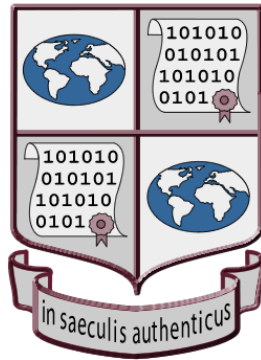


# InterPARES Project

International Research on Permanent Authentic Records in Electronic Systems



## The Preservation of Digital Records: InterPARES Findings

Luciana Duranti

Trieste (from Vancouver)

14 October 2010



# The Goal of InterPARES


To develop the body of theory and methods necessary to ensure that digital records can be created in **accurate** and **reliable** form and maintained and preserved in **authentic form**, both in the long and the short term, for the use of those who created them and of society at large, regardless of technology obsolescence and media fragility; and to develop methods of implementations that can achieve such purposes regardless of the available resources and in respect of organizational culture.



# Key IP 1 & 2 Final Products

## Policy Framework

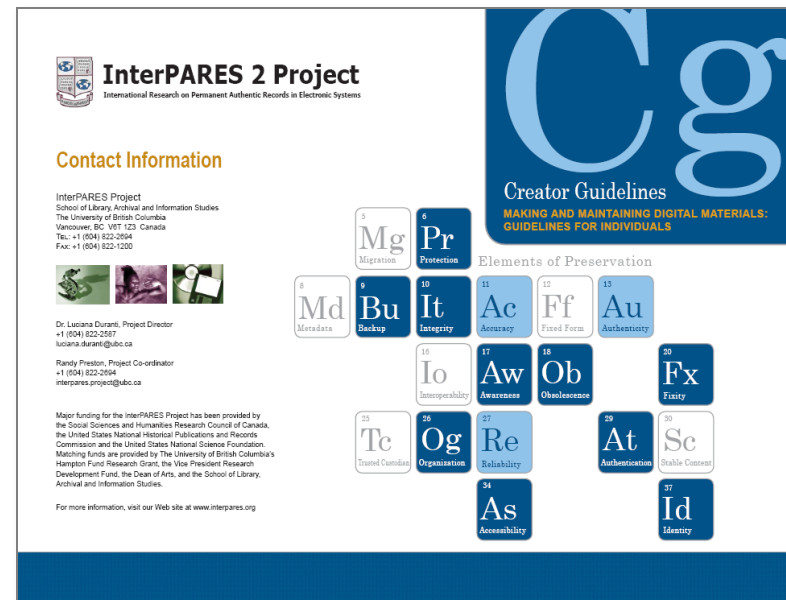
A framework of principles guiding the development of policies for records creating and preserving organizations

	<b>InterPARES 2 Project</b> International Research on Permanent Authentic Records in Electronic Systems
<b>Title: A Framework of Principles for the Development of Policies, Strategies and Standards for the Long-term Preservation of Digital Records</b>	
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<b>Author:</b> The InterPARES 2 Project	
<b>Writer(s):</b> Luciana Duranti, Jim Suderman and Malcolm Todd	
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# IP 1 & 2 Final Products

## Creator Guidelines

Recommendations for making and maintaining digital materials for individuals and small communities of practice



The image shows the cover of the 'InterPARES 2 Project Creator Guidelines'. The top left features the InterPARES 2 Project logo and name. Below it is the contact information for the project director, Luciana Duranti, and the co-ordinator, Randy Preston. The right side of the cover has a large 'Cg' logo and the title 'Creator Guidelines' with the subtitle 'MAKING AND MAINTAINING DIGITAL MATERIALS: GUIDELINES FOR INDIVIDUALS'. The bottom right features a periodic table of elements, where each element is represented by a chemical symbol and a number, corresponding to a specific element of preservation. The elements are arranged in a grid, with some elements missing, creating a pattern that resembles a periodic table.

**InterPARES 2 Project**  
International Research on Permanent Authentic Records in Electronic Systems

**Contact Information**

InterPARES Project  
School of Library, Archival and Information Studies  
The University of British Columbia  
Vancouver, BC V6T 1Z3 Canada  
Tel: +1 (604) 822-2064  
Fax: +1 (604) 822-1200

Dr. Luciana Duranti, Project Director  
+1 (604) 822-2067  
luciana.duranti@ubc.ca

Randy Preston, Project Co-ordinator  
+1 (604) 822-2064  
inter pares.project@ubc.ca

Major funding for the InterPARES Project has been provided by the Social Sciences and Humanities Research Council of Canada, the United States National Historical Publications and Records Commission and the United States National Science Foundation. Matching funds are provided by The University of British Columbia's Hargrave Fund Research Grant, the Vice President Research Development Fund, the Dean of Arts, and the School of Library, Archival and Information Studies.

For more information, visit our Web site at [www.interpares.org](http://www.interpares.org)

**Elements of Preservation**

5 Mg Migration	6 Pr Protection	
8 Md Metadata	9 Bu Backup	10 It Integrity
	11 Ac Accuracy	12 Ff Fixed Form
	13 Au Authenticity	
14 Io Interpretability	15 Aw Awareness	16 Ob Obsolescence
17 Tc Trusted Content	18 Og Organisation	19 Re Reliability
	20 As Accessibility	
		21 At Authentication
		22 Sc Stable Context
		23 Id Identity

# IP 1 & 2 Final Products

## Preserver Guidelines

Recommendations for digital preservation for archival institutions

The image shows the front cover of the 'InterPARES 2 Project Preserver Guidelines' report. The cover has a white background with a blue header and footer. The title 'InterPARES 2 Project' is in a bold, black font, with the subtitle 'International Research on Permanent Authentic Records in Electronic Systems' below it. To the right, the letters 'Pg' are prominently displayed in a large, stylized font. Below the title, there is a section for 'Contact Information' listing the project director, Dr. Luciana Duranti, and the co-ordinator, Randy Preston. To the right of the contact information is a periodic table of elements, where each element's symbol is replaced by a preservation-related term, such as 'Mg' for 'Migrating' and 'Fe' for 'Feasibility'. The table is titled 'Elements of Preservation'. The bottom of the cover features a blue banner with the text 'Preserver Guidelines' and 'PRESERVING DIGITAL RECORDS: GUIDELINES FOR ORGANIZATIONS'.

**InterPARES 2 Project**  
International Research on Permanent Authentic Records in Electronic Systems

**Contact Information**

InterPARES Project  
School of Library, Archival and Information Studies  
The University of British Columbia  
Vancouver, BC V8T 1Z3 Canada  
TEL: +1 (604) 822-2004  
FAX: +1 (604) 822-1200

Dr. Luciana Duranti, Project Director  
+1 (604) 822-2007  
luciana.duranti@ubc.ca

Randy Preston, Project Co-ordinator  
+1 (604) 822-2004  
inter pares.project@ubc.ca

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**Elements of Preservation**

1 Mg Migrating	2 Fe Feasibility				
3 Be Benchmark Requirements	4 Id Identifying	5 Pr Preserving	6 Ac Accuracy	7 St Storing	8 Au Authenticity
9 De Describing	10 Ma Managing	11 Ob Obsolescence	12 Mo Monitoring		
13 Tc Transfer Candidates	14 Op Outputting	15 Ba Baseline Requirements	16 Ap Assessing	17 Tr Transferring	18 Do Documenting
19 Ac Acquiring					



# IP 1 & 2 Final Products

## Benchmark and Baseline Requirements

Authenticity requirements for assessing and maintaining the authenticity of digital records

### << REQUIREMENT SET A >>

To support a presumption of authenticity the preserver must obtain evidence that:

#### REQUIREMENT A.1: Expression of Record Attributes and 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.

##### A.1.a Identity of the record:

- A.1.a.i Names of the persons concurring in the formation of
  - name of author<sup>a</sup>
  - name of writer<sup>b</sup> (if different from the author)
  - name of originator<sup>c</sup> (if different from name of author)
  - name of addressee<sup>d</sup>

##### A.1.a.ii Name of action or matter

##### A.1.a.iii Date(s) of creation and transmission, that is:

- chronological date<sup>e</sup>
- received date<sup>f</sup>
- archival date<sup>g</sup>
- transmission date(s)<sup>h</sup>

##### A.1.a.iv Expression of archival bond<sup>i</sup> (e.g., classification code)

##### A.1.a.v Indication of attachments

##### A.1.b Integrity of the record:

##### A.1.b.i Name of handling office<sup>j</sup>

##### A.1.b.ii Name of office of primary responsibility<sup>k</sup> (if different from the handling office)

##### A.1.b.iii Indication of types of annotations added to the record

##### A.1.b.iv Indication of technical modifications<sup>l</sup>

#### REQUIREMENT A.2: Access Privileges

The creator has defined and effectively implemented access privilege modification, annotation, relocation, and destruction of records.

### << REQUIREMENT SET A (cont) >>

#### REQUIREMENT A.3: Protective Procedures: Loss and Corruption of Records

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

#### REQUIREMENT A.4: Protective Procedures: Media and Technology

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

#### REQUIREMENT A.5: Establishment of Documentary Forms

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

#### REQUIREMENT A.6: 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 what means, and by whom.

#### REQUIREMENT A.7: Identification of Authoritative Record

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

#### REQUIREMENT A.8: Removal and Transfer of Relevant Documentation

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

### << REQUIREMENT SET B >>

The preserver should be able to demonstrate that:

**REQUIREMENT B.1: 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:

##### B.1.a Unbroken custody of the records is maintained;

##### B.1.b Security and control procedures are implemented and monitored; and

##### B.1.c The content of the record and any required annotations and elements of documentary form remain unchanged after reproduction.

#### REQUIREMENT B.2: Documentation of Reproduction Process and its Effects

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

##### B.2.a The date of the records' reproduction and the name of the responsible person;

##### B.2.b The relationship between the records acquired from the creator and the copies produced by the preserver;

##### B.2.c The impact of the reproduction process on their form, content, accessibility and use; and

##### B.2.d 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.


#### REQUIREMENT B.3: 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.

# IP 1 & 2 Final Products

## File Format Selection Guidelines

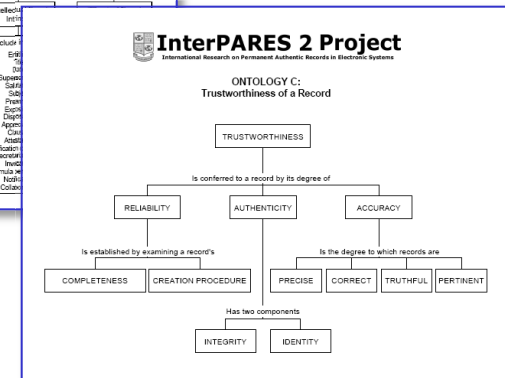
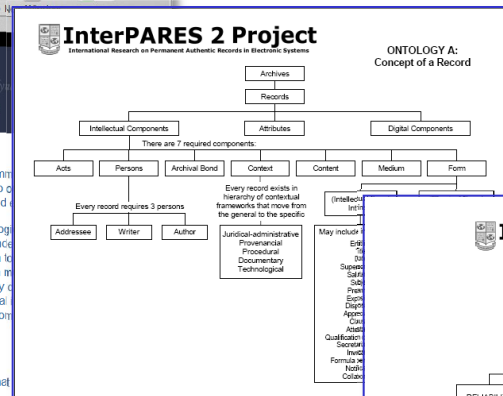
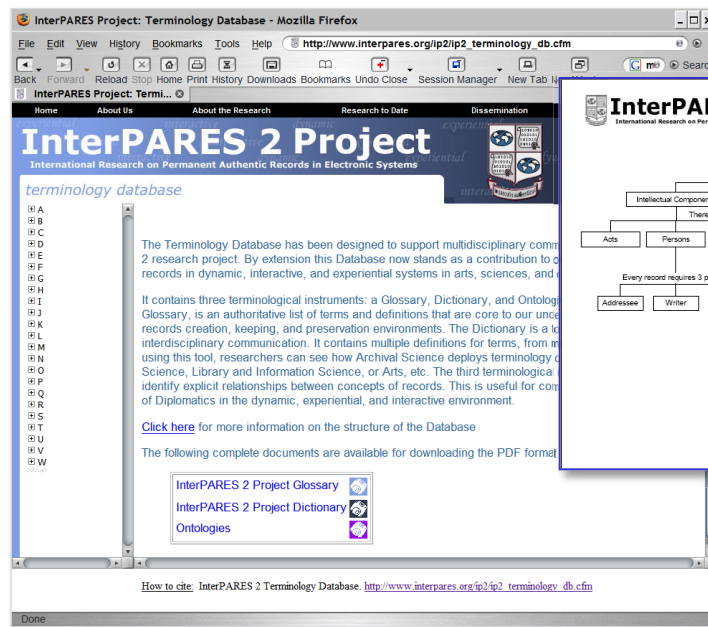
Principles and criteria for adoption of file formats, wrappers and encoding schemes

 <b>InterPARES 2 Project</b> <small>International Research on Permanent Authentic Records in Electronic Systems</small>	
<b>Title:</b> General Study 11 Final Report: Selecting Digital File Formats for Long-Term Preservation	
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<b>Author:</b> The InterPARES 2 Project	
<b>Writer(s):</b> Evelyn Peters McLeish	
<b>Project Unit:</b> Domain 3 (Methods of Appraisal & Preservation)	
<b>URL:</b> <a href="http://www.interpares.org/display_file.cfm?doc=ip2_file_formats(complete).pdf">http://www.interpares.org/display_file.cfm?doc=ip2_file_formats(complete).pdf</a> [English] <a href="http://www.interpares.org/display_file.cfm?doc=ip2_file_formats_tchiers_numeriques.pdf">http://www.interpares.org/display_file.cfm?doc=ip2_file_formats_tchiers_numeriques.pdf</a> [French]	
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# IP 1 & 2 Final Products

## Terminology Database

Including a glossary, a dictionary and ontologies





# Two Records Management Models

[illegible]

# IP 1 & 2 Final Products

## Two books:

Luciana Duranti, ed. *The Long-term Preservation of Authentic Electronic Records: Findings of the InterPARES Project* (San Miniato: Archilab, 2005). Available on line at

<http://www.interpares.org/book/index.cfm>

Luciana Duranti and Randy Preston, eds. *InterPARES 2: Interactive, Dynamic and Experiential Records* (Roma: ANAI, 2008). Available on line at

<http://www.interpares.org/ip2/book.cfm>.



# Most Important Findings

- **Conceptual**
  - The Concept of Record
  - The Concept of Life Cycle
  - The Concept of Trustworthiness
- **Methodological**
  - Appraisal
  - Preservation
- **Strategic**
  - Relationship Creator-Preserver
  - The Role of the Archivist

# The Concept of Record

- **Record**: any document created (i.e., made or received and set aside for action or reference) by a physical or juridical person in the course of activity as an instrument and by-product of it
- **Document**: recorded information (i.e., information affixed to a medium in an objectified and syntactic form)
- **Information**: a message intended for communication across time and space
- **Data**: the smallest meaningful piece of information

# Digital Record Characteristics

- **Medium:** necessary part of the technological context, not of the record
- **Stable Content and Fixed Form**
- **Archival Bond:** explicit linkages to other records inside or outside the system
- **Five Necessary Persons:** author, writer, originator, addressee, and creator
- **Act:** an action in which the records participates or which the record supports
- **Five Necessary Contexts:** juridical-administrative, provenancial, procedural, documentary, technological

# Fixed Form

- An entity has fixed form if its binary content is stored so that the message it conveys can be rendered with the **same documentary presentation** it had on the screen when first saved (different digital presentation: Word to .pdf)
- An entity has fixed form also if the same content can be presented on the screen in several different ways in a **limited series of possibilities**: we have a different documentary presentation of the same stored record having stable content and fixed form (e.g. statistical data viewed as a pie chart, a bar chart, or a table)

# Stable Content

- An entity has stable content if the data and the message it conveys are **unchanged and unchangeable**, meaning that data cannot be overwritten, altered, deleted or added to
- **Bounded Variability**: when changes to the documentary presentation of a determined stable content are limited and controlled by fixed rules, so that the same query or interaction always generates the same result, and we have different views of different subsets of content, due to the intention of the author or to different operating systems or applications

# The Parts of a Digital Record

- **Formal Elements:** constituent parts of the record documentary form as shown on its face, e.g. address, salutation, preamble, complimentary close
- **Metadata:** the attributes of the records that demonstrate its identity and integrity
- **Digital Components:** stored digital entities that either contain one or more records or are contained in the record and require a specific preservation measure



# Stored and Manifested Record

- **Stored record:** it is constituted of the digital component(s) used in re-producing it, which comprise the data to be processed in order to manifest the record (content data and form data) and the rules for processing the data, including those enabling variations (composition data)
- **Manifested record:** the visualization of the record in a form suitable for presentation to a person or a system. Sometimes, it does not have a corresponding stored record, but it is re-created from fixed content data when a user's action associates them with specific form data and composition data (e.g. a record produced from a relational database)

# Static and Interactive Records

**Static Records:** They do not provide possibilities for changing their manifest content or form beyond opening, closing and navigating: e-mail, reports, sound recordings, motion video, snapshots of web pages

**Interactive Records:** They present variable content, form, or both, but the rules governing the content and form of presentation are fixed. Ex. Interactive web pages, online catalogs, records enabling performances

# Interactive Entities

- **Not-dynamic:** the rules governing the presentation of content and form do not vary, and the content presented each time is selected from a fixed store of data. Ex. Interactive web pages, online catalogs, records enabling performances—**they are records**
- **Dynamic:** the rules governing the presentation of content and form may vary—**they are potential records**

# New Concept of Records Life-Cycle

Based on the recognition that we cannot maintain or preserve digital records, but only the ability to re-produce or re-create them, and that re-productions and re-creations of digital records

- if made by the creator in the course of and for the purposes of its business, are **records of the creator**, while
- if made by the preserver in the course and for the purposes of archival functions, are **authentic copies of the records of the creator**

# Digital Records Life-Cycle

It comprises **two phases** related to the status of transmission of the record (i.e. degree of perfection: whether draft, original or copy)

**Phase 1: Records of the creator:** the re-productions and re-creations behave and have to be treated as originals every time they are used and acted upon

**Phase 2: Authentic copies of the records of the creator:** they cannot be treated as originals because the creator has never used or acted upon them after re-production, which is made for preservation purposes.

# As a Consequence...

- The creator can decide at any time to stabilize its own fluid entities and to give them the most useful, accessible, interoperable form, or the form that best serves its present and projected needs, and have as a result an entity that we can call “record of the creator”
- The preserver can only preserve what it receives from the creator by making an authentic copy of it, and has no right to stabilize it or alter its documentary form—only its digital presentation, or format
- Whether the stabilized record of the creator and its authentic copy made by the preserver are to be considered trustworthy depends on the context in which they are created and used

# Trustworthiness

## Reliability

The trustworthiness of a record as a statement of fact,

*based on:*

- the competence of its author
- the controls on its creation

## Accuracy

The correctness and precision of a record's content

*based on:*

- the competence of its author
- the controls on content recording and transmission

## Authenticity

The trustworthiness of a record that is what it purports to be, untampered with and uncorrupted

*based on:*

- identity
- integrity

# Authenticity: Identity

The whole of the attributes of a record that characterize it as unique, and that distinguish it from other records.

## Identity metadata:

- names of the 5 persons concurring in its creation
- date(s) and time(s) of issuing, creation and transmission
  - the matter or action in which it participates
    - the expression of its archival bond
      - documentary form
      - digital presentation
  - the indication of any attachment(s)
    - digital signature
- name of the person responsible for the business matter



# Authenticity: Integrity

A record has integrity if the message it is meant to communicate in order to achieve its purpose is unaltered.

## Integrity metadata:

- name(s) of handling persons over time
- name of person responsible for keeping the record
  - indication of annotations
  - indication of technical changes
- indication of presence or removal of digital signature
  - time of planned removal from the system
  - time of transfer to a custodian
  - time of planned deletion
- existence and location of duplicates outside the system

# Authentication

A means of declaring the authenticity of a record at one particular moment in time -- possibly without regard to other evidence of identity and integrity.

Example: the **digital signature**. Functionally equivalent to medieval seals (not signatures):

- verifies origin (identity)
- certifies intactness (integrity)
- makes record indisputable and incontestable (non-repudiation)

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

# Digital Records Preservation

1. Establish a digital preservation program
2. Appraise digital records
3. Transfer digital records to the preserver's custody
4. Process digital records
5. Create archival description
6. Store digital records
7. Convert and migrate digital records



# Establish a Digital Preservation Program

- Establish Scope and Objectives
- Acquire Resources
- Focus on Digital Records
- Offer Advice
- Set a Good Example
- Develop Procedures
- Implement Maintenance Strategies



# Appraise Digital Records

1. As early as possible in the life of the records, **assess their continuing value** to the creator (after having identified multiple owners) and/or the designated preserver
2. Assess the **authenticity** of the records considered for continuing preservation, and document the process
3. Determine the **feasibility** of their preservation (after having identified all digital components) by the designated preserver (creator and/or delegated archives); and,
4. Constantly **monitor** all the records of the creator and, if warranted by the changes that they have undergone through time, **revise the appraisal decision**

# Assess the Authenticity of the Records

- Never done before because the records we kept over time were physically the same made or received and kept by the creator
- It is based on the assessment of the **identity and integrity of the records** either by **inference** if there are procedures in place that control the making and keeping of the records and their use, or by **verification**, comparing multiple copies, through recognition by the authors and other similar procedures
- If done long before acquisition by the preserver it must be repeated before transfer to the archival program or institution

# Determine the Feasibility of Preservation

- It means 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 digital record, and/or data or metadata necessary to order, structure, or manifest its content, and that requires specific methods for preservation
- Digital components are to the **stored record** what elements of form are to the **manifested record**. All digital records have digital components, but not all have elements of form.

# Monitor the Records

- All the records (not only those appraised for continuing preservation) must be checked on a regular basis
- This involves looking for changes both in their technological context and in their use
- In some cases it may be necessary to repeat the appraisal because of changes that can affect the feasibility of preservation or because the records result from other functions or present different characteristics
- In most cases, monitoring produces minor revisions to the documentation on the selection and to the terms and conditions of transfer
- Example of the UBC Students Registration System



# Acquire Selected Digital Records

- Develop shared plan for transfer
- Enforce standardised procedures
- Keep the oldest available logical format
- Avoid duplicates
- Document all processing

# Establish Scope and Objectives: What is the Purpose of Preservation?

1. To show the records as they were experienced by those who interacted with it when created—impossible
2. To re-create, re-execute or re-install the records as they were—emulation
3. Show various elements of the records—imaging
4. To enable a subsequent non-identical reproduction in which the essence of the records is conveyed, not necessarily their form and behaviour—migration

# Preservation 3/4

It involves the creation of authentic copies of the records of the creator. Their authenticity is guaranteed by:

- a controlled process of migration of the acquired records to the archives technological environment (always keeping the records in the format in which they were acquired)
- the accurate documentation of any change that the records undergo during such process and every time that the archives technological environment is upgraded
- the implementation and monitoring of privileges concerning the access, use and reproduction of the records within the archives

# Preservation (cont.)

- the establishment of procedures to prevent, discover, and correct loss or corruption of records, as well as
- procedures to guarantee the continuing identity and integrity of the records against media deterioration and across technological changes (ongoing conversion and migration) also by maintaining proper storage; and
- if authentication of individual records is required, by the existence of rules determining responsibility for and means of authentication.

# Archival Description

Archival description acquires a primary authentication function

- The authentication function of archival description is a collective attestation of the authenticity of the records of a *fonds* and of all their interrelationships
- The unique function of archival description is to provide an historical view of the records and of their transformations while maintaining the bond of their common provenance and destination

# What Else Is Needed

The **unbroken chain of preservation** must begin at creation and continue from the record-making system to the recordkeeping system and the record preservation system

Keeping in mind that solutions to digital preservation are always specific, **respect the organizational culture:** the collection of values and norms that are shared by people and groups in an organization and that control the way they interact with each other and with stakeholders outside the organization

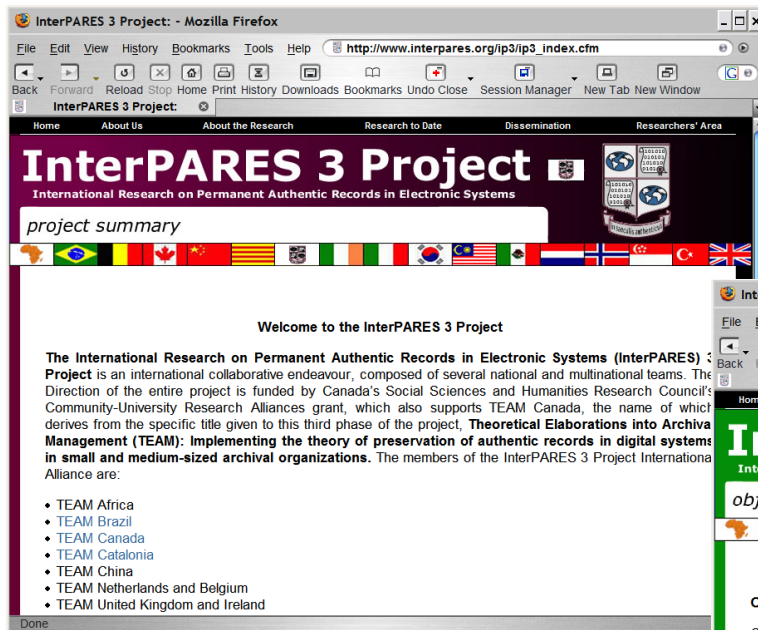
The new emphasis on accountability allows the archives to fulfill these needs by **presenting itself as the trusted custodian**

# Archivist as Trusted Custodian

The trusted custodian is a person who

- acts as a **neutral third party**, i.e., demonstrates that he/she has no stake in the content of the records and no reason to alter records under his/her custody, and that he/she will not allow anybody to alter the records either accidentally or on purpose,
- is equipped with the **knowledge and skills** necessary to fulfil its responsibilities, which should be acquired through formal education, and
- establishes a **trusted preservation system** that is capable of ensuring that accurate and authentic copies of the creator's records are acquired and preserved

# InterPARES 3 Web Site



[www.interpares.org](http://www.interpares.org)





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