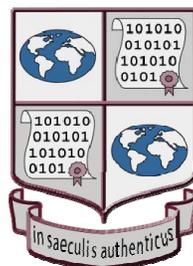


# InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems



## Concept of Record in Interactive, Experiential and Dynamic Digital Environments

CLAID Team Workshop, Vancouver, BC  
15 February 2006

Randy Preston  
School of Library, Archival and Information Studies  
The University of British Columbia, Canada



**InterPARES 2 Project**  
Randy Preston  
Concept of Record – CLAUD Team Workshop, 15 Feb 2006

1 of 39

# Outline

1. Basic record concepts and definitions
2. Key IP1 findings
3. Characteristics of Interactive, Experiential and Dynamic (IED) contexts
4. Identifying documents in IED contexts
5. Identifying records in IED contexts
6. Key IP2 findings
7. Summary
8. Discussion



# Electronic Records

## Basic requirements:

- Fixed documentary form
  - Stored binary content remains complete and unaltered
  - Able to be rendered with same form as when set aside
- Stable content
- Archival bond (i.e., explicit linkages to related records)
- Identifiable administrative context
- Identifiable author, writer, addressee and creator
- Identifiable action in which the record participates or which the record supports



# Electronic Records

## Key Features:

- **Attributes:** Defining characteristics of a record, or of record elements (e.g., author)
- **Elements:** Constituent parts of a record's *documentary form* (e.g., signature, seal)
- **Components:** Necessary parts of a record (e.g., documentary form, context, archival bond)
- **Digital Components:** Bit streams required to reproduce records. May comprise *content*, *form*, or *composition* data, or some combination of these.
  - Data type  $\approx$  analogous to physical medium



## Key Data Types

- **Content Data:** Constitute the content of a record.
- **Form Data:** Enable systems to reproduce records in their correct form.
- **Composition Data:** Tell systems what form and content data belong to which records.



# InterPARES 1 Findings

- Stored digital components  $\neq$  the record, they only enable its reproduction
- Stored digital components consist solely of content
- Manifested form  $\neq$  digital, stored form
- Preserving the manifest record = maintaining the ability to reproduce it from its digital components



# InterPARES 1 Findings

- Content, form and wholeness are determined conceptually and logically, not physically (i.e., medium and encoding scheme are irrelevant)
- Fixed form  $\neq$  a completely invariant form
  - Bounded variability (whether intentional or not) is acceptable if it does not compromise the nature of the record



## IP2: Interactive Environment

- One in which each user entry or input from another system causes a response from, or action by, the system.
- Both input and response options are bounded by a fixed set of pre-programmed or pre-determined variability.
- Primary purpose is to communicate specific information to the user.
- **Example:** Automatic Teller Machine (ATM)



## IP2: Experiential Environment

- Interactive system that provides for user interaction driven primarily by a user's interests (rather than by a set of pre-programmed options)
- Primary purpose is to communicate specific information to the user and/or engender a subjective user experience.
- **Examples:** video games, interactive art performances



## IP2: Dynamic Environment

- Interactive system (may also be experiential), that typically supports input, extraction and/or processing of information from heterogeneous sources, as well as variable output.
- Input data may autonomously change both the possibilities and requirements for processing input and producing output in real time.
- **Examples:** ‘evolutionary’ computing systems; systems involved in scheduling and modeling of financial markets



# Documents in IED Environments

## Basic Considerations:

- Documents can assume any form or contain any content, but must be finite, bounded entities.
- Existence of I, E or D systems does not necessarily imply their documents must exhibit I, E or D characteristics.
- All 3 environments can produce digital equivalents of traditional documents (e.g., invoices, receipts, packing slips, etc.), as well as digital documents with no traditional equivalents.



# Documents in IED Environments

## Key Concerns:

- Hard to identify clearly defined documents because:
  - the systems generally do not store any objects equivalent to what users see
  - input from users or other systems can continuously change both content and form of manifested documents



# Documents in I-Environments

## Basic Considerations:

- Excludes consideration of 'generic' interactions, as opposed to 'document-specific' interactions.
- Interactive documents = those that accommodate user input and use such input to change the content and form of the manifested documents.
- Appearance of interactive documents may resemble traditional forms, but such appearance often is misleading.



# Documents in I-Environments

## Basic Considerations:

- System only presents part of interactive document's content at any one time.
- User inputs are compositional data.
- Content of manifested documents change in response to each user input.
- Form data (e.g., HTML, XML files) specify how the system should display the content data.



# Documents in I-Environments

## Key Conclusions:

- Despite potential for variability of manifested documents, *pre-determined* nature of the variability ensures the system would produce identical output in response to identical user inputs.
- Thus, an interactive document exists if a system retains the ability to reproduce the document in response to identical inputs.



# Documents in E-Environments

## Basic Considerations:

- Experiential object = object that gives rise to experience or captures an experience.
- Hence, two types of experiential documents are identified:
  - Those used in *producing* or *enabling* experiences (e.g., musical scores)
  - Those that *capture* experiences (e.g., audio recordings of musical performances)



# Documents in E-Environments

## Subtypes of Enabling Documents:

- Those consisting of “instructions” whose execution produces an experience.
- Those describing the components, context, preconditions, or requirements for the experience, and whose execution is intended to help ensure users can recreate similar or identical experiences in the future.



# Documents in I-Environments

## Key Conclusions:

- Documents that enable experiences also enable variations in experiences and/or user perceptions of experiences.
- Hence, harder to identify and isolate than purely interactive documents due to greater latitude in user input, and subjective nature of user's perception of manifested document that adequately recreates the original experience in the user's eyes.



# Documents in D-Environments

## 3 Basic Document Strategies:

- Have fixed form, but draw some or all content in real time from sources external to the system (e.g., weather websites),
- Use fixed content, but vary both form and selection of elements of content to be presented in response to real-time inputs (e.g., marketing websites), and/or
- Use content that, although stored within the system, changes frequently through deletion, addition and/or replacement (e.g., GIS).



# Documents in I-Environments

## Key Conclusions:

- Heterogeneous nature of input sources, as well as document content and data types, coupled with ability of such systems to reconfigure themselves 'on the fly,' makes identification of clearly defined dynamic documents difficult.
- Dynamic documents are a subset of interactive documents distinguished, in part, by their capacity for 'autonomous' variability (vs. 'pre-determined' variability exhibited by purely interactive documents).



# Taxonomy of Static Documents

Class	Description	
1	<b>Static documents</b> Digital documents are static when they do not provide possibilities for changing their manifest content or form beyond opening, closing, and navigating within the document. Once a static document is retrieved and manifested, its entire content is available to the user and its structure is invariant. A user may need to interact with the system in order to access the content, or different portions of the content, but such interactions do not change the form or content of the document. Any user exercising an option for navigating within the document – which includes options for different manifestations of the document – will be presented with the same result.	
1.1	The electronic equivalents or counterparts of traditional documents	
	<i>Examples</i>	<i>Letters; reports of scientific experiments or observations of natural phenomena output from dynamic systems; digital sound recordings, digital motion video, and visual art works</i>
1.2	Documents that have no exact counterpart in hard copy or analog form but have fixed documentary form and content	
	<i>Examples</i>	<i>Snapshots of web pages, and recordings of performances of artworks which have characteristics that may exist only in a digital environment, as well as the results of freezing and capturing the output of a system that modifies its own instructions for processing or presenting content data</i>



# Taxonomy of Interactive Documents

Class	Description	
2	<b>Interactive Documents</b> Documents that present variable content, form, or both but have fixed rules which govern the content and form of presentation	
2.1	Interactive Documents which are not dynamic	
2.1.1	Documents where the content presented in any instance is selected from a fixed store of data within the system	
	<i>Examples</i>	<i>Online sales catalogs, interactive web pages, and documents which enable performance of music and other works of art</i>
2.1.2	Documents where the content and/or its presentation vary because it includes or is otherwise impacted by data that change frequently	
	<i>Examples</i>	<i>Documents in systems whose design permits updating, replacement or alteration of data but does not provide for keeping older or superseded data, and websites that collect data from users or about user interactions with or actions on a web site and use those data either to generate or determine subsequent presentation</i>
2.1.3	Documents where the content varies because it includes data received from external sources and not stored within the system	
	<i>Examples</i>	<i>Websites which present information on topics such as the weather or currency exchange rates, as well as many interactive artworks</i>



# Taxonomy of Dynamic Documents

Class	Description
2.2	<b>Dynamic Documents</b> Documents where the rules which govern the content and form of presentation vary
2.2.1	Documents produced in dynamic computing applications, which select different sets of rules – software applets or service components – to produce the documents depending on variations in user inputs, in the sources of content data, and in the characteristics of that content
2.2.2	Documents produced by adaptive or evolutionary computing applications, where the software which generates the documents can change autonomously



# Records in IED Environments

## Basic Considerations:

- Essential function of a record is to serve as 'memory' of an action, event, etc.
- Two essential characteristics of electronic records are fixed form and stable content.
- However, these constraints are not absolute.
- Bounded variability (whether intentional or not) is acceptable if it does not compromise the nature of the record.



## Key IP2 Findings

- Bounded Variability
- Manifested Documents vs. Manifested Records
- Stored vs. Manifested Records
- Retrospective vs. Prospective Records



## Bounded Variability

- Variation in content and/or form of a record, whether intentionally imposed or not, that does not compromise vital essence of the record or original intent of record's author.
- Digital technology supports *intentional* variability in the form in which information is presented.
- In essence, form is 'fixed' in that rules, procedures or processes enable authors to intentionally allow certain aspects of form to vary, but not others.
- Such variability should be considered part of the extrinsic elements of documentary form.



## Manifested Docs vs. Records

- Concept of a manifested record should accommodate any and all bounded variability in form and content that is specific to the record.
- For a manifested document to be a record, it must be possible to reproduce it repeatedly as it first appeared (within acceptable limits of bounded variability).
- If the system allows new input that can change content or form of the manifested document, it cannot be a record.



**InterPARES 2 Project**

Randy Preston

Concept of Record – CLAIID Team Workshop, 15 Feb 2006

27 of 39

## Manifested Docs vs. Records

- If a document uses and stores external content sources sequentially, rather than concurrently, it cannot be presumed to contain a fixed message and, hence, cannot be a record.



## Stored vs. Manifested Records

- IP1 finding that stored digital components only enable reproduction of the record, and are never themselves a record, is too limiting.
- In fact, digital components of a manifested record can themselves constitute distinct records when:
  - A digital component comprises all data necessary to reproduce a manifested record (e.g., binary image of a printable document)
  - A digital component has “a fundamental unity, autonomy and completeness” unto itself (e.g., logical model of a database, database form or report)
- Digitally stored record includes extra data (e.g., rendering instructions)



## Digitally Stored Records

- If the system stores an object that is a digital representation of a manifested document, that object can qualify as a stored record, unless form or content of the stored object is itself modifiable.
- If the document kept and used for future reference is the digital object (rather than a material rendering of that object), then the stored digital object is the record (e.g., online sales catalogue).
- In contrast to IP1 findings, stored records include content as well as the rules for processing that content, including rules that enable variation in form or content of the manifested record.



## Digitally Stored Records

- One or more digital components of a manifested record may also be used in reproducing other manifested records.
- A digital component in a set of digital components that comprises a manifested record can be considered a record itself if it is also used in the output of multiple records independently of the other digital components in the set.



# Memorial Functions of Records

## Retrospective Record

- Stored and/or manifested record whose principal function is to serve as memory of a past interaction, experience or dynamic process (e.g., recording of a performance, documentation of research results).

## Prospective Record

- Stored and/or manifested record, typically comprised of a set of instructions, whose principal function is to enable and/or inform future interactions, experiences or dynamic processes.
- Two subtypes: instructive and enabling.



# Instructive Record

- Manifested, prospective record containing instructions about executing an action or process.
- Exist as records reproduced from stored digital components into human-readable form.
- **Examples**: musical scores; regulations; manuals of procedures, instructions for filling out forms.



## Enabling Record

- Stored, prospective record that is actively involved in carrying out an action or process in a system.
- While active, an enabling record must exist in machine-readable form and be maintained in the system in which it was created to achieve its purpose.
- **Examples:** software patches that enable a musical instrument to interact with a computer; software agents that enable interacting business applications to execute transactions autonomously.



## Summary

- IP1 concept of electronic record excluded any consideration of digital components stored in a system as constituting records.
- IP2 findings have broadened this IP1 concept beyond just manifested records to also include stored digital records and, in certain cases, individual digital components of manifested records as records themselves.
- IP1 record requirements of fixed form and stable content have been re-affirmed, but with a deeper understanding of, and appreciation for, the role that bounded variability plays.



## Discussion

- What actually constitutes a ‘system,’ especially in terms of external vs. internal content/data sources, etc., and how should we define and delineate the boundaries of these systems?
- What impact does this have on the process of defining and identifying interactive, experiential and dynamic environments or the records associated with them?
- For example, how does an online catalogue system differ from a geographical information system in terms of what constitutes external and internal content/data sources?



# Discussion

## Record granularity

- What impact does granularity have on the identification and/or creation of records in IED environments? (e.g., entire object-as-record vs. individual object-interactions-as-record)

## Record perspective

- What impact does perspective have on what constitutes a record in IED environments? (e.g., activity from point of view of an author/artist vs. a user/participant, etc.)



# Discussion

## Record function

- As noted in the article, all records are substitutes that stand for or take the place of acts or facts.
- Is it therefore reasonable or necessary to expect that records be able to capture and reproduce an entire past interactive, experiential or dynamic activity or process?
- Do we expect this same level of functionality from our non-digital records?



# Discussion

## Record function (cont.)

- For example, at one point the article states that, “Reproduction of a digital document is not sufficient to reproduce a performance...”
- Should we expect a record to be capable of this?
- A record in the form of a receipt of a transaction is equally incapable of reproducing the transaction activity it documents, but so what? Is *reproducing* the transaction activity the function of the record?

