The Impact of Technological Change on Archival Theory

Archival theory comprises the ideas about the nature of archival material as they have developed overtime, confronted with the record reality of different cultures and juridical contexts. It constitutes the core of archival science. Archival science[1] comprises also the principles and methods for the control and preservation of archival material (i.e., archival methodology), the analysis of archival ideas, principles and methods, and the history of the way they have been applied over time (i.e., of archival practice).The study of the literature resulting from this analysis and the historical research into things archival (i.e., archival scholarship) are also integral part of archival science. Thus, archival science can be defined as a system inclusive of theory, methodology, practice, and scholarship, which owes its integrity to its logical cohesion and to the existence of a clear purpose that rules it from the outside and determines the boundaries in which the system is designed to operate.

If we regard archival science as an organic and unitary system, we have to accept that we are dealing with a special type of discipline. A discipline encompasses the rules of procedure that discipline the search of the scholar, and the knowledge so acquired. In the case of the system of archival science, however, the rules that guide the investigation of archival scholars into issues, problems or concepts are determined by archival theory and methods.

As already mentioned, theory, methodology, practice and scholarship are the components of the archival system, and each of them is on turn comprised of parts. This

[1] This paper presupposes that archival studies constitute a science. Many have argued against the idea on the basis of a common perception that a science is a type of study entirely objective by virtue of the rigorous manner in which it is carried out and the restricted range of topics to which it applies. In fact, the activity of science is based upon a complex framework of assumptions that make it possible for the

structure is a hierarchical one, where each level descends from and depends on the previous one, with theory being the determinant and cohesive element. Through the so-called “feedback process”, new hypotheses, ideas, findings or realities are brought into the system, confronted with the theory ruling the system from the inside and with the purpose guiding it from the outside, and absorbed and integrated within the system, renewing and enriching it.

The view of archival science as a system allows us to confront the issues presented by records generated in digital systems by using the whole of the archival knowledge accumulated through the centuries and developing it in a consistent manner, so that all archival activities will continue to be framed within a unified, integrated structure governed by an overarching theory, and will be carried out according to international standards applicable to all records types.

This process of investigation, discovery and integration of new archival realities within the archival system has been tested in the course of two research projects, the first of which was entitled "The Preservation of the Integrity of Electronic Records." It was undertaken between 1994 and 1997 by archival researchers at the University of British Columbia (UBC), in collaboration with the Department of Defense (DoD) of the United States. The goal of the research project was to identify and define conceptually the nature and components of an electronic record and the conditions necessary to ensure its integrity, meaning its reliability and authenticity while they are still needed by the creator. In order to investigate and discover the new reality presented by electronic records, the research team decided to confront it with the fundamental concepts of

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landscape of the scientific endeavour to be redrawn over time, and, while striving towards objectivity, considers it to be an unattainable ideal.

archival theory. Thus, it proceeded to analyze the nature and components of electronic records on the basis of the integration of the concepts and principles of diplomatics with those of archival science that has occurred in the past century.[2]

The primary contribution of diplomatics to the understanding of electronic records lies in its analysis of the attributes of a record, based on theoretical ideas that have evolved over centuries of detailed study of the documentary process. By decontextualizing and universalizing those attributes, the original diplomatists were able to recognize and evaluate records created over several centuries and across different juridical systems. On the basis of this understanding, the research team hypothesized that diplomatics would have been capable of guiding the recognition and identification of records generated within many different hardware and software environments. The complementary contribution of archival science to the understanding of electronic records was found in its analysis of aggregations of records and their documentary and functional relationships.

For the purposes of the project, the classical archival science definition of record was adopted, according to which a *record* is any document made or received, and set aside, either for action or reference, by a physical or juridical person in the course of practical activity as an instrument and by-product of it. An *electronic* record was defined as a record used and set aside in electronic form. The research team was thus able to distinguish the entity *record* from other entities typically found in electronic information systems, i.e., documents, information, and data.

[2] Luciana Duranti and Heather MacNeil, "The Protection of the Integrity of Electronic Records: An Overview of the UBC-MAS Research Project," *Archivaria* 42 (1996): 46-67.

- Defining an electronic record was a necessary first step in characterizing it as a distinct species of recorded information. The next step was to identify and define the necessary and sufficient components of an electronic record so that the entities record and electronic record could be compared and assessed. The result of such comparison would indicate whether the theory ruling the archival system from inside could be readily applied to the new entity or needed to be revisited and adapted. In either case, the identification and definition of the components of an electronic records would serve archival practice by allowing for an electronic record to be recognized and captured as such by an electronic information system. The research team found that an electronic record comprised the same components as its traditional counterpart.

Once the components of an electronic record had been individually and clearly identified, the research team turned its attention to determining the methods necessary to ensure reliability and authenticity. To this purpose, it adopted the concepts developed in the context of early jurisprudence, and later absorbed into diplomatic theory and archival science. Thus, *reliability* was taken to refer to the ability of a record to stand for the facts it is about (i.e., the trustworthiness of the record as to content). *Authenticity* was taken to refer to the fact that a record is what it purports to be and has not been tampered with or otherwise corrupted since its creation (i.e., the trustworthiness of the record as a record).

The research team found that, for electronic records, as well as for traditional records, reliability depends upon two factors: the degree of completeness of the record's form and the degree of control exercised over its procedure of creation.

While reliability and the methods for ensuring it are linked exclusively to record creation, authenticity is linked to the record's transmission, and to the manner of its

preservation and custody. It is protected through the adoption of methods that ensure that the record is not manipulated, altered, or otherwise falsified after its creation. It follows that an authentic electronic record is one whose identity and integrity can be proven because it is transmitted in a secure way, its state of transmission as either a draft, an original or a copy can be ascertained, is preserved in a secure way, and its provenance can be verified.

The main difference between electronic and non-electronic records is that non-electronic records are kept as authentic records by maintaining them in the same form and state of transmission in which they were when made or received and set aside, while electronic records can only be preserved as authentic copies by continuous refreshing and periodic migration.

Refreshing and migration generate different types of copies with different degrees of authenticity and consequent validity and juridical effects. Refreshing generates a complete reproduction of both the content and the formal elements of the records, therefore, the resulting records may be considered faithful copies of the original ones. Migration, on the contrary, generates a reproduction of the content of the record, with changes in configuration and format, often having a ripple effect on other elements of the record. Thus, migration always involves some measure of loss. These are not new concepts. Refreshed records are what diplomatists have traditionally called "imitative copies," whereas migrated records correspond to inserts (i.e., "vidimus" or "inspeximus"), simple transcripts of records preceded by a declaration of conformity of the record to the original. Other examples of migrated records are photographs or microfilms of paper records. Migration has always involved loss of information and the

amount of acceptable loss can be quite clearly defined by type of record.

It is essential, first, to identify for each type of electronic record the components that ensure its authenticity over time; second, to assess whether those that are not visible to the user can be made visible and stabilized by linking them inextricably to the intellectual form of the record; third, to determine whether, in the cases in which this operation were not feasible, it would be possible and advisable to move the records in question to a non-digital form (e.g., microfilm). But, more importantly, the fundamental principle governing the authenticity of records since antiquity still applies: if the records are still needed by the record creator for the usual and ordinary conduct of its business, the continuing reliance of the creator on them authenticates them. By extension, the reliance of the creator on the products of a migration process internally conducted and/or controlled would authenticate them. However, once the records are no longer needed by the records creator to conduct its business, the migration process will need to be carried out by a neutral party and its products verified and authenticated: the resulting records would thus become authentic copies of the obsolescent records.

The research team found that the reliability and authenticity of electronic records are best ensured by

- embedding procedural rules in an agency-wide records system and integrating business and documentary procedures;
- instituting procedures that tighten the archival bond, such as classification, registration, and profiling;
- integrating the management of the electronic and non-electronic components of the records system; and

- entrusting the creating body with primary responsibility for their reliability and authenticity while they are needed for business purposes, and a separate preserving body with responsibility for their authenticity over the long term. This conclusion was based on the team's belief that the custody of inactive electronic records by a trusted recordkeeper is a necessary precondition for safeguarding their authenticity in general and the integrity of the authentication procedures in particular.

Thus, an assessment of the findings of the first research project on electronic records can only conclude that, as a result of the feedback process, archival science as a system was enriched by the broadening of concepts and the development of methods that are intrinsically consistent with archival theory and methodology as they were developed for traditional records. This enrichment did not alter the system in any way, every theoretical and methodological idea being preserved in its integrity and in its cohesive relationship with all the other entities in the system, in the context of the same structure. Such preservation of an intact system is of course due in large part to the fundamental assumption of the research team that the purpose ruling the system from the outside is still the same, notwithstanding the advent of a new technology that has changed the way of working of the office. In other words, the constructs of archival science still derive from the need of records creators to carry out their business by means of records they can trust and from the need of society to preserve such records to maintain, protect and perpetuate itself. All the ideas and activities involved in fulfilling these needs are controlled by the juridical system in the context of which they occur and must therefore be consistent with it.

The second research project on electronic records is based on the same assumption. The International Research on Permanent Authentic Records in Electronic Systems (InterPARES), a project that involves fifteen countries in four continents, ten national archives and seventeen universities, aims to formulate principles and criteria for the development of international, national and organizational policies, strategies, and standards for the long-term preservation of authentic electronic records.[3] The research project is divided in four domains. The first domain aims to identify the requirements for preserving authentic electronic records. The second domain aims to establish whether, in order to satisfy the requirements for authenticity identified in domain one, the selection criteria and methods for electronic records need to be revised or even radically changed. The third domain aims to develop methods, procedures and rules for the preservation of electronic records according to the requirements identified in domain one, and to define the responsibilities for implementing them. The fourth domain aims to develop a framework for the formulation of strategies, policies and standards.

The basic concepts that constitute the theoretical framework of the project are those adopted and/or developed in the course of the previous project. They are the concepts of authenticity and reliability and the concepts of record and electronic record, as defined earlier. Each of these concepts subsume many other concepts, such as those related to the components of a record.

[3] The direction of the research and its infrastructure are funded by the Social Sciences and Humanities Research Council of Canada (SSHRCC), and by the Hampton Fund of the University of British Columbia (UBC) and the UBC Vice President Research Fund and Dean of Arts Fund. The national and multinational research teams are funded by national granting agencies and institutional and organizational contributions. For example, the Canadian team is funded by SSHRCC and the American team by the National Historical Publication and Records Commission (NHPRC). See the project web site http://www.interpares.org/

The research team found necessary to define also the concept of authentication, which is often confused with that of authenticity by legislators and decision makers. Although that of authentication is not a concept of archival theory, it is important that it be brought into it, as increasingly the need for it affects the records' creation, maintenance and preservation requirements and processes. European archival science has traditionally absorbed fundamental concepts from jurisprudence, thus consistence between the legal concept of authentication and the other concepts of archival theory was to be expected.[4] It was established that, while authenticity is a quality of the record, authentication is only a means of proving that a record is what it purports to be at a given moment in time. *Authentication*, in other words, is a *declaration of authenticity in time resulting either by the insertion or the addition of an element or a statement to a record*, and the rules governing it are established by legislation. The requirements for the continuing verifiable authenticity of records go much beyond legislated means of authentication and even juridical principles and structures, deriving from the historical stratification of traditions, uses, attitudes, and perceptions that each culture brings to bear on what it treats as an authentic record. This is the reason why contextualization of the requirements identified for the authenticity of electronic records is essential to the success of the research project.

The research methodologies used are as varied as the disciplines involved in the research, which range from archival science to computer engineering to music theory. Surveys, case studies, diplomatic analysis, and modeling are some of them. Diplomatics is especially useful for identifying commonalities between and among types of records

[4] See Elio Lodolini, *Lineamenti di Storia dell'Archivistica Italiana* (Roma: La Nuova Italia Scientifica, 1991), p. 44.

and records systems where they are not readily apparent, and for developing standards. Modeling methodology consists of two parts, one graphically representing the activities and processes involved in each hypothesis and the other the entities involved in each activity. To support the modeling process, every activity, entity, attribute, and relationship named in the models is consistently and rigorously defined in an interdisciplinary international glossary.

The final product of the research conducted within the first domain will be baseline requirements for authenticity with specific conceptual requirements defined for each record type according to a typology of electronic records defined in relation to the function they have in relation to the action in which they participate, on the basis of the fundamental diplomatic categorization of records in dispositive, probative, supporting and narrative.[5] To populate the electronic records typology, the researchers are performing an analysis of the empirical data gathered during case studies of electronic systems containing or having the capacity of containing records. Cases are selected for study "according to their potential for helping to expand on or refine the concepts or theory that have already been developed. Data collection and analysis proceed together."[6] Theoretical, rather than statistical, sampling is thus applied in the selection of the case studies.[7] Accordingly, criteria for selection have been developed, which will evolve as case study data are analyzed.

[5] Dispositive and probative records are records for which the written form is required, being either the substance of the action or necessary to prove that an action occurred. Suppoerting and narrative records are records for which the written form is discretionary, either being of support to an action in the procedure of carrying it out or external to the action and a means of setting oneself at work.
[6] Taylor, Steven J., and Robert Bogden, *Introduction to Qualitative Research Methods: The Search For Meanings*, 2nd ed. (New York: Wiley, 1984), p. 126.
[7] The process of theoretical sampling is "a process of data collection for generating theory whereby the analyst jointly collects, codes and analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges." Glaser and Strauss, p. 45.

The primary instrument that is used to analyze case study data is the *Template for Analysis*. This template was created using the diplomatic elements of electronic records identified in the findings of the previous research project. The template elements were then refined and expanded by utilizing the InterPARES International Team's combined interdisciplinary knowledge and experience with types of electronic records and electronic systems. Because of its theoretical framework, the template is a major product of the research in that it allows for the systematic analysis of any electronic system, regardless of the specific technology, and will support the analysis of future systems.

The work conducted in the context of the first domain shows that the research team operates on the fundamental assumption that investigation of new archival realities can use productively methodologies and concepts that are outside the realm of archival science, provided that the purpose, the questions and the theory guiding such investigation remain archival in nature. The work conducted in the context of the third domain, which aims to determine procedural and technological methods of preservation capable of respecting authenticity requirements is consistently based on the same assumption. This appears very clearly from the articulation of a basic reality on which the work in the preservation domain had to be grounded: it is not possible to preserve an electronic record; it is only possible to preserve the ability to reproduce an electronic record. Thus, it is first necessary to identify technical requirements that demonstrate that a digital object produced from stored digital data is an authentic reproduction of the digital object that was stored.[8] Then, to move beyond the general class of digital objects to the more specific class of electronic records, we must apply

[8] From the preliminary report to the research project's Director by the Chair of the Preservation Task Force, Ken Thibodeau, March 31, 2000.

the criteria resulting from the work on the first domain, but in the meanwhile we are studying and representing by means of models situations that present identifiable risks of changing the records.

What will certainly facilitate the integration within the system of archival science of the concepts and methods either adapted from existing ones or developed anew in each domain of research, is the building of the glossary of all terms used in the context of the research project. The major issues raised by international interdisciplinary collaboration derive from the different use made of the same term in the various disciplines and by the use of different terms to refer to the same entity or activity within the same discipline among the various countries. These are both scientific and cultural issues that need to be brought forward and dealt with in a scholarly analytical way Thus, every proposed term and related definition is researched through time and across disciplines, and then the outcome is subjected to discussion by representative members of the international research team, whose approval must be unanimous. To ensure internal consistency of the Glossary, terms and definitions already included in it are revisited in light of new terms and definitions proposed and developed in the course of the research work.

The development of the system of archival science in light of new realities is at its heart a scientific undertaking. However, when political and economical interests are touched by the outcome of the research aimed to this development, it may become a moral issue. Thus, it is essential to make the scientific undertaking as independent as possible of the whims of governments and the interests of the industry if we want to have any hope that the generations to come will receive a trustworthy record of their past. Any research result must have a strong conceptual basis, include a clear definition of terms

derived from archival theory and comprise consistent sets of decontextualized procedures with an explanation of their purpose and function. As demonstrated by the projects discussed above, this does not mean that archival science must be the only discipline supporting its own growth and development. The major impact of technological change on archival theory has been to induce archival scholars to study concepts, laws and models from various fields to foster useful transfers to their field, to encourage the development of archival theory in emerging areas of endeavor and investigation, to eliminate the duplication of theoretical efforts in different fields, and to promote consistency of scientific knowledge.[9] However, in order to develop the body of knowledge of archival science, it is essential to bring all this external knowledge into its system, make it consistent with the characteristics of its parts (i.e., confront it with archival theory, methods, practice and scholarship), subject it to the feedback process, and insert it into the fundamental structure of the system. Only so it will be possible to maintain the integrity and continuity of our discipline and science while at the same time fostering its enrichment and growth.

[9] See Checkland, Peter. *System Thinking. Systems Practice*. Toronto: John Wiley & Sons, 1981, p. 93.