



InterPARES 3 Project

International Research on Permanent Authentic Records in Electronic Systems

Title: Theoretical Elaborations into Archival Management in Canada (TEAM Canada): Implementing the theory of preservation of authentic records in digital systems in small and medium-sized archival organizations

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1. Summary of Proposed Research

Digital records and the applications that generate them have affected every aspect of business, research, government and domestic life. E-mail, e-voting ballots, research and survey data, financial company records, and digital art are just some of the materials used in the day-to-day operation of modern society. The keepers of these records need to maintain them in a way that their reliability, accuracy and authenticity can be demonstrated at any time to support, for example, research and innovation, legal validation, copyright and patent litigation, scientific discovery, issues of ownership and precedence for governments and individuals, and accountability. Long-term authentic preservation also needs to be a primary concern, firstly, because generations of digital material have already been lost due to changing technology and inadequate preservation practices, and secondly, because the authenticity of digital materials that have survived is currently difficult, if not impossible, to prove.

These issues have been addressed by several research projects which have developed knowledge essential to the long-term preservation of authentic records created and/or maintained in digital form, thereby providing the basis from which model policies, strategies and standards capable of ensuring the longevity of digital material and the ability of its users to trust its authenticity have been formulated. However, a key finding of the most comprehensive of these projects, InterPARES (an international multidisciplinary research initiative involving twenty-one countries, funded by SSHRC from 1999 to 2006), is that, although the body of concepts, principles and methods developed through scientific research constitutes the essential foundation and framework of best practices, any solution to digital preservation problems is situation specific, and must be devised by preservers taking into account: a) the cultural, administrative, legal, and functional context in which they operate, b) the nature and characteristics of the organizations producing the digital material to be preserved, c) the typology of the material produced and its documentary and technological features, d) the limitations imposed by the available financial and human resources, e) the organizational culture of both the producer of the material and the preserver, and g) access to educated professionals or educational programs and resources. Furthermore, while the conceptual and methodological findings of InterPARES and other research projects are equally applicable to larger and smaller organizations and programs, archives with limited resources, which often have the greatest need for assistance, will find the outcomes of the research difficult to apply without specific directions on how to move forward.

This research project will translate the theory and method of digital preservation drawn from research to date into concrete action plans for existing bodies of records that are to be kept over the long term by archives—and archival/records units within organization—endowed with limited resources. In the process, detailed knowledge will be developed on (1) how general theory and methods can be implemented in small and medium sized archives and units and become effective practices; (2) what factors determine the type of implementation that is appropriate for each body of records in each context; and (3) what skills professionals will require to conduct such operations. On this basis, teaching modules will be developed for in-house training programs, continuing education workshops, and academic curricula that will provide Canada with professionals who are competent not only to preserve over the long term its documentary heritage in digital form, but also to ensure the accountability of its organizations and institutions through the protection of the accuracy and authenticity of the digital information they produce.

Governance, law, art, science and scholarship urgently require concrete plans for the preservation of digital materials, so that today's actions, thoughts, achievements and creations will have a future and the future will have a memory.

2. Detailed Description

Problem, Goal, Objectives and Research Questions

Digital records and the applications that generate them have affected every aspect of business, research, government and domestic life. E-mail, e-voting ballots, research and survey data, financial company records, and digital art are just some of the materials used in the day-to-day operation of modern society. The keepers of these records need to maintain them in a way that their reliability, accuracy and authenticity can be demonstrated at any time to support, for example, research and innovation, legal validation, copyright and patent litigation, scientific discovery, issues of ownership and precedence for governments and individuals, and accountability. Long-term authentic preservation needs also to be a primary concern, firstly, because generations of digital material have already been lost, due to changing technology and inadequate preservation practices, and secondly, because the authenticity of digital materials that have survived is currently difficult, if not impossible, to prove. Several research projects worldwide have addressed these problems,¹ but the most comprehensive effort has been made by the InterPARES Project (1999-2006), which—building upon the body of knowledge deriving from other projects and creating new knowledge from original research—has developed theory, methods and strategies essential to the long-term preservation of authentic records created and/or maintained in digital form.² This body of concepts, principles and methods constitutes an essential foundation and framework for all digital preservation solutions (Duranti, 2005; Bearman, 2006). However, one of the key findings of InterPARES is that such solutions are situation specific and must be devised by preservers in light of: a) the cultural, legal, administrative, and functional context in which they operate; b) the nature and characteristics of the organization or person producing the digital material; c) the typology of the material produced and its documentary and technological features; d) the limitations imposed by the available financial and human resources; e) the organizational culture of both the producer of the material and the preserver itself; and g) their access to educated professionals or educational programs.

InterPARES theory and methods are readily applicable to the strategic and procedural structure of large archives rich in resources, but cannot be directly applied to small or medium sized archival organizations or programs (units within records creating organizations)³ without 1) the support of their regulating, controlling, and auditing bodies, 2) major adaptations of the recommended methods and strategies, 3) their translation into concrete action plans for each given body of records or data, and 4) the development of appropriate competences and skills in the

¹ Most notable is the Open Archival Information System (OAIS) Reference Model, available at <http://public.ccsds.org/publications/archive/650x0b1.pdf>. The information model articulated in the OAIS standard has been the foundation of several other projects, such as CEDARS, PREMIS and Persistent Archives, respectively accessible at <http://www.leeds.ac.uk/cedars/>, <http://www.oclc.org/research/projects/pmwg/>, and <http://www.sdsc.edu/NARA/>. Also, the CAMiLEON and METS projects, accessible at <http://www.si.umich.edu/CAMiLEON/> and <http://www.loc.gov/standards/mets/>, as well as the ERPANET project, available at <http://www.erpanet.org/>, have strongly contributed to the building of a consistent body of general knowledge on digital preservation.

² InterPARES (International Research on Permanent Authentic Records in Electronic Systems), funded by two SSHRC MCRI grants, is a multidisciplinary international project involving twenty-one countries, public and private sectors, academics and professionals, record makers, record keepers and record preservers. For its products see http://www.interpares.org/ip1/ip1_documents.cfm and http://www.interpares.org/ip2/ip2_products.cfm.

³ The expression “small or medium sized archival organization or program” refers to the number of records and/or archival professionals it employs (i.e., less than five) and the perceived level of financial and technological resources.

responsible professionals. Furthermore, InterPARES has concluded its research at the end of 2006 and its collaborative partnership is no longer active; thus, there is no research activity at this time aiming at building on its findings and implementing and testing them at a variety of levels. New international networks have been recently established, especially in Europe, which are operating at a very high level, mostly as clearinghouses of existing knowledge and best practices in digital preservation.⁴ Undoubtedly new knowledge will continue to be produced, mostly by smaller, localized and focused research alliances,⁵ compounding the requirement to ensure that InterPARES and other research projects' findings be made applicable to the variety of organizations that need them. In addition, the findings of a study of the effectiveness of existing workshops and seminars aimed at increasing archivists' skills in digital preservation and their ability to implement them in their repositories show that very few participants were able to implement the skills once they returned to their work environments (Duff et al., 2006).

The urgency of the problems outlined above is demonstrated by a few examples:

1. State-of-the art complex technologies will produce most of the records and data of the Vancouver Olympic Committee. These records and data will be subject to all relevant legislation, such as privacy and copyright, and will become non-current at the end of the Olympics in 2010, and thereafter transferred to the City of Vancouver Archives. But, unlike those of the City's public offices, the Olympic Committee records are not subject to the records management jurisdiction of the archives from the moment of their creation. Yet, it is a fact that all city archives in Canada acquire records of private individuals and corporations. The digital records of private bodies need to be generated and maintained in a reliable and accurate way and their long-term authentic preservation must begin at the moment of records creation to be successful, but, currently, there is no known practice of collaboration between private records creators and city archives that may serve these purposes. The proposed research aims to build such synergy by direct action.
2. Digital records make up 80% of fraud investigation cases, according to the forensic technology team at PricewaterhouseCoopers, which analysed the last two years' worth of investigations. The number of cases handled by the firm has tripled in that time and the average case requires the analysis of 500,000 e-mails and user documents.⁶ A trusted recordkeeping system containing records guaranteed authentic by a trusted custodian would avoid the very high costs in financial and human resources incurred by investigators, but none is in place at this time. This research can help design an affordable system usable by small agencies.
3. The British Columbia Information and Privacy Commissioner reported in April 2006 that the provincial government failed to follow proper procedures for destroying computer tapes containing medical information on thousands of citizens. Last year, when a Vancouver regional office was closed due to a reorganization of the Ministry of Employment and Income Assistance, forty-one computer backup tapes containing confidential information concerning individuals' HIV status, mental illness and substance abuse ended up at a government auction and were taken to a local newspaper.⁷ While procedures for proper disposal may exist,

⁴ For example, the Digital Curation Centre (DCC), www.jisc.ac.uk/; Digital Preservation Europe, <http://www.digitalpreservationeurope.eu/>; and CASPAR, <http://www.casparpreserves.eu>.

⁵ They do not exist in Canada.

⁶ "PWC On Fraud Trail." *Financial Director* (December 13, 2005), 22.

⁷ "B.C. Should Have Destroyed Computer Tapes." (April 2, 2006) http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/20060402/computer_tapes_cp_060402/20060402?hub=Health

intentional or unintentional mishandling occurs too frequently; this research can help embed in a record control system a practice that monitors the way in which procedures are followed.

4. TRIUMF, a national laboratory for particle and nuclear physics located on the University of British Columbia campus, and operated by a consortium of the universities who are partners in this research, will analyze and store data generated by the ATLAS project carried out at the CERN laboratories in Switzerland. These data are expected to fill 4.5 million CDs a year and will have to be preserved by one of the university consortium small archives.⁸ This research can develop an action plan for such an unprecedented endeavour.
5. In 2002, *The Journal of Cell Biology* developed a test that revealed that 25 percent of all accepted manuscripts contained one or more illustrations that had been improperly manipulated.⁹ If this test had been implemented earlier, it could have prevented infamous cases, such as Dr. Hwang Woo Suk's concocted images of human embryonic stem cells.¹⁰ A formalised procedure of accurate data transfer and deposit of pictures established by the universities' archives could have prevented the forging of research findings. The problem of research data preservation by a neutral third party was addressed by a study carried out by a SSHRC-appointed committee in 2001-2002. The final report recommended the creation of a national data archives, but no action has yet followed.¹¹ This research will develop action plans which will offer a solution to the problem for university archives.

In light of this situation, the **goal** of the proposed research project is **to enable Canada's many small and medium sized public and private archival organizations and programs, which are responsible for the digital records resulting from government, business, research, art and entertainment, social and/or community activities, to preserve over the long term authentic records that satisfy the requirements of their stakeholders and society's needs for an adequate record of its past.**

To achieve this goal, the research team has identified the following **objectives**:

1. to promote an environment supportive of the research goal by demonstrating to regulatory and auditing bodies and to policy makers that it is essential to integrate digital records preservation requirements in any activity that they regulate, audit or control;
2. to collaborate with small and medium sized archival organizations and programs in the development of scalable policies, strategies, procedures, and/or action plans that they can implement in order to preserve the digital materials that they expect to acquire or have already acquired, using the recommendations and products of leading edge research projects;
3. to assess the applicability of the recommendations of InterPARES and other projects about trusted record-making and recordkeeping to the situations of the small and medium sized archival organizations or programs selected as test-beds, and in particular the validity of statements about the relationship between preservers and the records creators;
4. to assess the applicability of these projects' preservation solutions to the concrete cases identified by the test-bed partners as needing immediate attention, both when the records in question are already in their custody and when they still reside with their creator;

⁸ Shaw, Gillian. "Universities here join in massive experiments." *The Vancouver Sun* (April 19, 2006) E3.

⁹ Wade, Nicholas. "It May Look Authentic; Here's How to Tell It Isn't." *The New York Times* (January 24, 2006,) F1.

¹⁰ Levin, Steve. "Stem Cell Researcher Admits Phony Data." *Pittsburgh Post-Gazette* (March 8, 2006), A-1.

¹¹ SSHRC and National Archives of Canada. *We Build Understanding. National Research Data Archive Consultation* (Needs Assessment Report, May 2001); SSHRC and National Archives of Canada. *We Build Understanding. National Research Data Archive Consultation. Final Report* (June 2002).

5. to refine and further elaborate the theory and methods, concepts and principles developed by these research projects on the basis of the results of the above activities;
6. to establish when such theory and methods, concepts and principles apply across jurisdictions, regardless of legal/administrative, social and cultural environment; and, in the situation where they do not apply, to identify why, and determine the measures that are required to ensure the preservation of digital records;
7. to assist small and medium sized archival organizations or programs in addressing the legal issues that have been identified by the relevant research projects as providing obstacles to long term digital preservation, and those that could be specific to their situation;
8. to formulate models that, for each choice of preservation methods and of digital objects to be preserved, identify the ethical consequences for individuals and society;
9. to create evaluation models capable of measuring the success of the preservation solutions that have been proposed and implemented;
10. to develop models of preservation costs for various types of records and archives;
11. to develop awareness and educational materials that can a) enable the staff of small archival organizations and programs to plan for and carry out digital preservation, b) assist professional associations in promoting career development of their members, and c) provide university programs with content and structure for university courses on digital preservation; and to identify effective delivery methods;
12. to ensure transfer of the knowledge generated by this research—including actual examples and success stories—to appropriate local, national and international stakeholders; and
13. to establish a strong network of research and education on digital preservation that is deeply rooted in the various communities served by each of its partners, and that integrates academic work with social and community action.

The **research questions** to be addressed and answered to achieve these objectives are:

1. Which are the regulatory, auditing and policy making bodies that need to be sensitized to the importance of digital preservation, and what are the best ways of influencing them?
2. How can we adapt the existing knowledge about digital records preservation to the needs and circumstances of small and medium sized archival organizations or programs?
3. How and when should these archives or programs prepare themselves for digital preservation?
4. What differentiates the preservation of digital records from that of any other digital entity for which the archives might be responsible?
5. What kinds of digital records, either soon to be preserved by a small or medium sized archival organization or program or already in its custody, are currently most in need of attention, and what are the most urgent issues and problems associated with their creation, management and/or preservation?
6. What are the nature and the characteristics of the relationship that each of these archives or programs should establish with the creators of the records for which it is responsible?
7. What kind of policy, strategy and procedures should any such archives or program have in place to be able to control the digital records for which it will be or already is responsible from creation to preservation, and on what factors are these administrative devices dependent (e.g. a specific accountability framework and governance structure)?
8. What action plans may be devised for the long-term preservation of these bodies of records?
9. Can the action plan chosen for a given body of records be valid for another body of records of the same type, produced and preserved by the same kind of organization, person, or community *in the same country*?

10. Can the action plan chosen for a given body of records be valid for another body of records of the same type, produced and preserved by the same kind of organization, person or community *in another country or culture*?
11. Can the action plan chosen for a certain type of record or system be valid independently of the creating or preserving organization and its context?
12. What knowledge and skills are required for those who must devise policies, procedures and action plans for the preservation of digital records in small and medium sized archival organizations or programs?
13. How can records professionals keep their knowledge of digital preservation up-to-date in the face of ongoing and increasingly fast technological change?

The **products** that are expected to result from this research are:

1. policies, strategies and procedures for small and medium sized archival organizations or programs, and guidelines for the records creators whose records fall under their responsibility;
2. action plans for the specific case studies carried out in the course of the project;
3. an analysis of the validity, applicability or adaptability of action plans developed in the specific cases studied to different organizations, contexts or countries;
4. a comparison among the action plans developed for the preservation of records at different stages in their lifecycle (i.e. creation, use, maintenance, modification, preservation);
5. criteria to determine “most-at-risk” materials, such as date created, date last accessed, carrier, operating system, software used, equipment required and its availability, etc.;
6. guidelines for addressing preservation requirements that apply to specific types of digital records, but not to others, and may be used in the context of limited resources environments;
7. evaluation models for assessing the degree of success of the chosen preservation action;
8. cost-benefit models for various types of archives or programs, records, and/or systems;
9. ethical models that identify and make explicit the consequences for individuals and society of various types of preservation measures or lack thereof;
10. a web site providing small and medium sized archival organizations or programs world wide with access to the products of this research free of charge;
11. a refined body of theoretical and methodological knowledge on digital preservation, communicated in conference papers, symposia, and refereed publications;
12. training and education modules for archival organizations or programs, professional associations, and university programs; and awareness and education modules for non archivists, such as IT professionals, vendors, and service providers; human resources and financial managers; communities of practice; members of the general public, etc.; and a strategy for delivering them; and
13. position papers directed to key regulating, controlling, auditing and policy making bodies, advocating the vital need of integrating planned digital preservation in the requirements they issue for the activities they regulate, control or audit, and explaining possible ways of doing so.

Structure of the Research Alliance and Governance

The TEAM Canada research alliance comprises, under the direction of this applicant, academic and professional co-applicants and collaborators (Canadian and international), and three types of partners: test-bed, resource, and international. The *test-bed partners* are the Canadian archival organizations or programs that constitute the locus and subject of the research, the primary stakeholders. A dedicated team, composed of at least one researcher from academia, one from the community, and one graduate research assistant, will work with the representative(s) of each test-

bed. The *resource partners* are organizations that have an expertise in all or part of the research objectives and are committed to sharing it with all researchers, by providing regular input and feedback through both the web site working spaces and the face-to-face plenary workshops, and by testing preliminary findings and products. Among them, there are two American partners. The *international partners* are national and multinational research teams constituted on the model of TEAM Canada, sharing the same goal, objectives, research questions, methodology, governance, and research, dissemination and mobilization activities; using and reporting to a common research headquarters (at the University of British Columbia); and directed and coordinated by this applicant, with the support of the headquarters' staff (i.e. a project coordinator and a technical coordinator).¹² TEAM Canada will be governed by the applicant, in her role of **Project Director**, and a **Steering Committee**, composed of the Project Director, one academic co-applicant, and at least one representative each from a city archives, a university archives, and a thematic or community archives on a rotational basis, plus the Project Coordinator as ex-officio member. The committee will meet four times a year to provide the intellectual and administrative direction of the research; to set the agendas for the plenary workshops; to formally recruit or accept new partners or collaborators; to assess partial results; and to make any other decisions having an impact on the project as a whole. All co-applicants, test-bed partners' representatives, and collaborators will meet twice a year in a week-long **plenary workshop** with representatives of the TEAM Canada resource partners to discuss the work done, receive input, develop plans of action, review tests, and plan the following steps. The Project Director will meet once a year with the Directors of the international partners in an **International Summit** for purposes of knowledge sharing, determination of the next steps, coordination of future research, and reconciliation of findings. The dissemination of the research findings and products will be directed by a **Dissemination Committee**, composed of the Project Director, one academic co-applicant, at least one representative each from a city archives, a university archives, a thematic or community archives, a professional archival association, and another type of resource partner on a rotational basis, plus the Technical Coordinator as ex-officio member, in his role of manager of the web site.

Methodology and Evaluation Framework

This type of project calls for action research (McNiff and Whitehead, 2006). Action research is a collection of participative and iterative methods, which pursue action (in this case, the preservation of digital records) and research at the same time. As a matter of course, action research forges collaborations between community members and researchers in a program of action and reflection toward positive change (Greenwood and Levin, 2003). Action research makes extensive use of case study methodology and of direct communication and interaction with the subjects of the research, who are at the same time participants and contributors in the research activity. The stages of research used in this project will be as follows.

Defining the Research Plan and Instruments--The TEAM Canada Director will first meet with the directors of the other national and multinational TEAMS to coordinate the research schedule to ensure that preliminary findings are comparable across TEAMS and that the research

¹² This applicant wishes to emphasize that she has the time required to fulfill the direction, management and research responsibilities outlined in this proposal because her second MCRI grant (commonly known as the InterPARES 2 project) has been completed on 31 December 2006. Although the project has been granted a one year extension for dissemination purposes, this activity will be mostly carried out by other members of InterPARES 2 (including Graduate Research Assistants). Also, this applicant will be on study leave during the first year of the proposed project (2007-2008).

will be at each given stage fully participatory and rigorously shared. At this week-long research summit, the research instruments to be used for the case studies will be defined and refined. There will be three kinds of case studies: 1) the first will focus on bodies of records; 2) the second will study systems that control, contain or should contain records; and 3) the third will analyze the archival environment of test-beds that have no digital records in their custody, but need to prepare themselves for digital preservation. InterPARES developed a set of instruments for conducting case studies that have been proven valid and effective. These will be adjusted to the specific objectives of this project, and an instrument will be constructed for the study of archival environments that is consistent with the existing set.¹³ Immediately following this summit, the Director will meet with all TEAM Canada academic and professional Canadian co-applicants to review the schedule and to make the necessary adjustments to the methodological instruments that may be required by the specificity of the Canadian environment.

*Establishing the Context and the Specific Research Cycle--*Initially, each Canadian test-bed partner will identify a body of digital material or a system for which a preservation plan will be developed. In the absence of digital material, it will identify its own policy, strategy, and procedural requirements. This stage represents the context of problem solving with theory, and theory development through solving problems.

*Data Collection--*Data will be collected for each test-bed about its context and limitations, the specific body of material, its documentary forms, technological constraints, functional or cultural meaning, etc., or the specific digital system. Where necessary, an ethnographic approach will be used: the researchers responsible for each test-bed will place themselves within the test-bed partner environment (creators of records, their users, and archivists) to gain the cultural perspective of those responsible for records, and will produce extensive descriptive documents about non-written but shared and well understood practices and interactions that create meaning and define values; these descriptions will complement the data collected (Gracy, 2004).

*First Iterations: Testing Different Solutions in Different Contexts--*All Canadian co-applicants, and all collaborators and resource partners' representatives (hereinafter "the TEAM Canada researchers") will reflect on the data from each test-bed and, at their bi-annual, week-long plenary workshop, will collectively articulate several possible solutions from which a single action plan will emerge and be tested. This action plan will include a strategy, protocols, functional requirements, procedures, and expected outcomes. If required by the plan, a prototype development method will be used, which is a user-centered prototyping approach that allows for exploration of the interplay between theory and practice, advancing the practice, while also offering new insights into theoretical concepts. It consists of developing a system that can serve as proof-by-demonstration of the underlying theory, while producing an artifact that can form the basis of ongoing and expanded research. This method comprises three major iterative stages – concept building, system building and system evaluation; all stages of system development reflect this focus on the concept that the system is to illustrate (Evans and Rouche, 2004). The test results will include performance of this plan against benchmarks and baselines established in extant research.

*Comparison of First Iterations--*The results of each test will be shared among the TEAM Canada researchers and analyzed. An assessment of these results will then allow us to reflect on this action, and refine the action plans.

*Second Iteration: Refining Solutions for Particular Contexts--*After this assessment, the process will begin another cycle. This second iteration will account for anomalies

¹³ See http://www.interpares.org/display_file.cfm?doc=ip2_template_for_case_study_analysis.pdf,
http://www.interpares.org/display_file.cfm?doc=ip2_reporting_framework_Dec2003.pdf,
http://www.interpares.org/display_file.cfm?doc=ip2_possible_questions_for_interviewees.pdf,
http://www.interpares.org/display_file.cfm?doc=ip2_23_questions_for_case_studies.pdf.

in the test results, and benefit from the insight gained from a comparison across contexts (both organizational and cultural). In so doing, it will refine our plans and performance measures. The second iteration will continue with small mini-iterations, that is, with minor refinements as needed, always keeping the focus on the concept that it was agreed to implement, until a definitive action plan is agreed upon for each context. *Comparisons of Second Iterations*--The data will be compared among cohorts – the partner organizations of the same type (e.g., city archives, university archives) – to establish what are the critical factors that determine the most appropriate solution for these contexts and whether they are linked to documentary forms, technology, organizational culture or function, or other environmental contextual elements. This comparison will allow us to make some statements of a general type. Furthermore, once a year, at the international partners' week-long summit, the results will be compared with parallel research findings produced by the national and multinational TEAMS. This comparison of results will not happen in a vacuum because all international partners will share the same web site and maintain ongoing communication. *Reflection, Analysis, and Synthesis*--Throughout the research, all researchers will reflect on issues and processes and make explicit their assumptions and biases, thereby giving rise to theoretical considerations. This reflexive and engaged scholarship will allow the researchers a chance to bind critical discourse with mission critical processes. Thus, while the project will start out with theory informing practice, as it will proceed, practice will refine theory, in a transformative cycle.

Evaluation Framework—Performance indicators for this type of research must necessarily relate to the effectiveness and productiveness of the collaboration. In fact, whether the policies, strategies or action plans developed for each test-bed are capable of resulting in the permanent preservation of the materials that are their object is impossible to know within the short duration span of the research project. Thus, the research alliance will assess the test-bed partners' motivation and purposefulness in contributing to the projected outcomes by the established deadlines; the quality, continuity, and effects of the resource partners' advice and support; and the products' effectiveness in establishing appropriate relationships among stakeholders within each archival environment, in addressing the most urgent preservation issues, and in informing and guiding both the staff of each test-bed and the bodies that control and audit them. Another performance indicator will be the number of requests the alliance will receive for the distribution, translation, and teaching of its products, and the number and type of test-bed partners that over time will become part of the project. It is indeed expected that each year new test-beds will be added to the project, while those who have achieved their objectives might exit after a couple of years. We have planned for this. For example, we have purposely postponed the recruitment of test-beds in the areas of performing arts and scientific research, as they present complex problems that we will be better equipped to deal with after one or two years experience in implementation and testing. It is also expected that more countries will want to join the international alliance as we have already augmented the number of the TEAMS since the letter of intent. As it regards the effectiveness of the education modules, feedback will be requested from those who deliver them on the basis of the questionnaires that they will submit to their audiences/students, and of their experience as instructors. The ultimate indicator of the success of this research alliance will indeed be the satisfaction level of its stakeholders, both from the community (based on their perception of the ability they have acquired to plan and carry out digital preservation) and academia (based on the body of knowledge produced in the research process). In any case, a more specific and detailed performance measurement plan will be developed during the project.

3. References

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Not Cited in the Detailed Description

Research projects on digital records publish their primary information on dedicated web sites. The web sites that are the most relevant to this proposal are cited in the footnotes of the detailed description. Some of them contain a very comprehensive list of online resources on digital preservation: see for example the list published on the site of the *Digital Preservation Europe* project <http://www.digitalpreservationeurope.eu/resources/>. To avoid loading this proposal with a list of web sites that would span numerous pages, we direct the interested reader to the sites cited in this proposal’s footnotes and to the online resources that these sites list. They are all relevant to this research project.

Also, several standards are relevant to this research, and they have been considered when this project’s objectives have been identified. Examples are:

- Canadian General Standards Board. *Electronic Records as Documentary Evidence* (CAN/CGSB-72.34—2005)
- U.S. Department of Defense. *Draft Design Criteria Standard for Electronic Records Management Software Applications* (DoD 5015.2—STD—2007)
- European Commission IDA Program. *Model Requirements for the Management of Electronic Records* (MoReq Specification—2001)
- International Council on Archives. Committee on Current Records in an Electronic Environment. *Electronic Records. A Workbook for Archivists* (ICA Study 16—2005)

The most recent literature on the matters we propose to study includes publications produced by the InterPARES project, which of course have been taken into account while designing this project. Examples are:

- Duranti, Luciana and Kenneth Thibodeau. "The Concept of Record in Interactive, Experiential and Dynamic Environments: the View of InterPARES," *Archival Science* 1 (2006): 13-68.
- Eastwood, Terry. "Appraising Digital Records for Long-term Preservation," *Data Science Journal* 3 (2004): 202-208.
- MacNeil, Heather. "Providing Grounds for Trust: Developing Conceptual Requirements for the Long-Term Preservation of Authentic Electronic Records," *Archivaria* 50 (2000): 52-78.
- MacNeil, Heather. "Providing Grounds for Trust II: The Findings of the Authenticity Task Force of InterPARES," *Archivaria* 54 (2002): 24-58.
- Moore, Reagan W. "Building Preservation Environments with Data Grid Technology," *The American Archivist* 69, 1 (2006): 139-158.
- Todd, Malcolm. "Power, Identity, Integrity, Authenticity, and the Archives: A comparative Study of the Application of Archival Methodologies to Contemporary Privacy," *Archivaria* 61 (Spring 2006): 181-214.

Among the most recent writings, special attention went to the following:*

- Anderson, Ulf. *A concept for governing the complete life-cycle of information*. Stockholm: AstraZeneca, 2006.
- Anderson, Sheila and Rachel Heery. *Digital Repositories Review*. London: UK: JISC, 2005.
- Benedict, Karen M. *Ethics and the Archival Profession*. Chicago: Society of American Archivists, 2003.
- Barata, Kimberly. "Archives in the digital age," *Journal of the Society of Archivists* 25, 1 (2004): 63-70.
- Besser, Howard. *Introduction to Imaging*. Los Angeles, CA: Getty Research Institute, 2003.
- Bloodgood, James M. and J. L. Morrow. "Strategic Organizational Change: Exploring the Roles of Environmental Structure, Internal Conscious Awareness and Knowledge," *Journal of Management Studies* 40, 7 (2003): 1761-82.
- Brown, Adrian. *Archiving Websites. A Practical Guide for Information Management Professionals*. London. UK: Facet Publishing, 2006.
- Chu, Catherine and Steve Smithson. "Organizational Structure and E-Business: A Structural Analysis," *Proceedings of the 5th International Conference on Electronic Commerce ICEC 2003*. (2003): 205-12.
- Cox, Richard. *Ethics, Accountability, and Recordkeeping in a Dangerous World*. London, UK: Facet Publishing, 2006.
- Dennis, A. R. and M. J. Garfield. "The Adoption and Use of GSS in Project Teams: Toward More Participative Processes and Outcomes," *MIS Quarterly* 27, 2 (2003): 289-323.
- Dyck, Bruno, et al. "Learning to Build a Car: An Empirical Investigation of Organizational Learning," *Journal of Management Studies* 42, 2 (2005): 387-416.

* The numerous writings of several co-applicants on various areas covered by this proposal are not included among these references, as they can be seen on the CV attachment of each applicant.

- European Commission. *Report on archives in the enlarged European Union. Increased archival cooperation in Europe: action plan*. Luxembourg: European Communities, 2005.
- Goold, Michael and Andrew Campbell. "Making Matrix Structures Work: Creating Clarity on Unit Roles and Responsibility," *European Management Journal* 21, 3 (2003): 351-363.
- Gorman, G.E. and Sydney J. Shep, eds. *Preservation Management for Libraries, Archives, and Museums*. London, UK: Facet Publishing, 2006.
- Hedstrom, Margaret L., et al. "The old version flickers more: Digital Preservation from the User's Perspective," *American Archivist* 69, 1 (2006): 159-187.
- Heuscher, S. "Workflow Modelling Language Evaluation for an Archival Environment," *Archivi & Computer* xxiv, 3 (2004): 123-141.
- Iacovino, Livia. *Recordkeeping, Ethics and Law. Regulatory Models, Participant Relationships and Rights and Responsibilities in the Online World*. Dordrecht: Springer, 2005.
- Maguire, Rachael. "Lessons learned from implementing an electronic records management system," *Records Management Journal* 15, 13 (2005).
- McLeod, Julie and Hare, Catherine, eds. *Managing Electronic Records*. London, UK: Facet Publishing, 2005.
- Menne-Haritz, Angelika. *Business Process. An Archival Science Approach to Collaborative Decision Making, Records, and Knowledge Management*. Dordrecht: Kluwer Academic Publishers, 2004.
- New York Times Co. v. Tasini, 533 U.S. 483 (2001). [A leading decision by the US Supreme Court involving copyright of freelance works reproduced and distributed in digital form outside of their original print publication context. See: <http://straylight.law.cornell.edu/supct/html/00-201.ZS.html>]
- Padfield, Tim. *Copyright for Archivists and Users of Archives*. London, UK: Facet Publishing, 2004.
- Powell, Anne, G. Piccoli and B. Ives. "Virtual Teams: A Review of Current Literature and Directions for Future Research," *ACM SIGMIS Database* 35, 1 (2004): 6-36.
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- Robertson v. Thomson Corp, 2006 SCC 43. [A recent Supreme Court of Canada ruling involving intellectual property rights and copyright infringement of works stored in digital format. See: <http://scc.lexum.umontreal.ca/en/2006/2006scc43/2006scc43.html>]
- Rusaw, A. Carol. "How Downsizing Affects Organizational Memory in Government: Some Implications for Professional and Organizational Development," *Public Administration Quarterly* 28, 4 (Winter 2005): 482-500.
- Shepherd, Elisabeth and Geoffrey Yeo. *Managing Records. A Handbook of Principles and Practice*. London, UK: Facet Publishing, 2002.
- Stephens, David O. and Roderick C. Wallace. *Electronic Records Retention. New Strategies for Data Life Cycle Management*. Kansas City: ARMA International, 2003.
- Tough, Alistair and Michael Moss, eds. *Record Keeping in a Hybrid Environment. Managing the Creation, Use, Preservation and Disposal of Unpublished Information Objects in Context*. Oxford, England: Chandos Publishing, 2006.
- Williams, Caroline. *Managing Archives. Foundations, Principles and Practice*. Oxford, England: Chandos Publishing, 2006.

4. *Communication of Results*

Ongoing dissemination will occur through a **Project Web Site** managed by the Project Technical Coordinator. The site will have a public area where information about the project will be available to the public at large, and a restricted area. The latter will comprise dedicated closed areas for each national and multinational team, and an area shared by all teams, including listservs and working spaces for research and governance units, methodological instruments, databases with all the collected data, structured on the basis of their content and purpose (e.g., terminological, bibliographic, metadata schema register), all research documents, and links to the web sites containing all relevant material for the research. This restricted area, available to all national and international researchers and partners, in addition to being their primary means of communication and the locus where a large part of the analysis, reflection and critical discussion will occur, is intended to serve as a powerful, collaborative dissemination and knowledge mobilization instrument across types of organizations, countries and cultures. The web site will also be the locus for **online conferences** to which the co-applicants will invite academics, professionals and representatives of interested organizations.

An **International Symposium** will be organized each year by a different international partner in a different country to present preliminary findings to local audiences. **Presentations** will be regularly given at professional and academic conferences, refereed and non-refereed **articles** will be published, **workshops and seminars** will be taught on a regular basis by the archival associations, but also occasionally by the co-applicants. Also, to sensitize communities of practice and members of the general public to the problems of digital preservation, the co-applicants will participate in appropriate events where **panels** of various kinds discuss pressing issues. The identification of the most appropriate *fora* will be one of the responsibilities of the Dissemination Committee, which will also develop new ways of dissemination tailored to the kind of issues that the research will address at any given time and to the type of public or category of professionals that they are likely to affect. Except for the web site, which will begin its activity on the first day of the research with complete information on its goal, objectives, products, methodology, partners, related projects, etc., and the international symposia, which will occur on a regular basis beginning at the end of the first year of the research, it is not possible to provide a dissemination schedule at this time, in consideration of the fact that the co-applicants, collaborators and partners have agreed that it is the responsibility of the Dissemination Committee to establish such a schedule and define the specific outputs. However, our goal is to achieve regularity and continuity of dissemination.

The **Position Papers** for regulating, controlling and auditing bodies will be distributed to the relevant agencies to achieve the maximum circulation possible. The specific policies, strategies and procedures will be distilled in model documents that can be used by similar kinds of organizations and will be included in **Study Kits** for staff training and professional continuing education. The study kits will also include bibliographies, guidelines from this project and others, cost-benefit analysis models, performance assessment models, ethical models, a checklist of criteria to assess material at risk, examples of real success stories, exercises with hypothetical scenarios, and strategies for outreach activities, aimed at increasing awareness among records creators and donors. The study kits will begin to be produced in the third year of the research.

The **students** who will graduate each year will further disseminate the knowledge acquired from their experience as research assistants and from the updated content of the academic curriculum. This kind of dissemination is the most likely to succeed in the development of standard practices throughout Canada and the world.

5. *Description of Team*

Applicant—The Director of TEAM Canada, who has headed both phases of InterPARES, will be responsible for the intellectual, financial and administrative direction of the research; the setting of agendas for the International Summits, the bi-annual research workshops and the meetings of the Steering and Dissemination Committees; the formal acceptance of new test-bed and international partners; and the supervision of the Project Coordinator and the Technical Coordinator. **Co-applicants-academics**—Francesca Marini and Joseph Tennis, from the School of Library, Archival and Information Studies (SLAIS) at the University of British Columbia (UBC), specialize respectively in performing art records and organization of knowledge. Ronald Cenfetelli, from the Sauder School of Business at UBC, is a specialist in organizational culture as it relates to the design of information systems. Mira Sundara Rajan, from the Faculty of Law at UBC, is a specialist in copyright law. Barbara Craig, from the Faculty of Information at the University of Toronto, is a specialist in medical records and in record-making and recordkeeping systems. Alexandra Bradley is an adjunct professor in records management at SLAIS, UBC, and a very experienced consultant in recordkeeping and archival systems for small programs and communities. These co-applicants will be primarily responsible for the application of and control on the methodology of each aspect of the research, and for the analysis of data, the development of theoretical considerations from the observation of how theory translates into reality, and the synthesis of the knowledge produced by the research. **Co-applicants-professionals**—These individuals have signed up as professional co-applicants to demonstrate the commitment of the test-bed partners, of which they are employees, to this project: they will be directly engaged in all aspects and phases of the research, and in the knowledge transfer activities, including the preparation and delivery of training and education modules and of presentations at conferences. **Co-applicants-TEAMs' Directors**—These individuals are directors of international partners (see details in the next section) who have signed up as co-applicants to signal the degree of their commitment to and the level of their involvement in the intellectual aspects of the project: they are not only international TEAMs' leaders but full fledged researchers in this project, actively involved also in the development of training and educational modules, in knowledge mobilization, and in the delivery of all expected products. In addition, they will participate in all International Summits and symposia, and will be in constant communication with the Project Director and TEAM Canada through the web site, analyzing and reflecting on the research at every step of the way. **Collaborators-Canada/USA**—Yvette Hackett, participating as an independent consultant, is an archivist with Library and Archives Canada expert in digital preservation and will help primarily with materials at risk. John McDonald, a consultant and international expert in the management and preservation of digital information, will contribute primarily to policy development. Richard Marciano, a researcher for the San Diego Supercomputer Centre, will provide expertise on system development in the context of persistent archives based on the data grid concept. Helen Tibbo, an archival professor and a scholar expert in digital preservation, specifically in the teaching of theoretical findings, will contribute primarily to the development of training and education modules. **Collaborators-International**—These directors of international partners will be actively involved with their own TEAMs in all aspects of the research, but not with TEAM Canada. They will participate in all International Summits and symposia, and will be in constant communication with the Project Director through the Project Web Site.

6. *Partnerships and Alliances*

This research project encompasses two distinct, yet integrated and interdependent alliances: an international alliance and a Canadian alliance. The **International Alliance** is led by the Director of TEAM Canada (this applicant) and administered from the UBC headquarters of the project. In addition to TEAM Canada, the partners composing the international alliance are:

- TEAM Africa, directed by Anne Thurston, the Director of the International Records Management Trust in London, a not-for-profit organization that supports the dissemination and application of good recordkeeping and record preservation in underdeveloped countries. With financial support from UNESCO, the Director will be responsible for a TEAM composed of archives in east and southern Africa and for ensuring the most effective transfer of knowledge to as many other African countries as possible;
- TEAM Brazil, directed by Claudia Lacombe, an archival manager in the National Archives of Brazil, who has been a member of the Caribbean and Latin America InterPARES Dissemination (CLAID) Team, funded by UNESCO, and is a specialist in record-making and recordkeeping systems in South America;
- TEAM China, directed by Jian Wang, an archival professor from the Renmin University of China who has translated several InterPARES documents, participated in several Chinese research projects in digital preservation, and developed teaching in this area;
- TEAM Netherlands and Belgium, directed by Peter Horsman, an archival professor and scholar from the University of Amsterdam, who was a researcher in InterPARES 1 and who is a specialist in appraisal of digital material and in the design of information systems;
- TEAM Ireland and United Kingdom, directed by Zoë Smyth, Senior Records and Information Manager for the Northern Ireland Office, a practitioner who is a member of ISO/TC46/SC11 (Archives/Records Management Sub-Committee) and a professional records manager working with digital records;
- TEAM Italy, directed by Maria Guercio, an archival professor and scholar from the University of Urbino, who has been a researcher in InterPARES 1 and 2 and is a specialist in legal issues related to digital preservation;
- TEAM Korea, directed by Sam G. Oh, a professor of library and information science from Sungkyunkwan University in Seoul, who has expertise in metadata and ontology schema design;
- TEAM Mexico, directed by Alicia Barnard, an information manager, director of the Documentation Centre of the Ministry of Health, who has also been a member of the CLAID Team and is a specialist in record-making and recordkeeping systems in Mexico;
- TEAM Singapore, directed by Horng-Jyh Wu, a professor of information systems design in the archival program of Nanyang Technological University, who is a specialist in the system development research method;

In addition to the above TEAMS, within the first year of the project, another four TEAMS will likely join the International Alliance. In fact, archivists from Norway, Sweden, Spain and the United States have just expressed interest in organizing national TEAMS: although it is too late to include them in this application, their interest should be noted.

As mentioned earlier, the directors of all TEAMS are either co-applicants or collaborators of the Canadian alliance (TEAM Canada), while their TEAMS are international partners of TEAM Canada. As co-applicants and collaborators, these individuals are responsible for sharing with all TEAMS of the international alliance both the knowledge that they have as scholars or professionals and that which they will acquire in the course of their TEAM's research. As Directors of TEAM

Canada's international partners, in addition to being responsible for the intellectual, financial and administrative direction of their TEAM's research, they are responsible for participating in the yearly week-long International Summit and in the yearly International Symposium, and for organizing in their country or in one of the countries under their jurisdiction either one summit or one symposium. The International Alliance will not share Canadian funds other than indirectly, by using the services of the project's headquarters at UBC.

The **Canadian Alliance** is also led by this applicant and administered from the project's headquarters at UBC. The partners in the Canadian Alliance belong in one of two categories: resource partners and test-bed partners. The **resource partners** do not take part in data collection, but are all responsible for providing their competence in the course of data analysis, comparison, and synthesis, and for contributing to the development of policies, strategies, action plans and models. In addition, some of them are specifically responsible for prototype testing or action plan testing and for the analysis of the results, while others are specifically responsible for knowledge mobilization and transfer. Thus, all resource partners are expected to take an active part in the bi-annual research workshops and in the ongoing communication occurring within the restricted area of the web site. In addition, they as a category will have one or more representatives on the Steering and Dissemination Committees. All these activities will be carried out at their own expense, thus they are to be considered contributions in kind. The Canadian Council of Archives (CCA) is the national body identifying and coordinating the strategic needs and activities of Canadian archives, and has a strong interest in ensuring that digital preservation be carried out effectively and consistently across Canadian archives according to leading edge international practices. They will therefore contribute specifically to the development of models (cost-benefit, ethical, and performance evaluation) and to the dissemination of preliminary products to non-participant Canadian archives, collection of feedback, and refinement of models. The Association of Canadian Archivists (ACA) and the Archives Association of British Columbia (AABC) are respectively the Canadian national professional association and the BC provincial professional association of which all test-bed partners and their representatives are members. They are the primary conduit of continuing professional education, respectively, in the country and in the province of BC, and their specific contribution will be in testing the education modules and providing feedback. They are also particularly well positioned to support knowledge mobilization, both through their annual conferences, and their newsletters. In addition, the ACA is the editor and publisher of one of the most important (in terms of readership numbers and of recognized content value) archival scholarly journals in the world (*Archivaria*). The Canadian Conservation Institute (CCI) is the Canadian national body responsible for issuing policies, guidelines, etc., for the physical preservation of all kinds of artifacts, including physical storage media for digital materials. Its primary function will be one of validation of research results and dissemination. Library and Archives Canada (LAC), and in particular its component known until 2004 as the National Archives of Canada (NAC), has led the Canadian effort in digital preservation since the 1970s. Archivists from NAC have been co-investigators in InterPARES 1 and 2, and LAC intends to continue such tradition by assigning several archivists to this proposed project, especially from the policy area. The National Librarian and Archivist leads the Small Agencies Network (SAN): last year LAC concluded the Small Agency Strategy (SAS) initiative, which resulted in the development of guidelines and other tools to assist small federal agencies in addressing information management issues. Thus, in addition to providing their experience in policy and models development, LAC representatives will contribute to the implementation of these guides and tools in the test-bed partners' environments. The Corporate Information Management Branch of the BC Ministry of

Labour and Citizens' Service is the provincial body responsible for supporting the administration and maintenance of records management in the agencies of the provincial government. The expertise of its representatives will serve in particular the research processes of analysis, reflection, synthesis and formulation of results as it regards the critical relationship between the archives and the creators of the records and the kind of guidelines that archives should provide to creators to support proper digital record-making and recordkeeping. The Royal British Columbia Museum is the locus of the provincial archives, which will provide its expertise in appraisal and selection and in outsourcing. The UBC Irving K. Barber Learning Centre will primarily provide venues for dissemination. The DOCAM research alliance is a partnership supported by a CURA grant, focused on the development of description and preservation strategies for digital art, which will be tested on case studies. The San Diego Supercomputer Center is a research centre specializing in digital preservation based on the concepts of persistent archives and data grids. Its contribution will focus on testing of prototypes. The Electronic Records Archives (ERA), in the National Archives and Records Administration in Washington, D.C., the most advanced digital archives, will provide expertise on the development of action plans for digital preservation, and plans to assign several archivists to all phases of the research, except data collection. ERA strongly believes that its contribution to the formulation and testing of action plans and the development and testing of prototypes will produce institutional knowledge that will be very useful to the small agencies for which the National Archives and Records Administration (NARA) is responsible, and in some cases to the larger agencies also.

The **test-bed partners** are the subject, locus, participants and stakeholders in the process of inquiry. They are also the primary and immediate beneficiaries of and contributors to the knowledge mobilization process in that, on the one hand, they are constantly informed on every aspect of the research as it happens in each test-bed in Canada and abroad—through the restricted area of the web site, the plenary research workshops, and their continuing interaction with co-applicants, collaborators and partners worldwide; and, on the other hand, they provide the case studies, and contribute to the analysis, reflection, syntheses and product development for themselves and everybody else. To them, the international collaborative environment is the most important assurance of the ultimate success of their research efforts: to have the opportunity to access so much expertise to solve problems that they would otherwise be left alone to struggle with, and to be certain in the process that somebody in the large alliance has already encountered the same problem, tried several solutions, learned from trial and error, and is willing to share the acquired expertise are the key reasons why they want to participate. As it is essential to be able to compare case studies that have similar contexts, it has been decided to select initially test-beds that fit into clear cohorts (also across the international alliance), instead of accepting a wide variety of test-beds at the beginning of the research project. This will allow the project to deal with the need for a variety of material by identifying appropriate case studies within each test-bed, and with the need for a variety of functions and responsibilities by recruiting additional test-bed cohorts (e.g., two or three archives of scientific organizations) each year. Accordingly, three university archives, those of the UBC (4 archivists), Simon Fraser University (3 archivists) and the University of Victoria (2 archivists), have identified case studies in e-mail management, preservation and access, each dealing with the records of one unit of a different kind (i.e., operational, administrative and academic). The City of Vancouver Archives (4 archivists, one conservator) has selected a case study that involves the examination and implementation of an electronic records management program at the City. The City is planning to purchase Electronic Records Management System software in the near future and is looking for help in selecting and deploying the software, including

developing policies and procedures and providing access to the resulting digital archives. The City of Victoria Archives (2 archivists) proposes a case study that involves the examination of ways to transition from the current hybrid mix of paper and digital building permit documentation to a fully digital system, while ensuring that important documents received from third parties, such as architectural plans, are what they purport to be and meet standards designed to help the City achieve its long-term preservation requirements for such documents. A second case study involves the scheduling for retention and disposition of the digital records resulting from the exercise of the city's Legislative Services, Corporate and Regulatory Services, and Financial Services. The North Vancouver Museum and Archives (1 archivist) is a community archives that intends to prepare for the expected transfer of digital records. Its priority is the development of a preservation policy and strategy, and of guidelines for records creators. The UBC Museum of Anthropology Archives (1 archivist) needs a policy for the creation and maintenance of its own records and for the acquisition of digital material from a variety of sources. The UBC Morris and Helen Belkin Art Gallery (1 archivist) wishes to develop policies, guidelines and strategies to preserve multi-media digital artworks, as these works present new problems for the gallery in terms of migration and maintenance. In addition, the Gallery is in the process of transferring analog works to digital form, and must create strategies to ensure these are preserved for the future while maintaining the integrity of the artists' intentions. The UBC Alma Mater Society Archives (1 archivist) proposes a case study that involves developing strategies for exercising greater control over modifications to its web site, and for the long-term preservation of its various iterations over time. This case study is similar to one of the two identified as urgent by the Insurance Corporation of British Columbia (ICBC) Archives (4 archivists), which involves developing strategies for preserving the various iterations of its online auto plan manual and linked e-mail. The manual provides instructions to brokers on all aspects of selling auto insurance and is the only means the corporation uses to communicate current insurance policies and procedures to them. A second case study proposed by ICBC involves developing strategies for preserving its Data Warehouse, its official data repository, which holds data extracted from all areas of the organization and compiled into reports that are used for many different purposes. These reports can be structurally quite complex, with many levels of nested reports combined within a single report. The British Columbia Medical Association Archives (1 archivist) needs a policy and strategy for the acquisition and preservation of the digital records of a community of practice, based on the design of an appropriate record-making and recordkeeping system.

The case studies will be carried out by teams of researchers purposely constituted for each case study. Such a team will include test-bed employees as needed, an academic and a professional co-applicant and one or more graduate students, and will receive ongoing input and feedback from all co-applicants and collaborators. Specific collaborators may be assigned to teams as needed.

The described case studies only represent an initial idea of the research work that will be carried out within each test-bed. When the research will begin and each environment will be collaboratively analyzed to understand all the issues in context, additional studies will be identified so that each test-bed partner will be able to contribute to and benefit from all the expected products of the entire project. Once each test-bed's objectives are reached, the test-bed may remain in the project as a resource partner, while other different test-beds will become the primary locus of the research. The research activities of test-bed co-applicants and representatives will be carried out at their own expense, thus they are to be considered contributions in kind. Project's funds will support students, research workshops, dissemination, and the project's headquarters services.

7. Training (role of students)

All TEAM Canada research test-beds are located in British Columbia, either in Vancouver or in Victoria, and purposely so, because the UBC School of Library, Archival and Information Studies (SLAIS) graduate archival programs have the largest enrollment of archival students in Canada and provide professional archivists to North America and the rest of the world. In any given year, SLAIS has about 50 master's level students and 4 PhD students available to work on research projects as Graduate Research Assistants (GRAs). This means that SLAIS can include GRAs in each case study team and still have enough students to work on digital preservation literature and web site reviews, entity and activity modeling, database design, maintaining a policy matrix which keeps track of information relating to policies, guidelines and standards from different jurisdictions, drafting research documents, etc. The students assigned to the case studies will mostly do data collection, but will also participate in the other parts of the research by attending the bi-annual plenary workshops and by communicating with all other researchers through the restricted area of the web site. Some students may choose to work on the research for credit rather than for payment. SLAIS offers several 3 credit courses that can accommodate this preference: ARST 592, Directed Research Project; ARST 594, Directed Study, ARST 595, Internship, and ARST 596, Professional Experience. In addition, SLAIS offers several theoretical courses that require some form of application of concepts and principles to concrete records or real circumstances in the form of an assignment. Such assignments could be small projects carried out in the context of the research. These students' research will be supervised and evaluated by the professors responsible for all courses mentioned above; that is, this applicant and the co-applicant Francesca Marini. When the research work will consist of a study of organizational culture, the development of metadata schemas or the analysis of legal issues, the supervisor will be, respectively, Ronald Cenfetelli, Joseph Tennis, or Mira Sundara Rajan. Among the students who apply for GRA positions, we will select those who have already taken the required master's level methodology course. The students belonging in case study teams will be supervised by the members of such teams. All students will be supervised in terms of logistics, amount of work assigned, ability to meet deadlines, and attention to the coordination of the various components of the research by the Project Coordinator. The Project Coordinator will also be responsible for presenting a bi-annual summary of the research to date to new students wishing to work on the research project who need to become familiar with the basic documents of the project, its research processes, and its preliminary findings. The Technical Coordinator will be responsible for training those students in the use of the various components of the restricted area web site, so that they can interact with all researchers, and in the use of modelling and other technology as needed.

As it regards the communication to all students of the knowledge developed in the course of the project, SLAIS has in its regular curriculum a course, ARST 555, Preservation of Digital Records, which can incorporate and deliver much of it. The knowledge more directly related to record-making and keeping systems and to the relationship between creators and preserver can easily be conveyed to the students in an existing advanced records management course. However, as soon as modules for university courses will be produced by the project, a new course will be created and the two courses mentioned above will be revised in such a way that harmonization of content and a proper pedagogical sequence of topics and methods will be assured.

All students will be invited to participate in dissemination by presenting papers at conferences, writing articles, and, at the PhD level, delivering the content of the training and education modules created for the various constituencies that the project intends to serve.