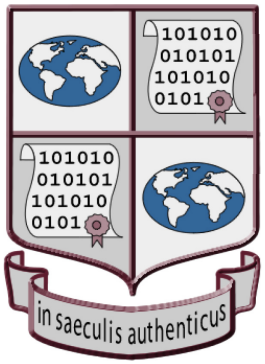
InterPARES Project

International Research on Permanent Authentic Records in Electronic Systems



Continuity and Transformation in the Role of the Archivist

The Findings of the InterPARES Project

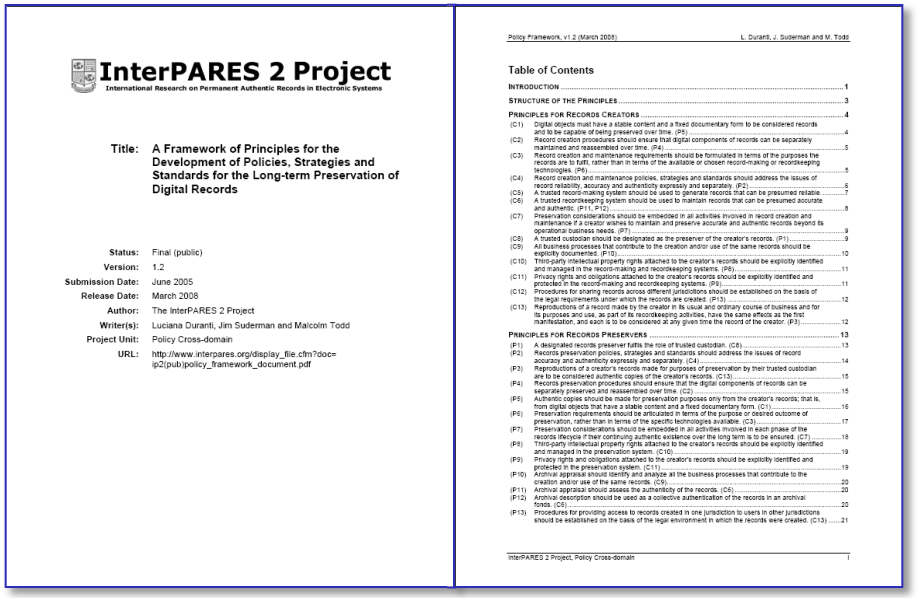
The Goal of InterPARES 1 & 2

To develop the body of theory and methods necessary to ensure that digital records produced in databases and office systems as well as in dynamic, experiential and interactive systems in the course of artistic, scientific and e-government activities 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.

Key IP 1 & 2 Final Products

Policy Framework

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



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

Title: A Framework of Principles for the Development of Policies, Strategies and Standards for the Long-term Preservation of Digital Records

Status: Final (public)
Version: 1.2
Submission Date: June 2005
Release Date: March 2008
Author: The InterPARES 2 Project
Writer(s): Luciana Duranti, Jim Suderman and Malcolm Todd
Project Unit: Policy Cross-domain
URL: http://www.interpares.org/display_file.cfm?doc=ip2(pub)policy_framework_document.pdf

Policy Framework, v1.2 (March 2008) L. Duranti, J. Suderman and M. Todd

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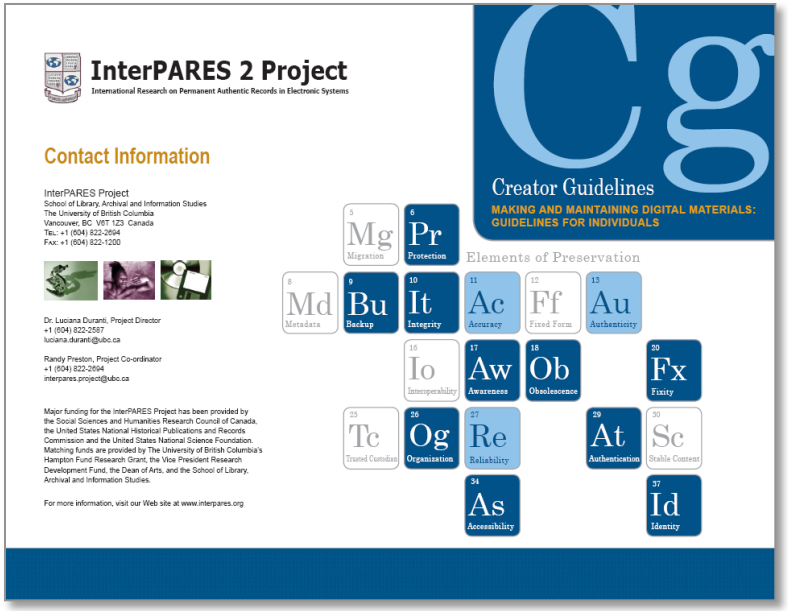
InterPARES 2 Project, Policy Cross-domain 1

IP 1 & 2 Final Products

Creator Guidelines

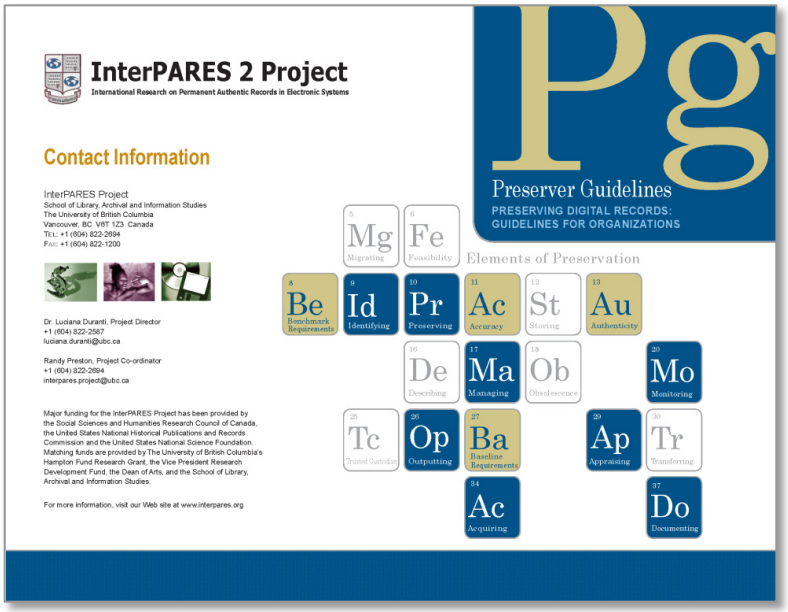
Recommendations for making and maintaining digital materials for individuals and small communities of practice



IP 1 & 2 Final Products

Preserver Guidelines

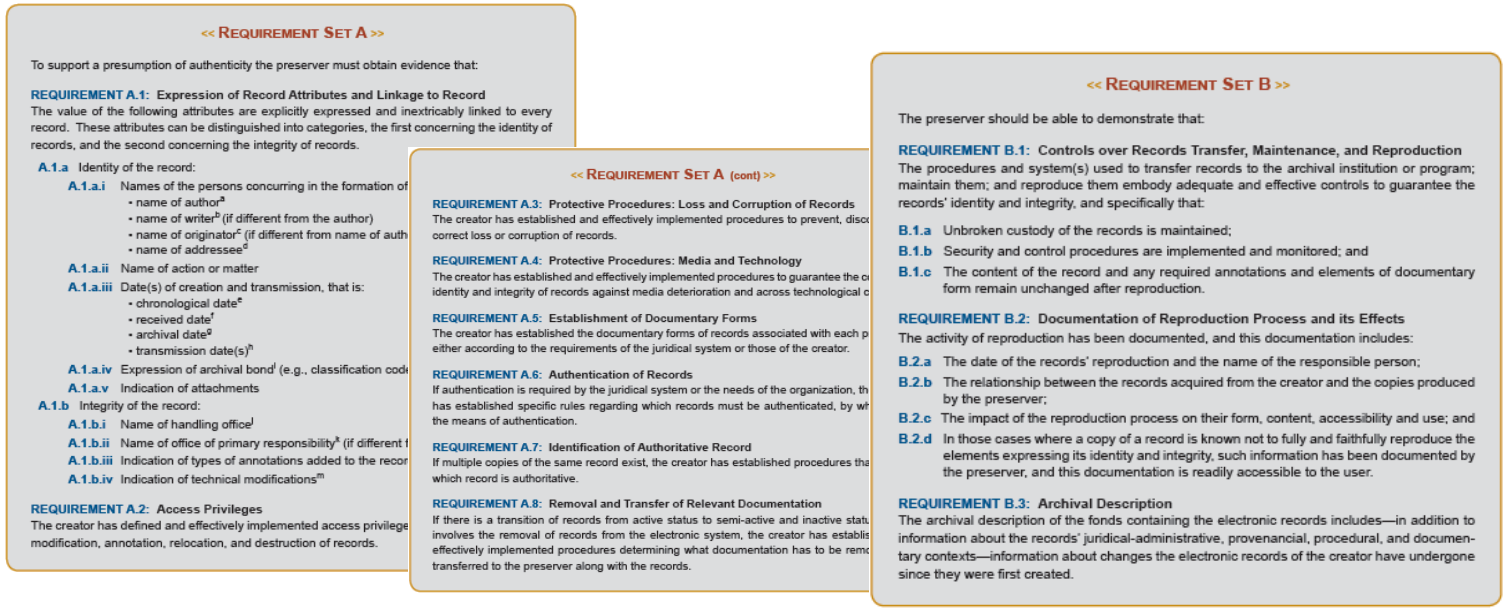
Recommendations for digital preservation for archival institutions



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[a]
  - name of writer[b] (if different from the author)
  - name of originator[c] (if different from name of auth
  - name of addressee[d]
- A.1.a.ii Name of action or matter
- A.1.a.iii Date(s) of creation and transmission, that is:
  - chronological date[e]
  - received date[f]
  - archival date[g]
  - transmission date(s)[h]
- A.1.a.iv Expression of archival bond[i] (e.g., classification cod
- A.1.a.v Indication of attachments

A.1.b Integrity of the record:
- A.1.b.i Name of handling office[j]
- A.1.b.ii Name of office of primary responsibility[k] (if different
- A.1.b.iii Indication of types of annotations added to the recor
- A.1.b.iv Indication of technical modifications[m]

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, disc
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 c
identity and integrity of records against media deterioration and across technological c

REQUIREMENT A.5: Establishment of Documentary Forms
The creator has established the documentary forms of records associated with each p
either 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, th
has established specific rules regarding which records must be authenticated, by wh
the means of authentication.

REQUIREMENT A.7: Identification of Authoritative Record
If multiple copies of the same record exist, the creator has established procedures tha
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 statu
involves the removal of records from the electronic system, the creator has establis
effectively implemented procedures determining what documentation has to be rem
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:

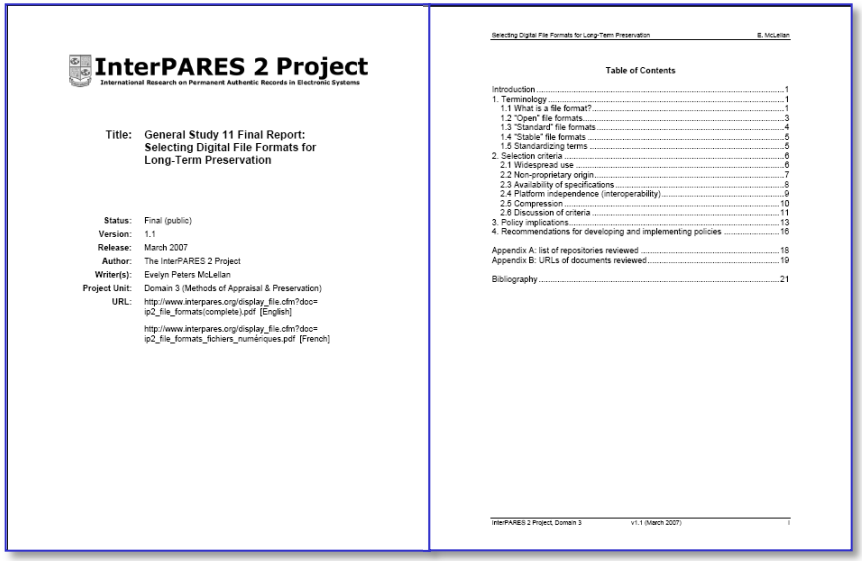
- B.2.a The date of the records' reproduction and the name of the responsible person;
- B.2.b The relationship between the records acquired from the creator and the copies produced by the preserver;
- B.2.c The impact of the reproduction process on their form, content, accessibility and use; and
- B.2.d 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



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

Title: General Study 11 Final Report: Selecting Digital File Formats for Long-Term Preservation

Status: Final (public)
Version: 1.1
Release: March 2007
Author: The InterPARES 2 Project
Writer(s): Evelyn Peters McLellan
Project Unit: Domain 3 (Methods of Appraisal & Preservation)
URL: http://www.interpares.org/display_file.cfm?doc=ip2_file_formats(complete).pdf [English]
http://www.interpares.org/display_file.cfm?doc=ip2_file_formats_fichiers_numériques.pdf [French]

Selecting Digital File Formats for Long-Term Preservation — E. McLellan

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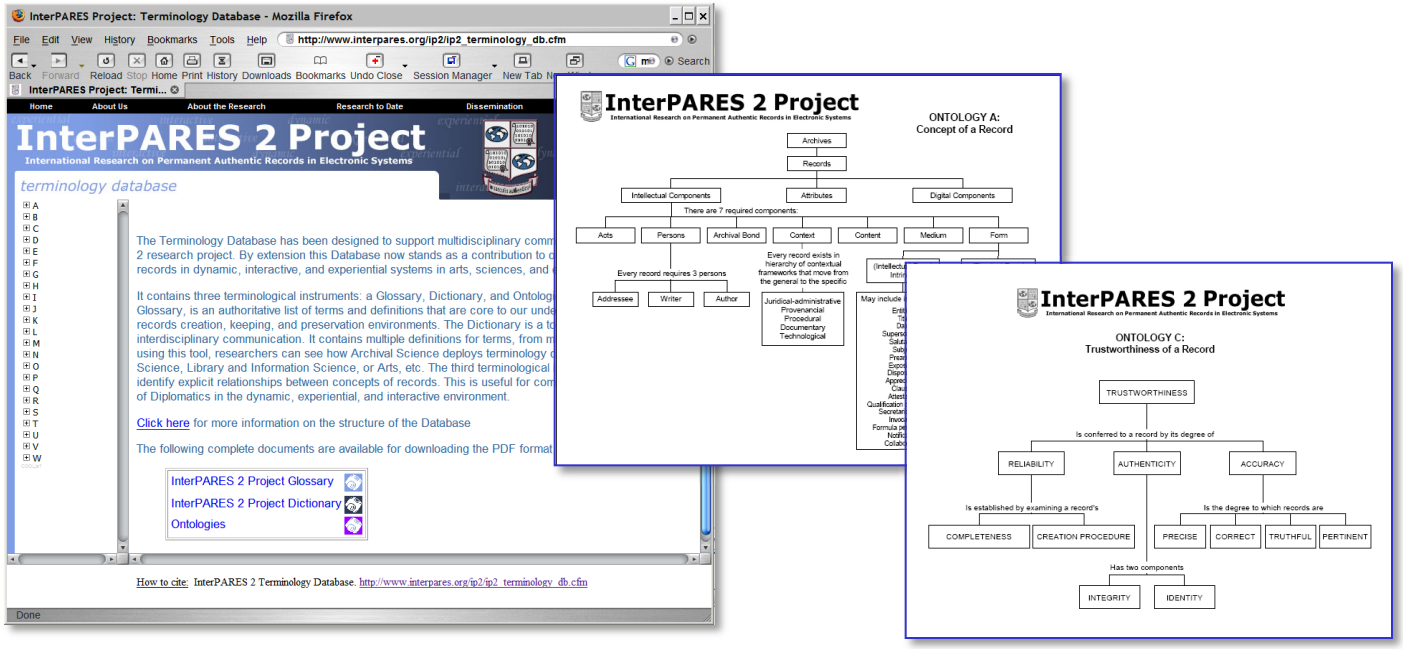
IP 1 & 2 Final Products

Terminology Database

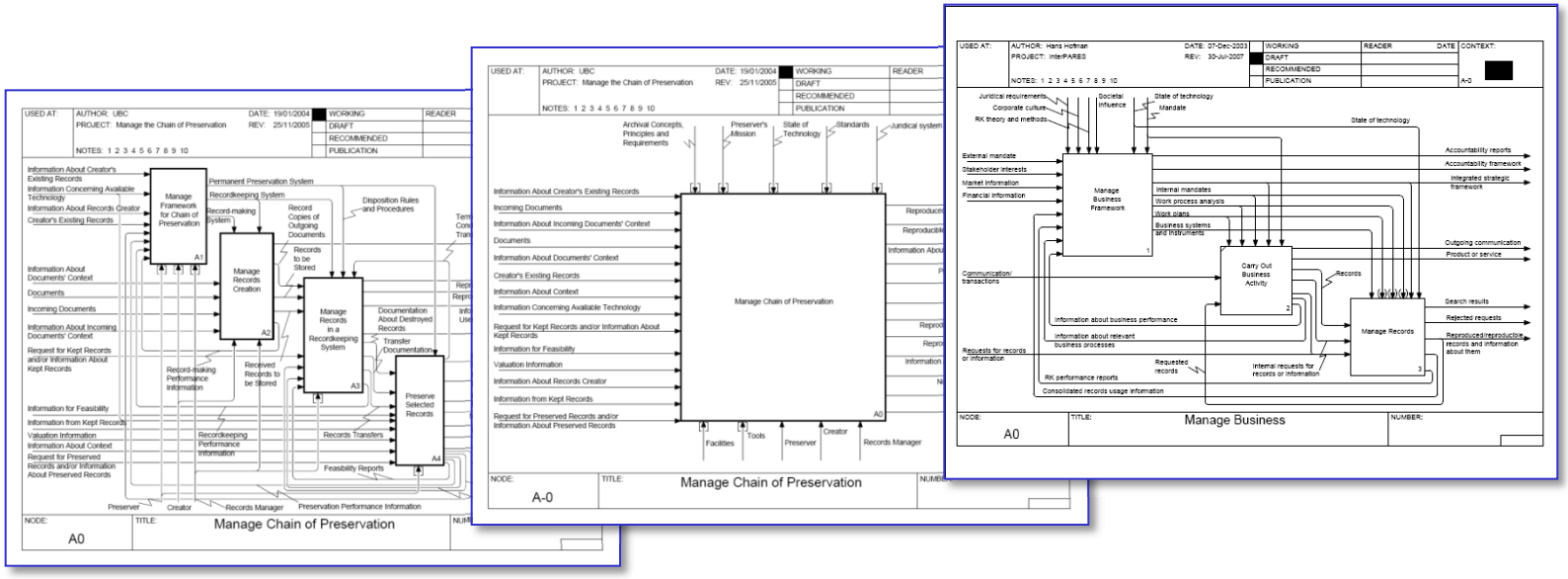
Including a glossary, a dictionary and ontologies



IP 1 & 2 Final Products

Two Records Management Models

Chain of Preservation (COP) Model (lifecycle)
Business-driven Recordkeeping (BDR) Model(continuum)



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 (identified in InterPARES 1)

- **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

Digital Record Characteristics (cont.)

- **Formal Elements**: a constituent part of the record documentary form as shown on its face (intrinsic or extrinsic)
- **Metadata**: the attributes of the records that demonstrate its identity and integrity (authenticity)
- **Digital Components**: entities that either contain one or more records or are contained in the record and require a specific preservation measure

Stored and Manifested Records (identified in InterPARES 2)

- **Stored record**: the digital component(s) used in re-producing one or more than one record, which include 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 or materialization of the record in a form suitable for presentation to a person or system. Sometimes, it does not have a corresponding stored record, but 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)

Types of Digital Records

Static: 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: They present variable content, form, or both, and the rules governing the content and form of presentation may be either fixed or variable

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

Interactive Record

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)
- 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)

Interactive Record (cont.)

- **Stable Content**: the data and the message in the record are unchanged and unchangeable, meaning that data cannot be overwritten, altered, deleted or added to
- **Bounded Variability**: when changes to the form 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

Interactive Potential Records

- Entities where the variation is due to data that change frequently (the design permits updating, replacement or alterations; allows data collection from users or about user interactions or actions; or uses these data to determine subsequent presentations)
- Entities where the variation is due to data received from external sources and not stored within the system (GIS)

Interactive Potential Records

- Entities produced in dynamic computing applications that select different sets of rules to produce documents, depending on user input, sources of content data, and characteristic of content (weather sites)
- Entities produced by evolutionary computing where the software generating them can change autonomously (scheduling and modeling of financial markets; edutainment sites)

Records Functions

- ***Ad substantiam*** and ***ad probationem*** (dispositive, e.g., contracts; probative, e.g., registries=legal records)
- **Supporting**: generated to be used in the course of multiple activities as a source of information (e.g., GIS)
- **Narrative**: generated as an instrument of communication but not required by the juridical system (e.g., most e-mails, reports, web sites)

Records Functions

- **Instructive**: delineate the form in which external data are to be presented (e.g., scores, scripts, regulations, manuals of procedure, instructions for filling out forms)
- **Enabling**: enable performance of artworks (software patches), execution of business transactions (interacting business applications), conduct of experiments (a workflow generated and used to carry out an experiment of which it is instrument, byproduct and residue), analysis of observational data (interpreting software), etc.

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

Trusted Systems

Rules, and tools and methods to implement rules, for

Making reliable and accurate records

- record-identity metadata schemes
- business and documentary procedures integrated in a workflow structure linked to classification schemes and filing plans
- specifications of record forms
- record-making access privileges

Maintaining and keeping authentic records

- record-integrity metadata schemes
- classification schemes and filing plans
- linked retention schedule
- registration system
- retrieval system
- record-keeping access privileges

Appraisal: The Central Question

Has appraisal as we understood it in the paper world changed when confronted with the digital environment?

To answer we need to distinguish between The concept of appraisal and that of selection

Selection and Appraisal

- **Selection** is a process that starts at creation (some say before creation) and continues till the records are acquired by the archives for permanent retention. It is the prelude to preservation, increasingly part of preservation itself
- **Appraisal** is a decision, resulting from an attribution of value to records, a value defined by the preserver. Appraisal is meant to justify the choice of continuing retention for a possible permanent preservation

Selection of Digital Records

1. As early as possible in the life of the records, assess their continuing value to the creator and/or the designated preserver (appraise)
2. Assess the authenticity of the records considered for continuing preservation
3. Determine the feasibility of their preservation 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

Assessing the Authenticity of the Records

- Never done before (Jenkinson: all records are authentic) 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

Determining 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.

Monitoring 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

Radical Changes

- The **theory** of appraisal has not changed: same values (including authenticity, which with paper was presumed to be a quality of all records)
- Fulfilling its requirements requires a selection process of a **methodological complexity** never needed in the paper environment:
  a) **team work** of all stakeholders and competent professionals: creator, designated preserver, IT and law specialists
  b) **scalability of the process**: action plans must be specific to the creator and the preserver
  c) **focus on the creator and its functions**: appraising the same records or digital objects from different viewpoints at the same time and many times before the disposal action
  d) selection of **the most appropriate form** of the record (music, science)
  e) **identification of the records** in systems containing different kinds of information, and, if the records do not exist, but should exist, ...**creation of the records?**

Case Study #1: the Alsace-Moselle Land Registry

The registry is required by the French real estate law, as the means to fulfill the requirement that the legal status of property (including the various forms of mortgages on the property) must be made publicly available to interested third parties by means of inscription within a land registry.

The Procedure of Inscription

- An electronic request for inscription is generated by the notary using custom software, which connects to the land registry in order to retrieve the information relative to the parties or parcels
- Once the request is received at the land registry office, it is dated. This date determines the inception of the rights on the property.
- For each request, an electronic file is created containing all of the associated documents (contract, cadastre, etc.), as scanned imaged files where they do not exist as digital data sets to which the request can be linked

The Procedure of Inscription (cont.)

4. A **draft order of inscription** is prepared. Inscriptions are also drafted directly in the database, but are not visible to outside users of the database until a judge has signed them; the draft order is transferred to the judge's "in box" in the form of an XML document
5. The judge is responsible for the required verifications; however, the custom software of the land registry office provides him/her with a "before" and "after" view of the inscription, that is, of the changes to the registry which the inscription will effect in the database;
6. After identifying himself through biometric (fingerprint) scan and inserting a smartcard with his private signature key, the judge signs the draft order. At that moment, **in a single step, the order is generated and signed, producing an inscription, and the relevant fields of the database are updated**.

Digital Entities in the Registry

- **The order**, which becomes the inscription, listing the information relative to the land parcel, the parties to the transaction, and the nature of the transaction. It is delineated in fields, using XML tags, and may thus be readily processed. It is authored by the judge, who dates and signs it.
- **The tables of a relational database** (that is, one table records the characteristics of land owners, another of land parcels, another of the *charges,* another of the mortgages); with links between the tables (using primary/foreign key mechanisms) that establish relationships between relevant data in the tables. The two most important views offered by the computerized land registry are (a) the ownership history of a given land parcel and (b) the set of land parcels owned by a particular individual.

Technological Structure

- An Oracle database, containing the land registry data;
- Personal (Windows) computers, for registry clerks, running web-based applications for consulting the registry and managing the inscription process;
- Plugs-ins for commercial notarial software for integration with the land registry;
- Personal computers, for land registry judges, running web-based applications for consulting the registry and for finalizing inscriptions to the registry and equipped with biometric identification peripherals, and digital signature software;
- A PKI infrastructure, linking together all land registry offices and the central database, so that judges may sign orders and add inscriptions to the registry.

What Is New?

- The system uses the digital signatures to provide continuous authentication services, that is, regularly performed declarations of the integrity and origin of the data.
- Digital signatures provide an extreme assessment of the integrity of data: if even a single bit of the signed data is modified, the signature fails.
- They also compare the orders with the inscriptions every time their authenticity is questioned.

Appraisal Issues

- While the acquisition of the orders by the District Archives, as stand-alone documents, poses no particular problems, that of the inscriptions does
- The digital inscriptions are not records, the land registry as a whole is.
- As a record, the land registry cannot be understood outside of its dynamic and interactive capabilities.
- The inscriptions cannot be authenticated outside the PKI infrastructure
- Migration to overcome obsolescence risks loss of interoperability

Possible Solution

The definition of an XML schema which may serve as a translation device between the complex data model used by the land registry, and a less complex model, to be defined, sufficient to satisfy the needs of future users.

Inscriptions could then be exported to a file according to the XML schema and imported into relational database sufficiently simple to be maintained by the designated preserver (e.g., Microsoft Access).

Case Study #2: the VanMap

The cross-corporate GIS created by the City of Vancouver and used by staff in

- **Engineering**
- **Planning**
- **Permits and Licenses**
- **By-law Enforcement**
- **Social Planning**
- **Police**
- **Fire and Rescue**
- **Parks and Recreation**

http://vanmappub.vancouver.ca - VanMap Public ActiveX Viewer version for Windows - Microsoft Internet Explorer provided by ICBC

VanMap
public edition

Contact Us

Legend Options

Address Search

Options | Reset | Help

Number Street

or select E 1st Av Go

Toolbox

Right-Click Menu | Help

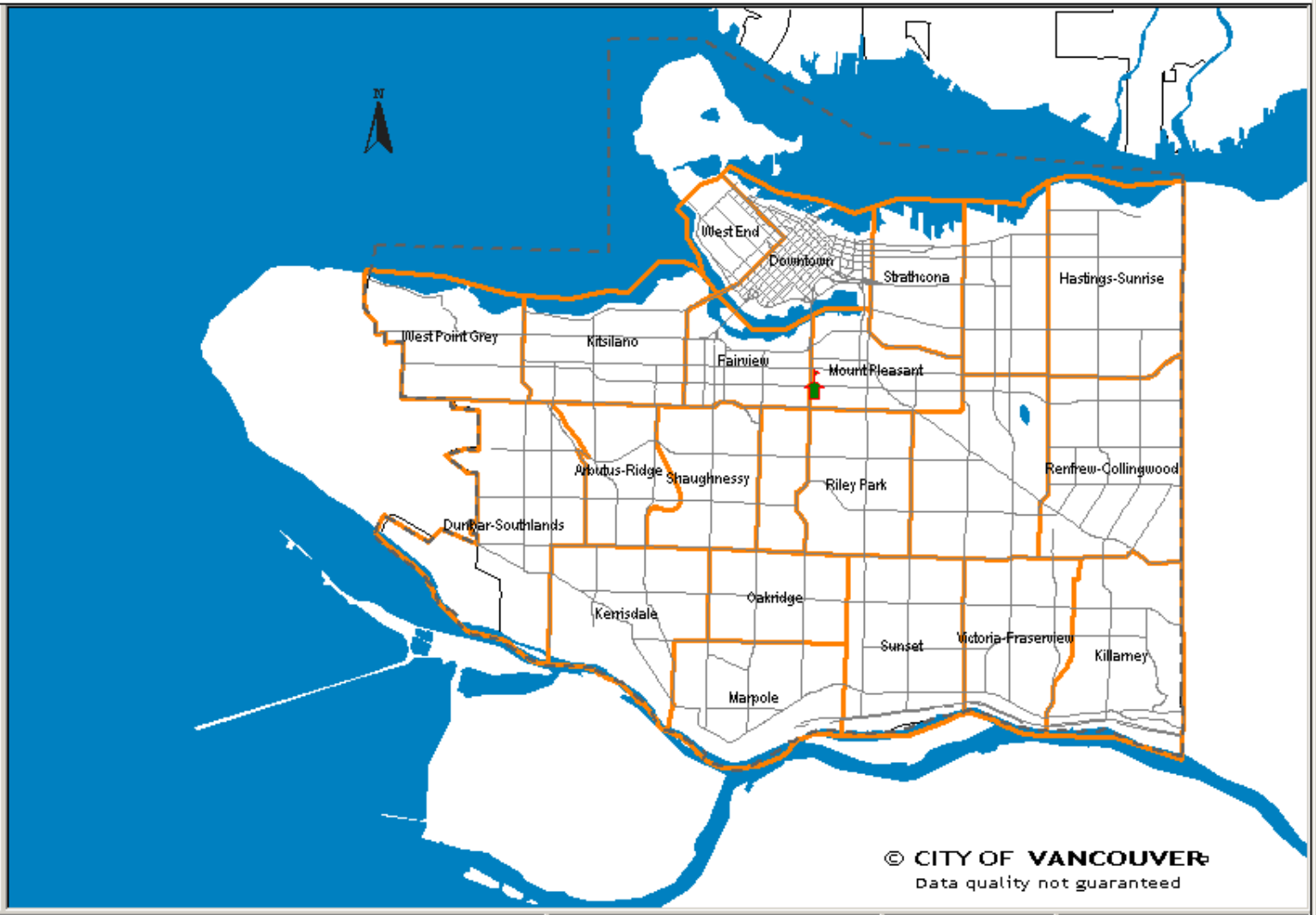
Help

About the Data

Applications

Select Application:

- Olympic Venues
- City Boundary
- Public Art
- Public Places
- The Road Ahead
- City Projects
- Child Care Facilities
- Web Cameras
- Non-Market Housing
- City-owned Properties
- Cemetery
- Urban Agriculture
- Contour Lines
- Truck Routes
- Canada Line Alignment
- Traffic Related
- Sewer
- Water
- City Streets Network
- View Cones
- Subdivision Categories
- DCL Areas
- Zoning Districts Types
- Zoning Districts
- Business Improvement Areas
- False Creek Navigable Chan
- Youth
- Property Information
- Facet Grids
- Administrative & Service Area
- Shore Lines (2002)
- Foreshore Contour Line
- Water Bodies



Water Bodies : Strait of Georgia | 0 feature(s) selected | 1 : 109,043 | 14.4 x 10.0 (mi)

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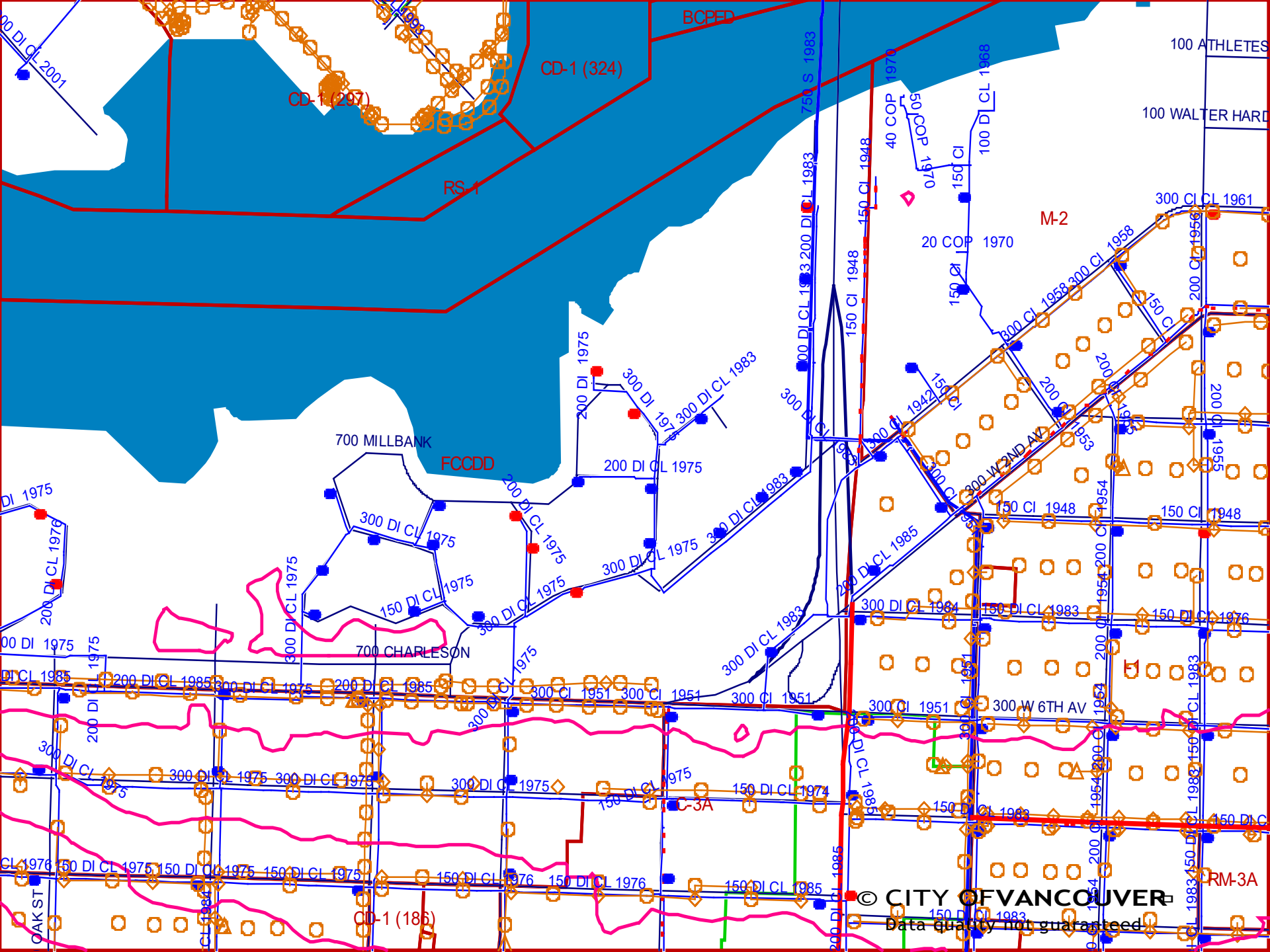
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RS-1
M-2
C-3A
RM-3A
CD-1 (186)
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100 ATHLETES
100 WALTER HARD
300 W 6TH AV
300 W 2ND AV
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20 COP 1970
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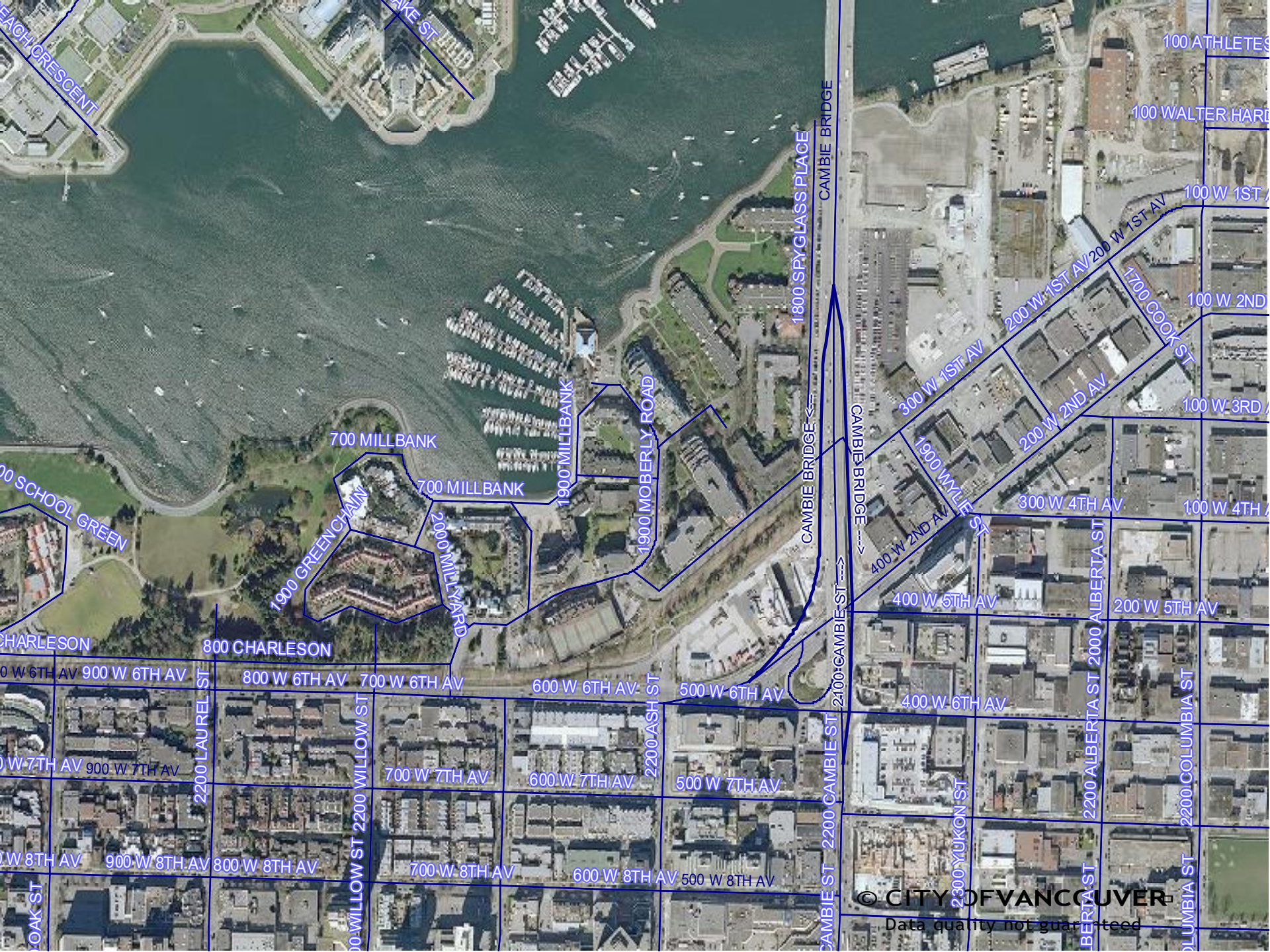
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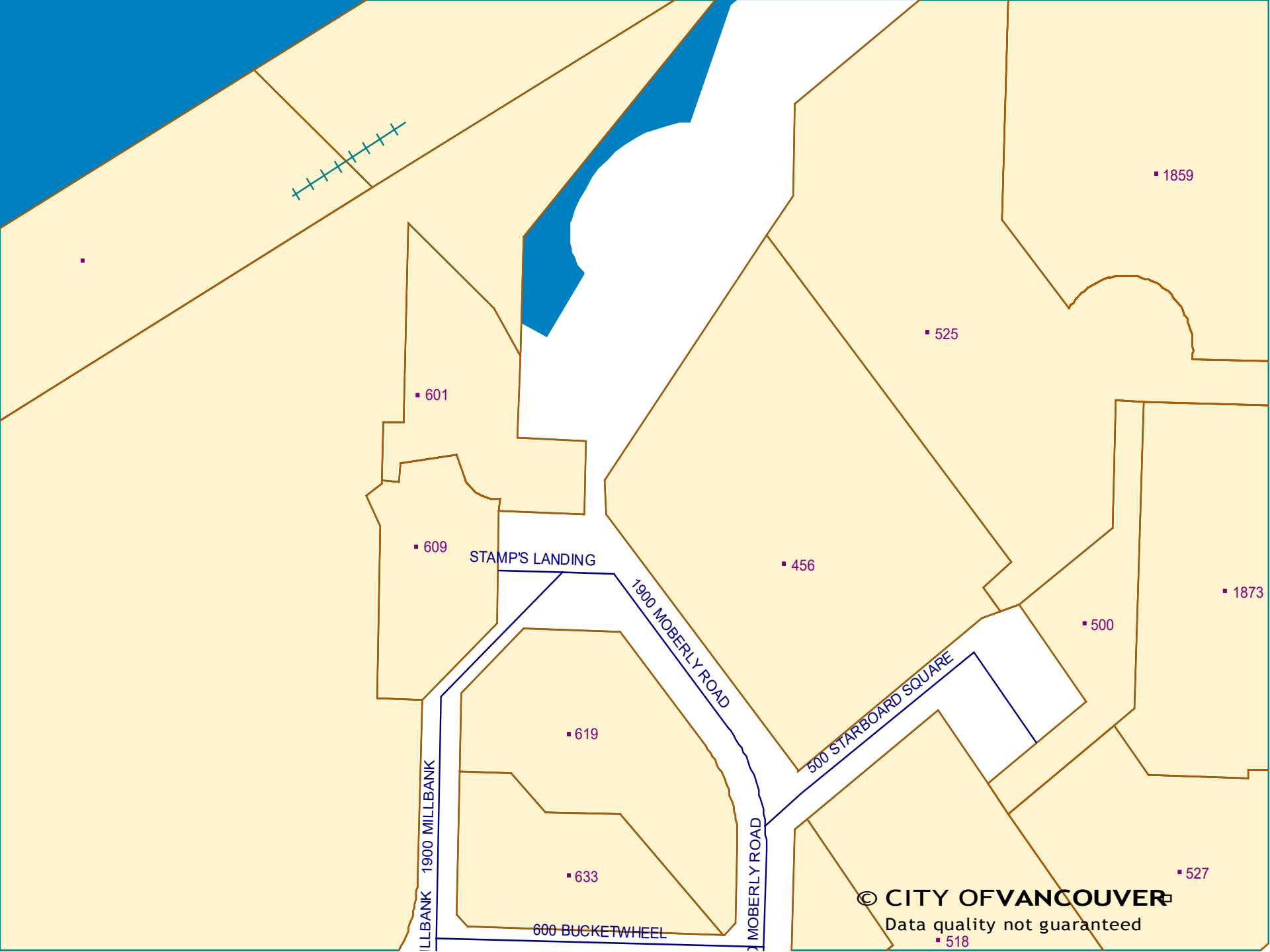
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VanMap
public edition

Print date: 13-Feb-07,01:52 PM

Tax Attributes Report

urce: The city's Property Tax System. (see About Data for the latest update.)

ecord	PID or Strata Plan Number	Assessment Roll Number (Folio)	From Address Number	To Address Number	Street Name	Property Postcode	Lot	Block	District Lot	Plan	Legal Description	Previous Year Land Value($)	Previous Year Improvement Value($)	Current Year Land Value ($)	Current Year Improvement Value($)	Asse
	VAS1831	164632770001		601	STAMPS LANDING	V5Z 3Z1	1		FC	VAS1831	LOT 1 PLAN VAS1831 DISTRICT LOT F C NEW WESTMINSTER AN UNDIVIDED 795 /808 SHARE IN THE COMMON PROPERTY T HEREIN EX PLAN 18514, 18515, & 1851 6.	570000	1124000	584000	1135000	2007
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VanMap Technical Components

- Oracle Spatial database
- Other databases linked to it, existing in a variety of offices, of a variety of local authorities, and whose data flow continuously in the Oracle database
- CAD drawings, satellite imagery, photographs, html pages
- Autodesk MapGuide
- Autodesk ActiveX Viewer
- Application servers
- Web server

VanMap is a Dynamic Information System

- Data that often do not exist anywhere else, especially in the correlated form showed on the GIS layers, are overwritten without being saved
- The data are viewed as maps but these views are not saved
- New layers are being added all the time
- VanMap does not contain records

Is VanMap as a Whole a Record?

Yes!

- It is made and received in the course of a practical activity
- It is an instrument and a by-product of that activity
- It is an indivisible unit affixed to a medium
- It has all the diplomatic characteristics of a record in terms of persons and contexts

Is VanMap a Record?

No!

- It lacks fixed form and stable content
- It is not set aside for action or reference

Thus, it cannot be used to render an account of the decisions made or as a memorial.

Can VanMap Become a Record?

- Yes, if we introduce fixed form and stable content
- We need to configure the system so that, as each layer is updated, the data are saved rather than overwritten
- Then we need to develop a means of reproducing VanMap as it was on any given date

What About Taking Map Views?

- The preserver cannot do so or would become the creator of digital objects never used by the creator in the course of business, a creator of his/her own records
- It is not feasible to require City staff to save the map views in connection with the decisions based on them
- We have to preserve not what the staff member ***saw*** at a given point in time but what s/he ***would have been able to see***
- A detailed documentation of the business process would support this preservation activity

How to Build a GIS Preservation Environment

- Step 1: save the empty layers
- Step 2: add metadata to the layers
- Step 3: store the data in a secure environment
- Step 4: create infrastructure independence
- Step 5: migrate to new/neutral technology platforms
- Step 6: reproduce the system

Using Data Grid Technology

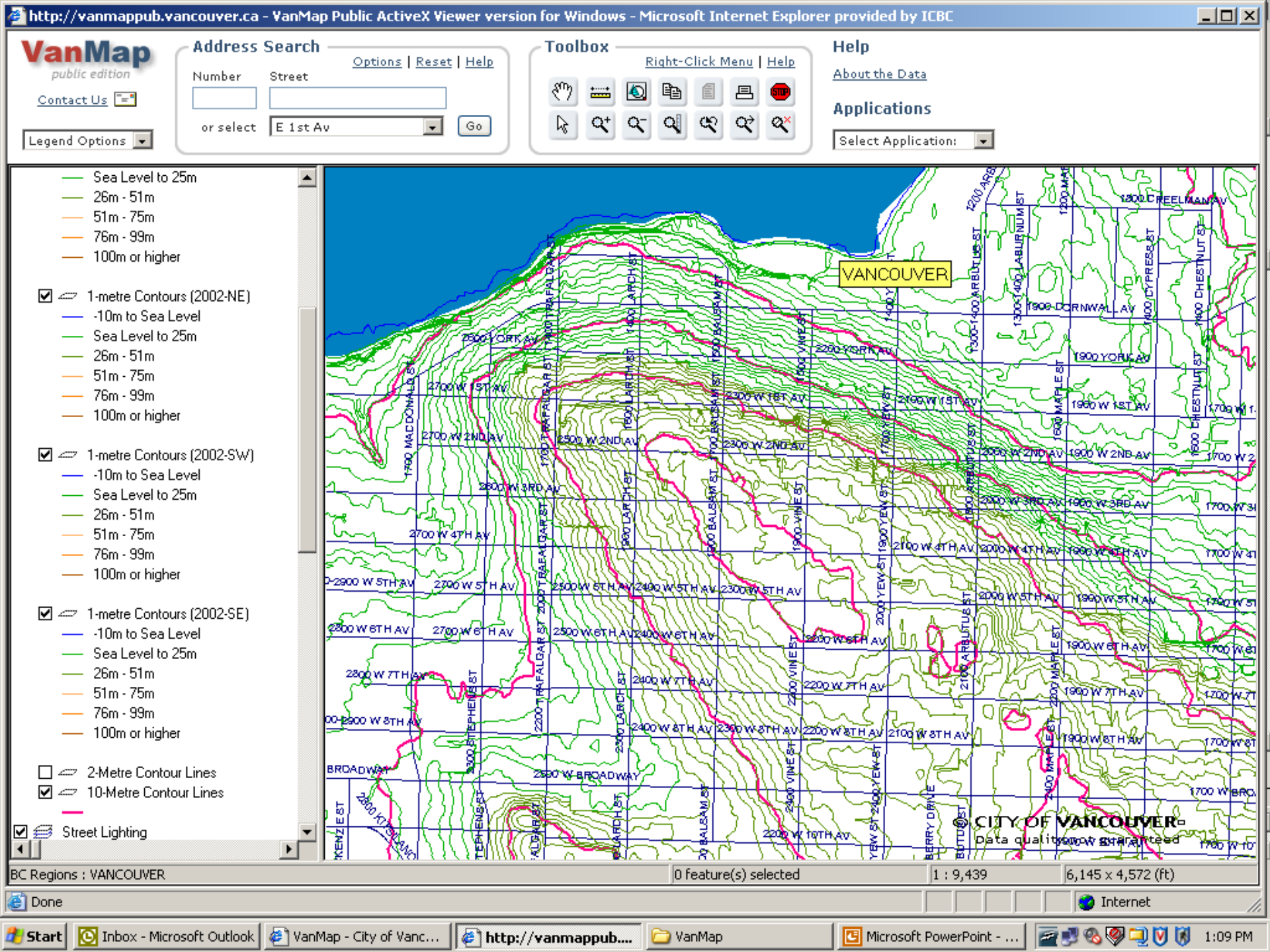
- Manages data and their associated metadata
- Separates the data from dependence on original creating infrastructure
- Maintains audit trails of all operations performed on the data
- Manages access and retrieval
- Supports migration of data to new platforms

Data Grid and VanMap

- Data grid is inserted between the data storage systems and the access applications
- Each saved layer within the GIS is independently registered in the data grid
- Queries based on the chronological date of the data are used to reproduce VanMap layers
- Queried data are loaded into a different GIS product

What Is Preserved?

- The data themselves
- The ability to see the data available on a given day and time
- The ability to render the data as interactive maps
- Presentation elements such as colours and fonts do not necessarily have to be preserved given the costs of doing so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The Same Solution for All GIS?

- **No!**
- What is identified as **the record to be generated and maintained over time depends on the use of the data by the creator and the reason for having records** rather that fluid information.
- The research GIS of the **Archaeological Society of Arizona** requires preservation of its ability to make the users detect underground materials from the layers showing vegetation and stratifications of the soil and therefore preservation of the records that suggest that excavations should be carried out.
- The **Canadian Atlas of Antarctica** requires preservation of the content of external users interactions with specific layers and therefore preservation of the users' records that have changed the system output.

Preservation

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; 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 as made explicit by their administrative, custodial and technological history, the illustration of their scope and content, and the hierarchical representation of the records aggregates
- The unique function of archival description is to provide an historical view of the records and of their becoming while presenting them as a universe in which the individuality of each member is subject to the bond of a common provenance and destination

Archival Traditional Role

Sir Hilary Jenkinson, *Manual of Archival Administration*. London, 1922.

- The archivist's **primary duty is to the records**
- The archivist's **secondary duty is to the user**

By serving the records we serve their users

Serving the Records

It means to maintain intact their characteristics:

1. **Naturalness** (by preserving the sedimentation)
2. **Interrelatedness** (by archival description)
3. **Impartiality** (by planned selection)
4. **Authenticity** (by protecting their identity and integrity through a chain of unbroken legitimate custody).

With digital records, these functions are still necessary, but no longer sufficient.

What Else Is Needed

The traditional **concept of preservation** must include the processes necessary to transmit the record through time, including conversion and migration

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

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;
- But, mostly...

The Archivist's New Role

1. Positions him/herself at the **beginning of the record life-cycle**, taking the role of "designated" trusted custodian
2. Assesses the **authenticity of the records** and **monitors it** throughout their existence
3. Identifies the records to be preserved at the moment of their creation and **monitors their transformation through time**
4. Determines the **feasibility of preservation** on the basis of the archives technological capacity

The Archivist's New Role (cont.)

5. Determines a **preservation strategy** independently of technological trends (tries to influence the industry through the adoption of standards, but not vice versa) and maintains a focus on interoperability
6. Controls the **accuracy of the records** after each conversion or migration
7. Develops **procedures** that address issues of **intellectual rights and privacy**
8. Recognizes to **archival description a primary authentication function**

The Archivist's New Functions (cont.)

9. Is constantly **involved in research and development projects** similar to those carried out by the industry, addressing questions like the following:
   - What entity constitutes the record in each dynamic or interactive system
   - What instantiation of such entity can be regarded as the record (manifested or stored entity)
   - How to keep such entities accurate and authentic through time
   - How to enable users to verify such authenticity over time

We must abandon the old ways!

The Old Ways

Academics conduct research which very few read and even less try to implement, usually unsuccessfully (as demonstrated by research)

Archival associations establish committees who **issue guidelines**, usually expressing the minimum common denominator shared by the experiences of the members, rather then research findings

ISO issues standards under the pressure of groups who need basic guidance and either develop their own (see OAIS) or are ready to adopt the ways of the most involved parties (see RM standard)

Legislators issue laws too often based on the expertise of IT professionals and without serious consultation with archivists (see the European Directive on digital signatures)

Governments make technological choices without consulting with archivists

Archives have to **respect** often unreasonable laws, **implement** far too generic standards, and **preserve** unidentifiable and non preservable material

Why It Does Not Work

Technology changes very rapidly while national and international consensus of any kind is very slow

General standards and laws **need much adaptation** to specific contexts to be implemented

Research results must be translated in concrete terms to be understood by professionals

Research has demonstrated that **solutions to digital records preservation are dynamic and specific**

The financial, technological, and knowledge **resources of archives are very different**

A Better Way

Each **archives becomes a locus of research** by establishing a partnership with academics involved in international research, professionals involved in standards development, experts in law and information technology and, most importantly, with the creators of the records that fall under their jurisdiction.

Each **archival association promotes an environment supportive** of the archives goal by demonstrating to regulatory and auditing bodies, and policy makers that they ought to embed digital records preservation requirements (not rules) in any activity that they regulate, audit or control.

This results in 1) the generation of **new knowledge**, 2) the achievement of **action-oriented outcomes**, 3) the **education** of all participants, 4) results that are **relevant to the local setting**, 5) a **sound** and appropriate research and development **methodology,** and 6) and the **empowerment of the archives.**

The Power of Archives

Each archives will then be able to establish a **policy** for the institution, **strategies** for implementing it, **plans of action** for specific aggregations or types of records, and **detailed procedures**, and to **update** all of the above continuously according to changes in available technologies, records produced, and resource availability

This is what we are beginning to do in **InterPARES 3 (2007-2012)** in an effort **to place the archives at the center of society** as **an instrument of accountability** and **a point of reference** for any institution, organization, community or person who needs guidance in the creation, maintenance and preservation of its records, a neutral third party to take care of the digital evidence of its activities, or an expert witness who attests the authenticity of digital records presented as evidence in legal proceedings.

Why a Third Phase?

A study of the effectiveness of workshop and seminar experiences for increasing archivists' skills in digital preservation and their ability to implement these skills in their repositories has shown that very few participants were able to implement the skills once they returned to their work environments

Wendy M. Duff, M., Amy Marshall, Carrie Limkilde and Marlene van Ballegooie (2006) "Digital Preservation Education: Educating or Networking?" *The American Archivist* 69(1): 188-212. In the context of ERPANET.

Feedback on the outcomes of the two phases of InterPARES from archivists working in institutions smaller than national archives has consistently shown concern about their downward-scalability and their relevance to small and medium sized organizations

Goal of InterPARES 3

To enable small and medium-sized public and private archival organizations and programs (units within records creating organizations)—which are responsible for the digital records resulting from government, business, research, art and entertainment, social and/or community activities—to preserve over the long term authentic records that satisfy the requirements of their stakeholders and society's needs for an adequate record of its past.

Expected Products

1. Policies, strategies and procedures for small archival organizations or programs, and guidelines for the records creators whose records fall under their responsibility.
2. Action plans for the specific case studies carried out in the course of the Project.
3. Criteria to determine "most-at-risk" materials
   e.g., checklist of age (date created, date last accessed), physical carrier, operating system, software used, equipment required and its availability, etc.

Expected Products (cont.)

4. Guidelines for addressing digital preservation requirements that apply to specific types of records, but not to other materials.

5. Evaluation models for assessing the degree of success, if any, of the chosen preservation action.

6. Cost-benefit models for various types of archival organizations or programs and for various kinds of records and/or systems.

7. Ethical models that identify and make explicit the consequences for individuals and society of types of preservation measures or lack thereof.

Expected Products (cont.)

8. Training and education modules for preservers, professional associations and university programs; and awareness and education modules for non-archivists, such as IT professionals, vendors and service providers; human resources and financial managers; doctors, communities of practice, members of the general public, etc.; and a strategy for delivering them.
9. Position papers directed to key regulating, auditing and policy-making bodies, advocating the vital need of embedding planned digital preservation in the requirements they issue for the activities they regulate, audit or control.

3 Primary Components

1. **Research component**
   (short-term and long-term projects, including case studies related to policy, records or systems, and general studies)
2. **Education and training component**
   (in the context of research projects, apprenticeships, activities credited as part of coursework, etc.)
3. **Knowledge-mobilization component** (workshops, seminars, colloquia, policy manuals and other publications, public lectures, etc., that meet the needs of both academic and community partners)

InterPARES 3 Composition

International Alliance

14 regional, national & multinational TEAMs:

TEAM (Theoretical Elaboration into Archival Management)
Canada (including US); Africa; Brazil; Catalonia; China; Colombia; Italy; Korea; Malaysia; Mexico; Netherlands & Belgium; Norway; Singapore; Turkey; and UK & Ireland

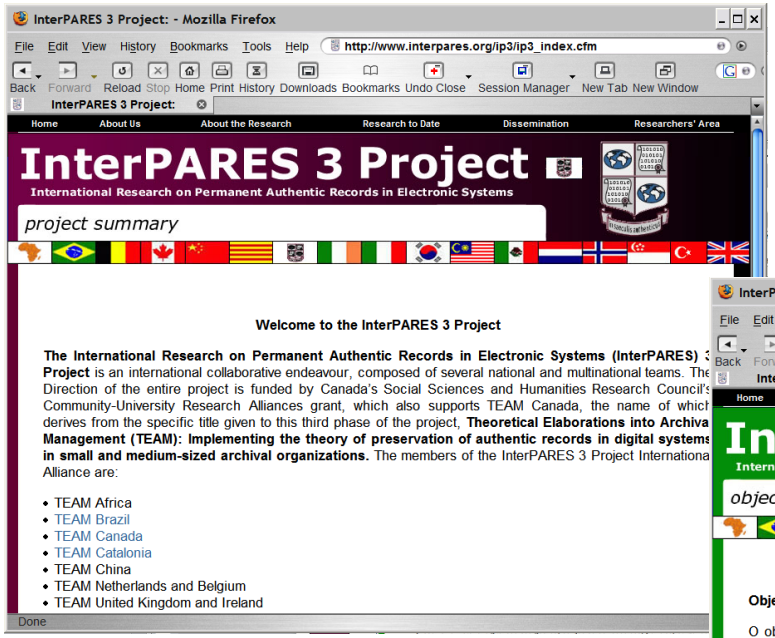
Director: Luciana Duranti

Headquarters: UBC - SLAIS (facilities provided by UBC)

Summits: Twice a year, each time hosted by a different country

Symposia: Once a year, each time hosted by a different country

InterPARES 3 Web Site



www.interpares.org

InterPARES Web Site

www.interpares.org