InterPARES: **INTE**rnational **R**esearch on **P**ermanent **A**uthentic **R**ecords in **E**lectronic **S**ystems

An International Collaborative Research Initiative

Research Goal

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.

Research Domains

- *Domain I*:   Conceptual Requirements for Preserving Authentic Electronic Records

- *Domain II*: Appraisal Criteria and Methods for Selection of Authentic Electronic Records

- *Domain III*: Methods and Responsibilities for Preserving Authentic Electronic Records

- *Domain IV*: Framework for the Formulation of Policies, Strategies, and Standards

Record

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.

Document

Recorded information

Information

A message intended for communication across space or time

Data

The smallest meaningful piece of information

Electronic Record

A record created (i.e., made or received and set aside for action or reference) in electronic form

Identifiable Characteristics of an Electronic Record

- Fixed form (i.e. its binary content is 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)

- Unchangeable content

- Explicit linkages to other records within or outside the digital system through a classification code or other unique identifier

- Identifiable administrative content

- Author

- Addressee

- Writer

- Participant in or supporting an action either procedurally or as part of the decision making process

A Trustworthy Record

A record that is reliable and authentic

Reliability

The ability of a record to stand for the facts it is about.

In other words, the trustworthiness of the record as a statement of facts.

Authenticity

Refers to the fact that a record is what it purports to be and has not been tampered with or otherwise corrupted.

In other words, the trustworthiness of the record as a record.

Authentication

- A declaration of authenticity, 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.

- A means of proving that a record is what it purports to be at a given moment in time.

Domain 1: Task Force Methodology

- Diplomatics for definition of concepts and the construction of a template for analysis

- Grounded theory for selection of case studies

- Statistical research methods for the development and analysis of the questionnaire and the structured interviews

- Records management and archival science for the development of functional requirements for authenticity

Domain 1: Task Force Products

- Template for analysis

- Questionnaire

- Analyses and overviews of case studies

- Benchmark Requirements Supporting the Presumption of Authenticity of Electronic Records

- Baseline Requirements for the Production of Authentic Copies of Electronic Records

Conceptual Framework for the Requirements for Authenticity

- In archival theory and jurisprudence, records that are relied upon by their creator in the usual and ordinary course of business are presumed authentic

- 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. To assess the authenticity of a record, the preserver must be able to establish its identity and demonstrate its integrity

Identity of a Record

- It refers to the attributes of a record that uniquely characterise 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; as well as an indication of any attachment(s).

- These attributes may be explicitly expressed in an element of the record, in metadata related to the record, or implicit in its various contexts (documentary, procedural, technological, provenancial, or juridical-administrative).

Integrity of a Record

- Its wholeness and soundness. A record has integrity if it is intact and uncorrupted

- A record is intact and uncorrupted if the message that it is meant to communicate in order to achieve its purpose is unaltered

- 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

The Records of the Creator

- The records that exist as created. They are considered authentic because they are the same as they were in the first instantiation

- The records that have undergone some change and therefore cannot be said to exist as first created. They are considered authentic because the creator treats them as such by relying on them for action or reference in the regular conduct of business. However, their authenticity is threatened whenever they are transmitted across space or time. Therefore, an inference of their authenticity must be further supported by evidence that they have been maintained in a way that guarantees their continuing identity and integrity.

Presumption of Authenticity

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.

Verification of Authenticity

- 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, when there is an insufficient basis for a presumption of authenticity.

- It involves a detailed examination of the record in all their contexts and of reliable information available from other sources (audit trails, backups, copies preserved elsewhere, textual analysis)

Benchmark Requirement A1:
Expression of Record Attributes & Linkage to Record

The value of the following attributes are explicitly expressed and inextricably linked to every record. These attributes can be distinguished into categories, the first concerning the identity of records, and the second concerning the integrity of records.

Benchmark Requirement A1:

- *A.1.a*

  Identity of the record:

- *A.1.a.i*

  Names of the persons concurring in the formation of the record, that is: name of author, writer, originator, and addressee

- *A.1.a.ii*

  Name of action or matter

- *A.1.a.iii*

  Date(s) of creation and transmission, that is: chronological date, received date, archival date, transmission date(s)

- *A.1.a.iv*

  Expression of archival bond

- *A.1.a.v*

  Indication of attachments

Benchmark Requirement A1:

- *A.1.b*

    Integrity of the record:

- *A.1.b.i*

    Name of handling office

- *A.1.b.ii*

    Name of office of primary responsibility

- *A.1.b.iii*

    Indication of types of annotations added to the record

- *A.1.b.iv*

    Indication of technical modifications

Benchmark Requirement A2:
Access Privileges

The creator has defined and effectively implemented access privileges concerning the creation, modification, annotation, relocation, and destruction of records

Benchmark Requirement A3:
Protective Procedures: Loss and Corruption of Records

The creator has established and implemented procedures to prevent, discover, and correct loss or corruption of records

Benchmark Requirement A4:
Protective Procedures: Media and Technology

The creator has established and implemented procedures to guarantee the continuing identity and integrity of records against media deterioration and across technological change

Benchmark Requirement A5:
Establishment of Documentary Forms

The creator has established the documentary forms of records associated with each procedure either according to the requirements of the juridical system or those of the creator

Benchmark Requirement A6:
Authentication of Records

If authentication is required by the juridical system or the needs of the organization, the creator has established specific rules regarding which records must be authenticated, by whom, and the means of authentication

Benchmark Requirement A7:
Identification of Authoritative Record

If multiple copies of the same record exist, the creator has established procedures that identify which record is authoritative

Benchmark Requirement A8:
Removal and Transfer of Relevant Documentation

If there is a transition of records from active status to semi-active and inactive status, which involves the removal of records from the electronic system, the creator has established and implemented procedures determining what documentation has to be removed and transferred to the preserver along with the records

Baseline Requirements for the Production of Authentic Copies

- After the records have been presumed or verified authentic in the appraisal process, and have been transferred from the creator to the preserver, their authenticity needs to be maintained by the preserver by reproducing them and authenticating the resulting copies

- The production of authentic copies is regulated by a second set of requirements that must all be met and are therefore called "baseline requirements"

Baseline Requirement B1:
Controls over Records Transfer, Maintenance, and Reproduction

The procedures and system(s) used to transfer records to the archival institution or program, maintain them, and reproduce them embody adequate and effective controls to guarantee the records' identity and integrity, and specifically that:

- unbroken custody of the records is maintained;
- security and control procedures are implemented and monitored; and
- the content of the record remains unchanged after reproduction

Baseline Requirement B2:

Documentation of Reproduction Process and its Effects

The activity of reproduction has been documented, and this documentation includes:

- the date of the records' reproduction and the name of the responsible person;

- the relationship between the records acquired from the creator and the copies produced by the preserver;

- the impact of the reproduction process on their form, content, accessibility and use; and

- in those cases where a copy of a record is known not to fully and faithfully reproduce the elements expressing its identity and integrity, such information has been documented by the preserver, and this documentation is readily accessible to the user

Benchmark Requirement B3:
Archival Description

The archival description of the fonds containing the electronic records includes–in addition to information about the records' juridical-administrative, provenancial, procedural, and documentary contexts–information about changes the electronic records of the creator have undergone since they were first created.

Authentic copies

- An electronic copy of an authentic electronic record is authentic if attested to be so by the official preserver. Such attestation is supported by the preserver's ability to demonstrate that it has satisfied all the baseline requirements for the production of authentic copies. By virtue of this attestation, the copy is deemed to conform to the record it reproduces until proof to the contrary is shown

Domain 2: **Methodology**

- Archival science for the literature search and analysis, the comparative study of appraisal reports from archival institution, and the identification of the activities and entities being modeled and of their relationships

- IDEF0 modeling for the representation of the activities involved in appraisal, including the identification of controls, mechanisms, inputs and outputs of each activity, and the definition of the related terms

Domain 2: Results of the literature and documentation analyses

- Consent on the fact that electronic records must be selected according to the same theory and criteria used for traditional documents

- Importance of evaluating the entire context of the records

- Necessity of conducting selection very early in the life of the records

- Importance of having all the documentation related to the technological context of the documents

- Absence of authenticity among the selection criteria

Domain 2: Model

- Point of view of the preserver
- The function of selection includes the following activities:
    1. Manage the selection function
    2. Appraise electronic records
    3. Monitor selected electronic records
    4. Carrying out the disposition of electronic records

Manage the selection function

To develop strategies, rules and procedures of selection using information on decisions taken in the past and on the records' context , keeping into account the needs of the creator and of society and legal norms.

Manage the selection function

First output: appraisal strategies, including

- criteria for appraisal

- guidelines on how to apply authenticity requirements

- procedures for carrying out appraisal

- guidelines for reporting the results of appraisals

- procedures for reporting on appraisal activities

Manage the selection function

Second output: rules and procedures governing the disposition of records, including

- procedures for carrying out disposition (for example, the roles and responsibilities of the creator and the preserver)

- rules for disposition (for example, acceptable formats for transfer or the means of transmission of records)

- procedures for reporting about disposition activities (for example, reporting on the character and volume of records acquired and/or destroyed)

Appraisal of electronic records

Composed of the following activities:

- compiling information about the records and their contexts

- assessing the value of the records

- determining the feasibility of preserving them

- making the appraisal decision

Compiling information about the records and their context

- It includes information on the context of creation and on the technological context

- It allows to establish the basis upon which the records are considered authentic

- It allows to determine the value of the records

Assessing the value of the records

It includes three activities

- assessing the continuing value of electronic records

- assessing their authenticity

- determining their value

Determining the feasibility of preserving the records

- Deciding whether the digital components embodying the essential elements that confer identity and ensure the integrity of the records can be preserved, given the preserver's current and anticipated capabilities

- A digital component is a digital object that contains all or part of the content of an electronic record, and/or data or metadata necessary to order, structure, or manifest the content, and that requires specific methods for preservation

Determining the feasibility of preserving the records

Comprises three steps:

- The appraiser determines both the record elements containing informational content and those elements that need to be preserved according to requirements for authenticity, as formulated by the Authenticity Task Force's benchmark requirements.

- The appraiser identifies where these crucial record elements are manifested in the digital components of the electronic record.

- The appraiser reconciles these preservation requirements with the preservation capabilities of the institution that is responsible for the continuing preservation of the body of records being appraised.

Making the appraisal decision

The decision comprises two parts:

1. What must be either transferred to the archives or destroyed (including the list of the digital components)

2. How and when this should happen

Documentation that explains and justifies the decision is essential not only for reasons of accountability, but also to provide information to those who manage the selection function

Monitor selected records

The records selected for preservation must be monitored, especially for changes in their technological context

In some cases it may be necessary to repeat the appraisal because of changes that can affect the feasibility of preservation

In most cases, monitoring produces minor revisions to the documentation on the selection and to the terms and conditions of transfer

Carrying Out the Disposition of Electronic Records

Comprises three steps:

1. Preparation of the records for disposition

2. Preparation of the records for transfer

3. Transmission of electronic records

Preparation of the records for disposition

Includes copying and, if necessary, formatting those records selected for preservation so as to prepare them physically for transfer, and/or, if such falls to the responsibility of the preserver, preparing records not selected for preservation for destruction, alienation to another entity, or such other disposition as has been determined in the appraisal decision

Preparation of the records for transfer

To package records selected for preservation with the necessary information for their continuing preservation, including the terms and conditions of transfer, identification of the digital components to be preserved, and associated archival and technical documentation needed for their treatment

Transmission of electronic records

It consists of the transfer of the records to be preserved from the creator to the preserver.

The outputs of this activity include information about transferred electronic records and the transfer of electronic records selected for preservation. These electronic records are copied and, if necessary, formatted for transfer and sent to the office responsible for the preservation function.

Key points related to domain 2

- It is essential for the appraiser to assess the authenticity of electronic records

- It is important to determine the feasibility of preservation

- It is vital that electronic records be appraised early in their life cycle

- It is important to monitoring the appraisal decision

Domain 3: Methodology

- Computer engineering for the study of storage media and of digital preservation technology

- Legal analysis for the study of certification methods

- IDEF0 for modeling the activities involved in the preservation of electronic records. The content of the model is based on the Open Archival Information System (OAIS) Reference Model proposed as an ISO standard, on an investigation of strategies and methods of preservation used by organizations that preserve electronic records, on studies of storage media and of processes of migration, emulation and universal preservation, and on literature on the subject

Ascertained facts

- It is not possible to preserve an electronic record, it is only possible to preserve the ability to reproduce it

- The relation between a record and a 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 viceversa, from one digital presentation a variety of record presentations can derive

- It is possible to change the way in which a record is contained in a file without changing the record

Fundamental concepts

1. To make possible the reproduction of electronic records it is necessary to preserve their digital components

2. The risks of corruption and loss of records are more frequent and complex when records cross technological boundaries. Thus, the controls are divided in two types: 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

Fundamental concepts

3. The controls may be technological in nature but must be determined on the basis of archival principles and criteria

4. It is impossible to maintain literally unaltered an electronic record

5. The only way to prove that an electronic record is authentic is to produce an authentic copy of it

Fundamental concepts: reproduction

- The first step in reproducing an electronic record is to reassemble all its digital components in the correct order

- The second step is to render the components, individually e 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)

- The third step is to reestablish the relationships between the record in question and all the other records that belong into the same archival unit. This requires, first, to reestablish the structure of the archival unit, and then, to fill it with the records that belong into it.

Fundamental concepts: Chain of preservation

- Considering that the processes of storage and retrieval imply transformations both physical and of presentation, the traditional concept of unbroken chain of custody must be extended to include the processes necessary to ensure the unaltered transmission of the record through time

- The unbroken chain of preservation begins when the records are created respecting the benchmark requirements, and continues with the documentation of all the changes to the records and of the processes of selection, transfer, reproduction and preservation

Domain 3: Model

- The point of view is the preserver's

- The process of preservation comprises four activities:

1. Manage the preservation function
2. Bring in electronic records
3. Maintain electronic records
4. Output electronic records

Manage the preservation function

On the basis of the information accumulated during the selection function, to develop a strategy of preservation, action plans (each connected to a specific body of records selected for preservation), a technologic infrastructure and the methods necessary to implement the action plans. This activity produces also reports on what has been preserved.

Bring in electronic records

To determine that the transferred records are those selected for preservation, that it is possible to preserve them, and that there are no other obstacles to preservation. To produce information on each transfer for the purpose of confirming or revising the strategy of preservation and the applicable action plans. To produce information to evaluate the execution of the acquisition activity and to satisfy the baseline requirements for authenticity.

Maintain electronic records

To apply specific methods of preservation for the body of records in question on the basis of the action plan for those records, maintaining the digital components together with the information necessary to produce again (re-produce) the records when requested, to certify their authenticity, and to make possible their comprehension. To produce information used to evaluate the execution of this function and satisfy the baseline requirements for authenticity

Output electronic records

To apply the re-production method established for the body of records in question and to implement the action plan to produce an authentic copy of the record in response to a request of access. If specified in the request, to generate a certificate that attests the record's authenticity. Alternatively, if requested, to give the user a reproducible electronic records, that is, the record's digital components with the instructions for rendering it as an authentic copy and with the information necessary to comprehend it.

Key points concerning domain 3

- Technology cannot determine the solution to the permanent preservation of electronic records

- Archival needs define the problem and archival principles must establish the correctness and adequacy of each technical solution

- Solutions to the preservation problem are inherently dynamic

Domain 4: Methodology

- Analysis and synthesis of the results of the first three domains

- Study of international, national and organizational policies, strategies and standards

- Development of an intellectual framework for the formulation of policies and strategies by distilling from the results of the work conducted within the first three domains principles, criteria and processes for the preservation of the authenticity of electronic records

- Evaluation and contextualization of the intellectual framework by each national and multinational research team

Intellectual framework: principles

Any records preservation policy, strategy, or standard should:

- address records specifically rather than digital objects generally; that is, it should address documents made or received and set aside in the course of practical activity.

- focus on authentic electronic records

- recognize and provide for the fact that authenticity is most at risk when records are transmitted across space (that is, when sent between persons, systems, or applications) or time (that is, either when they are stored offline, or when the hardware or software used to process, communicate, or maintain them is upgraded or replaced).

- be based on the concept of trust management and specifically on the concepts of a trusted record-keeping system and the role of the preserver as a trusted custodian.

Intellectual framework: principles

- be predicated on the understanding that it is not possible to preserve an electronic record as a stored physical object: it is only possible to preserve the ability to reproduce the record.

- recognize that the physical and intellectual components of an electronic record do not necessarily coincide and that the concept of digital component is distinct from the concept of element of documentary form

- specify the requirements a copy of a record should satisfy to be considered equivalent to an original

Intellectual framework: principles

- integrate records appraisal and archival description in the continuous process of preservation

- explicitly state that the entire process of preservation must be thoroughly documented as a primary means for protecting and assessing authenticity over the long term

- explicitly recognize that the traditional principle that records relied upon in the usual and ordinary course of business can be presumed to be authentic needs to be supplemented in the case of electronic records by evidence that the records have not been inappropriately altered

Reference

For the findings of InterPARES and related models of appraisal and preservation see the project's web site:

http://www.interpares.org
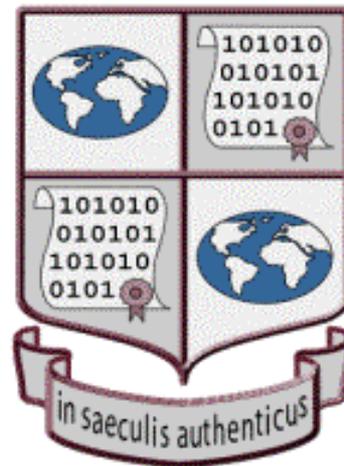
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