InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems

International Research on Permanent Authentic Records in Electronic Systems (InterPARES) 2: Experiential, Interactive and Dynamic Records

PART TWO

RECORDS CREATION
AND MAINTENANCE

Domain 1 Task Force Report

[including Appendices 9, 10 and 11]

by

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Introduction[1]

Background and mandate

An understanding of the meaning of a record rests upon an understanding of the process of its creation and of the function of the record within the activity in which it participates. To preserve such a record in authentic form over time, it is necessary not only to know its characteristics, processes of creation and function, the purposes for which it is kept by its creator and which of its intrinsic and extrinsic elements can be used to evaluate its authenticity, but also to ensure that the record is generated in such a way that it is possible to carry it forward for use by future generations. This knowledge needs to be acquired and developed across the wide spectrum of digital records identified in each focus area of this Project. Domain 1 was founded on this perspective. Its objective was to explore records and the processes that create and maintain them.

Although the creation process and documentary form of 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 records created in the course of an online interaction may be very different from that of digital 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 corresponds to the traditional definition of a record, as 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, in most cases, facilitates determination of their identity and integrity, regardless of labelling conventions, archival descriptions, etc. In the last two decades, however, digital environments have changed the practices of artists and scientists. In some cases, these environments provide comprehensive 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. Few of the documents produced using new information technologies have properties that allow users to determine their identity and integrity, to arrange and describe them, to ensure that they can be kept accessible, and to ensure that their authenticity can be maintained and subsequently verified through time. 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.

[1] This report was carried out under the direction of Professor Martine Cardin with the assistance of Peter Gagné, student in Archival Studies at Université Laval.

Research team

The following is a list of researchers and research assistants who participated in the Domain 1 Task Force throughout the Project:[2]

Chairs:

Malcolm Todd	Feb 2004 - Sept 2004
Martine Cardin	Sept 2004 - Dec 2006

Researchers:

Paul Berkman	University of California, Santa Barbara, USA—Working Group 1.2
Martine Cardin	Université Laval, Canada—Working Group 1.1
Henry Daniel	Simon Fraser University, Canada—Working Group 1.1
Luciana Duranti	The University of British Columbia, Canada—All Working Groups
Barbara Craig	University of Toronto, Canada—Working Group 1.2
Henry Daniel	Simon Fraser University, Canada—Working Group 1.1
Terry Eastwood	The University of British Columbia, Canada—Working Group 1.3
Ken Hannigan	National Archives of Ireland -Working Group 1.3
Michael Longton	University of Victoria, Canada—Working Group 1.1
Terrence Maxwell	State University of New York at Albany, USA—Working Group 1.3
Michael Murphy	Ryerson University, Canada—Working Group 1.1
Andrew Rodger	Library and Archives Canada—Working Group 1.1
Fraser Taylor	Carleton University, Canada—Working Group 1.2
Malcolm Todd	House of Lords Record Office, United Kingdom—Working Group 1.3

Research Assistants:

Natalie Catto	The University of British Columbia, Canada
Seth Dalby	The University of British Columbia, Canada
Heather Dean	The University of British Columbia, Canada
Heather Daly	The University of British Columbia, Canada
Jennifer Douglas	The University of British Columbia, Canada
Ann Forman	The University of British Columbia, Canada
Peter Gagné	Université Laval, Canada
Jessica Glidewell	The University of British Columbia, Canada
Nadine Hafner	The University of British Columbia, Canada
Keum Hee Yu	The University of British Columbia, Canada
Tracey Krause	The University of British Columbia, Canada
Tracey Lauriault	Carleton University, Canada
Philippe Perron	Université Laval, Canada
Carolyn Petrie	The University of British Columbia, Canada
Julie Simard	Université Laval, Canada
Geneviève Shepherd	The University of British Columbia, Canada
Frédéric Smith	Université Laval, Canada
Sherry Xie	The University of British Columbia, Canada

[2] Researcher membership in Domain 1 changed somewhat over the five years of the Project. Among those who were interested in Domain 1 issues but were unable to participate for the full length of the Project are: Paolo Buonora, Archivo di Stato, Italy; Su-Shing Chen, University of Florida, USA; and Susan Kennard, Banff New Media Institute, Canada.

Research Methodology

The three working groups within the Domain 1 Task Force were charged with examining the central concepts relating to records and record creation and maintenance processes. To achieve this, the investigators used a multi-method research approach involving three main analytical exercises: 1) analysis of case studies, 2) diplomatic analysis and 3) modeling.

First, using grounded theory, Domain 1 analyzed the case studies conducted across a wide spectrum of activities to gather information about record-making and recordkeeping processes and the records resulting from them. To achieve this purpose, it developed several tools to gather data from the case studies and produced overviews relevant to the work of all three domains. Such overviews served to highlight and summarize the Domain 1 issues as they related specifically to the findings of each case study and applicable general study, which, in turn, helped researchers to understand and evaluate the general guidelines that have emerged as a partial result of these findings.

Second, Domain 1 used the diplomatic analysis done on each case study to describe the formal elements of the records and their processes 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 digital records, by comparing unknown realities against the known one; that is, against the ideal template of the traditional record. In InterPARES 2, the approach was that of the original diplomatists: an examination of a wide variety of records served to identify elements, attributes and their functions 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.

Finally, the original plan was to represent the records observed during the case studies in models and to test them against the templates to see whether the key characteristics necessary for the authentic preservation of the records are consistent across activities. In addition, the plan was to abstractly represent the creation and maintenance processes of each type of record reflected by each template using activity modeling and then generate workflows that could be tested against the typical processes of each activity. However, at the first InterPARES 2 plenary workshop, it became clear that the modeling would not be limited to the documents' creation and maintenance contexts. Instead, the modeling would cover the entire range of activities and therefore also the entire range of issues covered by the other domains of the Project. It is for this reason that the International Team decided to create the Modeling Cross-domain Task Force, which would be specifically dedicated to modeling.

Activities carried out by the Task Force over time

The meetings of the Domain 1 Task Force started in February 2004. The delay in beginning these working meetings is explained by the fact that during the first two years of the Project, research was essentially carried out by the researchers in the three focus task force groups through the production of case studies. In September 2004, the first group of nine case studies was completed, with several others still underway. Domain 1 undertook an analysis of the accumulated material. The first order of business was to come up with a way to document the work produced to be able to compare the types of activities and creative entities being investigated. It was in response to this need that a first research tool was produced to support the

characterization of each case study: a template identifying a set of information common to each case study but spread over the narrative of the final reports.[3]

The template was divided into two sections. The first concerned the Creator of the Records and the second the Administrative and Managerial Framework. The information the Domain 1 Task Force was looking for about the creator was largely embedded within the contexts section of the final case study reports (i.e., section "C" in the InterPARES 2 Reporting Framework).[4] Details about the provenancial, juridical-administrative, procedural, documentary and technological contexts allowed the Task Force to understand who produced the digital records and for what reasons. The second section of the template was split into two sub-sections: Administrative and Managerial Framework and Digital Entity/Entities Under Study. Both sub-sections aimed to gather information to allow the characterization of the types of activities and entities that were being studied.

After being presented and discussed by the International Team at the Syracusa meeting in December 2004, the template was applied to each case study by a team of research assistants, resulting in an "Areas that Should Be Covered" report for each case study.[5] The necessary information could come from the final or interim case study report or from other available documentation, such as the creators' Web sites. Other information was inferred, based on researchers' knowledge of certain fields (for example, the management structure of the Archives of Ontario). A brief description of each item in the template was accompanied by references to the source material. These descriptive reports were the basis for a narrative characterization that was generated for each case study.[6] Once completed, the template, together with the accompanying instructions and the text of the characterization, was sent to the appropriate case study team leader for validation. If any item was unavailable or inapplicable to the case study, the team leaders were invited to explain why this was so, wherever possible.

At the end of this process, the Domain 1 Task Force had a tool that assisted the research in several ways. First, it permitted the validation of the case studies that had been completed up to that point and highlighted certain points that needed to be further developed in the impending final report. In short, it helped to fill in certain gaps in the reports and was useful as a methodological guideline for writing the final reports of the cases studies that were still underway. It should be noted that this was not an additional questionnaire, but a sort of reminder list of details to be included in various aspects. Secondly, this tool served as a sort of practical index for the researchers in the different groups, who could use the references to return to the source material as needed to clear up a given question. Lastly, by characterizing all of the case studies on a common basis, it was possible to make solid comparisons between them.

This characterization exercise was carried out continuously throughout the Project, as each final report became available. The production of the document, "Case Studies at-a-Glance,"[7] a sort of synthesis of the work, allowed researchers to follow the progress of the work. This document allowed the characterizations to be associated with the analyses done by other groups, including the diplomatic analyses[8] done by a team from the University of British Columbia and

[3] See Appendix 10.
[4] See Appendix 8. Available at http://www.interpares.org/display_file.cfm?doc=ip2_book_appendix_08.pdf.
[5] The "Areas that Should Be Covered" report for each case study is available on the InterPARES Web site (http://www.interpares.org/) and is also included on the DVD that accompanies this book.
[6] The "Characterization" report for each case study is available on the InterPARES Web site and is also included on the DVD that accompanies this book.
[7] See Appendix 11.
[8] The "Diplomatic Analysis" report for each case study is available on the InterPARES Web site and is also included on the DVD that accompanies this book. Note: no diplomatic analysis report exists for case study 08 (Mars Global Surveyor Data Records in

the walkthroughs of earlier versions of the Chain of Preservation Model done by the Modeling Cross-domain.[9] Finally, an annotated bibliography specific to creation and maintenance was produced.[10]

A comparative data analysis was then conducted, based on this body of accumulated material. Its aim was to determine the limits of the study sampling and to identify the presence of patterns in creation and maintenance. As a result, a preliminary overview, which aimed to analyze and characterize the entire body of case studies completed by researchers, was presented at the plenary workshop in Vancouver in September 2005. The relevance of such an exercise was to:

- *Critique the sources*. Because the case studies were important sources (although not the only ones) on which InterPARES 2 products would be based, it was essential, from a methodological perspective, to have a critical view of them. Thus, the presentation was a way to get input and validation from the researchers. It also allowed the Task Force to refine the analysis parameters.
- *Provide a common basis for the guidelines*. The case studies have observed how digital records are created, maintained and used in various milieus. On that basis, from an ethnographic perspective, the overviews profile certain particular schemas of cultural practices related to the production of digital entities. Such knowledge could scientifically support the conception of guidelines and their dissemination to various communities.
- *Support the dissemination of the case studies*. The case studies are more than a collection of data for InterPARES 2 researchers. In fact, they are considered as distinct InterPARES 2 research products themselves and could be used as tools for educational purposes. The only caveat is that, in spite of the fact that reports shared a standard reporting framework and that each has been summarized in a standard way, they are still raw material. Thus, they needed to be linked in a consistent narrative.

The Domain 1 Task Force undertook a second phase of analysis in the fall of 2005. Based on the defined parameters, the researchers reviewed the set of questions specific to Domain 1[11] and produced a set of instructions for extracting answers from the final case study reports. This extraction was carried out by a team of UBC research assistants under the supervision of Bonnie Mak and Terry Eastwood. The responses extracted from each case study were than compiled and analyzed by a team from Université Laval under the direction of Martine Cardin, culminating in a document that synthesized the information on the practices of records creation, recordkeeping, metadata schema and technology used by records creators in each of the case studies.[12]

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the Planetary Data System); a draft analysis was conducted by the author of the case study report, but the draft analysis was never validated by the researchers responsible for the diplomatics analyses.

[9] See William Underwood, Kevin Glick and Mark Wolfe (2007), "InterPARES 2 Project - General Study 12 Final Report: Validation of the InterPARES 2 Project Chain of Preservation Model Using Case Study Data." Available at http://www.interpares.org/display_file.cfm?doc=ip2_gs12_final_report.pdf; and Randy Preston (2004), "InterPARES 2 Project - Modeling Cross-domain: Walkthrough of the Manage Chain of Preservation Model Using Case Study 14 Data," draft report. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs14_COP_model_walkthrough.pdf.

[10] This bibliography was later merged with similar bibliographies developed for each case study, the other two domains and each of the cross-domains. The integrated bibliography is available on the InterPARES 2 Web site at http://www.interpares.org/ip2/ip2_documents.cfm?cat=biblio and on the DVD that accompanies this book.

[11] See Appendix 9.

[12] The "Domain 1 Research Questions" analysis report for each case study is available on the InterPARES Web site and is also included on the DVD that accompanies this book. Note: no Domain 1 analysis report exists for case study 17; however, answers to the Domain 1 research questions are provided on pp. 22–23 in the case study's final report.

Once this work was completed, a series of overviews was written for each case study.[13] The aim was to get relevant and significant quotations from the case study final reports and other validated material about specific aspects of creation and maintenance. Because maintenance and preservation issues are sometimes related, the Task Force looked at them together. For the same reason, despite the fact that they are Domain 2 issues, the Domain 1 Task Force also considered authenticity, reliability and accuracy aspects. However, in both cases the Task Force tried to keep the focus on Domain 1 issues. In addition, overviews of four InterPARES 2 general studies were generated for the same purposes. This stems from a decision at the Singapore International Team meeting in June 2006 to examine the general studies and pull out information relevant to Domain 1 for the Domain 1 Task Force Report. Consequently, Domain 1 examined the following four general studies: (1) general study 03, Preserving Interactive Digital Music: The MUSTICA Initiative; (2) general study 04, Survey of Recordkeeping Practices of Composers; (3) general study 07, Survey of the Recordkeeping Practices of Photographers Working with Digital Materials; and (4) general study 08, Survey of Government Web Site Interactivity. Such overviews served to highlight and summarize the Domain 1 issues as they relate specifically to the findings of each case study and applicable general study, which, in turn, will helped researchers better understand and evaluate the general guidelines that emerged partly as a result of these findings.[14]

Finally, a first draft of the Domain 1 Task Force Report was written and presented for discussion at the Los Angeles plenary workshop in September 2006. The draft report was then modified and augmented based on the comments received, as well as on further review of the InterPARES 2 documentation and as newer versions of some documentation became available.

Outcomes

The main outcomes of the research conducted in Domain 1 are: (1) the Template for Case Studies Analysis, (2) the set of case study characterizations, (3) the set of case study overviews and (4) the general overview on creation and maintenance observed in the larger context.

All of these research tools and products have been posted on the InterPARES Web site and communicated in presentations, lectures and scholarly writings. In addition, the Domain 1 work of collecting and analyzing data, and of developing methodology statements, coalesced with the research conducted in Domain 2 and resulted in the development of guidelines that can be used by various kinds of records creators to produce and maintain records that can be authentically preserved over the long term.[15]

Conceptual Basis

This section presents the theoretical and conceptual foundations of Domain 1. Before delving into the concepts particular to this domain, it first presents an overview of the fundamental concept of "record" as it evolved throughout the first and second phases of the InterPARES Project. This introductory presentation is a distillation of the article by Luciana Duranti and Ken

[13] The "Overview" report for each case study is available on the InterPARES Web site and is also included on the DVD that accompanies this book.
[14] The "Overview" report for each of the four general studies examined by Domain 1 is available on the InterPARES 2 Web site and on the DVD that accompanies this book.
[15] See *Creator Guidelines* in Appendix 20. Available at http://www.interpares.org/display_file.cfm?doc=ip2_book_appendix_20.pdf.

Thibodeau on the subject.[16] Following this foundation, the two notions essential to Domain 1 are presented; that is to say, the notions of creation and maintenance. These terms are defined as they are understood and used in the context of InterPARES 2, and, in particular, in the varied documentation produced by Domain 1. Finally, to situate these definitions in their archival context, the notions of creation and maintenance are presented as they apply to the concept of the records lifecycle.

Definition of record

The concept of "record" is based on that of a document as understood in archival science. In the simplest of archival terms, a document is recorded information. In turn, a record is a document that is created (made or received) as an instrument or by-product of a given activity and that is set aside for action or reference. Therefore, what distinguishes a record from a document that is not a record is the fact that a record has a relationship with the activity of the creator and is produced in the course of carrying out the activity. Research in the first phase of the InterPARES Project[17] sought to determine the soundness of the above definition for records mandated for accountability and administrative needs created in databases and document management systems.

InterPARES 1 Project

The definition of a record used by the InterPARES 1 Project is that which has been adopted by traditional diplomatic analysis and is based on a consideration of the dual notions of the identity and integrity of a document. In this definition, consideration is given both to the characteristics of a document itself (fixed form, stable content, etc.) and to the five contexts of its creation (juridical-administrative, provenancial, procedural, documentary and technological), to generate a "statement" of the presumption of the document's authenticity.

InterPARES 1 further defined the term "electronic record" as a record that is set aside and used in electronic form, regardless of the original form in which it may have been made or received. For example, a scan of a record originally in paper form is considered an electronic record. InterPARES 1 researches wanted to include digital records in the fundamental assumption of diplomatics that, regardless of differences in nature, provenance or date, from a formal point of view, all records are similar enough for it to be possible to conceive of a single document template containing all possible elements of a record. By extension of this principle, the InterPARES 1 researchers posited that the same formal elements found in traditional records could be found in digital records and that all digital records share the same formal elements. The researchers thus created a template of the four elements of an electronic record: documentary form, annotations, context and medium. The last element, medium, should not be considered one of the record's necessary constituent parts, however, but rather part of the record's technological context.

The definition of "record" by InterPARES 1 differs significantly from the traditional diplomatic definition, due to a fundamental difference in the way InterPARES 1 defines "document," which, as noted above, forms the basis of the concept of "record." While InterPARES 1 defines a document simply as "recorded information," diplomatics defines a

[16] Luciana Duranti and Kenneth Thibodeau (2006), "The Concept of Record in Interactive, Experiential and Dynamic Environments: the View of InterPARES," *Archival Science* 6(1): 13–68. (Note: a reprint of this article is included in Appendix 2. Available at http://www.interpares.org/display_file.cfm?doc=ip2_book_appendix_02.pdf.).

[17] See http://www.interpares.org for more information on the InterPARES Project and its two phases.

document as "information affixed to a medium." This difference is of great importance since "in the digital environment, it is possible to generate something that to all appearances is a document, but is not affixed to a medium."[18] This situation is based on the difference between the form in which a document is stored digitally (i.e., its binary form) and the form in which it is manifested to a person (i.e., reconstituted from its digital components and presented in a human-readable format on a computer screen or other display device), which distinguishes a digital document from a traditional one. It also leads to the distinction of the terms "stored digital record," which is a digitally-encoded object that is managed as a record,[19] and "manifested digital record," which, effectively, is defined as a digital document, treated as a record, that is visualized or rendered from a stored digital record and/or stored digital component(s) in a form suitable for presentation either to a person (i.e., in human-readable form) or to a computer system (i.e., in machine language).[20]

InterPARES 2 Project

The InterPARES 1 definition of a record worked well for the digital environments studied within the bounds of the first phase of the Project. However, when the Project expanded in its second phase to include documents created as by-products of artistic, scientific and governmental activities in interactive, experiential and dynamic environments, the question arose whether the traditional concept of a record needed to be refined or revised due to the unique characteristics of the environments being studied. In other words, InterPARES 2 research sought to determine whether the digital entities created and maintained in these environments indeed are, or could be, records based on the definition retained by InterPARES 1, or whether these entities have unique characteristics, due to the interactive, experiential and dynamic environments in which they are created, that would force a re-consideration or revision of the InterPARES 1 definition of "record."

Consequently, InterPARES researchers, Luciana Duranti and Kenneth Thibodeau, examined the aptness of the concept of record adopted by InterPARES 1 as it pertains to the InterPARES 2 case studies, particularly with the aim of examining "whether there are differences in the nature of the records produced in environments that only exist in the digital domain."[21] In some of these environments, the system itself acts as an agent for the system owner, carrying out individual transactions and creating a digital record without any physical, real-time input from the system owner or user.

Duranti and Thibodeau concluded that the concept of record did indeed need to be revised to include those records created and maintained in interactive, experiential and dynamic environments, particularly in environments that make use of digital technologies in innovative ways. Despite the fact that the electronic environments studied in InterPARES 2 can produce the digital equivalents of traditional documents, when the existing electronic document template was applied to the InterPARES 2 case studies, only slightly more than half of the systems studied were deemed to contain records. What is more, when the given systems did contain records, what records they did contain rarely resembled the model represented by the InterPARES 1 template.

[18] Duranti and Thibodeau, "The Concept of Record," op. cit., 27.
[19] The literal definition of stored digital record is given in the InterPARES 2 Terminology Database as "A stored digital document that is treated and managed as a record." However, when taking into account the embedded concept of a digital object, which comprises a stored digital record, the effective definition becomes "A digital object, placed in a storage system on a digital medium, that is managed as a record, and which includes information about the properties of the object and may also include methods of performing operations on or with the object" (http://www.interpares.org/ip2/ip2_terminology_db.cfm).
[20] Ibid.
[21] Duranti and Thibodeau, "The Concept of Record," op. cit., 22.

That was because, in addition to digital documents that mirror the form of traditional documents, these systems can also create documents that either differ significantly from traditional documents or have no traditional counterparts.

After examining the documents created in interactive, experiential and dynamic systems, Duranti and Thibodeau came up with a taxonomy of static and interactive documents based on the classes of documents created in the various types of systems. Their results are presented in an abbreviated form below.

Table 1. Taxonomy of Static, Interactive and Dynamic Documents[22]

Class	Description
1	**Static Documents**: Digital documents are static when they do not provide possibilities for changing their manifest content or form beyond opening, closing and navigating within the document.
1.1	The electronic equivalents or counterparts of traditional documents.
1.2	Documents that have no exact counterpart in hard copy or analogue form, but have fixed documentary form and content.
2	**Interactive Documents**: Documents that present variable content, form or both whose rules governing the context and form of presentation may be either fixed or variable.
2.1	Non-dynamic Interactive Documents: Documents where the rules that govern the content and form of presentation do not vary, and where the content presented in any instance is selected from a fixed store of data within the system.
2.2	Dynamic Interactive Documents: Documents where the rules that govern the content and form of presentation *may* vary.
2.2.1	Documents where the content and/or its presentation vary because it includes or is otherwise impacted by data that change frequently.
2.2.2	Documents where the content varies because it includes data received from external sources and not stored within the system.
2.2.3	Documents created in dynamic computing applications, which select different sets of rules—software applets or service components—to create the documents depending on variations in user inputs, in the sources of content data, and in the characteristics of that content.
2.2.4	Documents created by adaptive or evolutionary computing applications, where the software that generates the documents can change autonomously.

As can be seen from the above table, digital documents are divided into two main categories: static and interactive. It can also be seen that dynamic documents (Class 2.2) are a subset of interactive documents. However, which of the classes of documents can be considered records?

Fixed form and stable content are two of the key characteristics of an electronic record, as defined by InterPARES 1. Documents that fit into Class 1 presented in the above table therefore have the fixity of form and stability of content necessary to be considered records, provided that the other criteria are met. For the other classes of documents, the content or form may vary, but, for some, the type of variance may not necessarily prevent the documents from being considered

[22] Adapted from Table I in Duranti and Thibodeau, "The Concept of Record," ibid., 45–46.

records. For example, "there may be variations in the manifest form and/or content, even when there is no variation in the stored digital data used to generate the manifested document."[23] As such, some variations in form or content do not automatically prevent certain classes of interactive or dynamic documents from being considered records.

Certain documentary forms include variable elements that are controlled or intended by the author and that alter the form or presentation by allowing variable subsets of the content to be displayed at any moment. Although such cases present the user with what appears to be a document, this display is actually only a subset or part of the existing document, such as an online catalogue. However, "cases where the documentary form permits selective display of subsets of the content can satisfy the requirements for fixed content."[24]

If an interactive or dynamic document's form or content varies according to variable rules, this variability will prevent the documents from being considered records precisely because their content and/or form is not fixed. Nonetheless, it may be possible for digital documents in which fixed rules govern variations in content and/or form to be considered records, or as drafts in the process of being developed (i.e., potential records).

In their examination of the various types of records in interactive, experiential and dynamic systems, the authors also identified digital documents that, based on their use, can be described as "enabling documents."[25] Found primarily in the case studies in the arts focus of InterPARES 2, although present in other domains, these documents enable the presentation of interactive visual art or music, for example. There are at least two sub-types of enabling documents: 1) instructions for executing or producing a performance and 2) descriptions of the components, context, preconditions or requirements for performance, whose execution allows for future performances. The first sub-type of enabling documents may, for example, be likened to the script of a play, the scenario of a film or a musical score, and describe how all of the components fit together to execute the performance, while the second sub-type is like a detailed description of all the actors, props, locations, etc., used in the performance. InterPARES 2 arrived at the conclusion that, in the arts focus at least, these two types of enabling documents—the set of instructions and related information to carry out the instructions—are the necessary means for reproducing or re-creating digital artwork and music, and should be distinguished from the documents of the performance itself.

With the exception of documents where changes to content data result from system changes or the failure to retain data in the system—not through the explicit intention of the author—all interactive documents are enabling documents. Certain of these enabling documents may qualify as records. This occurs in certain situations where the document gathers some or all of its data from external sources. The requirement of having a fixed message is not met if the external data are not stored concurrently with the digital components of the record. However, "a document that delineates a fixed form in which external data are to be presented and may include some unaltered content may be an instrumental or instructive record […] The record in such cases is the digital entity, not the human-perceivable form which is reproduced from it."[26]

This last statement is quite different from the definition of an electronic record used in InterPARES 1, in which an electronic record is one that was manifested by a computer system to a human or another system. In other words, for InterPARES 1, the electronic record was the

[23] Ibid., 24.
[24] Ibid., 26.
[25] Ibid., 34–35.
[26] Ibid.

manifested record, not its stored digital component(s). The stored digital component(s) were seen to enable reproduction of the record, but were not considered the record itself. Duranti and Thibodeau's research has lead to a different, more nuanced and inclusive concept of a digital record and "to the recognition that a digitally stored record includes not only the data which must be processed in order to reproduce the manifest record, but also the rules for processing the data, including rules which enable variations in the content or form of the manifest record."[27] In this view, the digital components themselves may be seen as a record or a set of records, depending on how the different types of data (content data, composition data, form data) are instantiated in the system. "What is essential is that the computer stores and processes the data and the instructions in a way that consistently and correctly distinguishes each type and combines the different digital components of a record."[28] In other words, for the manifested document to be considered a record, it must be possible to reproduce it repeatedly as it appeared the first time.

Duranti and Thibodeau also make the distinction between retrospective and prospective records. Retrospective records fulfil the traditional, memorial function of records to bear witness to or remember a past action in which they participated or of which they were the by-products. Prospective records add a new and different dimension to the role of records. Rather than witnessing the past, they guide the future though a set of instructions or actions *to be carried out in the future*. In other words, they are the enabling records that were discussed saw above. "Retrospective records capture, while prospective records enable or at least inform interactions, experiences or dynamic processes."[29] These new types of records that have emerged in the interactive, experiential and dynamic systems in the case studies of InterPARES 2 bring an entirely new dimension to the concept of record.

InterPARES 1 has already affirmed that long-term preservation of digital records is not possible, only the ability to reproduce these records accurately, authentically and reliably. What prospective records add to the realm of digital records is the ability to reproduce them in the future, due to the set of instructions that they contain and the description of the component parts of the performance or action for which the records were originally created. The concept of "record" as now defined by InterPARES 2 is fully in keeping with the previous concept that was adopted; it merely expands upon this definition and brings digital records into the future.

Record creation and maintenance

Having defined the concept of "record" according to InterPARES 2, the discussion now turns to how the Project studied these records and the role that Domain 1 played in this research.

The overall aim of the second phase of the InterPARES Project was "to develop and articulate the concepts, principles, criteria and methods that can ensure the creation and maintenance of accurate and reliable records and the long-term preservation of authentic records in the context of artistic, scientific and governmental activities that are conducted using experiential, interactive and dynamic computer technology."[30] This mandate is broken down into three domains,[31] alluded to in the above quotation: Creation and Maintenance; Authenticity,

[27] Ibid., 27.
[28] Ibid., 30.
[29] Ibid., 33.
[30] InterPARES 2 Project Summary. Available at http://www.interpares.org/ip2/ip2_index.cfm.
[31] See InterPARES 2 Intellectual Organization. Available at http://www.interpares.org/ip2/ip2_intellectual_organization.cfm. There are also four cross-domains that address questions pertinent to all areas of inquiry in the project: Terminology, Policy, Description and Modeling.

Accuracy and Reliability; and Methods of Appraisal and Preservation. Each of these three domains cross the three focuses or "contexts" as described above, which are the artistic, scientific and governmental activities of the case study subjects.

Needless to say, the domains are not isolated or exclusive. Creation and maintenance includes considerations of authenticity, accuracy and reliability,[32] which may also be found in appraisal and preservation issues. Each domain is connected to and informs the two other domains and is in turn informed *by* them.[33] In addition, the Policy and Description Cross-domains, by their nature, obviously interrelate the three domains of InterPARES 2, as exemplified by the Description Cross-domain, which sought, in part, to determine the role of descriptive schemas and instruments in records *creation*, control, *maintenance*, appraisal, preservation and use in emerging recordkeeping systems in digital and Web-based environments in the three focus areas.[34]

Domain 1, Creation and Maintenance, studied the nature of records and of the processes that create and maintain them. As seen in the Methodology section of this report, Domain 1 made use of a series of seven questions[35] that focus on issues such as the purposes of document creation, the processes that result in document creation, document elements and attributes, the applicability of the current definition of "record" to the documents of each case study, the capture of documentary evidence, the responsibilities and liabilities related to the use of these documents and the determination and implementation of record retention decisions. These questions touch upon various elements of "creation" and "maintenance" as they are understood in and apply to InterPARES 2.

Creation

"Creation" is a term that may seem obvious at first glance. To create is to make something; give it form or life. In the case of traditional paper-based records, "creation" often meant writing, typing or otherwise physically applying information to a support—the *process* by which a record was made. In the electronic environment—especially in interactive, experiential and dynamic systems—the processes by which records are created often resemble the traditional record creation process very little or not at all. In many cases, "The use of digital technology to create records has…allowed for the bypassing of procedural controls"[36] that had been put in place to guide and define records creation. How, then, can "creation" be defined in such a context?

The InterPARES 2 Terminology Database defines "created record" as follows: "A made or received document declared a record and set aside for action or reference." Two important points can be gleaned from this definition. First, in the archival sense, creation does not simply imply making a record, but also the act of setting it aside. This organic and automatic setting aside of records is what distinguishes them as archival documents. Secondly, creation not only applies to

[32] See Records Creator Principle C4 in Appendix 19. Available at http://www.interpares.org/display_file.cfm?doc=ip2_book_appendix_19.pdf.
[33] For an example of the interrelation of creation and preservation as pertaining to digital records, see Records Creator Principle C7, ibid.
[34] Anne Gilliland (2005), "Discussion Paper on the Nature and Role of Metadata in the Creation of Reliable and the Preservation of Authentic Records in Electronic Systems," paper presented at InterPARES 2 Project Plenary Workshop 13, 20-24 February 2005, Vancouver, BC, Canada, 2 (unpublished). Emphasis added.
[35] A consolidated list of the Domain 1 research questions is provided in Appendix 9.
[36] Luciana Duranti (2001), "International Research on Permanent Authentic Records in Electronic Systems (InterPARES): Experiential, Interactive and Dynamic Records," SSHRC MCRI InterPARES 2 Project Proposal, 412-2001, 1. Available at http://www.interpares.org/display_file.cfm?doc=ip2_detailed_proposal.pdf.

the *making* of records but also to the *reception* of records,[37] along with setting them aside, as has already been discussed. This is an important point, for it allows documents made by a third party to be included in the fonds of a given creator.

The term "records creator," intrinsically linked to that of "creation," is also found in the InterPARES 2 Terminology Database, which defines it as "The physical or juridical person who makes, receives or accumulates records by reason of its mandate/mission, functions or activities." Included here, once again, are the twin notions of making or receiving records. "Accumulating" may appear to be a third notion involved in creation, but it is merely an expression of the notion of "setting aside," as we have seen in the definition of "creation." The reference to the mandate, mission, functions and activities of the creator is another expression of the organic nature of this accumulation.

Specific creators exemplified in the InterPARES 2 Project are identified among the various stakeholders that the Project identified, and include:

- *Individual records creators*, who rely on records for continuing use, reference purposes, cultural purposes, to carry out other activities, as evidence of their work or as proof of individual rights;
- *Organizations*, which rely on accurate, reliable, and authentic records to carry out their business, fulfil legal obligations, understand previous activities and ensure continuity; and
- *Governments*, which rely on their records to carry out their mandate and to be accountable for their actions.[38]

Maintenance

Although the concept of "creation" as understood and used in InterPARES 2 is widely agreed upon in the archival community, that of "maintenance" may be less so. Many may see this term at first to be a synonym for preservation; however, although the two terms are related, they are in fact distinct.

Put in its most simple terms, record maintenance can be characterized as the actions performed on a record between its creation and its preservation. These actions may include description, storage, migration, reproduction, appraisal and provision of access, although not all of these actions are necessarily performed on all documents, nor in the order listed here. Also, once a given action is performed, it may be repeated an unlimited number of times, as needed.

Although the Terminology Database of InterPARES 2 does not define "maintenance," it does include two related entries, including "*Manage maintenance of kept records*,"[39] whose definition is "To provide overall control and co-ordination of the recordkeeping storage system and the records stored in the system by managing information about kept records and their digital components, placing the records in storage, maintaining the digital components and monitoring the performance of the storage system," and "*Maintain records in recordkeeping storage system*,"[40] whose definition is "To monitor the storage of kept records and their digital

[37] Technically speaking, what is received is a document. It becomes a record only after being "declared" as such by being registered and classified by the recipient—a process that constitutes the *intellectual* setting aside of the record—followed by the *physical* setting aside of the record in a recordkeeping system. For more information on this process, see the discussion of the Manage Making and Receipt of Records activity (A2.2) provided in the narrative to the Chain of Preservation Model that is presented in the Modeling Cross-domain Task Force Report. Available at http://www.interpares.org/display_file.cfm?doc=ip2_book_part_5_modeling_task_force.pdf.

[38] See InterPARES 2 Project Summary. Available at http://www.interpares.org/ip2/ip2_index.cfm.

[39] This phrase and its definition correspond to activity A3.2 in the Chain of Preservation Model.

[40] This phrase and its definition correspond to activity A3.2.3.3 in the Chain of Preservation Model.

components and metadata, periodically back-up the recordkeeping storage system and, as necessary, correct problems with and update the digital components, and/or refresh storage media to ensure the records in the system remain accessible, legible and intelligible over time." These definitions outline three broad areas of maintenance: information about records, storage and "updating" records. Managing information about records essentially includes managing the capture, use and control of metadata about the records and the maintenance activities applied to them for the purpose of facilitating appraisal activities by the preserver and records indexing, storage, access and disposition activities by the creator. Managing storage includes overseeing the processes of placing the digital components of records and their metadata into storage (i.e., affixing them to digital media in the recordkeeping system), maintaining those components and metadata and monitoring the performance of the storage system. Lastly, "updating" records encompasses several related activities, including correcting problems with digital components in storage (i.e., dealing with stored digital components that cannot be located, retrieved, reconstituted or presented in accordance with current preservation strategies applicable to those records), updating the stored digital components (i.e., converting them via, for example, migration, standardization or transformation to persistent form, to ensure the records remain accessible, legible and intelligible over time) and refreshing the media on which the digital components are stored (i.e., copying or transferring the digital components from one digital medium to another, or otherwise ensuring that the storage medium remains sound), all of which involve careful consideration of various other maintenance-related issues, such as access restrictions, version control and the creation of an audit trail, among others.

Two key aspects of records maintenance can be found in the objectives of InterPARES 2.[41] One objective is "To identify and/or develop specifications for policy, metadata, and tools appropriate for the design of electronic infrastructures ensuring that…records are created accurate and reliable, and maintained and preserved authentic." Although this objective may seem at first to fall within the mandate of Domain 2, Authenticity, Accuracy and Reliability, it also has bearing on the work of Domain 1, since it deals with records creation and maintenance. While alluding to the record-making and recordkeeping systems ("infrastructure") in which creation and maintenance take place, this objective directly mentions metadata and other "tools" that can help maintain records. It also makes the distinction between maintenance and preservation, although it also shows that both actions are part of ensuring the authenticity of records.

A second InterPARES 2 objective is "To formulate methods for ensuring that…records are generated and maintained by the creator in a way that guarantees their accuracy, reliability and authenticity." Although this objective may also seem more appropriate to Domain 2, it nonetheless includes an important aspect of records maintenance: the fact that this maintenance is performed *by the creator*. This fundamental point is what essentially distinguishes maintenance from preservation and leads to the concept of the lifecycle of a record and how the notions of creation and maintenance fit within that concept.

Creation and maintenance in the context of the lifecycle of records

While the above discussion of "creation" provided the InterPARES 2 definition for "created record," the Terminology Database also includes a similar entry, that of "*record creation*." This term is defined as "The first phase of a record's lifecycle in which a record is made or received and then set aside for action or reference." This definition is essentially the same as the one

[41] InterPARES 2 Objectives. Available at http://www.interpares.org/ip2/ip2_objectives.cfm.

provided for "created record," with the exception that it situates creation as taking place in the first phase of a record's lifecycle.

The notion of lifecycle was originally conceived in France, where it became known as "the three ages of documents." It classified records as current records, intermediate records or definitive archives, based essentially on where the records were kept: at their place of creation, an intermediate archive centre or in an archival depository. This concept is also sometimes expressed in the terms "active records," "semi-active records" and "inactive records." Later incarnations and versions of the concept of lifecycle shifted the basis of the definition from where the records were kept to what actions were performed on them. For example, in the theory of lifecycle that developed in the United States in the 1960s, there were two phases—the records management phase and the archival phase—each with four actions. Two of the actions in the records management phase were "creation or receipt" and "maintenance and use."

The InterPARES 2 definition of the lifecycle of a record is an extension of this last approach, although it transfers the notion of lifecycle from the activities that are carried out on records to the records themselves. The InterPARES definition divides a record's lifecycle into two phases, the first being when the records are still in the possession of the creator and the second when the records are in the possession of the preserver. What actions are performed on the records—and more importantly, who performs them—are key elements of the InterPARES notion of lifecycle.

If the actions are performed *by the creator* in the usual course of affairs for the purpose of those affairs and the creator keeps the outcome for further action or reference, then the actions are considered as maintenance and the resulting documents are considered to be the records of the creator. On the other hand, if the actions are performed *by the preserver* for the purposes of preservation and dissemination and not for the use of the creator, then it is clearly no longer a question of maintenance but of preservation, and the resulting documents are not considered to be the records of the creator but, rather, authentic copies of the creator's records.

As a result, it can be seen that the records lifecycle, as defined by InterPARES, "implies a shifting of responsibility for the records, from the creator to the preserver," and that the lifecycle is based in part on the use of the records, "and consequently on the purpose of the activities carried out on the records and on the person responsible for those activities, the creator or the preserver."[42] Moreover, as noted earlier, both creation and maintenance are actions that are carried out by the creator during the first of the two phases of a record's lifecycle. The two essential differences between maintenance and preservation, then, are the fact that preservation is carried out in the second phase of the lifecycle of a record by the preserver, not the creator, and for different purposes or uses.

Characterization of the Case Studies

This section presents the scope of the analysis relative to the records creators and their activities resulting in document creation. The answers to the Domain 1 research questions have been largely based on an analysis of the twenty-three case studies completed by the researchers of the InterPARES 2 Project.[43] In particular, the report focuses on answers given to the seven research questions pertaining to the Domain 1 concentration: Records Creation and Maintenance.

[42] Luciana Duranti (2005), "The Concept of the Records Life Cycle," PowerPoint presentation, slide 14 (unpublished).

[43] Of the original twenty-nine case studies proposed and approved for InterPARES 2, several were "retired," two remained uncompleted at the time this report was drafted (case study 22 - Electronic Café International: Aging Records from Technology-based Artistic Activities; case study 08 - Mars Global Surveyor Data Records in the Planetary Data System) and the four

The records creators

The following table presents the various types of creating bodies investigated by the case studies teams. The number of cases from the private and the public spheres are comparable. There are eight private organizations and eleven public ones. Besides these, four cases have a mixed structure. The ten artistic creators are mostly concentrated in the private sector; however, three are in the public sphere and two have a mixed status. The five scientific bodies are not concentrated in any one particular sphere. Among the seven case studies related to administrative governmental activities, five deal with administrative activities while the other two deal with private sector activities.

Table 2. The Case Studies' Creators

Status	Total	Type	Arts	Sci	Govt
Private	8	Individual	2	0	0
		Corporation	3	1	2
Public	11	Government	0	1	6
		Agency	2	1	0
		Cultural Center	1	0	0
Mixed	4	Partnerships	2	2	0

Six of the eight cases in the private sphere are artistic bodies. There are two individuals: a composer (case study 13, *Obsessed Again…*) and a performance artist (case study 02, Performance Artist Stelarc). There are three corporations: A small theatre group (case study 01, ArboCyber, théâtre(?)), a multimedia production company using industrial design methodologies (case study 09-1, Altair4 di Roma) and a large commercial movie-making company (case study 09-3, Commercial Film Studio). However, three cases are in the public sphere. There is a cultural center/public non-profit organization (case study 03, *HorizonZero*) and two agencies, one involved in film (case study 09-2, National Film Board of Canada) and the other in television (case study 09-4, WGBH Boston). Lastly, there are two bodies with mixed status that are, in fact, partnerships involving university laboratories (case study 10, *The Danube Exodus* and case study 15, *Waking Dream*).

The five scientific bodies are not concentrated in any one particular sphere. There is one case in the private sphere (case study 14, Archaeological Records in a Geographic Information System), two cases in the public sphere (case study 08, Mars Global Surveyor Data Records in the Planetary Data System and case study 19, Preservation and Authentication of Electronic Engineering and Manufacturing Records) and two university research groups with a mixed structure (case study 06, Cybercartographic Atlas of Antarctica and case study 26, MOST Satellite Mission).

Among the eight case studies related to governmental activities, six deal with administrative activities (case study 05, Archives of Ontario Web Exhibits; case study 18, Alsace-Moselle Land Registry; case study 17, New York Department of Motor Vehicles; case study 20, Revenue On-Line Service of Ireland; case study 21, Supreme Court of Singapore; and case study 24, City of Vancouver Geographic Information System). Two others deal with private sector activities: an

components of case study 09 (Digital Moving Images) were treated as four individual case studies, leaving twenty-three completed case studies that served as the basis of the present report.

Italian provincial body of a national cooperative (case study 25, Legacoop of Bologna Web Site) and an expert services company (case study 12, Antarctic Treaty Searchable Database).

Obviously, such a sampling could not comprehensively cover all possible activities in the given sectors. Nonetheless, the sample is, to varying degrees, representative of the various frameworks within which records creation is taking place in each sector of activity. The arts are mostly created in the private sphere on an individual basis or in informal or incorporated groups. Besides this model, there are also non-profit public organizations, particularly in more commercial sectors like film and television, where industry is more prevalent. Lastly, university laboratories are experimenting with the use of new media in the arts.

The scientific sample does not include a single individual, since researchers rarely work alone. They are instead often affiliated with organized research units based on partnerships between universities, private research institutes and government agencies. Their projects are funded by various public and private bodies and are under the leadership of a principal scientist accountable to the funding agency.

Public organizations are governmental by definition, but not all are dedicated to administration. Half of those studied are doing administrative or service activities. Besides these, there are two cases in which the private sector is closely related to government: a cooperative that is closer to a public structure than a corporation and an expert company led by two individuals, one of whom is a scholar. Lastly, it merits noting that public partnerships in the arts and science spheres and those with a mixed structure involved non-administrative but governmental concerns shared with university research groups.

Records creator contexts

By their nature, information technologies favour inter-connection and networking. Not surprisingly, therefore, the creator context reveals a collaborative dimension underpinning the process of records creation and maintenance. Although only four creators have a mixed structure, a second look at the other case studies reveals that many creators are actually working collaboratively in one way or another.

In the arts, an artwork may be created by an artist who is fulfilling a performer's commission or working under contract on a given project. Collaboration may be between individuals—like a creative artist and a ballerina—or it may be between an individual and public or private bodies. In science, the works are largely based on a wide range of formal agreements with organized research units. In governmental activities, there are cases of joint ventures with private or public partners. This may come about when implementation is partly outsourced to a specialized corporation, or it may be for a given project involving two public bodies.

The collaboration context has the effect of distributing records creation among parties remote from each other—another dimension that new media favours. For instance, one case study associates an individual, a non-profit public agency, a private foundation and a project from a university centre. Each party created portions of the digital entity studied. The combination of all parts produced the artwork. The manager of the project was said to be from the university centre, which means that he could be considered as the party implementing the digital entity. However, the creative vision of the product was through the eyes of the individual artist and it was not clear which contributor was the originator of the project.

It is often the individual responsible for the creative vision who is the sole person to know how all the pieces fit together to interact and work. In large organizations, these instructions may be documented, but individuals often do not feel the need to do this, and the lack of such

documentation may pose a problem. As one report states: "It is in the best interest of the composer to document as completely and accurately as possible his process of creation and the characteristics of each element of his work in order to facilitate future performances of his work, especially if the accurate reproduction of his intentions is important to him,"[44] because if "traditional instruments and tools generally remain available for use for long periods of time, technological elements are 'almost guaranteed to become obsolete within a very short period of time after the work's creation.'"[45]

Case study 13 (*Obsessed Again…*) illustrates this point. It involves the composition of a musical score for bassoon and interactive electronic work written in 1992. The equipment required to perform it is quickly becoming obsolete. To be performed using current technology, the composition will require recovery and a substantial reworking of both the interactive and electronic elements. It appears, however, that some components will not be updated due to software obsolescence and will thus need to be re-created. This process of re-coding and re-implementing aspects of the work may be seen not as *keeping* or maintaining the records, but rather as continuing the composition process (i.e., record-making) by *re-creating* many of the records. In such a case, it would be impossible to overcome obsolescence and maintain the authenticity of the documents in instances where the composer, who is the only individual intimately familiar with all aspects of the original performance, is no longer available.

Even though the underlying cases are different, a similar problem exists with larger, governmental structures. Case study 05, an archives Web exhibit project involving the Toronto City Archives and the Ontario Archives, reports that during the study, the development of Web sites

> …appeared to be an emerging business process in that the Web-based resources were being developed to fulfil a 'big idea' but there was no procedural context established in terms of which officers would fulfil which roles, or what records needed to be created and how they would be maintained. Rather, various individuals participated in the creation of the Web site on an as needed basis, sometimes through business activities that were already being undertaken but were now adapted or applied to the creation of the Web site. Each individual's involvement was 'trust-based.' For example, the scanning technician was not required to report on the settings chosen for scanning a particular item. The scanned component was used on a basis of trust—the scanning technician's judgement in the matter was neither recorded nor challenged.[46]

Obviously, some guidance is needed to make sure that "all the processes that contribute to the making and use of the same records will be explicitly documented." Although contributors to a project may document their own role in the creation of digital entities, there is often no agreement on what types of standards to follow or even a thorough understanding of what preservation of authenticity or reliability entails. Individual partners should be aware that they need a collaborative effort with consensus on how to preserve the work as a cohesive whole for future re-presentation or *re-creation*. In other words, collaborative partnerships must develop and have in place a strategy of preservation and dedicated responsibility for its application before beginning their creation activities, or as soon as possible afterwards.

[44] Jennifer Douglas (2006), "InterPARES 2 Project - Case Study 13 Domain 1 Research Questions: *Obsessed Again...*," 4. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs13_d1_questions.pdf.
[45] Ibid., 2.
[46] Jim Suderman et al. (2004), "InterPARES 2 Project - Case Study 05 Final Report: Archives of Ontario Web Exhibits," 7. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs05_final_report.pdf

Activities resulting in document creation

The activities of the arts focus cases studied can hardly be compared with traditional activity processes. Some aim to *create an artwork* and others aim to *support the creation of artwork*. In the first group, some are creating new media artwork in whole or in part and others are totally or partly Web products in nature. All the cases in the second group are carrying out recordkeeping activities for digital records contributing to or documenting artwork or performances.

Table 3. Activities Resulting in Document Creation in the Artistic Sector

Artistic activities	**Web**	**DB**	**GIS**	**Files**	**Other**
Creation of artwork	***4***	***2***	***0***	***3***	***3***
Virtual reconstitution of an ancient Roman archaeological site on DVD					X
Program files for an electro-acoustic music composition				X	
Commercial computer graphics animated films				X	
Multimedia performance art piece involving dance/movement, a soundtrack, live and pre-recorded video and remote-controlled interactions between performers and various digital and analogue devices	X			X	X
An "online magazine with three Web environments with an HTML portal, which serves as the entry point to all three environments"	X	X			
A "multimedia interactive piece that has taken two forms, a gallery installation which is no longer active and a Web site which is still live"	X	X			X
A Web site (*Ludosynthèse*) with a synthesis section on the past experimental theatrical performances of the troupe and an interactive section where users can re-create similar performances	X				
Support the creation of artwork	***1***	***2***	***0***	***3***	***0***
Stelarc's Web site used to support the conception and development of a performance artist who considers his own body as the primary record of his works	X			X	
A database system used to store and manage digital animation products and documentation related to production		X		X	
A system at a television station that operates in a mixed digital and analogue environment, but which has developed and is converting to a digital asset management system		X		X	

Table 4. Activities Resulting in Document Creation in the Scientific Sector

Scientific activities	**Web**	**DB**	**GIS**	**Files**	**Other**
Web-based science creation	***1***	***1***	***1***	***1***	
"Dynamic, interactive, Internet-based, open source atlas of the Antarctic continent for education, research and policy	X	X	X	X	

purposes"					
Support the science activities	***0***	***1***	***1***	***3***	
A database and a GIS to answer archaeological research questions		X	X		
Data captured by a satellite camera to support astronomical research				X	
Set of data from NASA's Mars mission to allow further analysis and disseminate persistent research information				X	
Archival studies research to test a preservation process designed to archive persistent computer-aided design (CAD) records				X	

Like the artistic sphere, all five science focus case studies are producing born-digital entities. The purposes of these activities can be broken down into two types: one case is *creating Web-based science* and the other four aim to *support scientific activities* in a given field by providing reliable and accurate information to the scientific community.

Table 5. Activities Resulting in Document Creation in the Governmental Sector

Governmental activities	**Web**	**DB**	**GIS**	**Files**	**Other**
Recordkeeping	***3***	***4***	***0***	***4***	***0***
The computerization of a land registry in Alsace-Moselle (France)		X		X	
Web-based legal and financial transactions the New York State Department of Motor Vehicles	X	X		X	
Web-based filing of tax returns and tax payment in Ireland	X	X		X	
Web-based civil registry for the Supreme Court of Singapore	X	X		X	
Services	***4***	***2***	***1***	***2***	***0***
An American searchable database consisting of copies of Antarctic treaty and policy documents, used as an information resource	X	X			
A Web-based enterprise GIS system that enables data on municipal infrastructure and services in the City of Vancouver to be presented to the end user in the form of interactive maps	X	X	X	X	
A Web site that provides detailed and specialized information on a cooperative and its services, both to the general public and to cooperative members via a restricted area	X				
A Web-based project that created, promoted, publicized and managed archival outreach activities through the maintenance of a Canadian Archives Web site	X			X	

In contrast, the eight government focus case studies are mainly doing traditional activities applied to the digital environment. They use digital technology to *create and keep official records* or to *deliver services to citizens* in an interactive way.

None of the digital entities produced by these activities are easy to categorize. They are rarely just *one kind* of entity. For instance, the entity can be both a GIS and a database. However, it is possible to profile two types by considering their general form and features.

The first type involves hypermedia features. A majority of cases have such features. In the arts, they are mainly related to the creation of artwork activities; in the sciences, they are related to the Web-based science and data creation activities; while the majority of the government focus cases fall into this group. The literature makes the distinction between "closed" and "open" hypermedia features. The closed feature is defined as an autonomous digital entity in which links and bounds are internal. It has a Web format because of the nature of its language or software or because the creator wanted to enlarge his/her audience. It could also be a digital entity stored on a disk or a CD/DVD. Conversely, open features are found on Web sites that intrinsically function with external links in a network. They can be: (1) *interactive*: they use visitors' actions to create or change the work; (2) *generative*: they modify themselves according to the instructions of a program; or (3) *contributive*: they enlist the participation, voluntary or not, of visitors who may add material or simply react through e-mail, for example.

The second type of digital entity regroups digital components like files, program code, etc., that take place in a larger process of action involving other electronic and/or analogue means. It is exemplified by digital entities such as music files and software patches, computer graphic moving images, manufactured files and astronomical data.

Addressing the Research Questions

Question 1a

> *What types of documents are traditionally created (that is, made or received) and set aside in the course of these activities that are expected to be delivered online? For what purpose?*

As will be seen shortly, few, if any, of the case studies believe that they are doing traditional activities, although many of them do, to varying degrees, perform traditional activities applied to the digital environment. Instead, most claim to be—and are in fact—carrying out a new, non-traditional activity. They do not, therefore, believe that they are creating traditional types of documents in the course of these activities, since in their view the activities themselves are not traditional and therefore could not create traditional documents.

Despite this fact, from the various activities carried out in the three focuses, it is possible to extract or infer traditional types of documents that would be created in the course of these activities and then look at the types of digital documents that are currently being created to accomplish those same activities. This also makes it possible to determine if the purposes for which these documents are created have changed from the traditional to the electronic environments.

Artistic sector (Focus 1)

Despite the move to non-traditional hypermedia, performance art and telecollaboration, some aspects of the types of documents that are created in the course of artistic endeavours have remained the same. In fact, the core purposes for the creation of these documents and the types of documents themselves, in the abstract, have remained constant.

An example of this fact is provided by one of the uncompleted case studies in the arts focus, Electronic Café International, which exemplifies the types of documents that are traditionally created in the arts. The uncompleted Electronic Café International case study notes that, in general, for creators in the artistic field, documents are created to plan activities, execute and perform works/events, record portions of these and document and review these works/events. Despite a wide variety in the types of art produced (painting, sculpture, music, dance, theatre, photography, motion pictures, etc.), certain types of documents are created in a traditional artistic setting, including sketches, notes, film, photographs, sound recordings, musical scores, correspondence, contracts, reviews and news coverage.

Scientific sector (Focus 2)

Although increasingly relying on, and indeed inspiring, the advance in technology, science can also be seen as carrying out certain traditional activities and creating traditional documents. Any scientific endeavour involves the planning or design of a research experiment; the design, invention or modification of the proper apparatus to use; the collection of data; the pursuit of the research; the analysis of data; the communication of analyses; and the publishing of results.

As in the arts, the exact form and content of scientific documents vary considerably depending on the specific field or experiment, but it is possible once again to come up with a list of certain "typical" scientific documents. Documents that may be generated from the above activities include contracts, notes, sketches, diagrams, technical specifications, procedures or protocols, various collections or aggregations of data, analyses or transformations of these data, reports, correspondence, articles and presentations at conferences.

Governmental sector (Focus 3)

Government would seem to be the one of the three focuses in which the most traditional activities are being carried out, generating the most identifiable types of traditional documents. Again, in this focus there is a wide range of activities that may be carried out under the umbrella of "government." At its most basic, a government must provide essential services to its citizens, including registry and regulatory services; issuing licenses, permits and authorizations; providing information and access to the various branches of government; assessing and collecting taxes, fines and fees; devising and enforcing laws and regulations and maintaining civil status records.

A profusion of documents seems to be the hallmark or typical image of government. Some of the typical documents generated by government activities include laws and regulations, myriad forms and requests, various reports, minutes of meetings, correspondence, memos, notes, guides, announcements, civil status records or certificates, licenses, permits, receipts, passports or identity cards, election results, maps, plans, drawings and countless other documents.

Question 1b

> *What types of electronic documents are currently being created to accomplish those same activities? Have the purposes for which these documents are created changed?*

Many of the respondents in the case studies had difficulty responding to the previous question, as indicated, or believed that it did not apply in their case, because they believe that they are not engaged in a traditional activity and thus are not creating traditional documents. This equation of traditional activity and traditional documents—the former seen as necessarily

producing the latter—was nearly universal among the case studies in the three focus groups. However, when examining the purposes for which these documents are created and the types of documents that are created, independent of form or media, it is clear that the differences are not so great between the traditional and electronic environments.

Artistic sector (Focus 1)

In the arts focus, respondents were convinced that they were carrying out a new activity that was non-traditional and innovative. As the respondent in case study 01 stated, "This question supposed a parallel between traditional and electronic activities, which is not the case for Arbo Cyber, théâtre (?). The *Ludosynthèse* is a new activity that is not making use of the creation processes used in traditional documents."[47] Performance artist Stelarc goes one step further, actually integrating electronic components into his body for his performances. As such, his performances cannot be conceived without electronic means any more than they could be conceived without the artist himself. Two of the case studies, *The Danube Exodus* and *Obsessed Again...*, do not even discuss traditional documents in their final reports.

For the most part, from the point of view of technique, materials, form and presentation, the artists are indeed correct in thinking that they are doing something new and non-traditional. The performances or activities themselves are not performances or activities that are traditionally created and then converted to digital form, they are born-digital. However, the same types of performances have previously been done with traditional means and documentation. One of the case studies recognizes this fact. "Because *Waking Dream* is a unique creative work, it is not possible to speak of a traditional activity that is replaced or altered as a result of changes to technology; however, previous creative works of a similar type may have made use of analogue technologies where *Waking Dream* uses digital technology to record and save film, photographic and sound components of the work."[48]

The activities of the creators in the ten arts focus case studies involve the integration of multimedia language in dynamic, interactive or collaborative artwork. Through the use of technology from the very beginning of the creation process, these activities are being carried out in a non-traditional manner and are related to new media art that creates born-digital products. The case studies can generally be broken down into two groups. In seven cases, the purpose is to *create* new media artwork in whole or in part. Four of the seven are totally or partly Web products in nature and can be defined as "Web Art," characterized by their non-linearity, hypertextual and collaborative dimensions. The four case studies that are not actively creating new media artwork are *supporting the creation* of artwork by carrying out recordkeeping activities for digital records contributing to or documenting artwork or performances. Thus, they are creating "enabling records," as defined earlier by Duranti and Thibodeau.

Despite the fact that the documents created in the course of these new media activities are born-digital and do not have the same form as traditional documents, their purposes are largely unchanged in the move from a traditional to an electronic environment. Performance artist Stelarc, who believes that his performances cannot be conceived without electronic means,

[47] Martine Cardin (2004), "InterPARES 2 Project - Case Study 01 Final Report: Arbo Cyber, théâter (?)," 48. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs01_final_report_english.pdf, and http://www.interpares.org/display_file.cfm?doc=ip2_cs01_final_report_french.pdf.

[48] Jennifer Douglas (2006), "InterPARES 2 Project - Case Study 15 Domain 1 Research Questions: *Waking Dream*," 1. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs15_d1_questions.pdf.

admits that his documents are created "mainly for use in a digital environment,"[49] but that the essential purposes for document creation have not changed. At the Web-based *HorizonZero* magazine (case study 03), the same types of records would have been created as part of a traditional or analogue publication process and for the same purposes.

At WGBH Boston, where the creator did indeed change from a traditional to an electronic environment, this consistency of purpose in document creation is clear, despite the shift in the means and form of document creation. "The purpose for which these documents are created has not changed in switching from an analogue to digital management system."[50] However, it is Altair4 that most clearly states the fact that although the creation process has changed, the purpose has not. "The purposes of document creation have not changed. There has long been a search for increasingly sophisticated ways in which to represent nature. Thus, digitization is simply one step further in this process; it does not change the original intent of the representation impulse."[51]

So it can be seen that the digital environment, although changing the process and output, does not change the purpose of document creation in the arts. The traditional purposes are now simply being carried out in the digital environment. Past experience has shown that, traditionally, documents are created to plan activities, execute and perform works/events, record portions of these and document and review these works/events. As with Electronic Café International, digital documents are, like traditional documents, created during the processes of planning, implementing and performing works.

Examples can be drawn from the case studies in this focus. For planning purposes, Stelarc continues to use his documents for "the development of the performance [and] documentation of the execution of the performance."[52] In the category "execute and perform," at the National Film Board of Canada, "The records support either the creation or distribution of moving image materials."[53] Nearly all of the creators record portions of their work. Documents are also used to document or review a performance, notably at Arbo, where documents are seen "as witness to the past…[in which] they will form a new digital memory for the group."[54]

With many of the case studies in the arts focus, the role of the documents created is both retrospective and prospective. In other words, documents are created for the seemingly contrary purposes of bearing witness to past performances and guiding or informing future performances. They both document the original creation and provide a blueprint for re-creation. As noted earlier, Arbo's documents bear witness to the group's past, but this is not their only role. Documents "will be integrated to enrich the *Ludosynthèse*, either as witnesses to the past or as performance material to be used by spectator-users."[55] This second role is typical of the arts focus, in which part of the role of documents, whether traditional or digital, is prospective; that is, to provide instructions on how to execute or perform a given piece. For example, "as with traditional scores, the score for *Obsessed Again...* is created to provide a performer with

[49] Henry Daniel and Cara Payne (2004), "InterPARES 2 Project - Case Study 02 Final Report: Performance Artist Stelarc," 7. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs02_final_report.pdf.
[50] Geneviève Sheppard (2006), "InterPARES 2 Project - Case Study 09(4) Domain 1 Research Questions: Digital Moving Images - WGBH Boston," 1. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs09-4_d1_questions.pdf.
[51] Natalie Catto (2006), "InterPARES 2 Project - Case Study 09(1) Domain 1 Research Questions: Digital Moving Images - Altair4 di Roma," 1. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs09-1_d1_questions.pdf.
[52] Daniel and Payne, "Case Study 02 Final Report," op. cit., 7.
[53] Andrew Rodger (2006), "InterPARES 2 Project - Case Study 09(2) Final Report: Digital Moving Images - National Film Board of Canada," 3. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs09-2_final_report.pdf.
[54] Cardin, "Case Study 01 Final Report," op. cit., 53.
[55] Ibid.

instructions to perform the piece as it was intended to be performed. The additional digital entities serve the same purpose in that they describe how all of the components of the work…interact with each other to reproduce the performance."[56]

In the arts focus, although the purposes for document creation have not changed, the means of creation and the forms of the documents have. It appears that digital is becoming the new "traditional"—it is a new tradition in the making. And with this new tradition have come new uses or purposes of digital entities.

One of these new uses is the use of documents—often those documenting the performance itself—for promotion or publicity. The use of digital technology makes the integration and use of these documents much easier for artists, who can reach a wider audience through digital means. Although one of the documents created by the *Waking Dream* team is a Web site, which is used to promote the work, the potential of this avenue of publicity is fully realized by Stelarc, who continues to use his documents as a means to publicize his performances. The only difference is that the format of the Web site now allows for a wider publicity platform. Digital technology can bring a performance or its resulting documents to those who would otherwise not be able to see or hear about a given artist. This accessibility is not just due to distance, but also to disabilities, and digital technology can, to a certain extent, overcome these. In addition to publishing their Flash-based Web magazine, *HorizonZero* also provides "an accessible text-based site, published in both official languages,"[57] in keeping with W3C standards for accessibility.

Another new use of documents that is only possible, or at least greatly increased in the digital realm, is interaction. This can be interaction between the artwork and its spectators, as is the case with *The Danube Exodus*, where the digital entities are created "largely to display, and allow interaction with, the multimedia installation,"[58] or, in the case of *HorizonZero*, where the programming code documents allow for an greater degree of user/reader interaction than can be achieved with analogue publications. The interaction can also involve the various elements of the artwork or performance, as is the case with *Obsessed Again...*, where the performer, a microphone, an IVL pitch-to-MIDI converter, a Macintosh computer with MIDI interface, an external Proteus 1 synthesizer and a second amplification system interact with each other to produce the performance.

Lastly, another use of digital documents in the artistic field that is not possible with traditional documents is the creation of a virtual environment that is impossible in reality. This is the case in Arbo's *Ludosynthèse*, where pieces of past performances may be selected and re-combined in ways and in an environment that never existed and also in *Waking Dream*, where the team uses digital technology to help create the effect for the audience of having entered a waking dream state. These effects would not be possible without the use of digital technology.

Scientific sector (Focus 2)

The five science focus case studies are all related in one way or another to representing a physical or cultural phenomenon in space, be it geographical space or astronomical space. Like the artistic sphere, all are creating born-digital entities directly in an electronic environment that are not the result of the digitization of traditional activities. As observed in the case studies in this focus, the purposes of these activities can be broken down into two groups. One of the case

[56] Douglas, "Case Study 13 Domain 1 Research Questions," op. cit., 1.
[57] Brent Lee (2004), "InterPARES 2 Project - Case Study 03 Final Report: *HorizonZero*/Zero Horizon Online Magazine and Media Database," 2. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs03_final_report.pdf.
[58] Sally Hubbard (2006), "InterPARES 2 Project - Case Study 10 Final Report: *The Danube Exodus*," 5. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs10_final_report.pdf.

studies (case study 06, Cybercartographic Atlas of Antarctica) is actually *creating* Web-based science as a key deliverable of a geographic research project. The other four cases involve activities that aim to support scientific activities in a given field. This is to say, they handle or manage data to *support* research in a given field by providing reliable and accurate information to the scientific community.

Like the case studies in the arts focus, those in the science focus also see themselves as participating in a new activity, one that is non-traditional or in which the "tradition" was born in the digital environment. In the NASA case study, the activities observed are confined exclusively to the electronic environment, as may be expected from this creator. For the experiment conducted by the National Archives and Records Administration in the United States, "the digital entities pertaining to this case study are born digital as CAD records."[59] Again, the self-assessed "newness" by the creators in these case studies can be seen as stemming from the fact that the activities are conducted, and their supporting documents are created, entirely within an electronic environment that does not involve the conversion of traditional documents to digital ones.

However, like the case studies in the arts focus, the purpose of creating these documents is unchanged, since most documents are the by-products of the process of scientific research and are intended to provide information about the conclusion of an inquiry or to serve as the basis for further research or study. As exemplified by the NASA case study, documents are generally created to capture scientific data for further analysis and experimentation and for the dissemination of research information to the scientific community. The fact that the documents are born-digital does not change their purpose. The MOST project echoes this fact, noting that "The data in the digital entities will be used and analyzed in scientific publications and presentations to enhance our knowledge of stars."[60] Likewise, the documents created at the Center for Desert Archaeology by its Coalescent Communities GIS are created "to support archaeological research into the causes, tempo and spatial variability of the conspicuous population decline noted in prehistoric pan-Southwestern cultures of North America beginning circa A.D. 1300 and continuing into the early 15th century."[61] The purpose of the digital documents, therefore, is not new, even though some of the tools used to create the documents are. In other words, although scientific research can be innovative in its use of technology, and hence in its creation of digital documents, it, and the documents it creates, still serve a traditional purpose.

As was noted for the case studies in the arts focus, there are new uses that are particular to, or which result from, the digital technology used by the science focus case studies. Interactivity, seen in the arts focus, is a new purpose resulting from the use of technology that also benefits the scientific community. For example, in the progression of geographic representation from paper maps to their computerized counterparts to a more complex geographic information system (GIS), the entity in question "eventually [becomes] more interactive and expanded to include

[59] Geneviève Sheppard (2006), "InterPARES 2 Project - Case Study 19 Domain 1 Research Questions: Preservation and Authentication of Electronic Engineering and Manufacturing Records," 1. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs19_d1_questions.pdf.
[60] Bart Ballaux (2005), "InterPARES 2 Project - Case Study 26 Final Report: MOST Satellite Mission - Preservation of Space Telescope Data," 9. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs26_final_report.pdf.
[61] Richard Pearce-Moses, Erin O'Meara and Randy Preston (2004), "InterPARES 2 Project - Case Study 14 Final Report: Archaeological Records in a Geographical Information System: Research in the American Southwest," 19. Available at http://www.interpares.org/display_file.cfm?doc=ip2_c14_final_report.pdf.

multimedia,"[62] as is the case with the Cybercartographic Atlas of Antarctica, which uses this feature of the technology as a key component of its geomatic activity.

This last case study also demonstrates another new purpose that is derived from the use of digital technology in the scientific field: the creation of a "virtual" environment that does not exist in the real world. Again, this is a new purpose that the science focus case studies share with their artistic counterparts. The Cybercartographic Atlas of Antarctica makes extensive use of virtual reality fly-through and gaming technology to present information in a way that is not possible with traditional documents. In the case of the Center for Desert Archaeology, the use of digital technology allows for modeling the interaction between archaeological sites within the south western United States in a manner that, again, is impossible in a non-digital environment.

A final purpose of digital documents in the scientific field is one that was not observed in the arts focus; namely, the ability to increase the speed of performing an action, transaction or analysis, often expressed as the ability to accomplish tasks in "real time." In the realm of geomatics, the Cybercartographic Atlas of Antarctica demonstrates that "today, Web mapping involves generating maps from distributed data sets in real time."[63] As can be expected, this timesaving purpose of technology is also used by scientists in space research. The vast expanse of space is no longer a barrier to the real-time transmission and reception of data. At NASA, digital scientific data records are transmitted in real time through the Command and Data Handling Subsystem of the Deep Space Network to Mission Ground Control, where they are accumulated in a project database.[64]

Governmental sector (Focus 3)

The eight government focus case studies are mainly doing traditional activities that are applied to the electronic environment. They use digital technology to create and keep official records (e.g., case study 18, Computerization of Alsace-Moselle's Land Registry; case study 17, New York State Department of Motor Vehicles; case study 20, Revenue On-Line Service; and case study 21, Electronic Filing System of the Supreme Court of Singapore) or to deliver services to citizens in an interactive way (e.g., case study 05, Archives of Ontario Web Exhibits; CS12, Antarctic Treaty Searchable Database; case study 24, VanMap; and case study 25, Legacoop of Bologna Web Site). Despite the application of traditional activities to the digital environment, none of the digital entities created by these activities are easy to categorize, since they rarely fit into just one category. Nonetheless, it is possible to profile two types of digital entities by considering their general form and features.

The first type makes use of hypermedia features. Most of the case studies in the government focus have such features. In the arts, these features are mainly related to the creation of artwork and in science, to the Web-based science activities. The majority of the government focus case studies fall into this group. The second type of digital entity consists of groups of digital components such as files, program code, etc., that take place in a larger process or action involving other electronic and/or analogue means. These are related to digital entities like music files, software patches and computer graphic moving images in the arts and to manufacturing files and astronomical data in the science focus case studies.

[62] Tracey P. Lauriault and Yvette Hackett (2005), "InterPARES 2 Project - Case Study 06 Final Report: Cybercartographic Atlas of Antarctica," 26. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs06_final_report.zip.
[63] Lauriault and Hackett, "Case Study 06 Final Report," op. cit., 27.
[64] William Underwood (2005), "InterPARES 2 Project - Case Study 08 Final Report: Mars Global Surveyor Data Records in the Planetary Data System," 20–21. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs08_final_report.pdf.

As stated above, in the government focus there is a predominance of cases that are applying traditional activities of this field to an electronic environment. In these cases, the electronic environment seeks to mirror the traditional environment at the user level, as was seen in InterPARES 1. "Such records, although fixed digitally on relatively unstable media, are intended to approximate the physical documents generated in the course of established business procedures in well-understood judicial contexts."[65] The documents created as the by-products of these activities are specifically designed to appear to mirror the physical appearance of their traditional counterparts to provide a sense of familiarity, ease of use and comfort among the citizen-users. The visual similarity between the two types of documents (traditional and digital) is a key feature that was sought for the implementation of the electronic filing system for bankruptcy documents in the Singapore Supreme Court. Because the electronic filing system mimics the traditional paper-based one, "the records in the EFS mirror the paper-based system."[66]

Sometimes the traditional and electronic environments co-exist, at least temporarily, to facilitate the acceptance of, and transition to, the digital world. In Ireland, the Revenue On-Line Service (ROS) is an e-government application used to file tax forms and pay commensurate tax liability. Although ROS is used to replace paper-based transactions, the existing paper-based system is still available for users who prefer that format. A similar situation exists with the New York State Department of Motor Vehicles (DMV), whose On-line Services System is used to provide three core DMV business functions, including issuing and renewing or replacing drivers' licenses, vehicle registrations and titles of ownership. Users can also engage in related online transactions, such ordering a driver's record abstract or personalized license plates, paying fees and scheduling road driving tests. Procedures in the On-line Services System have been set up to mirror as much as possible the procedures for transactions conducted in person at a DMV office. Like Revenue's ROS, the DMV's On-line Services System is used to replace paper-based transactions, but the existing paper-based system is still available for users who prefer that format. Unlike the ROS situation, however, users of the DMV's online system must first establish a core record (i.e., a record created for each individual DMV customer containing information that uniquely identifies each customer, such as name, address, social security number and birth date), which can only be done during an in-person visit to a DMV office.

The implementation of an electronic system that appears to mirror a traditional one can be seen as *continuing* the tradition via electronic means. This is precisely the intent with the computerization of the Alsace-Moselle land registry in France. The region is very proud of its land registry tradition, which is unique in comparison to the rest of France,[67] and there is a feeling that the computerization project will ensure the continuation of this unique local land registry system in the future. If the appearance of the electronic system did not visually resemble the traditional one, citizens would not have the same level of confidence and would not make use of such a system, due to their unfamiliarity with the new system and the lack of intuitive and familiar features. If that were the case, the government's investment in the new system, as stated above, would be for naught.

[65] Domain 2 Task Force Report, 1. Available at http://www.interpares.org/display_file.cfm?doc=ip2_book_part_3_domain2_task_force.pdf.
[66] Elaine Goh (2005), "InterPARES 2 Project - Case Study 21 Final Report: The Electronic Filing System (EFS) of the Supreme Court of Singapore," 17. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs21_final_report.pdf.
[67] Jean-François Blanchette, François Banat-Berger and Geneviève Shepherd (2004), "InterPARES 2 Project - Case Study 18 Final Report: Computerization of Alsace-Moselle's Land Registry," 10. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs18_final_report.pdf.

As can be inferred from the conclusions of the arts and science focuses, and the desire in the government focus to mirror the traditional environment, the purposes of creating documents in the government focus have remained unchanged in the move from a paper-based to an electronic environment. In the above examples of ROS and Alsace-Moselle, the creators echoed their counterparts in the arts focus by stating that the purposes for which documents are created have not changed from those of a traditional environment. The only difference is the inclusion of one or more added purposes, as will be seen below.

The case study on the electronic filing system (EFS) of the Singapore Supreme Court is an excellent example of this aspect of the government focus. The purposes for which these documents are created have not changed. On the contrary, they have been augmented through the move to an e-government environment. The EFS has enabled the Supreme Court to facilitate the filing of court documents, to enable the quick retrieval of court documents, to improve access to records and information, and to manage and track cases, streamline workflow processes and improve case file security.[68] These points illustrate the purposes—both traditional and new—of document creation in the governmental sector.

First of all, documents in the government focus provide a service or information to citizens. This is the case regardless whether the activity is traditional or non-traditional. Documents created for the Alsace-Moselle land registry are created and set aside in compliance with French real estate law, "which dictates that the juridical status of a property…must be made publicly available to interested third parties by means of transcription within a land registry."[69] The Ontario Web exhibits are meant to inform the public. The Antarctic Treaty Database is used and is intended to be used as an information resource and the documents on the Legacoop of Bologna's Web site are created as a means of sharing information about the Legacoop's projects and to provide services to cooperative members.

Another purpose of documents in the government focus that has remained unchanged in the move from a traditional to a digital environment is that these documents are meant to provide citizens with access to their government. In Alsace-Moselle, the motivation for computerizing the land registry is to allow for remote access. Before the creation of the electronic database, no digital documents were created in the specific process of registry inscription and publication. Instead, individuals had to visit land registry offices in person to view an inscription. Singapore implemented their electronic filing system "to enhance access to justice and instil public trust and confidence in the court system."[70] Even in non-traditional activities, like VanMap and the Ontario Web exhibits, access is a major motivator in the creation of documents. The purpose of VanMap "is to provide the user with instant access to this information to support various functions of the civic government."[71] In the case of the Ontario Web exhibits, "Access is defined both in terms of access to unpublished or previously poorly described materials as well as in terms of remote and around-the-clock access."[72]

Like the other two focuses, in the government focus, these traditional purposes carried out by digital documents are augmented with new uses or purposes of e-government documents. As with the artistic and scientific sectors, providing or increasing interactivity is also a purpose of digital documents in the governmental sector. This point is best illustrated by VanMap, which

[68] Goh, "Case Study 21 Final Report," op. cit., 13.
[69] Blanchette et al., "Case Study 18 Final Report," op. cit., 2.
[70] Goh, "Case Study 21 Final Report," op. cit., 3.
[71] Evelyn McLellan (2005), "InterPARES 2 Project - Case Study 24 Final Report: City of Vancouver Geographic Information System (VanMap)," 6. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs24_final_report.pdf.
[72] Suderman et al., "Case Study 05 Final Report," op. cit., 13.

seeks to provide "an interactive, graphical representation of the data that allows the end user to see how the various features of the City relate to one another."[73]

A second new purpose of digital government documents, as was alluded to above, is to reduce the cost of a transaction while at the same time increasing the ease or flexibility of performing that transaction. For the Archives of Ontario, all of their intended purposes were "accomplished at less cost and with greater flexibility in a Web environment than in a physical one."[74] The technology used in the Antarctic Treaty Searchable Database allows for increased search capabilities, while the motivation for computerizing the Alsace-Moselle land registry was to allow for remote access, speedier processing times and increased storage capacity. Besides increasing the ease and flexibility of transactions, the use of new technology in the governmental sector also helps reduce errors and increase the accuracy of these transactions by reducing human intervention or interference. In Ireland, "the rationale for developing the online service is quite simple: '…people don't really want to see us and we don't really want to see them. The whole process should work without too much actual interaction. It should simply happen as a matter of course.'"[75] The system is also "consciously promoted as a means to reduce errors in tax returns. As the Commissioners had found that nearly 20% of all returns were inaccurate or contained human error."[76]

A final new purpose for transaction-based governmental services is particular to the government focus: the provision and assurance of electronic security. Biometric identification is used in the Alsace-Moselle system. In Ireland, the system is designed to maintain existing levels of confidentiality while incorporating a further level of security. "Revenue's requirement for a secure system dictated the use of PKI as an additional element."[77] The Singapore Supreme Court also makes use of digital certificates, which are generated in-house.

Question 2

> *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?*

In general, the traditional processes of document creation—taken in the abstract to mean the activities and steps involved from conception to creation—have not been discarded in the move from a traditional to a digital environment. In some cases, the process is seen as continuing the tradition, but with electronic means. Technology has allowed the creator to carry out a greater portion of the creative process him or herself, which increases the ad hoc or individualistic nature of creation in fields where this is already the case. The main change in the creation process is an increase in the speed with which the process is accomplished and the inclusion of additional steps for verification or to take into account certain features or limitations of the technology used.

[73] McLellan, "Case Study 24 Final Report," op. cit.
[74] Suderman et al., "Case Study 05 Final Report," op. cit., 14.
[75] John McDonough, Ken Hannigan and Tom Quinlan (2005), "InterPARES 2 Project - Case Study 20 Final Report: Revenue On-Line Service (ROS)," 1. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs20_final_report.pdf.
[76] Ibid., 2.
[77] Ibid., 70.

Artistic sector (Focus 1)

In the arts focus, the activities and processes impacting the creation of documents obviously involve the development and implementation of an artwork or performance. Despite the wide variety of forms of artistic expression, the development of an artwork or performance, independent of the media or artistic field, involves some or all of the following document-generating activities: proposal and contract writing; applications for funding or other correspondence; research; and developing and perfecting notes, sketches and/or instructions for elements of the overall artistic design and the implementation of a performance, artwork or installation.

In the digital environment, documents are created to reflect these same traditional functions. The functions have not changed, although the means to achieve them—the activities—have. While some documents are created by digitizing traditional documents, including photographs, audio clips, technical drawings and some text documents, other documents, most notably text documents resulting from the creation process, are born-digital. More and more elements and products of the artistic process are also being born-digital, as exemplified by digital photography, animation and music.

The arts focus case studies reflect the unchanging nature of the process of document creation in the move from a traditional to a digital environment. In the case of Altair4, in archaeological films, paper drawings and watercolours would traditionally have been used to recreate an archaeological site. Now, the watercolours and paper drawings have simply changed to pixels. At the National Film Board of Canada, a number of activities traditionally have characterized—and still do characterize—the creation of animated films and result in a variety of documents. The majority of these documents are now either born-digital or scanned and brought into the digital domain. Some artistic activities, such as performance art, involve purely born-digital documents created in the digital domain that are not the result of changing from a traditional to a digital environment. The *Waking Dream* project claims that there is no traditional activity that the activity under investigation replaces, nor is there a traditional process of document creation that is replaced. However, performance pieces have been created prior to *Waking Dream*.

What is being witnessed in the arts focus case studies is the *continuation* of the artistic tradition in the digital environment. The processes are largely the same, based on the long-established artistic principles of each field. It is not the process that has changed, but the environment in which this process is carried out and the specific actions used to carry it out. The tools and materials used in creation are now digital, not analogue. Once again, Altair4 provides an excellent example of this point. The basic methodology followed in the geometric representation that it carried out in a digital environment is based in rules established during the Renaissance. The process of document creation used to model the components of the villa is governed by the archaeological practice of proceeding from the front to the interior. This did not change because a computer was used instead of paints and brushes. In the case of the commercial film studio, the process of production has not changed, in that once an individual receives an entity, whether digital or non-digital, he or she completes the required artwork or manipulation and passes the work on to the next person in the production process.

The process of document creation in the arts focus is largely variable or ad hoc. It is either an individual process or similar to one in its subjectivity or lack of formality. In the case of the National Film Board projects, it is not possible to generalize a workflow or document creating process, because each animator follows his or her own steps to create the final product. The collaborative effort to create *The Danube Exodus* was not collaborative in the sense that all

parties worked together throughout the process. Instead, each of the groups involved in the creation of the installation developed its own creative process and then brought the results to the others. These processes were described as flexible and capable of adapting to circumstances as they arise. In other words, they were not fixed or formalized. The *Waking Dream* project also involved an ad hoc creation process. No formal procedures were followed during the creation of the performance. The three co-authors conceived of the idea together and then divided tasks according to each person's creative talent and area of expertise. The result was the collaborative work of all partners, but the partners did not work together; each developed his or her own process to arrive at a collaborative conclusion.

This individualistic, ad hoc nature of the creation process is not exclusive to the digital environment. However, it is easy to see why such a situation is continued in—even thrives in—a digital environment. The *HorizonZero* case study points out that, whereas traditional environments—especially "institutional" creators such as magazines or film studios—may have pre-established production mechanisms in place, new media producers often lack the managerial background to implement these mechanisms. This difference is attributed to several factors.

First, the environment in which new media objects are created is very different than that in which traditional media objects are created. The contributing creators of new media objects are often remote from each other and from the production environment. Also, new media productions frequently lack the financial resources to implement and monitor effective managerial practices. The Internet is often used as a means to reduce cost, although not necessarily to save money that the production has, but as a means of coping with the fact that the production has little or no money to begin with. Lastly, new media productions usually employ fewer people than traditional media productions, so that individuals often create and manage the documents for which they are responsible, seemingly reducing the need for strict document management practices.

Although the creation process is largely the same for traditional and digital environments in the artistic field, there are key differences between working in a digital new media environment and a more traditional print environment. These are not so much changes to the creation process, but additions to or new aspects of the process.

A digital environment generally provides an artist with more flexibility or freedom in the creation process. For example, traditional print and film media are largely fixed, while digital media has a more flexible nature. Besides adding flexibility to the creation process, this fact also leads to an increased need for procedures to be put in place to determine when a digital media object is considered complete and should not be altered. In the case of animated film, traditional animation was tightly controlled in the sense that film and frame size, frame ratios and projection speed were standardized. With digital animation, the frame ratio can be whatever the animator wishes it to be and the frame rate depends only on the video system being used. The WGBH case study also showed that with the digital asset management (DAM) system, production teams are now able to create their own footage logs during the actual production process and not months after, as with a traditional system. Also, the DAM system allows for the added capability of creating storyboards using film clips and re-purposing the footage for other media types. Thus, although the basic creation process has not been fundamentally changed, certain new, flexible features have been added to it.

Another novelty in the creation process introduced by the digital environment is increased interaction in artwork or performances. Altair4 has shown that the main element that has been altered by digital technology is the fact that the end result allows the user to interact with the

artistic representation in a new way that would not be possible in a traditional environment. For the musical score of *Obsessed Again...*, where the traditional process may have included testing and modification of the score following rehearsal with instruments, the creation of electro-acoustic music includes the "virtual" development of many of the interactive elements that will ultimately make up the final work.

Lastly, the creation process in the artistic field has been adapted in some cases to take into account the technology used or because of the possibilities of or limits to the digital technology. The creators of *Obsessed Again...* felt that the traditional compositional process had been modified by the addition of new steps to accommodate the use of digital technologies. In the case of the uncompleted Electronic Café International case study, digital technology affected document creation in the sense that ECI's works or performances have been *limited* by available technologies and their functionality.

Scientific sector (Focus 2)

In the science focus, there is only one case that exhibits a variable, subjective creation process similar to the arts focus. For the Coalescent Communities database of the Center for Desert Archaeology, both the system and the variety of activities carried out through the GIS display an ad hoc nature in regards to the creation process. Like the commissioning of an artwork, the use of the GIS is usually dictated by a specific question or project, so a specific problem is addressed and a project file created for each project according to a process that is more or less specific to that project.

However, for the rest of the science focus case studies, document creation takes place in a much more formalized and controlled environment, with pre-determined processes including the collection, analysis and preservation or communication of data. Most of the case studies take place entirely in a digital environment with a born-digital creation process that is often wholly or partially automated through the use of technology. As with the NASA case study, in which standard data products, documentation, index tables and archive volumes are generated automatically, the majority of digital entities in the MOST project are also the result of automated processes of data gathering, packaging and reduction (analysis).

It is the desire and possibility of translating the collected data into a neutral or open source format that characterizes the majority of case studies in the science focus. In the NARA experiment, the original digital entities are altered by the use of digital technology in the interest of preserving these records and ensuring their authenticity, reliability and usability over time through persistent object preservation. In the case of the Cybercartographic Atlas of Antarctica, the increased use of multimedia objects led to the development of interoperability standards, open source specifications and more metadata elements for both information objects and their relationships.

One of the characteristics of the creation process for science focus case studies in the digital environment is the inclusion of elements that permit increased interaction, which is only available through digital technology. The increased use of multimedia objects has lead to increased interactivity, which is especially evident in the case studies involving geomatics and the use of GIS, such as the Center for Desert Archaeology and the Cybercartographic Atlas of Antarctica. That is because, today, Web mapping can involve generating maps from interoperable, distributed datasets in real time. This fact calls for increased interactivity between the user and the system to create these real-time results and also an increased use of multimedia objects that make up the presentation of the datasets to the user. As the field progresses, this type

of interaction is leading to the development of the interoperability standards and open source specifications referred to above.

Another use of technology in the science focus, as stated above, is the automation of the creation process and the reduction of human input. This phenomenon has come about in an effort to reduce errors through the automated verification of data and can be reflected in the desire of many creators to increase the accuracy of their data from the very beginning of the creation process.[78] In this use of technology, one can see the implementation of the concept of the system as an agent of the creator with no physical, real-time involvement of the creator itself, as discussed in the InterPARES 2 definition of record.[79] Uses of this technology include the validation of data archive volumes by NASA and the automatic creation of files by the various software programs in the MOST system, with a lack of "human involvement."[80]

Although science largely makes use of the benefits of technology in the creation process, it is sometimes confronted by the limits of this technology, which therefore also limit or otherwise affect the creation process. A notable example from the case studies is NASA, where technology has affected document creation in the sense that NASA is limited by the current capabilities of the technology and instruments used. These limitations not only concern which data can be collected, but also the accuracy of those data, since accuracy is highly associated with both the method of data collection and the type of instrument used in the collection. Nonetheless, it is often exactly such limitations that lead to the development of new technology and new standards.

Governmental sector (Focus 3)

Most of the case studies in the government focus deal with a traditional activity being carried out in a new way. Therefore, the process of document creation is largely the same as for the traditional environment; it is simply transposed into the digital environment with the possible addition of certain steps in the process to take the technology into account. For the Alsace-Moselle land registry, the process is not changed; it is simply automated with the use of technology, as is the case for the electronic filing system of the Singapore Supreme Court, the Revenue On-Line Service of Ireland and the On-line Services System of the New York State Department of Motor Vehicles.

While the above-mentioned systems are examples of traditional registry-type activities that are now being carried out online, the lack of change in the creation processes is not limited to what can be seen as traditional government activities. At the Italian cooperative, the Legacoop of Bologna, an increasing number of documents are born-digital, although they mirror traditional documents in appearance and intent. The group's newsletter and job postings are simply published online, as opposed to in print form. The underlying process has not changed. Even in the case of the Ontario Web exhibits, the creation process is not something that is entirely new or different. Although creating a Web-based exhibit was seen as taking place in a nascent creation context and was described as an emerging business process, this nascent activity should be nuanced, however. The creator acknowledged that although the creation of Web exhibits is an emerging business activity for it, the creation of exhibits is not a new activity for archival

[78] Although the term "data quality" is often used in the scientific field to include the notion of accuracy as understood by InterPARES, the term "accuracy" is used here to be consistent with InterPARES terminology. Further discussion of issues surrounding the concept of "data quality" can be found in the Domain 2 Task Force Report in the section titled "Conceptual analysis: authenticity, accuracy and reliability in the literature of the sciences."

[79] Duranti and Thibodeau, "The Concept of Record," op. cit., 7.

[80] Ballaux, "Case Study 26 Final Report," op. cit., 10.

institutions in general and the creator has previously been involved in creating traditional exhibits.

There are, of course, some exceptions to the observation that most government focus case studies have similar creation processes for the traditional and digital environments. These exceptions, however, should be seen as nuances to the above affirmations that are brought about by pursuing non-traditional–type activities. Due to the creator's perception that the activity in question is a non-traditional or nascent business practice, some of the otherwise strict control mechanisms in the creation process were slacked or ignored in the digital environment.

In the case of the Ontario Web exhibits, in both institutions, the business process leading to the creation of Web exhibits was in a formative stage. In each organization, some aspects of the process were clearly defined, whereas others appeared to vary or be ad hoc in nature. Also, because the activity of creating Web-based exhibits was seen as an emerging business process, there were no formal record-making practices in place. Various individuals participated in the creation of the Web site on an as-needed basis, sometimes through business activities that were already being undertaken but were now adapted or applied to the creation of Web site exhibits. Similarly, at the Legacoop of Bologna, there were no specific criteria or controls over the creation of digital documents, as opposed to their traditional counterparts. Despite the fact, as mentioned above, that these activities are normal activities of the creator previously carried out in a traditional environment that were being applied to a digital environment, the "newness" of the digital world partially blinded the creator to the fact that the same creation processes could be carried out with slight additions or modifications. As seen above, both of the two creators carried out some aspects of their traditional creation process, while other aspects were ignored or simply not applied in the digital environment.

As with the science focus, some of the case studies in the government focus used technology in the creation process to reduce or eliminate "human interference" as a means of reducing errors through system automation. In the Alsace-Moselle land registry, the use of digital technology automates and expedites records creation. Requests for inscription are received electronically, using custom software that connects to the land registry database to retrieve the information relative to the property in question. Once the request is received, it is dated and a digital file is created containing all associated documents as scanned image files. An ordinance project is prepared automatically and is transferred to a judge's in-box. The judge then "intervenes" by verifying the information and electronically signing the ordinance project. An ordinance is then created by the system, and the relevant fields in the database are updated automatically. In the traditional process of document creation in Ireland's Revenue On-Line Service, Revenue employees manually enter information from analogue forms into databases. In the electronic system, certain fields of the tax forms are pre-populated and automatically verified to reduce the number of errors that were apparent in analogue formats. Information is also now added to the database automatically, rather than being typed in manually by Revenue employees. In other systems where automatic pre-population of forms is not possible, there are still control mechanisms in place to reduce human error. In the electronic filing system of the Singapore Supreme Court, law firms are required to enter information under a prescribed documentary template in EFS before submitting it to the courts. Any deviance from the template is rejected, which helps automate the process and reduce differences and errors.

A final aspect of document creation in the government focus that is the result of the move from a traditional to a digital environment is the inclusion of security measures as a means of assuring authenticity from the very beginning of the creation process. In Alsace-Moselle,

biometric technology is used. The judge identifies him or herself through a fingerprint scan and a smart card containing his or her private signature key and electronically signs the ordinance project. Based on the need for a secure online environment, Ireland's Revenue On-Line Service (ROS) is also regulated using private key infrastructure. Document creation is done, therefore, in a controlled environment. ROS users are required to obtain access numbers: individuals require an ROS Access Number and tax agents require a Tax Agent Identification Number to use the system. In Singapore, the Supreme Court itself manages the public key infrastructure process that results in the issuance of a smart card to only those solicitors who possess valid practicing certificates.

Question 3

> *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?*

There was considerable variability in the awareness and use of document elements and attributes in the three focus areas. Perhaps this variability can be attributed to the differences in the creation environments and the legal and professional requirements present in each focus. A general progression of the understanding and use of elements, attributes and the manifestation of authorship can be seen from the arts focus to the science focus, finding its most clear understanding and systemized use in the government focus.

Artistic sector (Focus 1)

Most of the case studies in the arts focus had no idea of, or at least no concern for, the "elements" or "attributes" of their documents, as these terms are defined by InterPARES. As is understandable, aesthetics are prioritized in any artistic endeavour and the creators often pay no specific attention to the attributes of digital entities. As a result, few formal elements were identified in the records. For example, at Arbo the *Ludosynthèse* records contain several elements, but these are not standardized and the digital records' details of date, time and place are not always noted. What is more, subjects are not explicitly inscribed on the digital records.

When pressed about the matter by the Project's researchers, many of the case studies' creators spoke of "elements" in terms of the file type or format in which a document is manifested, and it became apparent that this term is widely understood as such in the artistic community. Sometimes, responses were given that listed the specific file types created or used by the creators, or instead echoed Stelarc's response that "key elements of the digital entities on the artist's Web site are text, still and moving images and sound."[81] In some instances, the case studies do not describe the formal elements and attributes of the documents generated during the creation processes, except to describe the hardware and software used by each of the creators. In some cases, such as *Waking Dream*, there is either limited information in the case study final report about the formal elements and attributes of the various digital entities, or the formal elements and attributes of the creator's documents are not noted at all.

[81] Daniel and Payne, "Case Study 02 Final Report," op. cit., 7.

When they are identified in the arts focus case studies, elements and attributes are largely defined or limited by software specifications. It seems that in the arts there is little or no intentional or even conscious capture or notation of elements by the creator. Many creators in this focus used off-the-shelf graphics or production software, with little or no modifications. At Arbo, although technological constraints certainly influence the form of certain records, these are not seen as affecting the record's function. As a result, the formal elements and attributes of the documents are determined by the specifications of the individual software programs used in the creation process, whether or not the creator is aware that the software is capturing the documents' elements and attributes.

The use of off-the-shelf proprietary software not only limits the capture of elements, but also access to the documents themselves. Because these documents are created using proprietary software, they can generally only be accessed using that software and, in some cases, the particular operating system. For example, the computer code used to read the remote control dowser in *Waking Dream* is written in a version of Visual Basic Project Manager developed to run on a Windows 98 platform. The code can only run in Windows 98 because it requires access to functions that have been disabled in subsequent Windows operating systems. Also, the PowerPoint file currently only works on a Macintosh computer running OS9. As such, the very elements that make up the record are confined to the software and operating system in which they were created. Thus, they are not interoperable and run the risk of becoming obsolete.

Authorship is a concern for artists, but it is often not formally manifested in works created by individuals or in loose partnerships or collaborations. Sometimes, authorship is only attributed when works are collected or published, not at the moment of creation. This is the case with Arbo, which is creating a "final credits" page for the *Ludosynthèse* on its Web site. This page will identify those who worked on the *Ludosynthèse* and the collaborators, photographers and others who contributed prior to digitization. The chronological section and the "Documentation" file will also introduce each participant in original performances. The digital records are therefore not signed, except to identify those who participated in the original analogue production. In this case, the signature is visible to users and is usually included to ensure authorship rights. Signatures are not, however, necessarily attached to the records, as they can be located on the credits page only.

It is often assumed by artists that simply keeping their works in their own possession or allowing controlled access to them is enough to prove or ensure authorship. For example, with *Obsessed Again...*, the composer is the author and sole possessor of all digital entities created during the composition of the piece. External users do not have access to the master copies of the digital elements used to create the piece. Although the composer's authorship is protected under copyright legislation, it is not clear from the final report how authorship is manifested in the individual records themselves, if it is at all. With individuals, possession or controlled access to their works is largely put into practice by keeping their documents on their personal computer or by the presence of the documents on a proprietary Web site. This fact is best demonstrated by Stelarc, who is considered to be the author of all the documents on his Web site, as it is he who chooses what to include and post.

However, authorship issues become muddled in the cases of partnerships or collaborations. In *The Danube Exodus*, it is difficult to ascertain exactly how authorship is manifested in the documents, but it is clear from the interim case study report that authorship is an issue in this project, since different components of the installation are created by different groups and individuals. The question of authorship is also interesting in the case of *Waking Dream*. The

creation team consists of three people and each is responsible for the creation of certain components. However, authorship has not been made manifest in any of the formal attributes of any of the digital components.

The larger and more "official" the creator in the arts focus, the clearer the issue of authorship becomes. Larger and more formalized groups usually have some clear means of indicating authorship of their records. At Altair4, 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 are all decided by the three heads of the company. At the online publication *HorizonZero*, media assets that are saved to the ZeroHorizon database, including assets designed and developed by individual contributors, are tagged with *HorizonZero* metadata in accordance with CanCore standards, including those noting authorship.

Some more organized groups or collaborations in the arts focus have written contracts or even a rights management system specifying authors' rights and intellectual property issues. At *HorizonZero*, individual contributors and artists retain copyright over their work but waive moral rights, thereby permitting *HorizonZero* and the Banff Centre to reproduce the work in print or digital form in perpetuity. In other words, although individual artists and writers are the authors of their work, many of the rights associated with authorship belong to *HorizonZero* and the Banff Centre. Specifically, *HorizonZero* is allowed to use an artist's work for any purpose without paying royalties. In the uncompleted Electronic Café International case study, ECI is the author of the digital documents in the legal sense. In particular, Sherrie Rabinowitz and Kit Galloway hold intellectual rights over entire projects, as they envision, develop and manage the collaborative works. More "industrial" creators, such as WGBH and the National Film Board of Canada, have electronic rights management systems that provide information about rights pertaining to a given production and determine the royalties that must be paid out when a production is sold or broadcast.

Scientific sector (Focus 2)

For larger creators in the science focus, elements are often formalized or structured by professional standards or practices, or, in some cases, by well-documented in-house standards and practices that are specific to a project. At NASA, digital entities take the form of structure objects within the Planetary Database (PDB), which outlines the format in which the scientific data appear in PDB labels. Standards for the form and description of elements are documented in the PDS Standards Reference, which provides a detailed description of each label and the Planetary Science Data Dictionary, which, in turn, provides definitions for all attribute names used in resource descriptions. PDS data also adhere to nomenclature standards, which define rules for constructing Data Element and Data Object names. In the MOST project, there is an internal document that describes the descriptive fields of the FITS (i.e., Flexible Image Transport System—a standard astronomical data format endorsed by NASA) files. The digital entities are also given a unique, standardized name, based on the target (i.e., the star) and the time.

Larger, more structured creators also often use metadata or professional standards to reference elements. For the Cybercartographic Atlas of Antarctica, the data are fully referenced within modules or within the metadata or are embedded within the digital objects. Remote access to some data is possible on the fly when a map is created, in keeping with the Open Geospatial Data Consortium Standards. At MOST, the metadata schema that is used was created by the project researchers and is specific for the data files created in the MOST project. It is based on experience and best practice in the astronomical community and on the foreseeable use of the

records in the future. Some of these metadata or descriptive fields in the FITS files are mandatory because of the file format.

As with the case studies in the arts focus, for small corporations and individuals in the science focus, document elements are not formalized, although some practices may be used informally, based on perceived best practice, practicality or functionality. At the Center for Desert Archaeology, the process for creating and maintaining digital entities is ad hoc and lacks systematization, mainly because of financial and time constraints. Also, the procedural context is not rigid or always predetermined, due to the small number of people creating the GIS and the fact that it is a work of a non-governmental organization. Within the ArcView software, the user could create, manage and edit metadata based on accepted standards in the field. However, the nature of the archaeological site source information used is based on an idiosyncratic, in-house decision rather than on any established metadata standard. Nevertheless, this practice is seen as improving the reliability of the database as a trusted source of archaeological information.

Authorship is clearly manifested in the documents of larger creators in the science focus. The individual author is sometimes noted, but in most cases the sponsoring body or collective creator is often attributed authorship over the individual scientists, who are mostly regarded as producing a work-for-hire. This is a notable difference from the case studies in the arts focus, as exemplified by *HorizonZero*, where individual authors are noted, although the collective creator retains certain intellectual rights. In the Canadian copyright legislation that applies in this case, rights to a work are divided into financial rights (article 3) and moral rights (articles 14.1 and 28.2(1)). Although financial rights may be sold, granted or waived, moral rights, such as acknowledgement as the author of a work, cannot be waived or ceded.

For the Cybercartographic Atlas of Antarctica, individual module content creators are identified when their content is discussed in various academic papers, presentations and reports and on the project's Communication Web site. Authorship and responsibilities for the Atlas itself are attributed to the Geomatics and Cartographic Research Centre. In the case of the Coalescent Communities database at the Center for Desert Archaeology, the creator and author is the Center for Desert Archaeology, but the name of the originator is the GIS Specialist, who is also the writer. Within the archaeological site entry form, there is a special sign in the form of the organizational logo. The creator views the special sign as one that denotes authorship and intellectual ownership of the dataset as a whole; that is, as a unique amalgamation of individual datasets, each of which possesses its own authorship and intellectual ownership attributes. At NASA, the agency is the author of all documents created in the Mars Global Surveyor Mission. For smaller groups, authorship is not as much a concern and as a result is not as formally noted.

Similar to the arts focus, in which certain intellectual property rights were ceded to a publishing authority to reproduce the work, in the science focus intellectual property issues are sometimes limited to a proprietary period or are simply waived or reduced to share data with the scientific community. This is in keeping with the scientific method, which results in data being shared with other researchers and the public in the interest of furthering science. However, although the data are shared, certain moral rights, such as paternity, are retained by the original creator. An example of this situation is the Cybercartographic Atlas of Antarctica, in which much of the data used in the creation of the atlas—a non-commercial research product—can be used at no cost as part of the Antarctic Treaty System. The product nonetheless includes typical intellectual property issues such as license agreements, use rights to objects and data and copyright.

Governmental sector (Focus 3)

By and large, in the government focus there is a greater awareness of the formal elements and attributes of documents than that which is found in the other two focuses. Metadata are often used to define or describe the various elements, similar to the science focus, and may be automatically or intentionally generated, depending on the creator and the software used.

Often, elements were correctly understood by creators to be the intrinsic and extrinsic elements of their documents. Perhaps the most easily and consistently identified elements were those related to Web site documents. Elements and attributes that are considered integral to the validity and completeness of such documents (intrinsic elements) include: navigation links, the creator's logo or visual identity signs, a privacy policy, terms and conditions of use, site content and copyright statements. Elements that constitute the material make-up of the document and its external appearance (extrinsic elements) include a Web page template, cascading style sheets, navigation bars and a feedback form.

Many elements are designed for the purposes of providing and assuring security, privacy and authentication. Formal elements and attributes include digital certificates and signatures, annotations and electronic seals. Digital certificate and signature elements include the name of the certificate owner, the dates of issue and expiration and the user's public key and unique login number and a date/time stamp.

As a rule, authorship is formally manifested in the government focus, mostly through logos or other visual cues or by means of a formal statement of copyright. Often, the URL of a Web site is seen as proof of authorship, as an indication of the corporate domain. For example, in the URL http://www.archives.gov.on.ca/english/exhibits/index.html, "gov.on.ca" indicates that the site resides in the domain of the Government of Ontario, Canada. In the Revenue On-Line Service of Ireland, Revenue's authorship of its documents is reflected in the consistent URL naming, which provides the ROS with strong ties to Revenue.

A particularity of the government focus is that the authorship of, or responsibility for, the records is sometimes separated from the responsibility for maintaining the digital environment. For example, in the Alsace-Moselle land registry, the judge remains the author of the ordinance and the information in the computerized registry is based on the ordinance. However, the GILFAM (i.e., Groupement pour l'Informatisation du Livre Foncier d'Alsace-Moselle—the administrative body specifically charged with computerizing the land registry) is responsible for the maintenance of the database system. In the case of the Legacoop of Bologna, although the content of its Web site is created in-house, the Web site is technically managed by an external Web agency that is responsible for ensuring infrastructural services, posting data and developing and maintaining the technical and graphic aspects of the site. Other creators, such as the Irish Revenue and the Singapore Supreme Court, maintain their own systems in-house.

As has previously been seen with the types of documents created in traditional and digital systems, in the government focus, the physical elements of documents created in the course of more traditional registry or service activities often appear to replicate the appearance of paper-based elements. In the computerized land registry system of Alsace-Moselle, form and function (physical elements and their behaviour) remain largely identical in the traditional and digital environments. In the digital environment of the Revenue On-Line Service of Ireland, it should be noted that the use of the PKI environment in conjunction with digital certificates is analogous to an individual using his or her PPS (Personal Public Service) number and signature in the analogue environment. Tax forms and their elements are designed to appear visually consistent with existing paper-based forms, but have added levels of pre-population and dynamically generated content.

Question 4

> *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 factors that make a document a record other than those that diplomatics and archival science have considered so far?*

There was considerable difficulty in responding to this question adequately, mainly due to the fact that the objects or entities studied in the diplomatic analyses are not always the same as those that are identified as the digital entities under study in the final reports or other documentation on the case studies. Another factor that muddied the individual responses of the case studies to this question is the fact that in a good number of case studies, the creator believes that his or her documents are records, despite the fact that these documents do not meet all of the criteria making up the definition of a record as established by diplomatics and adopted by InterPARES 1.

Given that the definition of a record adopted by InterPARES 1 relies on the defining criteria of traditional diplomatic analysis, it was the diplomatic analyses of the case studies that prevailed and were used as the definitive source material to respond to this question. In regards to the perception by the creators as to whether their documents were records, despite the archival principle that "whatever the creator treats as a record in the course of any given action is indeed a record in the context of this action," the diplomatic analysis took precedence in determining if the digital entities created in each case study were indeed records. "A record is whatever the creator treats as a record, but that 'whatever' must be something that the creator can in fact keep, associate with other records and subsequently recall."[82]

Artistic sector (Focus 1)

In the arts focus, many of the creators were either unfamiliar or unconcerned with archival terms, notably the definition of "record." As an extreme example, performance artist Stelarc considers that the primary record of his work is his own body. However, most artistic creators are more exemplified by the team that put together *The Danube Exodus*. In this case study, none of the subjects were familiar with archival terminology, but all seemed to make the distinction between works, files used in the actual installation and supporting documents or documents created as a by-product of work production and seemed to be willing to see the latter as records.

In other words, there was some vague sense of a difference between the end product (the work) and the by-products (records), but this distinction and realization was provoked by the questions and intervention of the InterPARES researchers and was not one that the creators were in the habit of making in the course of their activities. After discussing their documents with an InterPARES researcher, the creators were able to see how the end products or works would not be considered records, while the by-products of the action of creating the artwork or installation should be.

[82] Duranti and Thibodeau, "The Concept of Record," op. cit., 32.

The entities studied in three of the ten arts focus case studies fulfil the InterPARES 1 definition of records. The documents kept on Stelarc's Web site satisfy the requirements of a record. The digital entities studied are by-products of Stelarc's performance activities and are bound to each other during the creation of projects, and all records stored on the Web site are bound to each other. For WGBH, both the original footage and the original footage logs posses all the elements required of a record and therefore are both considered records. WGBH must preserve the original footage, the original footage logs and the links between the two entities. In the case of *Obsessed Again...*, the computer code (the MSP/Max patch) is a record because it is the by-product of the act of musical composition, is fixed on the composer's hard drive and is set aside by the composer for future use or reference. The diplomatic analysis did not examine any of the other digital entities created during the composition of the piece.

In the rest of the case studies in this focus, the entities studied were not records or by-products, but rather publications or end products. In these case studies, there is a focus on the final outputs of the activity rather than on the so-called supporting documents. Publications may use or include records, but they are not records themselves. In the arts, these non-records are mainly Web art productions belonging to the category of artwork creation. Although these documents are considered to be records by their creators and meet most of the requirements of the definition, the diplomatic analyses state that they are not records because they are not by-products but clearly end products of creative activities. Therefore, they have been defined as publications.

A good example of this is the case of Arbo. The diplomatic analysis concludes that the group's *Ludosynthèse* is an autonomous entity and not generated as the by-product of the group's research or performance activities. Instead, original records are being modified and edited for publication in the *Ludosynthèse*. As such, the *Ludosynthèse* is therefore not a by-product, but an end product. The Web site has been specifically constructed as a publication, rather than having been set aside during the course of any of the activities documented. Other examples are Altair4, in which the DVD produced is clearly an end product, and *The Danube Exodus*, for which the diplomatic analysis reveals that the exhibit itself and its interactive database are not records because they are end products.

Despite the fact that the digital entities studied in only three of the ten case studies in the arts focus can be considered records, many of the "failed" case studies nonetheless create partial or potential records. The three case studies from the film industry, whose documents were not considered records, provide good examples of this. With Altair4, although the actual film is a final product or publication and therefore not a record, all of the digital entities that are created as the by-products of its creation are set aside and so possess an archival bond with one another and a stable form and content. The National Film Board of Canada presents a near exact scenario. Although each film is considered a final product/publication, all of the digital entities that are created as the by-products of its creation are set aside and thus possess an archival bond with one another and a stable form and content. Comstudio is in a similar situation to the previous two creators, although it is much more focused on the final product, to the detriment of the by-products. In fact, interim documents are "not important" to this creator and are only seen as stepping stones to the final product. Most are not even kept. The by-products of production are considered ephemeral and "exist solely to advance the work of the production."[83]

[83] James Turner et al. (2004), "InterPARES 2 Project - Case Study 09(3) Final Report: Digital Moving Images - Commercial Film Studio," 9. Available at http://www.interpares.org/display_file.cfm?doc=ip2_cs09-3_final_report.pdf.

Another factor that results in presence of potential records among the creators' documents is the fact that the diplomatic analyses do not always analyze or consider all of the documents created in the given activity, particularly those considered to be "supporting documents." For example, in the case of *The Danube Exodus*, records are created in the process of creating the exhibit (such as Forgac's notes), installing the exhibit and in the collaboration among the various contributors. The diplomatic analysis does not assess whether the "supporting documents" are records, most likely because there is too little information in the case study interim report about these types of documents to be able to make an informed decision. *Waking Dream* also creates potential records during its activity. These include the original video footage; the edited video that is projected onto the screen during performance; the original sound samples; the different versions of the edited soundtrack; the computer code used to operate the remote control dowser; the PowerPoint file used to switch between videos; and administrative records related to the funding, planning and promotion of the work. Lastly, although Electronic Café International's documents may not currently satisfy all requirements of a record as defined by InterPARES 1, the diplomatic analysis for this uncompleted case study has concluded that the artworks created in telecollaborative works are themselves records.

In the case studies of the arts focus that may potentially contain records, there is often the lack of one particular, necessary record: a "script" or enabling record to provide the link among the other entities for re-creation and to provide a context for them or instructions for their interaction. It is often the individual responsible for the creative vision who is the sole person to know how all the pieces fit together to interact and work, without there being any documented means of transmitting this knowledge. In large organizations, these instructions may be documented, but individuals often do not feel the need to do this and the resulting lack of documentation may pose a problem.

With regards to *The Danube Exodus*, it is difficult to ascertain whether it will be possible to re-create the exhibit in the future. In short, it appears that it may be a challenge due to the choices made in short-term preservation strategies. Each contributor has varying financial resources and interest in terms of archival preservation. Although *The Danube Exodus* is a collaborative art exhibit, from an archival perspective there appears to be no collaborative effort on how to preserve the work as a cohesive whole for future re-presentation and no existing set of instructions that would enable anyone other than the three creators to reproduce the work. For *Waking Dream*, the creation of an additional record is required if the piece is to be re-performed. Currently, no description of the piece exists, except for a brief description of the general idea behind the performance that is posted on the Web site. For *Waking Dream* to be re-created by other performers, a document will have to be created that describes the characteristics of each of the components and explains how they work together.

Scientific sector (Focus 2)

Whereas the creators in the arts focus had no idea or functional concept of "record," the creators in the science focus had a different definition or concept of "record" than that used in archival science. In the MOST case study, the researchers use the word "record" as a field value in certain contexts. Yet, in other contexts, its meaning and use is more closely aligned with the archival concept of the term. In the case of the Archaeological GIS study, the creator believes that the GIS is a record only after the findings and data in it are published in a journal article or monograph. To the scientists in the NASA case study, records—or "data products" as they are often called—are characterized primarily by the type of data they contain and the degree to which the data are processed; hence, they distinguish between *experimental data records* (EDRs)

(i.e., "the measurements received from the instruments at the mission ground control system"), *reduced data records* (RDRs) (i.e., "processed EDRs") and *engineering data records* (EDRs) (i.e., entities consisting "of raw data in the form of packets containing time-ordered sequences of science data obtained by a given instrument together with engineering information that allows instrument teams to check operations of its instruments").[84]

In addition to distinguishing records base on their content and level of processing, the scientists in the MOST case study further characterize records by the ease with which they can be recreated; thus, while raw data files, which are considered the most important files, are never deleted, the scientists state that "any other files may be deleted because it is possible to recreate them." This seems to imply the raw data files are the only digital entities that the scientists in this study consider to be records or, perhaps more precisely, the only records worthy of permanent preservation.[85]

Yet another distinct concept of record is found in archaeology, where archaeologists commonly refer to the "archaeological record," which, in the words of the creator in the Archaeological GIS case study, is understood to mean "the stuff we have out there in the ground."[86] In this sense, the archaeological record is conceived as a theoretical compilation, rather than as tangible, discrete units of information. On the other hand, the Society for American Archaeology (SAA), in its *Principles of Archaeological Ethics*, refers to the "archaeological record" more broadly as including "in situ archaeological material and sites, archaeological collections, *records* and reports."[87] Meanwhile, later in the *Ethics*, archaeologists are encouraged to

> ...work actively for the preservation of, and long term access to, archaeological collections, *records*, and reports. To this end, they should encourage colleagues, students, and others to make responsible use of collections, *records*, and reports in their research as one means of preserving the in situ *archaeological record*, and of increasing the care and attention given to that portion of the *archaeological record* which has been removed and incorporated into archaeological collections, *records*, and reports.[88]

This double use and meaning of the word "record" permeates the archaeological literature and professional discourse and, to a degree, appears to have been a source of some confusion for the creator in the Archaeological GIS case study, as is suggested by the extended discourse on the definition of the concepts of record and fixity, in an archival sense, spoken to the creator by one of the InterPARES researchers during the case study interview.[89]

Finally, another factor that appears to influence the way that many scientists relate to the concept of record, especially in relation to the notions of fixed form and stable content—two

[84] In fact, the National Research Council Committee on Data Management and Computation (CODMAC) defines eight distinct processing levels or types for Space and Earth Science Data Records: raw data, edited data, calibrated data, resampled data, derived data, ancillary data, corrective data and user description data (National Research Council, Committee on Data Management and Computation, *Issues and Recommendations Associated with Distributed Computation and Data Management Systems for the Space Sciences*, report no. NAS 1.26183026 (Washington, D.C.: National Academy Press, 1986), 31–32. Available at http://hdl.handle.net/2060/19880017724.
[85] Ballaux, "Case Study 26 Final Report," op. cit., 13.
[86] InterPARES 2 Project - Case Study 14: Interview B Transcription, lines 442–443 (unpublished).
[87] Keith W. Kintigh (1996), "Principle No. 1: Stewardship," in *SAA Principles of Archaeological Ethics*. Available at http://www.saa.org/Publications/SAAbulletin/14-3/SAA9.html. Emphasis added. See also the similarly broad definitions provided in the Canadian Archaeological Association's *Principles of Ethical Conduct* and in the Archaeological Institute of America's *AIA Code of Professional Standards*. Available at http://www.canadianarchaeology.com/conduct.lasso and http://www.archaeological.org/pdfs/AIA_Code_of_Professional_StandardsA5S.pdf, respectively.
[88] Ibid., "Principle No. 7: Records and Preservation." Emphasis added.
[89] InterPARES 2 Project - Case Study 14: Interview B Transcription, lines 391–409 (unpublished).

characteristics that are fundamental to the concept of record in an archival context—is that, because of the inherently experimental and probatory nature of scientific inquiry, scientists view their activities as resulting in a *provisional* body of work that is continuously subject to revision by themselves and/or by other scientists. Even the raw data, which many scientists consider to be the one product of scientific inquiry most worthy of long-term preservation,[90] are themselves subject to continuous revision as, for example, whenever new and more precise measurement tools or data collection techniques are developed. Thus, even raw data, the most fundamental components of science, are, in effect, themselves subject to obsolescence.

A clear example of this notion of the provisional nature of science data and records is offered by the creator in Archaeological GIS case study, who, when asked about his opinion on the long-term importance of the results of his GIS research, and the records related to that research, expressed doubt that anybody twenty years hence would be interested in or need his data or his results. This belief is based in part on the creator's assumption that GIS technology and research methodology will have changed so significantly within the next twenty years that his data and results will have been rendered completely "obsolete," and in part on his observations of how few of today's researchers actually use or rely on the data and results of archaeologists from 100, 50 or even 20 years ago.[91] According to the creator in this case study,

> There is so much archaeological data that is literally falling off the shelves because the boxes are decomposing that we can't analyze it, that I'm just skeptical that anyone is going to have the time or motivation to try to dredge all this stuff up...I really doubt anyone is ever going to need the raw data.[92]

Despite the wide variability in the way that the concept of record is used and interpreted in the sciences, diplomatic analysis reveals that four out of the five case studies in the science focus are indeed creating records in the course of their activities. Regarding the Archaeological GIS case study, the diplomatic analysis shows that the Coalescent Communities database GIS itself is the authoritative record. The creator treats the various versions of the database as records when they are purposely set aside during the course of business. For the MOST case study, the diplomatic analysis finds that the SDS (science data stream) raw data collected by the satellite and the various data products generated using this raw data are all records. The digital entities studied in the NASA case study are all deemed to be records, as well, and in the case of the National Archives and Records Administration experiment (case study 19), the digital entities comprising the "bill of materials structure," as set aside during the business activities of the originating research partner, as well as the digital entities comprising the test records generated and evaluated during the engineering experiment, all meet the requirements of a record as defined by InterPARES 1.

The one case study that does not create records in the science focus, the Cybercartographic Atlas of Antarctica (CAA), is involved in Web-based scientific activities. The diplomatic analysis established that in spite of the dynamic and interactive environment, every instantiation of the assembled data produced by the entities, or every display generated in response to user inquiries, is autonomous and has therefore been assessed as a publication, as long as it will be hosted and consulted online. Furthermore, the Atlas only partially satisfies the definition of a

[90] See, for example, discussion of the results of the general study 09 survey question, which asked participants to briefly describe the elements and/or outputs of their GIS projects that they thought should be preserved for future use or reference and why (Preston, "General Study 09 Final Report," op. cit., 68–71).
[91] Pearse-Moses et al., "Case Study 14 Final Report," op. cit., 28, 36.
[92] InterPARES 2 Project - Case Study 14: Interview B Transcription, lines 1508–1511, 1519 (unpublished).

record because both its content and documentary form are subject to continuous change and because it does not possess an archival bond.

However, the analysis adds that the Atlas has the potential to become a record. When the time comes to set it aside and in so doing to stabilize its content and fix its documentary form, it can become a record. This setting aside fixes the digital entity's documentary form and stabilizes its content[93] and gives the "retired" Atlas an archival bond with other records that are organized in an identifiable documentary context. It also indicates that the Atlas participated in an action and is now filed with other records generated in the same action for further actions or reference. The CAA project also creates traditional records in its administrative activities, but these were not the object of the case study, which focused solely on the Atlas and its production environment.

As with some of the cases in the arts focus, in at least one of the cases in the science focus, there is the lack of an enabling record or set of instructions to provide a link among the digital entities for re-creation or to provide a context for them. The National Archives and Records Administration's experiment encountered a problem in that the STEP (Standard for the Exchange of Product Model Data) file only contains the resultant solid model itself and there was no way to store the construction directions of the solid model records in a neutral format. In other words, there is no "script" describing how to produce the machine parts from the model. This is problematic, because it is unlikely that a new model could be constructed from a preserved drawing that would be equivalent in construction to the original model. To the creators, the construction file is the most important file to preserve, but there is no way to do so in a neutral format.

Governmental sector (Focus 3)

Exactly one half of the case studies in the government focus are creating records. This is the case with the Alsace-Moselle land registry, the Revenue On-Line Service of Ireland and the Singapore Supreme Court, all of which are engaging in traditional, registry-type government activities applied to the digital environment. According to the diplomatic analysis, the ordinances and inscriptions created within the Alsace-Moselle computerized land registry fulfil all the requirements of a record and may be considered as such. Strict procedural and documentary controls ensure that these records are reliable and there are procedural and technological controls in place to ensure the authenticity of the records over time. In the Irish case study, the digital certificates, tax forms and debit instruction forms generated from ROS meet all the requirements of a record. In Singapore, the documents created and set aside in the course of the activities of the Supreme Court in administering bankruptcy proceedings also meet all requirements of a record as defined by InterPARES 1, as do at least some of the documents created by the New York State Department of Motor Vehicles On-line Services System, including the core records (i.e., user profiles) and audit trails.

The remaining four case studies in this focus do not create records, as defined by InterPARES 1. These creators are all in the service activities group. Two have open hypermedia features with fluid and changing data that provide various information, but without a document that is set aside. They therefore lack fixity of content and/or form, which is needed for the entities to be considered records and preserved over time.[94] VanMap cannot be considered a record because: (1) there is no act, (2) it has not been set aside and has thus not acquired an

[93] See Records Creator Principle C1 in Appendix 19, op. cit.
[94] Ibid.

archival bond and (3) its form is not fixed. Although less fluid and dynamic, the Legacoop of Bologna's Web site contains entities that do not satisfy all the requirements of a record. Specifically, current practices do not ensure stability of content, the entities do not possess an archival bond beyond a chronological record of their posting and the procedural context is under-developed. Furthermore, several documents on the Web site may be considered publications, such as the member's newsletter.

The remaining two cases also create publications, not records. The Antarctic Treaty Searchable Database does not meet the requirements of a record primarily because the database does not participate in an action and does not possess (or require) an archival bond. It is a compilation of documents selected and gathered for dissemination that is developed to stand alone as an information resource and is therefore a publication rather than a record. The representation of the component documents and records in the database does not have the effects and contexts equivalent to the originals. In the Ontario Archives Web exhibits, the files found on the production server do not fulfil certain requirements of the definition of a record. Their autonomous nature reveals them instead to be publications.

Despite the shortcomings of these cases that prevent their documents from being considered records, like the previous two focuses, the "rejected" cases in the government focus nonetheless contain partial or potential records. At the Archives of Ontario, although the files on the production server are not considered records, the files that are stored on the development server fulfil all InterPARES 1 record requirements and may therefore be considered records. They are public records and narrative records of the activity of creating exhibits. In the case of VanMap, the system has the potential to become a record once it has been set aside. This is also the case with the Legacoop of Bologna's Web site. The creator uses the documents on the Web site as records and the site is used as a place to post important documents. These include some documents that are not found elsewhere in the creator's fonds. However, they will not fulfil the InterPARES definition of a record until they are set aside. The act of setting the site aside will stabilize its content and link it to the Legacoop's other administrative records as evidence of its activities.

General observations

As examination of the case studies in each of the three focuses has shown, the diplomatic analyses reveal that digital entities that satisfy the requirements of a record are mainly those created: 1) to support the creation of artwork, 2) to support scientific activities and 3) for use in public filing and registry systems. All of these have open hypermedia features or belong to the second type of digital entities discussed earlier (i.e., digital components like files, program code, etc., that take place in a larger process or action involving other digital and/or analogue means).

Some conclusions can be drawn regarding the documentary form produced. Generally speaking, there are two reasons why documents have not been assessed to be records. In several of the cases, there was a problem related to the capacity to ensure the stability of the content and fixity of the documentary form. In many of these cases, open hypermedia features generated fluid and changing data. In these cases, the creator must ensure there is a fixed store of data within the system and that the rules by which the data are aggregated and presented on screen are predetermined, consistently applied and well documented. Part of the problem stems from the fact that the activities of these creators often give rise to new or emerging productions in which the form may evolve according to the development of the technological approach over time. These cases are strongly linked to the availability of software and the ease of using it in a given field. On that basis, if the creators want to allow the transformation or re-creation of their work,

they must keep in mind that their documents will have to remain as independent as possible from the applications used to create them. Under these conditions, they must use software and file formats that offer the best hope for ensuring accessibility of the records over time. Software that is not compatible with previous versions (backward compatibility) or with future versions (forward compatibility) impedes accessibility over time. Creators must also ensure that software for one application works well with that of other applicable applications and systems (interoperability).

In many other cases, information technology was used to create end products dedicated to the dissemination of artistic works or scientific knowledge. These are self-contained entities that stand on their own and do not require any other information to be understood. This situation leads the creators to a false sense of completion. Arbo is a good example of this. Their Web site integrates documents judged to be the most representative of fifteen years of performance of their theatre troupe. The artists refer to it as a tombstone, since for them the site has become a repository of their entire memory. They therefore did not feel the need to link it to the rest of their fonds. However, the fact is that although Web art is open work, it often has a predetermined finishing point in time. The work may remain open for a fairly long period of time, but it is eventually closed. In the same way, both scientific and non-administrative governmental end products are eventually retired. At that point, the documents should not only be stable, but they should also have archival bonds with other traditional and digital records in the creator's fonds. This implies, therefore, that at a minimum, creators must be aware that digital records should be organized into logical groupings consistent with the organization of the paper files and linked to retention periods as much as possible.

Table 6. Digital Entities' Fulfillment of the Criteria of a Record

CS#	Entity Studied	Criteria Necessary to be Considered a Record				
		Fixed Content and Form	Participate in an Action	Archival Bond	Three Persons	Identifiable Context
1	*Ludosynthèse*	√	X	X	√	√
2	Documents on Web site	√	√	√	√	√
3	Online issues and database	√	X	X	√	X
	Component documents[95]	√	√	√	√	√
5	Files on production server	√	X	X	X	X
	Files on development server	√	√	√	√	√
6	Cybercartographic Atlas	X	X	X	√	√
8	Data (raw data and SPICE files)	√	√	√	√	√
9(1)	*House of Julius Polybius* DVD	√	X	X	√	X
	Individual production files	√	√	√	√	√
9(2)	Animated films	√	X	X	√	X
	Component documents[96]	√	√	√	√	√

[95] Computer programming code, graphic design, artist commissions, editorial scripts, database architecture, etc.
[96] Including textual, artistic, database and musical components.

9(3)	Digital animated films	√	X	X	√	X
	Digital moving image material	√	√	√	√	√
9(4)	Original footage and footage logs	√	√	√	√	√
10	Component documents[97]	√	√	X	√	X
12	Antarctic Treaty Database	X	X	X	√	?
13	Computer code (patch)	√	√	√	√	√
14	Coalescent Communities DB	√	√	√	√	√
15	*Waking Dream* performance	X	X	X	√	√
	Public Web site	√	X	X	√	√
	Component elements.[98]	√	√	√	√	√
17	User profiles (core records)	√	√	√	√	√
	Audit trails	√	√	√	√	√
	Licenses/registrations	√	√	√	√	√
	Driving record abstracts	√	√	√	√	√
18	Ordinances and inscriptions	√	√	√	√	√
	Entire database	X	√	X	√	√
19	"Bill of materials structure"[99]	√	√	√	√	√
	Test records (NARA experiment)	√	√	√	√	√
20	Digital certificates	√	√	√	√	√
	Tax forms	√	√	√	√	√
	Debit instruction forms	√	√	√	√	√
21	Bankruptcy records in EFS	√	√	√	√	√
24	VanMap GIS system	X	X	X	√	√
25	Documents on Web site	X	√	X	√	X
26	SDS raw data and data products	√	√	√	√	√

Question 5

> *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?*

This response revealed a cleavage between the arts and science focuses on one side and the government focus on the other side. The first two fields capture little or no documentary evidence, due to the fact that the creators do not view themselves as participating in

[97] Forgacs' notes, video and multimedia documents, still images, texts, etc.
[98] Including sound samples and video recordings, compiled soundtrack, computer code and PowerPoint file.
[99] From the originating partner.

"transactions," which was largely understood as the provision of goods or services. They simply did not feel that the question applied to them or that they had the legal obligation to capture documentary evidence. On the opposite end of the spectrum, with few exceptions the creators in the government focus have sophisticated means and procedures for capturing documentary evidence, which is seen as ensuring the evidential value of the documents that they produce.

Artistic sector (Focus 1)

This question does not apply to the majority of case studies in the arts focus. This is mostly because the case studies in this focus do not involve the delivery of services (unless a performance may be considered a "service"), or the creator does not enter into transactions. However, another fact distinguishes this focus from the other two. For individuals and small businesses in the arts focus, there is no legal mandate to keep their records, but rather only an interest on the part of the creator to sufficiently document his or her activities to be able to re-create or reproduce the work.

HorizonZero states that for most of the activities undertaken by the team, there is no legal mandate to make or keep documentary evidence, a sentiment that is echoed by performance artist Stelarc, the composer of *Obsessed Again...* and the *Waking Dream* team. However, it is clear that if the creators of *Waking Dream* intend that the work continue to be performed in the future—and in particular, if they hope to have performers other than themselves do so—better documentation of the team's intentions and of the methods and technologies used to realize those intentions will be required. It is also in the best interest of the composer of *Obsessed Again...* to document his process of creation and the characteristics of each element of his work as completely and accurately as possible to facilitate future performances of his work, especially if the accurate reproduction of his intentions is important to him. Despite the lack of a legal mandate to capture documentary evidence for most artistic creators, there is still the question of whether adequate documentation is being kept in an organized and systematic manner to allow for the recreation of the installation of the work or performance as a whole.

For larger businesses or creators in the arts focus, there is still a lack of documentation of records during the creation process. What documentation is being done in this creator context may depend not on institutional or official policies, but rather on the practices of individual artists or producers. At the National Film Board of Canada, little, if anything, is documented about the creation of the film itself. The way in which entities are documented and maintained depends on the individual supervisor for each production and the size of the project (small projects may only be sparsely documented). In fact, problems have been encountered in post-production due to insufficient or poor documentation. In the case of Comstudio, new artwork is not so much created as it is merged with additional artwork to form a single file. Previous versions are saved for a time in case it is necessary to consult previous iterations, but eventually old versions are overwritten and no documentation of their existence or transformation is captured.

The individual practices followed for documentation in the arts focus mostly include naming conventions. At the National Film Board of Canada, every production is assigned a number and this same number applies to all the documentation concerning the production, both paper and digital records. At Comstudio, naming conventions are used to identify digital entities and provide information about sequence, scene, name of the object and numerical information to identify the version. Physical images are numbered and once they are scanned into the Avid computer, these numbers appear and are used to link the digital images with the images on paper. At WGBH, a unique identifier links the catalogue record in the footage log with the original

footage. Both the original footage and the original footage logs follow naming conventions that allow them to be linked together and to the final program production. It should be noted that these three examples, which all come from the motion picture industry, are among the most organized and institutional of the creators in the arts focus. Smaller organizations and individual artists may not even apply these basic documentation measures. "For individuals, the burden may seem great, but the alternative—loss of records or the emergence of corrupt and unverifiable data—would be an even greater problem in the long run."[100]

Scientific sector (Focus 2)

As with the arts focus, this question does not apply to (or there is "no legal obligation" for) four out of the five case studies in the science focus. Once again, the primary reason is that no transactions occur in the activities of the creators studied. For example, although it is an agency of the United States government, the focus of NASA's work is scientific endeavour; as such, no transactions occur. The transactions for the users of the Cybercartographic Atlas of Antarctica are primarily to view and interact with the content for educational purposes. In this context, there is no legal obligation to maintain a record of these transactions. Nonetheless, from an historical perspective, there is an interest on the part of the creator in preserving the entire CAA at different points in its development.

The only case study where this question seems to apply is that of the National Archives and Records Administration of the United States. In this case study, a product data management system captures all of the digital entities within the scope of creating a digital solid model (the entities that are created in the CAD system). The product data management system captures all actions and transactions that take place within the system. There is a rigorous change-control process, whose changes are recorded in the product data management system. In this case, the term "transaction" may be understood to be an action, modification or procedure performed on the digital entities and not the exchange of money, information or goods.

Governmental sector (Focus 3)

The government focus is the opposite of the other two focuses in regards to this question. In fact, the question applies to all but one case study in the focus (The Antarctic Treaty Database). Most of the case studies in this focus have extensive login capabilities to record or capture all actions and transactions performed in the system. These cases are mostly implementing electronic versions of traditional registry or service activities. The evidential weight of the records that they create depends upon capturing this information and assuring the accuracy, authenticity and reliability of the system's records. These requirements are reflected in the relevant legislation governing the activities in question.

For example, the Alsace-Moselle land registry has extensive login capabilities for recording all actions and transactions taking place in the system. It is extremely thorough in terms of capturing documentary evidence. Transactions are conducted within the system itself and information relative to all properties is contained within a database. In Ireland's Revenue On-Line Service, transactions are documented through the formal act of signing and submitting a tax form to the Revenue Commissioners via the ROS. This is considered evidence of a record. In Singapore, the Bankruptcy Act and Bankruptcy Rules ensure the continuation of strict procedural controls over all transactions conducted by the government, even in the electronic realm.

[100] See the *Creator Guidelines* in Appendix 20. Available at http://www.interpares.org/display_file.cfm?doc=ip2_book_appendix_20.pdf.

Transactions are also strictly controlled by the rules of the court, internal work processes and Practice Directions. In fact, the electronic system is capturing more documentary evidence than the paper-based system. This is likely the case also with the New York State DMV's On-line Services System, which maintains extensive user logs and audit trails that track all transactions and changes made by both employees and customers so that records cannot be modified without leaving behind evidence of that modification. The DMV also makes use of a strict access rights system that controls what type of access each employee has to the digital entities in the system. As well, all online DMV transactions are electronically transmitted using Secure Socket Encrypted Transactions that are authenticated through the use of digital watermark technology.

Some exceptions to this trend of thorough government documentation involve case studies in which changes or transactions are undocumented or in which data are overwritten. In the case of the Ontario Web exhibits, changes to Web exhibits may be made by the creator without consistent, or even any, documentation. There was also no indication of any documentation around reformatting older exhibits to bring them to current standards. Interviewee comments confirm that recordkeeping of supporting documentation is done individually in terms of what is created and captured, and how and where it is filed. In the case of VanMap, different data are updated at different times, either on a regular basis or as needed. Most updates consist of data being overwritten. For data that are overwritten, there is no way to track updates over time. There is also no capture of actions or transactions in the system. It should be noted, however, that these two examples are non-traditional government activities and resemble case studies in the arts and science focuses, respectively.

There are also two exceptions in which documentation is less thorough than normal for government creators, due to the fact that the creator's electronic system is not connected to the traditional, paper-based system. For the Ontario Web exhibits, these exhibits are not treated the same as traditional, physical exhibits. The recordkeeping process described in one institution in the Exhibit Approval Form has evidently not been followed. In the case of the Legacoop of Bologna's Web site, there is no doubt that the dynamic, Web-based entities are neglecting to capture adequate documentary evidence. This may be due to the fact that the creator does not focus on the Web environment with the same quality and attention as is given to traditional documents. Although a recordkeeping system is used, digital records are not considered to be part of any formal recordkeeping system. Some documentary evidence, therefore, is being neglected.

Question 6

> *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?*

As with the previous question, this question was seen to not apply in large part to creators in the arts and science focus groups. Legal liabilities in the arts focus are largely limited to intellectual property considerations, which may become complicated in a partnership or multiple-creator situation. In the science focus, professional ethics and norms seem to define the bulk of creators' responsibilities and liabilities, while the legal liabilities of government creators delivering traditional registry-type activities in the digital environment have largely remained unchanged by the move to a technological environment.

Artistic sector (Focus 1)

This question does not apply to many of the case studies in the arts focus. In some cases, such as Altair4, the question is not applicable because the case study does not involve electronic transactions. This is the situation for several case studies in this focus. For others, the lack of relevance for this question hinged more on the fact that the artist does not have any legal liabilities, as expressed by the composer in *Obsessed Again...*, or on the perception that the artist, such as performance artist Stelarc, does not have to live up to legal requirements in the same way that government or businesses have to.

When artistic creators do recognize legal requirements or responsibilities, these are all copyright or privacy related. Some creators must obtain a rights release prior to reproducing certain works, while for others a contract states that individual artists retain the copyright to the work, but the publishing or performing body retains the financial or re-use rights.

The attention to and understanding of these rights and responsibilities varies widely in the field, based largely on the level of complexity and sophistication of the creator. Arbo knows that it is subject to copyright and disposition laws, but the legal questions concerning photographs are only vaguely understood and addressed by the group. In *The Danube Exodus* project, these issues are aggravated as a result of the complicated authorship and ownership of the work and its component parts, including those to which institutions other than the primary authors hold copyright. *HorizonZero* states that there are no specific laws or regulations governing its activities except for those related to copyright, which are specified in the artists' contracts. At the National Film Board of Canada, complexities exist with respect to film rights due to the contracting out of work, while at the uncompleted case study, Electronic Café International, ECI owns the rights to its telecollaborative works, although certain performances cannot be recreated until third parties have released their rights.

Despite the sometimes complex and misunderstood issues of copyright and privacy in the arts focus, these responsibilities appear to be consistent with a paper-based environment and remain unchanged with the move to a digital environment. At *HorizonZero*, the case study final report does not provide any information indicating that copyright issues have been affected or altered through the use of digital technologies. A similar situation is encountered in most of the other case studies, such as *The Danube Exodus*, where there is nothing in the case study documentation that specifically addresses how this situation would differ from a similar situation in a non-digital environment. Even among the *Waking Dream* team, where there is conflict over whether the work is performance art (therefore proprietary) or theatre (which would be reproducible), "this issue revolves around the nature of the performance, not the nature of the technology used to create it and would manifest itself in the same way in a non-digital environment."[101]

The greater the hierarchy involved, the more formalized the rights are in the arts focus. Loose associations of individuals seem to recognize and respect each other's rights, without these being formally spelled out or documented. Most responsibilities or obligations for individuals and small groups come from moral or ethical concerns or from granting or funding bodies, rather than from legal issues. For example, at Arbo, the group's ethical code requires that the photographer's name is identified for each work and the group has agreed to never force a spectator to participate in a performance. Also, the *Waking Dream* team claims to have no legal liabilities or responsibilities besides compliance with grant stipulations.

[101] Douglas, "Case Study 15 Domain 1 Research Questions," op. cit., 4.

Small businesses and agencies formalize their legal rights and responsibilities more by entering into contracts of varying complexity. The uncompleted case study, Electronic Café International, is bound by the contracts into which it enters with contributing artists. Similarly, *HorizonZero* negotiates a copyright license with each of its contributors, whereby the contributor retains copyright over the work but waives financial rights, so that the Banff Centre has rights in perpetuity for the reproduction of the work in digital or print format.

Larger groups and businesses have given more thought and resources to legal responsibilities and digital security. This is most evident in the motion picture industry. At the National Film Board of Canada, copyright law applying to the use of third party segments in films led to the development of an electronic rights management database, which is now an integral part of the creator's Synchrone system. WGBH also uses a digital asset management system, which includes a login procedure so that archives personnel can track use of the digital library and secure certain assets. Any changes are tracked by system administrators and only archives personnel can modify metadata information linked to the footage. Comstudio has put in place strict internal security controls to ensure that responsibilities and rights are clear. An approval process exists to provide access to specific files. In short, while individuals and small companies are "putting out fires" (i.e., dealing with problems as they arise), larger companies and government are installing firewalls (i.e., taking pro-active actions to prevent problems). For example, Arbo has agreed to remove any image from the *Ludosynthèse* as a result of complaints received from those who appear in them, while the large motion picture studios are organizing their assets into a digital rights management system to prevent any future problems from arising.

Scientific sector (Focus 2)

In the science focus, most of the creators' legal responsibilities or obligations come from legislation that is already in place for a paper-based environment, as well as from professional standards and obligations. For example, NASA is an agency of the United States government and, as such, must adhere to the governing legislation from which it draws its mandate. In the case of the Center for Desert Archaeology, major federal regulations and policies affecting the protection and management of archaeological resources in the study area are embodied in several laws, regulations and executive orders, which impact on the group's activities.

As in the arts, the realization of, and response to, legal responsibilities increases with the size of the creator in the science focus case studies. Due to its size, structure and organizational culture, the Center for Desert Archaeology does not rely on procedures in a formalized sense—instead, they are inferred. Even in the MOST project, there are hardly any procedures (with the exception of the MOST Archiving Manual), due to the organizational culture, the size of the research team and the resources available. On the Cybercartographic Atlas of Antarctica Web site, the group's responsibilities are disavowed with disclaimers as to the accuracy and reliability of information for other than educational purposes.

In some of the science focus case studies, issues of professional ethics come into play in the question of rights and responsibilities. At NASA, those involved in the creation of documents are bound by professional ethics in the planetary sciences as well as the institutional ethics of NASA, which call for trustworthiness and competence. Even in a small creator context such as the Center for Desert Archaeology, there are no overwhelming ethical issues that arise in this research activity on a daily basis, but there are many overriding professional ethical concerns that govern certain practices within the North American archaeological community.

For some case studies in the scientific field, memoranda of understanding seem to replace the contracts that were noted in the arts focus. These documents outline the responsibilities and

obligations of each party. For example, in the National Archives and Records Administration experiment, the three trusted research partners are bound by memoranda of understanding, in which responsibilities are outlined in terms of the engineering/archival experiment.

Governmental sector (Focus 3)

For the most part, legal liabilities of transactions in the government focus have not been altered in the move from a traditional to a digital environment. In Alsace-Moselle, the judge is still personally responsible for the verification process and may be sued by the state if errors are made. The judge has sole competence for the creation and signature of ordinances and thus for inscriptions within the registry, even the computerized version. In Ireland, Revenue is still responsible for the collection and management of taxes. It must still adhere to the legal mandates related to Irish law and to Ireland's membership in the European Union. Legal liabilities of transactions have not changed in the case of the Singapore Supreme Court, either. In the digital as in the traditional environment, the court maintains its role of information service provider for establishing the creditworthiness of individuals and for setting legal precedents. The same also holds true for the New York State Department of Motor Vehicles, who is still responsible for issuing, renewing and replacing vehicle licenses, registrations and titles.

For formal, registry-type activities such as the ones exemplified above, there is a more heightened recognition among creators in the government focus of the obligation to create a secure Web environment needed to support transactions. There is often strict control over access, such as through the use of PKI and biometrics, to protect privacy and confidentiality. In Alsace-Moselle, the judges, in particular, had deep security concerns in case of tampering or system malfunction, due to their heightened responsibilities. In Ireland, Revenue currently remains aware of its responsibilities and legal liabilities regarding the digital records generated in the Revenue On-Line Service, which must comply with the E-Commerce Act of 2000, while the Supreme Court of Singapore ensures strict control over access to, and use of, its records to protect the privacy and confidentiality of involved parties. Likewise, the On-line Services System of New York State's Department of Motor Vehicles is subject to numerous state and federal laws and regulations dealing with issues such as system security, protection of privacy, the use of electronic signatures and requirements regarding accessibility of online DMV services for persons with disabilities.

Smaller groups, or those engaging in less traditional activities, often disengage their responsibilities with disclaimers as to the accuracy and reliability of information for other than educational purposes, similar to what was seen with the Cybercartographic Atlas of Antarctica in the science focus. It should be noted, however, that these case studies are more like those in the science focus than their peers in the government focus. At VanMap, whenever the public version is opened, a disclaimer appears reading, in part, that "The City assumes no obligation or liability for the use of VanMap by any person and makes no representations or promises regarding the completeness or accuracy of VanMap or its fitness for a particular purpose."[102] The user is required to click OK to use VanMap. For the Antarctic Treaty Searchable Database, The end-user license agreement included with the webCDserver versions of the database includes a disclaimer against the accuracy and reliability of all documents included in the database. Any inaccuracy in the copies included in the database is attributed to the creators of the original documents.

[102] McLellan, "Case Study 24 Final Report," op. cit., 17.

Some of the governmental creators engaging in non-traditional activities have fewer or no defined standards or responsibilities. In the case of the Ontario Web exhibits, there are no internal policies at the Archives of Ontario governing the creation, storage, or access to Web exhibits. The *Management of Recorded Information Directive* (the existing Ontario Government recordkeeping policy) is not adhered to (e.g., Web exhibits are not governed by a records retention schedule). Similarly, the policies, procedures and standards used to determine how to include and present data in VanMap are not extensively documented. At the Legacoop of Bologna, the responsibilities are not clearly identified with reference to control of the integrity of digital entities. The recordkeeping system in place has no relationship with the cooperative's Web site. What is more, Legacoop is not bound by any formal obligations, short of an ethical obligation to ensure that information posted on the Web site is accurate and correct.

Question 7

> *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?*

When considering the response to this question before looking at the evidence from the case studies, one might presume that the experience of using digital technology would lead creators to greater appreciation and understanding of the need to make retention decisions and implement preservation procedures based on the technology that they are using. Whereas paper records might last indefinitely in a traditional environment despite a lack of formal retention and preservation policies, an informed awareness of the tendency for digital documents to become inaccessible due to technological obsolescence might compel creators to be more proactive in a digital environment and consider the retention needs of their organization to preserve their records. At this point, the discussion now turns to the activities and practices of the case studies in the three focus groups to see if reality is indeed in line with this presumption.

Artistic sector (Focus 1)

In five of the case studies in the arts focus, the creators have either not considered record retention adequately or at all, or have no formalized criteria if they have considered the question. Part of the problem stems from a lack understanding of archival practices, of course, but another factor is the lack of clear definition of responsibilities in a partnership or group setting, such as in *Waking Dream*, whose creators have not considered record retention, or in collaborative efforts such as *HorizonZero*, where no formal recordkeeping procedures have been identified.

In some of the case studies that have not considered records retention or that do not have formal retention policies, the lack of a policy, ironically, does not lead to a lack of retention. In fact, in such cases, since the creator has not determined what to keep, they instead keep everything, which ensures that they keep the important records (along with everything else, of course). In the case of WGBH, the final report does not give information on specific retention times, but does indicate that the creator maintains footage dating back to the 1950s. Perhaps it can be assumed that the creator retains all of its production work related to the television programs it produces. At Altair4, selection is made on the basis of importance and similarity. For example, when two versions are practically identical, only one is saved. This creator therefore saves about 90% of the digital entities that it creates. As for Arbo, the absence of criteria results

in no real established standard in place for preservation. Since the group's members have no defined selection criteria, they therefore keep everything.

For the artistic creators that do have criteria or policies to guide their record selection and retention, the majority of them keep records for their own business needs (which vary from creator to creator), or for future re-use or re-purposing. In other words, since there is no legal mandate for most creators in the arts focus to create records, it may be assumed that a record's retention period or the decision to preserve records is determined based on the needs of the creator for access to his or her own records for use and/or reference, if such a decision is indeed actively made. However, selection criteria are highly subjective and may be unspecified or undocumented.

For example, the composer of *Obsessed Again...* has not considered the issue of record retention as such, although he is concerned with the ability to perform his work in the future. Performance artist Stelarc chooses records for their convenience and whether he thinks they are effective publicity tools for his continuing activities. At Altair4, retention decisions are made based on legal and marketing reasons. Files are retained when there is a specific reason to do so, but there is no defined retention schedule in place. Some creators, such as *The Danube Exodus*, have priorities for preserving certain documents and digital entities over others. The works themselves—or parts of those works—are preserved, along with the files needed to render them. Next in importance are documents that describe or illustrate how the installation should "look, work, behave."[103] Least important in terms of long-term preservation are administrative records, including meeting minutes and correspondence. At Arbo, some activities require the preservation of documents to reintegrate them into subsequent performances. Again, subjectivity was the most important factor in guiding the selection of records for the creation of the *Ludosynthèse*.

In some cases in the arts focus, the selection of documents for preservation was driven—even limited—by the technology used in the creation process. The creators at Arbo realized that their digital entities could only be read using the specific programs with which they were created. These programs would therefore need to be maintained to access or use the entities in the future. For Stelarc, the selection of records to be posted to the Web site and thus retained is often technologically driven, as well. *HorizonZero* attempted to get around the problem of obsolescence by transferring all files related to the project to a single personal computer capable of running all of the software and hardware needed to access all file types used in the project.

Scientific sector (Focus 2)

As with the arts focus, creators in the science focus generally keep their records for future business needs or usability. At NASA, the Planetary Data System was designed for long-term preservation and usability of data. A similar situation can be observed in the National Archives and Records Administration experiment. The business owner that created the original documents must be able to access and use his or her records for business purposes over a long period of time (over fifty years).

Conversely, in the science focus documents and digital entities are often discarded once they are no longer useful. In the case of the Center for Desert Archaeology, there are many intermediary files that are created during the course of the research that are discarded once the calculation is completed or the research question has been fully answered. At the MOST project, only the FITS and SDS files are routinely captured and backed up. From the moment that other entities are not up-to-date (because there is a better reduction, for instance) they can be removed

[103] Hubbard, "Case Study 10 Final Report," op. cit., 6.

from the system. An exception to this practice is the Cybercartographic Atlas of Antarctica, which uses an open source content versioning system to capture, track and backup all versions of its code.

The retention and organization of entities in the science focus often reflects the creation or business process. At the Center for Desert Archaeology, the creator retains the digital entities, but not in a separate, formal recordkeeping system. Rather, the ad hoc documentary procedures mirror the business procedures. The digital entities are usually organized by project, which mirrors the majority of the creation process, which itself is project- or problem-focused. Data are usually created in relation to a project and the filing schema is not significantly altered once the project has been completed. This situation is also seen at MOST, where the digital entities are organized by target (star) and date and thus reflect the creation process. VanMap also follows this procedure. In this case, the organization and schema are dictated by the nature of the activities used to create the data.

One surprising fact concerning records retention by creators in the science focus is that Microsoft Windows tools are often used as the only recordkeeping system or means of capturing the digital entities that are retained. In a field where advanced and cutting-edge technology is used to measure variations in the brightness of stars thousands of light years away and to map out and present dynamic information from Vancouver to Antarctica to the Arizona desert, similar trend-setting technology is not being used to capture and maintain the results of these scientific activities. This fact holds true in creators of all sizes, from small, private groups to large, government projects. At the Center for Desert Archaeology, other than elements of the Microsoft Office Suite, there are no collective capture tools for the information within the GIS. Similarly, at the MOST project, other than Microsoft Windows tools, there is no formal capture system in place. All digital entities are accessed via Windows Explorer. The Cybercartographic Atlas of Antarctica was the exception, using primarily open source solutions and MAC technologies.

To implement decisions made regarding the retention of their records, many creators in the science focus case studies make periodic backups of their data and software. The data are most often backed up to CDs or DVDs. Smaller groups may maintain their data on a team member's personal computer for access, but nonetheless back up their entities. At the Center for Desert Archaeology, besides burning data to CD-ROMs, there are no systematic retention strategies in place. Larger groups may have formal, documented procedures, such as the Archiving Manual in the MOST project. In these larger organizations, all records or data are systematically backed up according to a procedure in place for the creator or the given project. At MOST, the software is also updated and backed-up for obsolescence reasons. Because the FITS files and reductions are done in specific software, the MOST researchers periodically back up the software so that each reduction can be redone in the same software environment in which it was originally created. For the creation of the FITS files and reductions, the old versions of software are preserved.

Migration is also commonly used by the creators in the science focus, but not as an archival tool. Instead, migration is performed as a means of maintaining the usefulness of retained digital entities. In the National Archives and Records Administration experiment, there is some concern that the use of technology to preserve the digital solid model records, such as encapsulating the CAD file into a STEP file, will fail. As a result, a TIFF image of the drawing is also created so that if all else fails, the image of the drawing will survive and the original model can be reconstructed from the TIFF image. In the case of the Center for Desert Archaeology, the organization is actively migrating the files to newer versions of the software. However, this is the most that they are doing in terms of addressing software and hardware obsolescence.

Governmental sector (Focus 3)

In some case studies in the government focus, the move from a traditional to a digital environment has lead to more attention to the issue of digital retention and more formalized procedures or precise rules in this area. The cases in which this is true are those that perform traditional registry or service activities, but through digital means. For the Alsace-Moselle land registry, in the paper-based system, records were retained indefinitely but were not transferred to an archival authority—the land registry offices maintained the registers. Computerization has meant that retention periods must be instituted and records must be transferred to an archival institution. The GILFAM must specify the length of time it will keep the records in the computerized land registry and the method by which it will transfer the records to an archival institution. At the Singapore Supreme Court, one motivation for the implementation of the electronic filing system was to solve the storage problem of paper records. At the same time, the court is conscious that despite the availability of digital storage space, it may be more cost effective and efficient to impose stricter retention guidelines with appropriate checks and balances embedded in the workflow to ensure that documents are deleted as soon as they cease to have value and that only those that require long-term storage are retained in an online or offline environment.

Despite this heightened awareness of the issues involved in the retention of digital records among some of the more traditional-type creators in the government focus, others have either no set rules for digital retention, or the traditional retention rules do not apply to the digital environment. In some cases, the digital entities are not part of the recordkeeping system at all, even if there is the assumption on the part of the public that the creator has a legal requirement to keep records. The most surprising case in which this is true is the Revenue On-Line Service of Ireland. Although Revenue abides by the National Archives Act as a guide to retention practices for all paper-based records and requires authorization to destroy any tax forms, no strategy has yet been articulated to deal with the retention of records found or created within the digital environment. For example, it is unclear for how long older public keys and digital certificates are maintained. In the case of VanMap, the digital entities cannot be said to form part of a recordkeeping system and no preservation strategies are currently being employed in the archival sense. For some of the creators, although there are no preservation strategies in place, there are some individual practices in use, which would almost certainly become components of a preservation strategy were one to be developed and implemented.

Due to the lack of a formalized preservation strategy for many of the creators in the government focus, many digital entities are overwritten or deleted as they are updated or are no longer useful, as was seen in the science focus. This overwriting or deletion is performed without the capture of the previous instantiation of the digital entity. For example, the Revenue On-Line Service of Ireland maintains only a subset of its records, retaining the records only of active users and agents. In the case of VanMap, the geospatial data are generally not captured or kept, but rather are overwritten as needed. The data and the HTML pages are recorded and saved, but are overwritten as needed and previous versions are not captured within a recordkeeping system.

Despite these practices, there are nonetheless some strategies employed by government creators to counter the problem of obsolescence. For example, at the Singapore Supreme Court the outsourcing of digital certificates to a licensed certification authority to counteract technological obsolescence is being considered. However, throughout the government focus, the migration of records is not performed to counteract obsolescence or as an archival tool, but to maintain use, as was also noted in the science focus. In Singapore, migration is recommended

only for active and semi-active records (those that have a greater chance of being used), while microfilm is recommended for the permanent storage of court records. In VanMap, not only have the existing data been migrated to the Oracle Spatial database, but the use of the new system is expected to streamline the processes that create the data and to also allow VanMap users to view mostly live data instead of static image files. The purpose of migration was thus not to preserve the entities as archival records, but to improve the use of VanMap.

In the government focus, more than the other two focuses, questions of protecting personal information appear with regards to the retention of records. For the Alsace-Moselle land registry, the French public agency that deals with privacy issues (*Commission Nationale Informatique et Libertés*) mandates that all personal information be destroyed past the period for which it is useful for the purposes for which it was collected, except if its preservation is required for historical, scientific or statistical purposes. In the case of Ireland's Revenue On-Line Service, it has been noted that the preservation of tax records is not appropriate, given the level of personal information within it and its lack of suitability for archival preservation.

Appendix 9

Domain 1 Research Questions

1a) What types of documents are traditionally created (that is, made or received) and set aside in the course of these activities that are expected to be delivered online? For what purposes?

1b) What types of electronic documents are currently being created to accomplish those same activities? Have the purposes for which these documents are created changed?

2) 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?

3) 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?

4) 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 no, 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 factors that make a document a record other than those that diplomatics and archival science have considered so far?

5) 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?

6) 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?

7) 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?

Appendix 10

Template for Case Study Analysis ("Areas to be Covered")

Version 1.0: Heather Daly and Ann Forman, December 2004
(Pagination may differ from original document: ip2(d1)_anlaysis_template.pdf)

The purpose of this template is to enable the gathering of information spread over the whole of the documentation related to each case study. Through this exercise, a general overview will be created, which will provide insight into the types of record creators and activities that have been studied by Focus 1, 2 and 3. With this overview, we will be able to validate the case studies and inform the work of the Domains and Cross-domains.

This template is not intended to be another framework to be used when writing the Final Report. Rather, it serves as a reminder of the information that we must have as part of the Report.

The template has been structured in two sections. The first concerns the ***Creator of the Records***. The second concerns the ***Activities Resulting in Document Creation***. This latter section is split into two sub-sections, involving the "Administrative and Managerial Framework" and the "Digital Entity/Entities Under Study."

CREATOR OF THE RECORDS

The information we are looking for about the *creator of the records* is often embedded within the provenancial, juridical-administrative, procedural, documentary and technological contexts (see Case Study Reporting Framework, December 2003). This information is essential to understanding who has produced the digital records, and for what reasons. This understanding will allow the characterization of the case studies.

If the following is inapplicable to the case study at hand or unavailable, please indicate wherever possible in the report why this is so.

Name

- Provide the official name and other names of the body under study.

Location

- Provide the country, region (example: province, state) and/or city which exerts the most legal influence over the body.

Origins

- Provide the origins of the body, such as information regarding how and why the body began its activities.
- Provide the official founding date and/or founding event.

Legal Status

- Provide the legal status. For example: "private individual," "for-profit small company," "research group"
- Provide the year of legal establishment, if applicable.
- Provide specifics about the most relevant laws under which body is governed. For example: "copyright legislation," "Companies Act"
- Provide information about any legal status inherited from other organizations or associations, any other legally required standards, codes or regulations that apply to the body.

Norms

- Provide information about any non-legally required standards, methodologies, codes or regulations that are subscribed to by the body.
- Provide information about the non-legally required standards, methodologies, codes or regulations from other organizations, traditions or associations that are subscribed to by the body. For example: "methodologies related to archaeology"

Funding

- Provide information about the sources of revenue related to the digital entity under study. For example: "grants", "ticket sales"

Resources (Physical)

- Provide information about the physical context in which the creator is working, including relevant information about equipment and infrastructure. For example: "one office, shared with another group"

Governance

- Provide information about how the body is managed. For example: "cooperative," "collective," "partnership"
- Provide information about the organization of the body, such as through the inclusion of an organizational chart.
  Provide information about employees, members or partners (number, areas of specialization, qualifications, turnover).
- Provide information about the body's place within an organization, if applicable.
- Provide information about any internal policies or regulations.

Mandate

The responsibilities of the body

- Provide information about the responsibilities of the body given to the body through enabling legislation.
- Provide information about any stated mandate.

Philosophy

The vision and values the body works toward or under

- Provide information about the body's philosophy and values.

- Provide information about which genres or disciplines the body is related. For example: "multidisciplinary theatre," "geology"
- Provide information about the schools of thought to which the body subscribes, if these influence the body's choices and practices.

Mission

The stated ways in which the body is working towards the mandate

- Provide the mission statement(s), which may have evolved over time.

Functions

- List all of the major functions which the body undertakes to fulfil the mission(s) and mandate. For example: "administration," "research," "performance," "training"

Recognitions

- Provide information about any achievements, honours or prizes that the body has received for its work.

ACTIVITIES RESULTING IN DOCUMENT CREATION

Administrative and Managerial Framework

This section is divided into two sub-sections. The first concerns the Administrative and Managerial Framework within which the digital entity under study is created. The second focuses on the digital entity. Both sub-sections aim to gather information to allow the characterization of the types of activities and entities that have been studied.

If the following is inapplicable to the case study at hand or unavailable, please indicate wherever possible in the report why this is so.

General description

- Provide a general description of administrative practices. For example: "The creator must administer payroll and grant applications"

Type of activities

- List the general types of administrative activities undertaken on a regular basis. For example: "submitting reports," "writing grant applications"

Documents resulting from activities

- List the main types of documents resulting from administrative activities. For example: "receipts," "reports," "correspondence"

Existence of a records management and/or archives program

- Provide a description of the existence of activities related to archives and records management.
- Provide information about any policies that the body may have which govern archives and records management.

Individuals responsible for preservation

- Provide the name and qualifications of individuals(s) responsible for archives and/or records management.
- Provide information about the relationship of the individuals responsible for preservation to the creation of the records. For example: "Once completed, he maintains the records on his computer"

Existence of preservation strategies

- Provide the location in which the records are kept.
- Provide the nature in which records are kept. For example: "All records are digitized"
- Provide a description of the organization of the records created by the body under study. For example: "Records are split, with some records being kept by the contracting party"
- Provide a brief description of any methods used to preserve records.
- Provide a brief description of any methods used to attempt to avoid technological obsolescence.

Legal Requirements and Constraints

- Provide a description of how the relevant laws impact upon the policies and procedures by which *administrative activities* are carried out.
- Provide a description of how the relevant laws impact upon the creation, form, content, identity integrity, organization and preservation of the records related to administrative activities.

Normative Requirements and Constraints

The written or unwritten rules of a specific discipline or area of thought to which the body subscribes

The written or unwritten rules may not be limited to scientific, artistic and ethical requirements and constraints.

Scientific requirements and constraints

Scientific foundations of the discipline with which the body uses or identifies with that require, influence or prohibit certain behaviours

- Provide a description of how relevant scientific requirements/ constraints impact upon the policies and procedures by which administrative activities are carried out.
- Provide a description of how relevant scientific requirements/ constraints impact upon the creation, form, content, identity, integrity, organization and preservation of the records related to administrative activities.

Artistic requirements and constraints

Artistic foundations or schools of thought which the body uses or identifies with that require, influence or prohibit certain behaviours

- Provide a description of how relevant artistic requirements/constraints impact upon the policies and procedures by which administrative activities are carried out.
- Provide a description of how relevant artistic requirements/constraints impact upon the creation, form, content, identity, integrity, organization and preservation of the records related to administrative activities.

Ethical requirements and constraints

Propriety and rules of behaviour which the body uses or identifies with that require, influence or prohibit certain behaviours

- Provide a description of how relevant ethical requirements/constraints impact upon the policies and procedures by which administrative activities are carried out.
- Provide a description of how relevant ethical requirements/constraints impact upon the creation, form, content, identity, integrity, organization and preservation of the records related to administrative activities.

Technological Requirements and Constraints

Technology requirements and constraints related only to the administrative or management function

- Provide a description of the equipment used:
  - Architecture (e.g., network topology, infrastructure, hardware)
  - Creation or input tools (e.g., software, camera, microphone)
  - Processing tools (e.g., software, console)
- Provide a list of the types of media created (e.g., graphic, textual, audio).
- Provide a list of the formats created (e.g., .pdf, .doc, .jpg).
- Provide a description of how relevant technological requirements/constraints impact upon on the policies and procedures by which administrative activities are carried out.
- Provide a description of how relevant technological requirements/constraints impact upon the creation, form, content, identity integrity, organization and preservation of the records related to administrative activities.

ACTIVITIES RESULTING IN DOCUMENT CREATION

Digital Entity/Entities Under Study

General description of the activity

- Provide the name and type of the digital entity/entities being studied.
- Provide a description of the goals and functions of the digital entity/entities.
- Provide a description of how the digital entity/entities relate(s) to the body's mandate and mission(s).

Type of activities

- Provide a description of the activities related to the creation of the digital entity/entities.

Documents resulting from activities

- Provide a list of documents that enable the activities related to the digital entity/entities.. For example: "photographs," "correspondence"
- Provide a list of documents that result from the activities related to the digital entity/entities. For example: "digitized images," "e-mails"

Existence of preservation strategies

- Provide a brief description of any methods used to preserve records related to the digital entity/entities or the digital entity/entities itself/themselves.

- Provide a brief description of any methods used to attempt to avoid technological obsolescence.

Legal Requirements and Constraints

- Provide a description of how any relevant laws impact upon the policies and procedures by which activities related to digital entity/entities are carried out.
- Provide a description of how any relevant laws impact upon the creation, form, content, identity, integrity, organization and preservation of the records generated by the digital entity/entities or the digital entity/entities of the record(s).

Normative Requirements and Constraints

The written or unwritten rules of a specific discipline or area of thought to which the body subscribes

The written or unwritten rules may not be limited to scientific, artistic and ethical requirements and constraints.

Scientific requirements and constraints

Scientific foundations of the discipline with which the body uses or identifies with that require, influence or prohibit certain behaviours

- Provide a description of how relevant scientific requirements/constraints impact upon the policies and procedures by which activities related to digital entity/entities are carried out.
- Provide a description of how relevant scientific requirements/constraints impact upon the creation, form, content, identity, integrity, organization and preservation of the records generated by the digital entity/entities or the digital entity/entities of the record(s).

Artistic requirements and constraints

Artistic foundations or schools of thought which the body uses or identifies with that require, influence or prohibit certain behaviours

- Provide a description of how relevant artistic requirements/constraints impact upon the policies and procedures by which activities related to digital entity/entities are carried out.
- Provide a description of how relevant artistic requirements/ constraints impact upon the creation, form, content, identity, integrity, organization and preservation of the records generated by the digital entity/entities or the digital entity/entities of the record(s).

Ethical requirements and constraints

Propriety and rules of behaviour which the body uses or identifies with that require, influence or prohibit certain behaviours

- Provide a description of how relevant ethical requirements/constraints impact upon the policies and procedures by which activities related to digital entity/entities are carried out.
- Provide a description of how relevant ethical requirements/constraints impact upon the creation, form, content, identity, integrity, organization and preservation of the records generated by the digital entity/entities or the digital entity/entities of the record(s).

Technological Requirements and Constraints

Technology requirements and constraints related only to the administrative or management function

- Provide a description of the equipment used:
  - Architecture (e.g., network topology, infrastructure, hardware)
  - Creation or input tools (e.g., software, camera, microphone)
  - Processing tools (e.g., software, console)
- Provide a list of the types of media created (e.g., graphic, textual, audio).
- Provide a list of the formats created (e.g., .pdf, .doc, .jpg).
- Provide a description of how relevant technological requirements/constraints impact upon on the policies and procedures by which activities related to digital entity/entities are carried out.
- Provide a description of how relevant technological requirements/constraints impact upon the creation, form, content, identity, integrity, organization and preservation of the records related to the digital entity/entities or the digital entity/entities of the record(s).

Appendix 11

Case Studies at-a-Glance

Geneviève Shepherd, The University of British Columbia
10 Mar 2006, updated 16 Apr 2008

Case Study and General Study Statistics

Completed Case Studies
Number of Case Studies completed to date: **23***
ARTS: **10**
SCIENCE: **5**
GOVERNMENT: **8**

Number Analyzed and Characterized: **23**
Number of Analyses Validated: **23**
Number of Characterizations Validated: **23**
**Includes four sections of CS09; excludes CS22 draft final report completed by UBC GRAs*

Case Studies Yet To Be Completed and ***Interim Reports***
Number of Case Studies yet to be completed: **1**
ARTS: **1***
SCIENCE: **0**
GOVERNMENT: **0**
Number Analyzed and Characterized: **1****
Number of Analyses Validated: **0**
Number of Characterizations Validated: **0**
**This is CS22, for which there is a yet-to-be-validated draft report that has been used to complete the analysis and characterization. Note: This case study has since been retired.*
***CS22, based on draft report*

General Studies
Number of General Studies completed to date: **10**
Number of General Studies yet to be completed: **1***
Number of General Studies Analyzed and Characterized: **0**
**This is GS02. Note: This general study has since been retired.*

Case Study Documentation Summary																								
	01	02	03	05	06	08	09 /1	09 /2	09 /3	09 /4	10	12	13	14	15	17	18	19	20	21	22	24	25	26
Interim/Draft Report(s)	X				X						X		X	X							X[1]	X		X
Case Study (Final) Report	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
• **Glossary of Terms/Abbreviations**	X	X		X		X						X	X		X			X	X			X		X
• **Workflow Diagram**	X	X	X	X	X	X	X			X	X													
• **Bibliography** (in Report)	X	X			X	X					X	X	X			X	X	X	X	X			X	
• **Other**[2]				X	X	X	X		X			X		X		X	X		X	X		X		
Areas to Be Covered (CS)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Characterization (CH)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CS/CH Validation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Diplomatic Analysis	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Entity Relationship Model[3]	X	X											X	X	X									
Activity Model[3]		X		X			X					X	X	X	X		X	X	X	X		X		X
Bibliography, Posted Separately		X			X								X											
Literature Review				X[4]	X																			
Survey/Questionnaire Results					X									X[5]										
Transcripts/Interview Notes	X	X	X		X									X	X									
Presentation(s)[6]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X
Article(s)					X		X	X	X	X		X		X				X				X		
Research Documentation[7]	X			X	X	X			X					X			X							

[1] Report completed by GRAs, but never validated by the Principle Investigator.
[2] e.g., list of laws, abstracts, productions; screenshots; charts, etc.
[3] Copy may be in final report.
[4] A summary of the literature survey is posted; the full literature survey is part of the Report (Appendix).
[5] The survey has since been extracted from the case study and designated as general study 09.
[6] e.g., PowerPoint.
[7] e.g., ethics form, methodology, etc.

Case Studies at-a-Glance

The following information is based on case study proposals and validated and yet-to-be validated case study analyses and characterizations.

CS01: Arbo Cyber théâtre (?)
Final Report: Yes Focus: Arts
Type of Discipline: Theatre
Type of Creator: Theatre group
Type of Organization: Private corporation
Managerial Framework: Two individuals in Québec City, QC, Canada
Type of Digital Entity: Web site (*Ludosynthèse*). Purpose: maintain memory of group, while allowing audience interaction to continue

CS02: Performance Artist Stelarc
Final Report: Yes Focus: Arts
Type of Discipline: Performance art
Type of Creator: Private individual
Type of Organization: Individual; may work anywhere but is from Australia
Managerial Framework: Individual
Type of Digital Entity: Web site. Purpose: advertising, and implementing and documenting the stages of the performance process

CS03: *HorizonZero*/ZeroHorizon Online Magazine and Media Database
Final Report: Yes Focus: Arts
Type of Discipline: Media
Type of Creator: Media and Visual Arts Department
Type of Organization: Institute, part of larger Centre; in Banff, AB, Canada
Managerial Framework: Within organizational hierarchy, made possible by grants
Type of Digital Entity: Issues of the online magazine, *HorizonZero*/ZeroHorizon

CS05: Archives of Ontario Web Exhibits
Final Report: Yes Focus: Government
Type of Discipline: Archival
Type of Creator: Provincial archives
Type of Organization: Government body (Province of Ontario)
Managerial Framework: Within governmental hierarchy, under Management Board Secretariat
Type of Digital Entity: Three Web exhibits

CS06: Cybercartographic Atlas of Antarctica
Final Report: Yes Focus: Science
Type of Discipline: Cybercartography
Type of Creator: Geomatics and Cartographic Research Centre (GCRC), Carleton University
Type of Organization: University research group in Ottawa, ON, Canada
Managerial Framework: Granted research group

CS08: Mars Global Surveyor Data Records in the Planetary Data System
Final Report: Yes Focus: Science

Type of Discipline: Space flight
Type of Creator: NASA (National Aeronautics and Space Administration)
Type of Organization: Government agency, headquarters located in Washington, DC, USA
Managerial Framework: Within governmental hierarchy
Type of Digital Entity: Records and data from the Mars Global Surveyor Mission and the Planetary Data System records

CS09(01): Digital Moving Images—Altair4 di Roma

Final Report: Yes Focus: Arts
Type of Discipline: Moving images
Type of Creator: An independent producer (Altair 4)
Type of Organization: Small, private corporation
Managerial Framework: Small, private corporation, run by three partners in Roma, Italy; based on contract
Type of Digital Entity: Multimedia virtual reconstruction of the House of Polybius

CS09(02): Digital Moving Images—National Film Board of Canada

Final Report: Yes Focus: Arts
Type of Discipline: Moving images
Type of Creator: A public filmmaker (National Film Board)
Type of Organization: Government body
Managerial Framework: Within government hierarchy, under the Canadian Heritage Department
Type of Digital Entity: Digital animation products and documentation relating to production

CS09(03): Digital Moving Images—Commercial Film Studio

Final Report: Yes Focus: Arts
Type of Discipline: Moving images
Type of Creator: Anonymous, commercial film studio
Type of Organization: Large, private corporation
Managerial Framework: Large, private film studio
Type of Digital Entity: Artwork related to animated film production

CS09(04): Digital Moving Images—WGBH Boston

Final Report: Yes Focus: Arts
Type of Discipline: Moving images
Type of Creator: A public broadcaster (WGBH)
Type of Organization: Large, public corporation
Managerial Framework: Large, public corporation; in Boston, MA, USA
Type of Digital Entity: Original footage and footage logs generated during the production process of a documentary film

CS10: *The Danube Exodus*: Interactive Multimedia Piece

Final Report: Yes Focus: Arts
Type of Discipline: Multimedia exhibit
Type of Creator: Private individual based in Budapest (installation in Los Angeles, CA, USA)
Type of Organization: Individual, working with an art collective and a research institute
Managerial Framework: Temporary, based on contract or partnership
Type of Digital Entity: Complex media installation

CS12: Antarctic Treaty Searchable Database

Final Report: Yes Focus: Government
Type of Discipline: Treaty documentation
Type of Creator: Private corporation
Type of Organization: Small, private corporation
Managerial Framework: Two individuals, in Ohio, USA
Type of Digital Entity: Database. Purpose: support teaching of Antarctic Treaty documents, enable those searching for Antarctic Treaty materials

CS13: *Obsessed Again...*

Final Report: Yes Focus: Arts
Type of Discipline: Musical performance
Type of Creator: Contract between composer and artist in Vancouver, BC, Canada
Type of Organization: Partnership between composer and artist based on contract
Managerial Framework: Based on contract
Type of Digital Entity: Digital music score

CS14: Archaeological Records in a Geographical Information System: Research in the American Southwest

Final Report: Yes Focus: Science
Type of Discipline: Archaeology
Type of Creator: Center for Desert Archaeology (CDA)
Type of Organization: Private, not-for-profit center located in Tucson, AZ, USA
Managerial Framework: Small, private organization
Type of Digital Entity: GIS Database. Purpose: provide answers to archaeological research questions relating to the aggregation and migration of prehistoric peoples in the American Southwest

CS15: *Waking Dream*

Final Report: Yes Focus: Arts
Type of Discipline: Multimedia performance art
Type of Creator: HCT Laboratory (UBC); three-individuals partnership (digital entity)
Type of Organization: Within university hierarchy
Managerial Framework: Based on partnership
Type of Digital Entity: Web site and multimedia performance art piece

CS17: New York State Department of Motor Vehicles On-line Services System

Final Report: Yes Focus: Government
Type of Discipline: Motor vehicle licensing and driver registration
Type of Creator: New York State Department of Motor Vehicles
Type of Organization: Government department (state)
Managerial Framework: Within governmental hierarchy
Type of Digital Entity: Web site. Purpose: to provide online access to critical state services

CS18: Computerization of Alsace-Moselle's Land Registry

Final Report: Yes Focus: Government
Type of Discipline: Real estate law
Type of Creator: Le Livre Foncier d'Alsace-Moselle; GILFAM (digital entity)
Type of Organization: Within hierarchy of justice system
Managerial Framework: Distributed between offices, judges, clerks

Type of Digital Entity: Database. Purpose: to allow the activities currently underway in the paper-based environment, such as issuing ordinances and completing inscriptions to be done in an automated fashion via a central database

CS19: Preservation and Authentication of Electronic Engineering and Manufacturing Records

Final Report: Yes Focus: Science
Type of Discipline: Engineering and manufacturing
Type of Creator: Various US government departments (Research Division of the Electronic records Archives (ERA), San Diego Supercomputer Center (SDSC), element of the U.S. government with responsibilities in the science, engineering, design and manufacture of complex assemblies)
Type of Organization: Government departments (federal); university unit
Managerial Framework: Within governmental hierarchy; within University of California at San Diego
Type of Digital Entity: Digital engineering and manufacturing records; knowledge-enhanced digital object file

CS20: Revenue On-Line Service (ROS)

Final Report: Yes Focus: Government
Type of Discipline: Tax law
Type of Creator: Office of the Revenue Commissioners of Ireland (Revenue)
Type of Organization: Government body (central)
Managerial Framework: Within governmental hierarchy
Type of Digital Entity: Internet-based tax filing system (Web site)

CS21: Electronic Filing System (EFS) of the Supreme Court of Singapore

Final Report: Yes Focus: Government
Type of Discipline: Law
Type of Creator: Supreme Court of Singapore
Type of Organization: Legal body
Managerial Framework: Within hierarchy of justice system
Type of Digital Entity: Electronic civil and criminal law records filing system

CS22: Electronic Café International: Aging Records from Technology-based Artistic Activities

Final Report: No (unverified draft only) Focus: Arts
Type of Discipline: Multimedia (collaboration and co-creation)
Type of Creator: Electronic Café International; individual artists (digital entities)
Type of Organization: Multimedia international network
Managerial Framework: Two principals, network of artists in Los Angeles, CA, USA
Type of Digital Entity: Accumulation of multimedia related to telecollaborative work

CS24: City of Vancouver Geographic Information System (VanMap)

Final Report: Yes Focus: Government
Type of Discipline:
Type of Creator: City of Vancouver, BC, Canada
Type of Organization: Municipal government
Managerial Framework: Team, within government hierarchy (IT Department)
Type of Digital Entity: GIS database. Purpose: to allow the City of Vancouver to "meet the needs of internal users in providing services to Vancouver's citizens and businesses"

CS25: Legacoop of Bologna Web Site

Final Report: Yes Focus: Government
Type of Discipline: Cooperative
Type of Creator: Cooperative network
Type of Organization: Provincial body of cooperative network in Bologna, Italy
Managerial Framework: Divided into departments, within network hierarchy
Type of Digital Entity: Web site. Purpose: to increase communication with and maintain the cooperative network of Legacoop Bologna's members

CS26: Microvariability & Oscillations of Stars (MOST) Satellite Mission - Preservation of Space Telescope Data

Final Report: Yes Focus: Science
Type of Discipline: Astronomy
Type of Creator: Microvariablity and Oscillations of STars satellite mission
Type of Organization: Partnership between Canada Space Agency, industry, universities
Managerial Framework: Based on partnership
Type of Digital Entity: Space telescope data and engineering telemetry