

The Interaction of Research and Teaching: Speaking From the InterPARES Experience

by Luciana Duranti

The world of archives has much changed since the time I went to school to earn my post-graduate education in archival studies. Although mainframe computer had existed for quite a while, the PC, with the documentary nightmare that it would have generated in a couple of decades, was not yet appearing on the horizon. The only challenges modern records presented to archivists were those of poor quality (e.g., acidic paper) and enormous quantity. Thus, conservation and appraisal issues were raising their ugly heads in conference speeches and journal articles, but they hardly entered the classroom, primarily because it was very much assumed that most of newly graduated archivists would begin their career at the entrance level and not be responsible for making decisions in those areas; they would eventually learn on the job.

This conservative approach to archival education was supported by the facts that new ideas and methods were developed very slowly, thus there was not much to discuss about modern archives; that new problems would reach the archives in the long term, thus it was hoped that we would have practical solutions by then; that the major part of the material archivists would deal with was in any case very old, thus their education had to focus on the identification, arrangement and description of ancient records; and that most educators believed in the immutability of the theory supporting archival work, thus, there was no need for theoretical research within our discipline. Therefore, my education was based on institutionalized archival theory and methods, history of archives, medieval

diplomats, Latin and Greek paleography, exegesis of the medieval document, history of administration, history of the law, public law, and electives such as sigillography. This education was theoretically very solid and served me very well in my career as an archivist first and as an academic later. Moreover, it gave me an undisputable advantage on North American archivists when the spectrum of managing electronic records appeared at the horizon, and all of a sudden it was necessary to understand their nature, their behavior and their relations, and develop methods for managing them.

Well, one might say, if it worked for you, it can work for the archivists of the present and future generations. I do not think so. It is absolutely vital that archival education continue to focus on theory as the primary point of reference for understanding and controlling new and increasingly complex records, but such theory is developing rapidly as a result of research that attempts to meet the challenges presented by information technology, and so are the methods, which change accordingly. We cannot provide students with the traditional education and then tell them to go out and learn by doing: it is not that they would not be able to, but that they would have simply no time. When they go out in the world, they must be ready to deal with the present and possibly with the future. We have observed that, increasingly, employers of archivists do not seek professionals who graduated a few years earlier and earned working experience: they want graduates fresh of the classroom, on the assumption that they will have just learned the last developments at international level! But, we cannot limit ourselves to provide our students with the latest monographs, laws, regulations and standards. By the time they will graduate, all those texts will very likely be out of date.

What to do then? I believe in the necessity of establishing within our archival programs one or more research projects that deal with contemporary challenges and get the students deeply involved in the development of new theoretical and/or methodological knowledge. In our two-year graduate program at the University of British Columbia, we hire all second year students as research assistants in our projects, and we require them to speak once a week to the first year students, during a time regularly scheduled, about what their specific responsibility in the project is, how their research progresses, and how all the pieces fit together. At the same time, the teachers bring into the first year classroom all the knowledge that is being developed.

There are three very important aspects in this initiative. First, in the design and development of a research project in the context of archival education, there is a programmatic and planned development of our fundamental disciplines that is constantly introduced in the classroom and is there discussed, challenged, revised, tested and elaborated. Second, in the involvement of all students in this process, there is a programmatic and planned teaching of research methods, research results, identification of new challenges, and the ability to gather together the means to meet them. Last, but not least, the students learn that their disciplines are live and vibrant, that their profession, just like their knowledge, is in constant evolution, and that new things should never intimidate them because they are armed with the intellectual ability to understand and control them.

I would like to dedicate the rest of this paper to illustrate the first aspect through the description of how the most traditional of the archival disciplines, diplomatics, has

evolved through research and its dissemination, and how this development process has contributed in fundamental ways to the education of all our graduate students.

Diplomatics was born as a discipline and a science for the purpose of verifying the authenticity of records of disputed origin. The object of diplomatic study and criticism were individual medieval written records connected to juridical facts either ad substantiam or ad probationem. Between 1989 and 1992, I wrote a series of articles on diplomatics that appeared in six issues of Archivaria (numbers 29 to 33),¹ the primary purpose of which was to extend diplomatic concepts and methods to make them relevant and applicable to contemporary records of all kinds and on all media. This effort was based on two assumptions: first, that diplomatics is a living science, capable of renewing itself without compromising its fundamental tenets; and, second, that diplomatics concepts and principles can be used to design record-making and record-keeping systems. The first assumption brought about the endorsement of a broader definition of record, the creation of two new categories of records (i.e., in addition to dispositive and probative records, consideration was given to supportive and narrative records), an adjustment of the concept of annotation, the removal of the medium from the concept of form, the tinkering with extrinsic and intrinsic elements of form, which were renamed elements of physical form and elements of intellectual form, and the introduction of the concepts of procedural phases and categories of procedures.

This modernized version of diplomatics was tested in the classroom by analyzing several types of contemporary documents and evaluating the kind of understanding so gained. In addition, several students wrote theses on the application of diplomatic concepts and methods to aggregations of records, rather than to individual records, for the

purpose of carrying out the archival functions of appraisal, arrangement and description: they were on the multimedia records of the broadcasting industry, of the film industry, of the United Church, of the modern land registry, and of the World Bank. The results were encouraging, although not particularly useful to solve any of the challenges presented by the current records accumulating in hybrid systems in the modern offices.²

The second assumption was argued in the articles on purely logical grounds, but was left untested, because the transformation of a body of knowledge originally constructed to analyze and evaluate historical material into a method for designing and engineering organizational record-making and record-keeping is not naturally evident or even implicit in the exposition of the concepts, principles and methods of diplomatics, and its realization cannot simply be left to the creativity of system designers. While it may be reasonable to think that records professionals who participate in the formulation of records creation and management requirements, especially for electronic records, will find in diplomatics a rigorous conceptual language allowing for a systematic understanding of the material to be created and managed, it is rather difficult to demonstrate how, from there, one arrives to building a record-making and record-keeping system capable of handling the hybrid records systems of contemporary offices without carrying out a substantial amount of research.. Although students were sent as part of their field assignments in the context of the course in records management to design or re-design or evaluate systems of various organizations, they were not experienced enough to produce much beyond very simple requirements.

Thus, between 1994 and 1997, I developed with Terry Eastwood a research project entitled The Preservation of the Integrity of Electronic Records, the goal of which

was to identify and define conceptually the nature of an electronic record and the conditions necessary to ensure its integrity while kept by its creator in current or semi-current state.³ In 1995, the Department of Defense (DOD) of the United States joined our research team intending to build a record system based on diplomatic theory and method.⁴ This collaboration gave many fruitful results as it allowed for unlimited theoretical and methodological exploration while providing the means of testing hypotheses in real life situations and, more importantly, on a very complex hybrid records system in an organization having extremely strict operational and documentation requirements. A PhD student, Heather MacNeil, was research assistant for the project under my supervision.⁵

From a theoretical point of view, this work produced a slight revision and adjustment of concepts, but, more importantly, it integrated diplomatic and archival concepts. In fact, when it defined the components of a record, it added context and archival bond to medium, form, act, persons, and content, and, when it listed the persons necessary to the existence of a record, it included the creator. From a methodological point of view, the project produced rules for the creation and management of records by the creator that are consistent with diplomatic and archival concepts and principles. These rules and their implementation both in the procedures of the Department of Defense (DoD) and in the DOD standard for electronic records management software served to demonstrate how diplomatics could be used not only in addressing the nature of records in modern organizational contexts, but also in developing record-making and record-keeping systems that are effective in such contexts.⁶ As it regards our educational program, the primary result of this research was the creation of a first year required

course called “archival diplomatics” in which the archival and the diplomatic concepts on the nature, characteristics, attributes and aggregations of records were merged, and the records of the sixteen century were analysed together with e-mails and databases. This course was established as a pre-requisite to the courses on the management of current records, arrangement and description, and appraisal and acquisition.

The achievements of the UBC project provided the starting point for the InterPARES (International research on Permanent Authentic Records in Electronic Systems) project, the goal of which was to develop the theoretical and methodological knowledge essential to the permanent preservation of authentic records generated and/or maintained electronically, and, on the basis of this knowledge, to formulate model policies, strategies and standards capable of ensuring that preservation. Therefore, they will be discussed in the context of the findings of InterPARES.

InterPARES began in 1999 and its first phase was concluded at the end of 2001. Although the project is continuing for other five years in order to address more complex types of electronic records and systems used in non-regulated environments, the findings of the first phase are substantial enough to allow for an discussion of diplomatics vis-à-vis electronic records as experienced in the research.⁷

The research team determined at the outset that, before plunging into the study of the material in question, it was necessary to establish what the object of the study was, at least as a hypothesis that the actual investigation could support or overturn. In other words, the team needed to agree on the definition of record and on how it differed from document, information and data. Thus, the team decided to adopt the definition of a record as any document created (i.e., made or received and set aside for further action or

reference) by a physical or juridical person in the course of a practical activity as an instrument and by-product of it, thereby choosing the traditional archival concept over the traditional diplomatic one. This had indeed been the definition adopted by the UBC project. The team then proceeded to define document as recorded information, information as a message intended for communication across space or time, and data as the smallest meaningful piece of information. Finally, an electronic record was defined as a record created in electronic form, meaning that a message received in electronic form but set aside for action in paper form is a paper record, while a letter received on paper but scanned in the computer and only used as a digital file is an electronic record. However, the research focused on records born, maintained and used in electronic form.

Regardless of the choice of an archival definition for an electronic record, diplomatics was essential to determine what the necessary characteristics of such record are. The following were identified: 1) a fixed form, meaning that the binary content must be stored so that it remains complete and unaltered, and its message can be rendered with the same documentary form it had when first set aside; 2) an unchangeable content; 3) explicit linkages to other records within or outside the digital system, through a classification code or other unique identifier; 4) an identifiable administrative context; 5) an author, an addressee, and a writer; and 6) an action, in which the record participates or which the record supports either procedurally or as part of the decision making process.

The other concept to clarify was that of authenticity, given that so often in common language it is confused with reliability and with authentication. Also in this case, the definitions adopted by the team were those developed in the course of the UBC project. Thus, authenticity was defined as the trustworthiness of the record as a record.

In other words, the term refers to the fact that a record is what it purports to be and has not been tampered with or otherwise corrupted. Thus, authenticity differs from reliability, which is the trustworthiness of the record as a statement of fact, that is, its ability to stand for the facts it is about. This differentiation is of course in contrast with traditional diplomatics, which assumes the reliability of authentic records, but it is made necessary by the modern record environment. The same is to be said for the differentiation between authenticity and authentication, which is defined as a declaration of authenticity, resulting either by the insertion or the addition of an element or a statement to a record. In fact, the distinction between authenticity and authentication is even more important at a time when governments are legislating about the use of digital signatures and other similar devices. In the InterPARES diplomatic analysis of the extrinsic elements of electronic records, digital signatures are identified as examples of electronic seals, being functionally equivalent to medieval seals, which were not only a means of verifying the origin of the record and the fact that it was intact, but also made the record indisputable and incontestable, that is, had a non-repudiation function. The analogy is not perfect, because the medieval seal was associated exclusively with a person, while the digital signature is associated with a given person and a specific record, and because the former is an expression of authority, while the latter is only a mathematical expression. However, it is essential to remember that authenticity is a property of the record that accompanies it for as long as it exists, while authentication is a means of proving that a record is what it purports to be at a given moment in time. It has to be noted that this exercise of trying to understand the unknown by comparing it with that which is known, and by going beyond its aspect to analyze its function, has been extremely beneficial to our graduate students,

especially in enabling them to examine and assess policies, regulations and standards that are often proposed by bodies lacking in specific disciplinary knowledge. All our archival students, and some joint library and archival students, have been directly involved in InterPARES work, and have attended as entire classes all the meetings taking place in Vancouver and, as individual research assistants, those taking place outside Canada.⁸

In order to understand further what the idea of authenticity implied when it came to ensure its existence and preservation, the researchers divided the concept into two components: identity and integrity. Identity refers to the attributes of a record that uniquely characterize it and distinguish it from other records. These attributes include: the names of the persons concurring in its formation (i.e., author, addressee, writer and originator); its date(s) of creation and transmission; an indication of the matter or action in which it participates; the expression of its archival bond; and an indication of any attachment(s). These attributes may be explicitly expressed in an element of the record or in metadata related to the record, or implicit in its various contexts (documentary, procedural, technological, provenancial, or juridical-administrative). Integrity is the wholeness and soundness of a record. A record has integrity if it is intact and uncorrupted, that is, if the message that it is meant to communicate in order to achieve its purpose is unaltered. This means that a record's physical integrity, such as the proper number of bit strings, may be compromised, provided that the articulation of the content and its required elements of form remain the same. Integrity may be demonstrated by evidence found on the face of the record, in metadata related to the record, or in one or more of its contexts.

One of our primary objectives was to establish conceptual requirements for assessing the authenticity of electronic records. The rationale for this objective was that, while in archival theory and jurisprudence, records that are relied upon by their creator in the usual and ordinary course of business are presumed authentic, with records in electronic systems, the presumption of authenticity must be supported by evidence that a record is what it purports to be and has not been modified or corrupted in essential respects when transmitted across space (i.e. between persons, systems or applications) or time (i.e., when stored off line, or when the hardware or software used to process, communicate or maintain it is upgraded or replaced). To assess the authenticity of a record, the preserver must be able to establish its identity and demonstrate its integrity by observing the existence of certain conditions, which are made of key importance by the fact that the records of each creator can be distinguished in two categories: 1) the records that exist as created, and 2) the records that have undergone some change and therefore cannot be said to exist as first created.

In order to define the requirements for authenticity, we decided to use diplomatics as the guiding methodology. Following the classic diplomatic assumption that, regardless of differences in nature, provenance or date, all records are similar enough to make it possible to conceive of one typical, ideal documentary form containing all possible elements of a record, we hypothesized that, while they may manifest themselves in different ways, the same elements that are present in traditional records exist either explicitly or implicitly in electronic records, and that all electronic records share the same elements. Thus, we created a template that would allow for a systematic analysis of the electronic records contained in several different systems. “The template is a

decomposition of an electronic record into its constituent elements which defines each element, explain its purpose, and indicates whether, and to what extent, that element is instrumental in verifying the record's authenticity.”⁹ The template was used to study a significant number of cases in order to assess whether the elements identified in the template were present in the records contained in the systems in question and, if so, to what extent and where, and to identify elements present in the records contained in the systems but not in the template. As the case studies proceeded, the template was refined in light of the results.

Building the template, that is, the ideal model of an electronic record, some of the elaborations of traditional diplomatics I made since 1989 were revisited and corrected. For example, the concepts of physical and intellectual form were abandoned in favor of a return to the classic concepts of extrinsic and intrinsic elements of form, the primary reason being that it is hard to identify anything as “physical” in electronic records. Also, the annotations were completely separated from the form of a record and considered an autonomous component of the record, while the broad component “context” was articulated more precisely by dividing it into categories of context, including technological context. Thus, the template results composed of four sections: documentary form, annotations, context, and medium. Those who are interested can examine it on the InterPARES web site at www.interpares.org, <links>, <reports>, <book document>. I will only note here that the medium was difficult to place within the template, because, although it is still necessary for an electronic record to exist, it is no longer inextricably linked with the message, does not store the record as such, but a bit-stream, without the software and the operating system needed to read the record, and its choice by the record-

maker or keeper can be completely arbitrary or based on reasons related to preservation rather than to the function of the record. In addition, the medium is not a relevant factor in assessing a record's authenticity, at least from the perspectives of the creator and of the record preserver. This was confirmed by the case studies, by the end of which the research team was convinced that, with electronic records, the medium should be considered part of the technological context.

It was the responsibility of our graduate students to analyze the case studies using the template and to identify discrepancies and gaps, which would be discussed in class before being presented to the whole group of researchers. Then, the students would accumulate information that would be relevant to the writing of the conceptual requirements for assessing the authenticity of electronic records, and to the development of a typology of electronic records based on those requirements.

The diplomatic analysis of the case studies consisted of answering questions about the nature of the entities found in each case study (e.g. whether they had record nature according to the definition of electronic record and of its essential characteristics), about their function, form, the action(s) they were connected to, their status of transmission, the measures by which their authenticity is protected, etc. In cases in which it was clear that the system under examination did not contain records, the questions regarded whether, given the administrative or operational functions of the system, it should contain records, and whether the system itself can be considered a record (e.g. the register of native Indians is a database that can be considered a record in the making).

The diplomatic analysis was useful to establish two sets of requirements for authenticity: the first set, called "benchmark requirements", is meant to support the

presumption of the authenticity¹⁰ of the electronic records of a creator before they are transferred to the custody of the preserver; the second set, called “baseline requirements”, is meant to support the production of authentic copies of electronic records that have been transferred to the custody of the preserver. The two sets of requirements are based respectively on the archival notions of trusted record-keeping and trusted custodianship, but while the first set is entirely derived from diplomatic concepts, the second is entirely derived from archival principles and methods. Their development clearly showed the students/research assistants the interplay of diplomatics, archival science, jurisprudence and management, and made them very much aware of the inter-disciplinarity and integration of the archival body of knowledge. The requirements are posted on the InterPARES web site.¹¹

An idea completely new to archival science which showed the students its nature as an applied science, able to react in an innovative way, but still consistently and rigorously, to real circumstances, is that the authenticity of electronic records can only be maintained by the preserver by producing authentic copies, and that the production of authentic copies is the only way of ensuring their preservation. This fact derives from the nature of electronic records.

In electronic records, the physical and intellectual parts do not necessarily coincide, and the concept of digital component (physical part) accompanies that of element of documentary form (intellectual part). A digital component is a digital object that contains all or part of the content of an electronic record, and/or the data or metadata necessary to order, structure, or manifest the content, and that requires specific methods for preservation.¹² In addition, these other conditions exist: the relation between a record

and a computer file can be one-to-one, one-to-many, many-to-one, or many to many; the same presentation of a record can be created by a variety of digital presentations and, vice-versa, from one digital presentation a variety of record presentations can derive; and it is possible to change the way in which a record is contained in a computer file without changing the record. Thus, the risks of corruption and loss are very high, and become very complex when records go across technological boundaries. To minimize these risks, controls of two types are implemented: those inside the system, which ensure that the records remain unaltered within it, and the dynamic ones, which ensure that the records remain unaltered when they cross technological boundaries. These controls are technological in nature but must be determined on the basis of the diplomatic understanding of the structure of the record, because it is impossible to maintain literally unaltered an electronic record. What is possible to do is to protect those components of the record that include the elements of form conveying its meaning.

In other words, it is not possible to preserve an electronic record, but only the ability to reproduce it. To make possible the reproduction of an electronic record, it is necessary first to store its digital components; second, to reassemble all its digital components in the correct order; third, to render the components, individually and collectively, in the correct documentary form (i.e. the elements of the record that constitute its external appearance and convey the action in which it participates and the immediate context in which it was created must appear on the face of the record and in its profile as they were originally); and, fourth, to reestablish the relationships between the record in question and all the other records that belong into the same archival unit. This requires reestablishing the structure of the archival unit and filling it with the records that

belong into it. However, to prove that a record so rendered is authentic requires either its inclusion in the set of procedures prescribed by the Benchmark Requirements, added to the fact that the creator is still relying on the record in the usual and ordinary course of business, or a declaration produced by the preserver in a certificate of authenticity. While certifying authenticity can be easily done at the time when a presumption of authenticity is established on the basis of the Benchmark Requirements, after the transfer of the authentic records to their custodian, it is only possible if the preserver's procedures are also controlled by strict requirements. In fact, while an electronic copy of an authentic electronic record is authentic if attested to be so by the official preserver, such attestation must be supported by the preserver's ability to demonstrate that it has satisfied all the baseline requirements for the production of authentic copies. Only by virtue of this attestation, the copy is deemed to conform to the record it reproduces until proof to the contrary is shown. For this reason, the second set of requirements, the Baseline Requirements, directed exclusively to the preserver, must all be implemented at the highest degree.

Of these requirements I will only discuss the third, which prescribes that the archival description of the fonds containing the electronic records include information about changes the electronic records of the creator have undergone since they were first created. This is important because archival students do not always realize, and archival teachers often forget, that it has always been the function, either explicit or implicit, of archival description to authenticate the records and perpetuate their administrative and documentary relationships. With electronic records, this function has become indispensable and it is essential that students see this. In fact, as original electronic

records disappear and an interminable chain of non-identical reproductions follows them, the researchers looking at the last of those reproductions cannot find in it any information regarding provenance, authority, context, or authenticity. The authentication function of archival description is different from that of a certificate of authenticity, because it is a collective attestation of the authenticity of the records and of all their interrelationships as made explicit in the description rather than being simply an attestation of the authenticity of individual records. This is one of the many examples that I could provide of how the introduction of research in the classroom enhances the students' understanding of traditional principles and methods. But, of course, it also brings the students to challenge traditional knowledge when it does not work, or it appears not to work

One has to admit that the use of diplomatic methodology for the study of electronic records has not been completely satisfying. It proved to be very useful to demonstrate when systems were designed to contain data rather than records, to show what attributes of a record's identity are implicit in the system and need to be made explicit and linked to the record in order to ensure that they are not lost when the record will be removed from the system, and to reveal the fundamental indifference of records creators to the issue of authenticity, mostly due to their confidence in generic technological security controls and authenticating instruments. However, diplomatic methodology has not been very useful in other respects. For example, as it has been used so far, it is founded on the classic concept of record, albeit a concept broader than that used by traditional diplomatics, and is therefore limited in its capacity to examine electronic systems containing a variety of very complex entities that do not correspond to that definition. Thus, to make the methodology more useful, the definition of record

needs to be more flexible, the identification and interpretation of its components and elements should be more nuanced, and the possibility of trading the characteristics of completeness, stability and fixity with the ability of the system to track and preserve any change to the records should be considered. Students have learned to understand this and, having observed how concepts and methods can be elaborated and further developed without damaging the internal consistency of the whole body of archival knowledge, are not intimidated by the task and, even less, turned off by the apparent failure of their discipline to support their work. They have realized, for example, that they need to develop a detailed decomposition of contexts into their parts to support an analysis of aggregates of records whose key attributes reside outside the records themselves. This will be vital in the second phase of InterPARES, because of the types of records it is focusing on, the most salient characteristic of which is the lack of a stable form and content (that is, of fixity), that is, experiential, interactive and dynamic records produced by artistic, scientific and e-government activities.¹³

It is possible that the challenge that diplomatics is called to meet with the new types of electronic records is of much greater significance than a simple adaptation of concepts and methods based on analogy of function of the formal elements of the record. The components and characteristics of the entity record need to be rethought from a completely different perspective, the idea of looking at records in isolation is to be abandoned in favor of a diplomatic examination of records aggregates in their context, the influence and capability of the technological context in ensuring record authenticity must be explored in depth, and, most importantly, the possibility should be considered that general diplomatics has contributed all that it could to the criticism of electronic

records and that the only way of proceeding further in our understanding of records generated by increasingly complex technologies is to develop special diplomatics, not of specific records creators as in the past, but of specific types of systems. It is an exciting challenge, one that, if met, has the potential of revitalizing diplomatics in the same way in which Einstein's relativity renewed physics. Are we up to it? I know for sure that archival graduates who, as students, have been in close contact with the challenges presented by contemporary records, and worked throughout their studies on bridging the divide between theory and practice by developing the former through analysis of existing cases and shaping the latter with testing, trial and error, are up to it. Because they have the rigor of their discipline, an understanding of how to use the knowledge of other disciplines to bear on their own, a firm belief that growth and change are good, and the intellectual courage of who has already experienced a real challenge and met it using the armor of his/her education.

¹ The articles were subsequently published in a single volume as Luciana Duranti, Diplomatics: new uses for an old science, Lanham, Maryland, and London, 1998 (Scarecrow Press, with Society of American Archivists and Association of Canadian Archivists)

² Incidentally, all three graduates were immediately offered positions in the area of their study. .

³ For an overview of this project, commonly called “the UBC project”, see Luciana Duranti and Heather MacNeil, The protection of the integrity of electronic records: an overview of the UBC-MAS research project, in Archivaria 42, 1996, p. 45-67.

⁴ The results of the UBC project were substantially incorporated into the Design criteria standard for electronic records management software applications (DOD 5015.2-STD), promulgated by the Department of Defense. Links to the findings of the UBC project and to the DOD standard can be found on the web site of the InterPARES project, at www.interpares.org <resources> <links>: “The Preservation of the Integrity of Electronic Records”, and “U.S. Department of Defense 5015.2 Standard.”

⁵ Dr. MacNeil graduated with a thesis describing the project results and the function of diplomatics in their development. Her thesis was later published with the title Trusting records: legal, historical, and diplomatic perspectives, Dordrecht, 2000 (Kluwer Academic). Dr. MacNeil is now teaching in our archival program a course on how to develop record-keeping systems on the basis of archival diplomatics.

⁶ Several organizations have used the results of the UBC project to develop their own record-making and record-keeping system. Among them, the state administration of Mississippi and that of South Africa. The complete findings of the UBC project are in course of publication by Kluwer Academic as a book entitled The preservation of the integrity of electronic records, co-authored by Luciana Duranti, Terry Eastwood and Heather MacNeil.

⁷ The following presentation of the InterPARES work relies on the many documents collaboratively produced by its researchers. Although this author is the director of the project, and is responsible for most of the diplomatic part of the research, methodology, analysis, and development of concepts, the work presented here belongs to all the co-investigators of the InterPARES project, who have debated and refined each detail of it, deliberated on it, and integrated it in the rest of the work, and to all the students/research assistants, without whom this work would not have been possible. All documents produced by the research team are posted on the InterPARES website at www.interpares.org <resources><reports>.

⁸ InterPARES meets four times a year for a week. We take to the three international meetings two students as note-takers, and additional students involved in specific activities when they have to make a presentation of their work to the group of researchers.

⁹ Heather MacNeil, Providing grounds for trust: developing conceptual requirements for the long-term preservation of authentic electronic records, in Archivaria 50, 2000, p. 52-78, at p. 56. This article describes in detail all the elements included in the template and the way it was used in the case studies. The template itself can be found on the InterPARES website at www.interpares.org <resources> <reports> “The Template for Analysis.”

¹⁰ The presumption of authenticity is an inference that is drawn from known facts about the manner in which a record has been created and maintained. The evidence supporting it is enumerated in the Benchmark Requirements. A presumption of authenticity will be based upon the number of requirements that have been met and the degree to which each has been met. If the presumption of authenticity is weak, a verification of authenticity is necessary. The verification of authenticity is the act or process of establishing a correspondence between known facts about the record and the various contexts in which it has been created and maintained and the proposed fact of the record’s authenticity, and involves a detailed examination of the records in all their contexts and of reliable information available from other sources (e.g. audit trails, backups, copies preserved elsewhere, textual analysis, etc.).

¹¹ A trusted record-keeping system is one that controls what records are included in the system, who can include, retrieve, modify, delete or remove them from the system, and how the records are included, maintained, retrieved, deleted or removed from the system. A trusted custodian is a person entrusted with the responsibility of preserving the records, having demonstrated that it has no reason to alter the records

entrusted to its care or to allow others to do so, and is capable of implementing the necessary measures for the physical and intellectual protection of the records.

¹² For example, a report containing graphics may consist of three or more digital components: the text of the report, the profile, and the graphic(s). In contrast, a message with textual attachments may consist of only one digital component.

¹³ Experiential records are electronic objects the essence of which goes beyond the bits that constitute the object to incorporate the behavior of the rendering system, or at least the interaction between the object and the rendering system. Defining the authenticity of such objects is much more complex than with raw data or more traditional electronic records, because it is dependent not on the ability to reproduce a copy of the object's original bit-stream, but on the ability to recreate the environment in which that object was experienced. Examples of experiential digital objects range from audio and moving images embedded in a web page to virtual reality systems to databases that link geo-spatial coordinates to specific smells. Interactive records are records made and maintained in interactive systems, where each user's entry causes a response from or an action by the system. To determine means to keep records in such systems authentic, one needs to ascertain a) how user input affects the creation and form of each record (as is the case with much on-line commerce); and b) if and when the interactive system and its inherent functionality need to be maintained intact. Examples of interactive systems range from web pages delivering government services online to musical performances based on human-computer interaction to commercial video games. Dynamic records are documents whose content is dependent upon data that might have variable instantiations and be held in databases and spreadsheets. Examples range from simple web pages with embedded links to complex systems where information is stored and updated to be shared via wireless transmission by multiple mobile users in diverse ways. The increasing reliance on such documents by individuals and institutions will necessitate understanding how the information they contain is captured and set aside.