2 research.

The primary means of disseminating the results of InterPARES 2 research will be presentations at symposia devoted to InterPARES 2 research and at national and international conferences, postings on the project's web site, and publication of books and of scholarly articles. As with InterPARES 1, researchers (including students and the post-doctoral fellow) will publish articles in internationally respected journals such as the Records Management Journal, Archivaria, The American Archivist, D-Lib Magazine, Archival Science, and the Information Management Journal. Likewise, co-investigators, students, and the post-doctoral fellow will present papers at national and international conferences such as the Congress of the International Council of Archives, the European Conference on Archives, the DLM Forum on Electronic Records, the Very Large Databases International Conference, and the annual meetings of the Association of Canadian Archivists and the Society of American Archivists.

In addition to disseminating findings at established conferences and seminars, symposia will be organized to present the analysis and preliminary findings of InterPARES 2 research.[19] The symposia will also provide an opportunity for the research assistants to present papers in a professional setting. Another dissemination effort of benefit to students will be an InterPARES Essay Competition, wherein prize money will be awarded to students writing research papers on topics related to the research. Co-investigators will give numerous seminars at universities and archival institutions around the world for students and practitioners unfamiliar with the leading edge of electronic records research.[20]

Lastly, as with InterPARES 1, we expect that interest in the InterPARES 2 project will spread from academic and professional circles to the business, industry and the community at large. This interest will be both fostered by and the impetus for media publications and broadcasts.

InterPARES 2 will follow the strategy outlined above, which has proven effective in InterPARES 1, and seek to improve upon it, taking advantage of the participation to the project of several additional experienced and influential researchers who will provide access to broader and more varied audiences. Most notably, as the interdisciplinary base of InterPARES 2 has been expanded to include members of diverse artistic, cultural, and professional communities, it is expected that InterPARES 2 findings will be even more widely available through the conferences and the publications established within those

[19] Two such symposia devoted to InterPARES 1 research were held in Vancouver and were well-attended by academics and practitioners from a variety of disciplines.

[20] In the course of InterPARES 1, the Project Director regularly gave lectures in the contexts of the courses offered by the Italian government for the employees of the public administration.

communities, such as Leonardo and The Computer Music Journal. Similarly, the participation as co-investigators of researchers who are already involved in internationally based interdisciplinary research endeavours, such as the David project, will ensure cross-fertilization among scholars working on complementary areas of inquiry. Finally, the broader international participation will ensure the dissemination of results to researchers and practitioners in additional countries around the world.

A vital innovation with respect to InterPARES 1 will be the establishment of the independent Advisory Committee to oversee the research as it proceeds. As the members of this committee will be representatives of important archival, scientific, artistic, records management, and computing associations and institutions, it is expected that their familiarity with InterPARES 2 research will greatly aid in increasing awareness of the research among the members of those organizations.

InterPARES 1 promised the issuing of a multimedia publication containing all the findings of the project, from authenticity requirements to models of preservation activities. This publication is in the making and will be submitted to Kluwer Academic Publishing early next year. We also proposed to conclude the project with a large international conference featuring the participation of the research assistants. Such conference is scheduled for June 2002 in Washington, D.C. and will be supported by several non-Canadian funds, primarily by the National Archives of the United States. Similarly, we propose to collect the final findings of InterPARES 2 in a publication like the one that we are preparing with those of InterPARES 1 and to officially close the project with a conference like that of Washington.

VI. Impact of the Research

The major impact of InterPARES 2 is expected to derive from the development of the theoretical knowledge necessary to guide the creation, maintenance, appraisal and preservation of records in interactive, experiential, and dynamic environments. This theoretical knowledge will be articulated in conceptual frameworks for record keeping and preservation for organizations and institutions and guidelines for records creation and maintenance for individual records creators. We anticipate a profound impact of such frameworks on policy development for records and archives management in both the public and the private sectors, especially in relation to appraisal and preservation, this having already been the case with the preliminary findings of the InterPARES 1 research. The impact of guidelines for creators is more difficult to predict. If an activity takes place in an institutional setting, such as a scientific research lab, a centre for the arts, or a government agency, guidelines might easily be recommended and adopted. As governments and businesses around the world move to on-line interaction with citizens and customers, an adequately researched body of knowledge surrounding complex record-management practices will prove essential to the design and implementation of such systems. In contrast, we will need to rely on a broadly conceived dissemination strategy to reach individual records creators, such as composers; certainly those who are witnessing the loss of their work through technological obsolescence and media fragility will be interested in the preventive measures that might be taken. We know from InterPARES 1 research that unless record creation and maintenance practices are adapted to these challenges, many of the records created in digital environments will not be preservable.

A substantial impact on existing appraisal and preservation practices is expected from the models and prototypes that will guide the authoring of software applications suited to the preservation of authentic records over the long term. But one must not underestimate the impact of products like the interdisciplinary and multicultural glossary on the development of bridges across disciplines and cultures. In addition, research tools, such as the templates for analysis, are invaluable for recognizing and identifying new forms of records that will inevitably continue to arise as technologies reach new levels of complexity. Finally, the principles and guidelines for developing descriptive standards will enable archival institutions and programs to make the records accessible to future generations and their authenticity verifiable.

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