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

Overview

Case Study 24:
City of Vancouver Geographic Information System (VanMap)

Peter Gagné, Université Laval

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The Creator Context / Activity
Creator: The City of Vancouver, British Columbia. More specifically, the Application Development Division of the Information Technology Department.

Creator type: Government focus, Public sphere (municipal administration).

Juridical context: The following legislation pertains to the City:

- Vancouver Charter
- Assessment Act
- Emergency Program Act
- Freedom of Information and Privacy Act
- Police Act
- Waste Management Act
- Water Act

Activity: Creation and maintenance of VanMap, an interactive geographic information system (GIS) or mapping system. VanMap is a Web site with both public and staff access, with different options available for each access group. It is a GIS system created "to provide an interactive, graphical representation of the data that allows the end user to see how the various features of the City relate to one another." (FR 6) The Web site has a home page, data sheets, interactive maps, legend, toolbar, reports and links to departmental Web pages.

While the City carries out many administrative and managerial activities in the governance of the citizens of Vancouver, the activity profiled in this case study is a less-traditional government activity. However, even though it is a non-traditional government activity, it is seen as *supporting* traditional activities. "The interview subjects agreed that VanMap is used to streamline functions that have traditionally been carried out by other means, rather than supporting entirely new functions." (FR 28) "VanMap is used whenever traditional maps would have been consulted in the past, and has enhanced the efficiency of [many City government] activities." (FR 28)

Nature of Partnership
VanMap uses both internal and external data, and as such the data providers (external to the City or from other City departments) may be seen as partners in the project. External data are supplied and updated on a regular basis from various provincial governmental departments or agencies, such as the Land Titles Office, the British Columbia Assessment Authority and utilities such as BC Hydro. "VanMap does not simply draw on one pool of data that is administered by the IT Department. Some of the data are in fact viewed within systems that are created and administered by other departments, with the GIS viewing software acting as a portal." (FR 5)

"The VanMap Team manages the complete range of activities that results in data being included in VanMap (with the various departments being responsible for supplying the data)." (FR 23) Representatives from the City departments that provide data to the project are included as part of the VanMap Team (see *Bureaucratic/Organizational Structure*, below). Some departments that were not initially suppliers of data have become interested in being involved since the implementation of the project. The inclusion of new members from other departments on the VanMap Team likely means that there will be more data layers related to these departments added in the not-to-distant future.

In addition to partners furnishing data, others help maintain or provide access to VanMap and its data. Employees in Engineering Services and Corporate Services Group (CSG) may modify data based on access rights. Information Technology Security, a division of the Corporate Services Group, controls access rights.

In addition to having various "internal" partners (within the project), VanMap in turn can be seen as a being an "external" partner of other departments in the City of Vancouver. VanMap supports the following departments outside of the project structure: Community Services Group, Engineering Services, Corporate Services Group, Board of Parks and Recreation, Vancouver Police Department, Fire and Rescue Services.

Bureaucratic/Organizational Structure
The manager of GIS in the Application Development Division of the Information Technology Department (part of the Corporate Services Group) is responsible for VanMap.

The VanMap Team guides the overall development of VanMap. Headed by the manager of GIS, it is the body that makes decisions about VanMap's content. The VanMap team includes several staff members from IT, two representatives from the Community Services Group and one from Engineering Services, the two largest contributors to VanMap. The GIS Sustainment Team consists of staff responsible for the technical development of VanMap (the main GIS developer, the Graphics Planner and the GIS Technician).

This structure is located within the administrative framework of the City of Vancouver, which is governed by an elected mayor and council. The corporation has departments, agencies, boards and commissions.

Digital Entities Studied
The digital entity for the purpose of the study is the internal (i.e., staff access) view of VanMap.

The main technical components of the VanMap system are:
1. Oracle Spatial database
2. SQL server and CSG web application server
3. Community Web Pages SQL database and Web application server
4. Other databases
5. Autodesk MapGuide
6. ColdFusion MX
7. MapGuide ActiveX Viewer
8. Microsoft Windows 2000 server (Web server)

The HTML pages on the Web site contain the following file types: GIF, CFML (ColdFusion markup language), CGI script, DWT (Dynamic Web Template), CSS (cascading style sheets); spatial geometry layers in Oracle9i Spatial Database, SDF (AutoDesk MapGuide Spatial Data Files), DWF (Design Web Format), JPEG and ECW (Enhanced Compression Wavelet).

Both internal and external data are used. Engineering and CSG graphics are created in the form of CAD drawings in AutoDesk, or are keyed or drawn in the Oracle9i Spatial database. Permit and license data are stored in PRISM or License+ and extracted to an SQL server for inclusion in VanMap. Property tax data are extracted from the SQL Property Tax System for inclusion. Some data are drawn from smaller databases, but these will disappear as more data are entered directly into Oracle.

Documentary Practices Observed
The City of Vancouver has a records management and archives **program**. The Records and Archives Division is under the administration of the City Clerk's Department.

Regarding the **documentation** of the procedures, practices and policies of VanMap, certain layers of the application have become inactive or restricted out of concerns of misuse; formal policy is being written.

Documentary and technological processes within the VanMap project seem to be **informal** and largely undocumented. "Departmental representatives on the VanMap team are largely responsible for determining which data are included in VanMap. Decisions may be based on their perceptions of how City workflow and business processes might be enhanced by the inclusion of certain data… In other cases, it is department heads or other managers or IT support personnel who suggest that a layer be included." (FR 23) In another example, the commitments from data owners that the data is as complete and as accurate as can be made "are not formalized, however, but are either agreed to verbally or through e-mail." (FR 25) What is more, the City has no e-mail management policy.

<u>Records Creation and Maintenance</u>
Policies, procedures and standards regarding how to include and present data are not extensively or consistently documented. Despite the fact that the City departments produce

manuals regarding data entry *per se*, "the decision to include data is usually an informal process, and is often the result of verbal communications with the VanMap Team." (FR 4) The VanMap Team establishes, in negotiation with the departments, the administrative and technological processes by which the data will be included in VanMap. The Team also decides how the data will be organized and presented in VanMap and what new functionalities may be incorporated into the system to allow the data to be viewed and manipulated in different ways by end users.

It is not known if these processes are documented and, if so, if these documents are retained by the Team as records of their work. The reference to an informal process and verbal communications leads one to believe that these administrative and technological processes are not documented.

The HTML and CFML pages and embedded GIF images are **identified** by unique URLs. The data fields, layers and groups are also identified by field names, layer names and group names, respectively (it is not possible to view field names from VanMap). More research will need to be done to determine whether any of these identifiers can be considered persistent.

The various HTML and related pages are **grouped** into folders for storage, identification and retrieval purposes. The data are organized into layers, with each layer including either a single data source or multiple data sources. Some layers may be organized into layer groups consisting of two or more layers. For example, the Public Places layer group contains the following layers: Community Centres, Fire halls, Libraries, Parks and Schools. Each layer may be viewed separately or in combination with other layers.

Metadata are assigned based on what the VanMap Team thinks would be most useful for users. **Metadata** generated automatically upon creation of the data have not yet been investigated. "Fortunately, the VanMap Web site includes data sheets listing, at varying levels of detail, the types of data, their origins and the means by which they are included in VanMap." (FR 5) The home page of the staff edition Web site includes links to the data sheets ("About the Data" and "Layers"). The data sheets, which can also be reached from the VanMap toolbar, contain information about layers, layer groups, reports and functionalities. Links to the departments responsible for the data are also provided.

There is as yet no **classification** scheme applied to the City's electronic records. In fact, the classification scheme to be applied to paper records is still under development. There is, however, **organization** of the data based on the activities that they represent. "The organization and schema are dictated by the nature of the activities used to produce the data. For example, processing a building permit application requires that [all] data…pertaining to the permit application and approval process be recorded and maintained together." (FR 31)

Recordkeeping and Preservation

The City of Vancouver Archives, part of the Records and Archives Division within the Office of the City Clerk, is the official repository for records created and received by the City in the course of carrying out its mandated functions. However, in regards specifically to the VanMap project, "No preservation strategies in the archival sense are currently being employed." (FR 32) As part of any future preservation strategy, "research by the City of Vancouver Archives will be required

to determine the legal and/or moral obligations associated with preserving externally supplied data and eventually making those data available to the public." (FR 34)

Preservation practices in place seem to be sporadic and not part of a coherent system. Some digital entities are preserved, but not others. The PRISM information that is extracted to VanMap is generated in part by a CSG workflow system called DOMINO, which manages scanned images of the original permit applications and all related correspondence. The paper originals are destroyed.

However, for other records, physical, not digital, media are used to maintain records included in VanMap, which appears to be more of a means of access to and diffusion of these records than a means of preserving them. The physical media are seen as records, with the digital entities seen as copies. "The digital entities cannot be said to form part of a recordkeeping system. The data pertaining to properties, such as address and owner, tax coordinate numbers and permit and license information, are generated as part of the DOMINO, PRISM, Property Tax System and License+ systems, but are copied from those recordkeeping systems for inclusion in VanMap." (FR 30) Also, zoning changes are graphically represented by CAD drawings created by the Planning Department; the drawings are printed out on Mylar and kept in the Planning Department and are also loaded into Oracle Spatial and converted to DWF files to be viewed by VanMap. "Thus, the zoning maps being viewed by the VanMap user are actually copies of the official Zoning By-law amendment drawings." (FR 24)

The database administrator is responsible for **maintaining** the database system, which is only understood as ensuring that it functions properly.

Data are overwritten as needed, although no versions are **captured**. "The data and the HTML pages are recorded and saved but are overwritten as needed, and previous versions are not captured within a recordkeeping system." (FR 30) For data that are being overwritten, there is no audit trail or other way to track updates over time. Reports generated within VanMap are not captured, either. The report information is granular and grouped only ephemerally in the form of reports viewed through the MapGuide reportals. "Whenever map or report screens are exited those maps or reports no longer exist (although they can be re-created as long as the underlying data upon which the original maps/reports were generated have not changed in the interim), unless they have been deliberately saved outside of the VanMap system (e.g., on the user's computer)." (FR 20)

"The data in VanMap are constantly being updated, with the frequency of the updates varying considerably." (FR 1-2) Employees in Engineering Services and Corporate Services may **modify** data based on access rights. Departmental requests for adding data to VanMap from Community Services and Engineering Services are funneled through their representatives on the VanMap Team. Inclusion of other data occurs through a process of negotiation with the departments involved. In some cases, the initiative for including new data (or new functionalities) comes from the department, while in others it comes from the VanMap Team.

Transaction logs are generated. Use of the data can be **tracked** by unique client IDs randomly generated when users download the MapGuide ActiveX Viewer to their workstations. Whenever

a user accesses VanMap and issues a request for data…the transaction results in a log file record containing his or her ID, the date and time of access, and strings of numbers representing specific data layers used.
Manuals on security and **access** have been completed. Access rights are based on job competencies and one section requires a password. Access is controlled by Information Technology Security, a division of the Corporate Services Group, which supplies user IDs and passwords at the request of departmental managers.

Regarding the question of **interoperability** or dependence on a certain form of technology, the VanMap project does not address this issue directly, but nonetheless seems to be addressing problems that may lead to them considering the problem directly. For example, some data are drawn from small departmental databases. Specifically, some of the Public Art layer resides in an Access database that generates an HTML page using CGI scripts, accessed by the viewer by double-clicking a public art icon in VanMap. "It is likely that these isolated systems will disappear over time, as more data are entered directly into Oracle Spatial." (FR 21) However, the VanMap Team uses technological change to enhance the City's ability to create, maintain and use GIS data and to streamline the processes that produce the data and allow VanMap users to view those data. "The purpose of **migration** was thus not to preserve the entities as archival records, but to improve VanMap." (FR 32)

Accuracy, Authenticity, Reliability
Links to the departments responsible for the data are provided on the data sheets. This link to the source of the data may create or reinforce the notions of accuracy, authenticity and reliability, since the user knows where the data came from and can make a judgment on these notions based on the source.

Accuracy
Note: the notions of accuracy and reliability are closely linked in this study and often presented together. It appears that these two notions are combined in the notion of data "quality."

Data quality is not the responsibility of the VanMap developers but rather of the originating departments. However, "The VanMap Team will guarantee that the information that appears in VanMap is as good as the original source. In other words, when they are added to VanMap the data are not altered in such a manner as to affect their accuracy and reliability." (FR 26) The Engineering Services representative on the VanMap Team stated, "each data layer is signed off by the data owner. I don't proceed with moving anything into VanMap unless I have a commitment from the data owner that the data is as complete as we can make it, and as accurate as we can make it." (FR 25-26)

However, whenever the staff version of VanMap is opened by the end user a disclaimer appears, reading in part: "The City makes no warranty as to the accuracy or completeness of the information." (FR 32) The user is required to click OK to use VanMap. A more robust disclaimer is provided for the public version of VanMap.

In most cases, the departments consider themselves the authoritative sources of the information. For example, decisions about zoning are made by City Council through amendments to the

Zoning By-law, but the responsibility for creating the zoning maps based on these amendments lies with CSG, which assumes responsibility for the accuracy of the work. If data from two different departments do not match, the VanMap developers ask the originating departments to verify or fix the data. "If there is a complaint made to the VanMap developers about the accuracy of the data, the developers will refer the complaint to the originating department." (FR 26)

Nonetheless, supplying data and supplying an assurance of their accuracy do not always go together. When data are supplied from external agencies, the agencies include disclaimers about the accuracy and reliability of the data. "Various departments are responsible for supplying the external data to VanMap, according to the data sheets, but in this case responsibility for supplying data does not translate into responsibility for ensuring data quality." (FR 26)

See also under "Reliability," below.

Authenticity

The fact that the data in VanMap are constantly being updated and that the interaction with the system by the end user is dynamic and experiential presents "significant conceptual and technical challenges relating to the need both to ensure that the city government can be held accountable for the way in which the data are used, and to preserve the authenticity of the data and the experience of accessing them in the form of interactive maps." (FR 2)

Only a limited number of people within the departments are able to update data, staff entering the data are well trained, and the data entry formats are strictly controlled: according to one interview subject, "It's mostly all list driven now. You don't have opportunities to type in whatever you want. You are forced to input specific information that is based on the requirements of the branch themselves." (FR 27)

Reliability

The activities that created the data themselves were investigated only to a very limited extent, and only to determine such matters as why certain data are included in VanMap or whether the data might be considered by the VanMap Team to be accurate and reliable. Part of the information contained in the data sheets is an element called "Data currency status," which is information on how and when the data are uploaded to VanMap. This additional information may serve to re-enforce the data's reliability.

However, it seems that the data in VanMap are not of sufficient reliability to be used alone to make decisions; verification or completion is necessary. "Data from VanMap may be used in the process of making decisions, although they are likely to be used to graphically illustrate a point using data obtained originally from VanMap but verified and possibly added to from other sources." (FR 27) Data used within the department that supplied it to VanMap is seen as reliable by users from that department, but "staff may be more reluctant to rely on data supplied by other departments." (FR 27)

The reliability of the records in VanMap has come into question. Although the underlying data may be entirely exact and correct, the way in which they are presented may not be and thus the record—as presented—is not able to stand for the facts that it is about. For example, "survey

monuments are precise coordinates, but in VanMap, because of limitations in the way the data are presented, the coordinates are in fact not entirely precise. However, surveyors were using the data in their survey reports and providing the City with property measurements that were not properly aligned. When this problem was discovered, the City Surveyor requested that the layer be removed, a request with which the VanMap Team immediately complied." (FR 33)

In other words, the records may be accurate, but may not be reliable, due to software limitations related to the way the records are viewed or represented. "Because of limitations in the viewing software and because users may not be familiar with all the functionalities of VanMap, some information may not be represented accurately when it is viewed by the user, even if the data themselves are accurate." (FR 33)