GIS and Information Management Needs within First Nations in Canada

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Abstract

Six Nations of the Grand River Community is the largest populated First Nation in Canada. It is situated in the centre of the most populated and industrialized area of Canada in Southern Ontario. With the development of the Land Claims Policy in the 1970's, Six Nations became involved in research into the lands as deeded by the Haldimand Deed of October 25, 1784. Six Nations had since collected thousand of historical documents that needed to be managed and visually displayed on a map. A search for a GIS began. However, in searching for a GIS, it became apparent that no one system could our specific needs or the needs of many other First Nations in Canada. Therefore, from an information management need, a Native GIS system was developed by Six Nations. This system has since been designed for Native specific applications such as historical and present legal survey base maps, public works/ utilities, land holdings, housing, tourism and historical sites, community 911 emergency response, Indian Lands Registry System, and natural resources. Connecting information to the land is not a new concept for First Nations, traditionally it has always been a way of life; only technology is new.

Introduction

This paper will discuss the information management needs of the Six Nations of the Grand River Territory and the development and implementation of a Native needs specific GIS for First Nations. Furthermore, community enhancement GIS applications will be presented along with some of the issues involved in the search and development of a Native GIS.

Background

The Iroquois Confederacy was originally composed of the Cayuga, Mohawk, Oneida, Onondaga, and Seneca Nations. In the early 1700's the Tuscarora joined the Confederacy and thus became the Sixth Nation of the Iroquois Confederacy.

Today Six Nations of the Grand River Community is the largest populated First Nation in Canada. It is situated in the centre of the most populated and industrialized area of Canada in Southern Ontario. With a total membership of 19,558 (December 1997), Six

Nations consists of approximately 47,000 acres of land, most of which is under Certificates of Possession. There are 9,922 members who currently reside on the territory. The principle community is Ohsweken and is considered an urban centre.

Administering services and overseeing various mandates for the Six Nations are eleven separate departments. These departments include: Public Works, Health Services, Social Services, Economic Development, Housing, Lands Research, Central Administration, Welfare, Lands/Membership, Parks and Recreation and Secondary Services. Most of these departments have sub-departments under them such as Tourism, Forestry, Correctional Services, to name a few.

A Need for a Information Management System

With the development of the Land Claims Policy in the early 1970's, Six Nations became involved in research into the Land

Claims of Six Nations. The Land Research Office has a mandate to research into the ancestral, territorial and lands deeded to Six Nations Indians by the Haldimand Deed of October 25, 1784.

After 22 years of research into the Public Archives of Canada and elsewhere, Six Nations obtained thousands of documents, which outline the history of land transactions. As documents accumulated an obvious need to manage the information developed. Not only was there a need to manage the documents, there was also the desire to display the acquired information relevant to its respective land base. How could an endless amount of documented information be displayed related to its location on the earth? Six Nations needed a to find an information management system.

A Land Research Information System

In looking for a method to manage the enormous amounts of documents and visually display the documents related to their respective land parcel, Six Nations began looking for a Geographic Information System to do this work. A GIS is a computer-based tool for mapping and analyzing things that exist and events that happen on Earth. It uses computer technology to store, manage, manipulate, analyze and display database information on full colour maps.

An analysis of current GIS systems available on the market quickly revealed that existing off the shelf systems would not meet the needs of Six Nations. There were several reasons, as follows:

- The systems were simply too costly. Six Nations, as with all First Nations suffer from financial constraints, especially for purchases of large computer systems that require on going technical maintenance. The maintenance for the systems often led to dependency on the GIS distributor, in turn, additional costs.

- The systems would not manage the vast amounts of documents as required. Although GIS systems do manage information, most is in the form of spatial data related to the map. There is no management of archival documents such as copies of original signed treaties and deeds.

- The systems could not easily integrate with current database information already compiled by Six Nations. It required additional computer software to convert existing data, thereby escalating the set up costs of hardware/software and time required to complete the conversion.

- The level of technical knowledge required to implement and maintain the systems was beyond what was available in Six Nations. GIS companies provide training courses. However, they are often expensive and do not provide the full range of skills required to independently maintain the system.

- The systems were not user friendly. Current GIS systems require that all users have a high level of GIS expertise.

- The systems were not equipped to do the land parcel mapping that was required.

From a GIS market analysis Six Nations learned that of every 100 GIS sold in non-Native society, only 5 ever become operational. This is a common problem that could possibly compound for First Nations in Canada. In speaking with other communities in Canada, it was determined that some have 1, 2

and even 3 different GIS systems, each of which run independent of one another. In most cases the systems have never met their intended purposes.

Six Nations identified a need for a GIS specific to First Nations Applications. The system would need to be cost effective, manage all forms of information, integrate with existing technology be customizable to user needs, be user friendly, and require a minimum of technical knowledge to implement and maintain.

Based on the identified needs of First Nations communities in Canada, Six Nations developed the "Eagle's Cry" a Research Information Management System. The Eagle's Cry met all of the needs previously described. It is a desktop GIS that can be run on a lap top computer, and is therefore portable. The software is designed so that it can link to most existing databases. The software also provides a media viewer which displays pictures and images complete with sound. This is extremely important for First Nations who often identify with features visually and not descriptively. Most importantly, the Eagle's Cry GIS software meets the needs of cost efficiency since it is customizable, user friendly, and requires a minimum of technical knowledge.

To deal with technical training issues, Six Nations had to develop a customizable Eagle's Cry Certification Training Course. To meet the needs of other First Nations, Six Nations designed the course to be delivered either on or off site, depending on user needs. In seeking training options, it was realized that there was a need for a Native GIS Program at the college level. Therefore, Six Nations designed a Native GIS Diploma Course, in conjunction with Niagara College, Welland, Ontario. This program allows First Nations to learn the academics of GIS using the Eagle's Cry while building a base map and applications for their community. The knowledge is obtained and brought back to the First Nation for community benefits, thereby increasing community expertise, something that is greatly needed in First Nations communities if they want to manage their own lands.

GIS Applications for First Nations

To expand the GIS software beyond land claims applications, the internal Six Nations Departments were contacted and needs analyses for each were conducted. From this, the basic information management and mapping needs of each Department were ascertained. The following briefly outlines Native GIS applications that are in development on Six Nations:

Historical and Present Legal Survey Base Maps

A Native GIS system allows First Nations to build a base map of their community both from historical records and to the present day legal surveys. The base map provides an outline of the Reserve's lots, streets, railways and waterways. The map can be built from Canada Land Survey Records (CLSR) hardcopy maps, or created using digitally available data. The base map can be enhanced with point and click linking from the map to scanned images and pictures related to specific parcels of land.

In obtaining the historical documents for land claims and developing the Eagle's Cry, Six Nations in fact has compiled a computerized land based history of Six Nations. This has opened up a whole new educational tool for the Community. The Six Nations Teacher's Association was impressed with the capabilities of the GIS system, and excited with the new technology for Native history. The teachers could now teach Six Nations History and computer skills simultaneously.

Public Works/Utilities

Another current Native GIS application includes public works infrastructure management and utilities maintenance. Layered over the CLSR base map are features such as sewer lines, septic tanks, water lines, hydro lines, cable lines, natural gas lines, landfill sites, and Fire Stations and hydrants, to name just a few.

Now water, sanitary, transportation and communications systems can be mapped and used as a tool for long term community planning. This system can also monitor utilities such as water, gas, and electricity. This is an effective way to retrieve customer data, create billing reports, and assess current and future needs.

Land Holdings

Individual and community land holdings are mapped and linked to a related database complete with scanned images of original Certificates of Possession and Regional Surveyors Ontario map records. Search and select functions are designed so that ownership, lease, transfer, and membership information are available by simply clicking on a selected lot on the map. This information can be linked to the Housing database, if so desired.

Six Nations can now track property ownership changes over time. This could also be useful for tracking possible environmental hazardous sites over time, by knowing who owned the lands, and what was once on it.

For membership security, Six Nations can input scanned images of actual status cards bearing clans. These can then be linked to the individual land holdings, if desired.

Housing

Housing GIS applications can be developed in conjunction with Lands and Membership, or built independently, depending on the needs of the First Nation Community. Smaller communities may feel the need to have one system for several Departments. The housing application displays information such as number of buildings on a lot, type of building, date of construction, current owner/lessee, and an actual photograph of the building. All of this information is available by clicking on the base map.

Six Nations is developing their Housing application by scanning air photos and digitizing the buildings from the air photos. This provides an outline of where the buildings are located on the lot. Much of this information can be used for the emergency response application.

Tourism and Historical Sites

The primary base map can be modified to include historical significant sites such as sacred areas, burial grounds, battle grounds, original village sites, and other culturally significant features. Traditional areas including berries, herbs, roots and medicinal plants can also be displayed along with hunting, trapping and fishing areas. Electronic storage of this information can help to preserve the culture of the First Nation.

For the Tourism Department a Native GIS can show points of interest, owners and caretakers of a site, date and hours a site is open and other pertinent information.

Community 911 Emergency Response

Six Nations is compiling all of the necessary information to implement a community based 911 emergency response system using the Eagle's Cry GIS technology. This system will link a conglomerate of information. It allows for scanned pictures of the buildings to be linked to the map. Also, engineering site plans are stored with the maps. Access to information prior to entering an emergency situation is vital for monitoring hazardous situations such as location of gas valves in fire instances, and ensuring safety of emergency workers.

The Police can also be provided a GIS system with scanned pictures of child findcards. These cards can be linked to the maps and display where the children live.

Customization will allow the Police and Fire Departments to add crucial images and information, when needed, which may increase emergency response effectiveness.

This information can now be portably available for emergency response teams to access since the system can be run off a portable lap top computer.

Indian Lands Registry System

A Native GIS system provides First Nations with an in-house Indian Lands Registry System which can be customized to meet the specific needs of each separate First Nation. This system would be more manageable and easier to use, beyond the existing system currently used by Indian and Northern Affairs Canada.

This system can customized to do automatic title searches with a click of the mouse.

Natural Resources

Other applications beyond what has been presented include point and click access to agriculture, wildlife, fisheries, wetlands, and forestry. These are all critical issues to First Nations as opportunities for growth and self government challenge leadership.

Conclusions

The idea of connecting information to the land is not a new concept and Six Nations does not profess to be presenting a new theory. What Six Nations has done it taken its traditional beliefs of respect for Mother Earth and our relationship with the land, and adapted new technology to meet the needs for the benefit of its people for today and the children for the future seven generations.

Six Nations has taken a proactive role in dealing with the challenges that face them. They have developed the Eagle's Cry, a Research Information System to meet its current needs and to help the entire community.

Biography

Sheri Longboat is the GIS Administrator and Education Coordinator for Six Nations Geo Systems Inc. She has a Master of Arts in Geography and a Bachelor of Intermediate/Senior Education.