Report to

Service Nova Scotia & Municipal Relations

GeoNOVA Initiative – 5 Year Strategy

Program Evaluation Report

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1. EXECUTIVE SUMMARY

The purpose of the GeoNOVA Initiative – 5 Year Strategy Program Evaluation Report is to provide an evaluation of the current GeoNOVA initiative based on feedback from user consultations, a review of current policies and standards, and a comparison with initiatives in other jurisdictions. This evaluation, along with the key questions and issues arising with respect to the future of GeoNOVA, will provide the basis for considering the future direction of GeoNOVA.

Great progress has been achieved within SNSMR in the development, maintenance and access to the "primary" databases.

Much work remains to enable the discovery and access to "thematic" databases in the province. Stakeholder requirements are ahead of the province's ability to deliver and these requirements are growing by the day.

GeoNOVA has not created a sustainable environment for policy, standards, a directory of geographic information holdings, or the technical infrastructure for provincial geographic data discovery, access and dissemination. These areas must be addressed to realize GeoNOVA's vision of "a corporate approach to the creation, maintenance, and distribution of geographic information. GeoNOVA encourages the creation of corporate geographic information resources collected, maintained, and distributed to accepted standards and shared amongst all users within the Province to support decision making and to reduce duplication of effort."

There is strong support for SNS&MR to lead the GeoNOVA initiative for the next 5 years provided:

- A clear direction is set
- A workable governance model is employed
- Stakeholders are engaged as partners
- A realistic plan is set with achievable results
- Constraints stakeholders are working within are recognized

Stakeholders are looking to the future with anticipation. They want to see GeoNOVA as part of that future.

2. INTRODUCTION

2.1. Purpose

The purpose of the GeoNOVA Initiative – 5 Year Strategy Program Evaluation Report is to provide an evaluation of the current GeoNOVA initiative based on feedback from user consultations, a review of current policies and standards, and a comparison with initiatives in other jurisdictions. This evaluation, along with the key questions and issues arising with respect to the future of GeoNOVA, will provide the basis for considering the future direction of GeoNOVA.

The GeoNOVA Initiative – 5 Year Strategy study will result in three reports:

- User Evaluation Report
- Program Evaluation Report
- Strategic Directions Report

The User Evaluation report documents the data gathered from users through focus groups and questionnaires, used in the focus groups. In some instances, focus group findings are augmented with data from one-on-one interviews. That report presents findings based on the data gathered and makes observations about these findings. These observations form the user consultation component of the Program Evaluation Report and enable the Program Evaluation Report to focus on the program, without including the bulk of material associated with documenting the user consultation. Whereas the Program Evaluation Report looks at past performance and the current state of affairs, the Strategic Directions Report presents a vision, direction and path for GeoNOVA in the future.

2.2. Background

The GeoNOVA Initiative – Five Year Strategy project is an opportunity to reflect on the effectiveness of GeoNOVA over the past 10 years and re-focus on the GeoNOVA Vision and key strategies required to make significant progress in the coming five years.

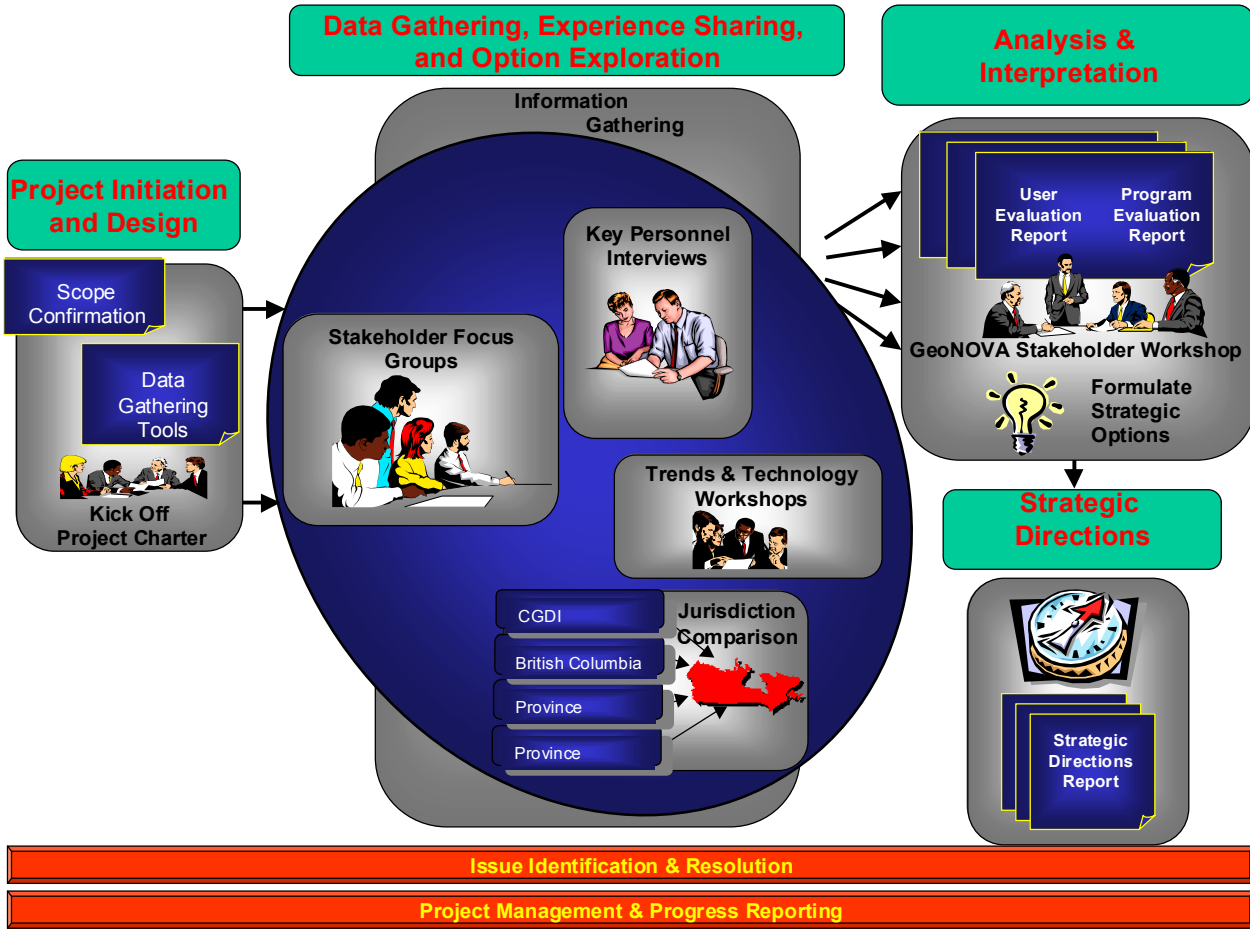
Service Nova Scotia & Municipal Relations retained Sierra Systems to assist in examining the performance of the GeoNOVA Initiative to date, determining current and future user requirements from a broad base of stakeholders, explore trends and best practices in the industry, and identify options for GeoNOVA's future. A major component of this study involved consulting a wide range of stakeholders from data providers to sophisticated partners to emerging users.

3. APPROACH

3.1. Project Approach

The GeoNOVA Initiative – Five Year Strategy study encompasses four phases with logical deliverables from each phase. Each phase consists of a group of activities that provides information as a foundation for the next phase and for making management decisions. Figure 1 depicts the approach and phases for this project.

Figure 1: Project Approach and Phases



The overall approach to conducting the program evaluation involved broad based user consultation with 51 focus group attendees to gather user evaluation data, a review of policies and standards in the province, an investigation of GeoNOVA-like initiatives in four other jurisdictions, and an examination of industry trends and technologies.

Gathering user evaluation data was performed by conducting interviews, surveys and focus groups with GeoNOVA Initiative stakeholders and users (including GeoNOVA partners) from the provincial, municipal, federal governments, the academic and private sector communities. The intent was to solicit feedback and to identify priority user requirements now and over the next five years. Prior to facilitating the focus groups, Sierra Systems conducted a series of Trends and Technologies workshops to stimulate thinking and discussion about the future of GeoNOVA based on industry trends and activity in similar jurisdictions. Observations made from the user evaluation process have been taken from the User Evaluation Report and included in this report as Section 4 User Evaluation.

A review of the current policies and standards in the province was conducted. These reviews are included in Appendix A - Geomatics Policies in Nova Scotia and Appendix B - Geographic Information Standards in Nova Scotia of this document. Observations from the reviews are used as part of the basis for comment in the program evaluation Section 6.4 Policies and Standards.

A review was conducted of similar initiatives in four other jurisdictions:

- Canadian Geospatial Data Infrastructure (CGDI)
- Alberta
- British Columbia
- Ontario

The federal Canadian Geospatial Data Infrastructure (CGDI) and British Columbia's experience were examined through workshops presented by Terry Tarle, Sierra Systems' Spatial IT Practice Leader. Terry Tarle has worked extensively with the British Columbia government on the INCOSADA, Tantalis and Land Use Coordinating Office (LUCO) initiatives. He also worked closely with Parks Canada on the development of a geoportal under the CGDI/GeoConnections umbrella program. The presentation material from these sessions is found in Appendix C – Canadian Geospatial Data Infrastructure Presentation and Appendix E - British Columbia Presentation. Information on CGDI was also obtained from the GeoConnections web site www.cgdi.gc.ca.

A questionnaire was developed to facilitate the review of Alberta and Ontario's experience. The questionnaires were forwarded to key representative in each province. Alberta's response was prepared by representatives from three agencies: Sustainable Resource Development (Phil Mackenzie), Innovation and Science (Liam Barry), and Government Services (Bill Elliott). Ontario's response was provided by Land Information Ontario (Raphael Sussman). The results of the questionnaires can be found in Appendix D – Alberta Questionnaire Results and Appendix F – Ontario Questionnaire Results. A presentation describing the Ontario Land Information

Infrastructure initiative is contained in APPENDIX G - Land Information Ontario (LIO) Presentation

Based on information from users, other jurisdictions, industry trends and an examination of current policies and standards, an evaluation of the GeoNOVA program is presented in Section 6. The framework for the evaluation of the program is based on the program components described in a GeoNOVA program presentation developed by Nancy Vanstone, Executive Director of RIMS and Rob Doiron, Director of Information Management, RIMS in September, 2000. It is contained in Appendix H – GeoNova Program Presentation.

From the program evaluation, key questions and issues that affect the future of GeoNOVA are identified and recorded in Section 6.6.

4. USER EVALUATION

The following sections deal with users' evaluation of GeoNOVA and are taken directly from the GeoNOVA User Evaluation Report. The observations are based on the findings and focus group discussion.

4.1. GeoNOVA Awareness

GeoNOVA has good name recognition among stakeholders. Focus group attendees who were not involved in the GeoNOVA Advisory Committee had heard of GeoNOVA and held opinions regarding its objective and effectiveness. Even among participants where we did not expect an awareness of GeoNOVA (e.g. St. Mary's University students), half of the participants were aware of GeoNOVA through its web presence.

There is a wide diversity of views of what GeoNOVA is and what GeoNOVA's objective is. This causes confusion for stakeholders, particularly when asked to consider its accomplishments or lost opportunities. Is GeoNOVA a:

- Concept
- Principle – capturing data once and using many times
- Committee
- Coordination effort
- Policy effort
- Standards body
- Program within SNSMR for anything to do with geographic information
- Data set
- Application providing access to geographic information
- Clearing house to collect and disseminate geographic information
- Name attached to successful projects after they are completed
- All of the above

There is considerable diversity of opinion on what GeoNOVA is within SNSMR – the agency with the mandate for GeoNOVA.

For provincial participants, GeoNOVA is generally synonymous with the activities of the GeoNOVA Advisory Committee. This is not evident in participants' view of what GeoNOVA is but it comes through when asked when you last saw action from GeoNOVA or when gauging accomplishments or lost opportunities.

The dominant theme throughout GeoNOVA is geographic data. Stakeholders care deeply about efficiently building, maintaining and disseminating geographic information. They believe that better government and sustainable economic development will occur with increased access to and integrated use of a wide range of information related to its location.

The expectation is that GeoNOVA will make all types of geographic information available simply and will foster its use in government operations and in decision making throughout society.

Having said this, stakeholders readily acknowledge that the process to do so is not simple or easy. There are many views on "the way" to get there.

Stakeholders generally view GeoNOVA as inactive. With the exception of a few projects they associate with GeoNOVA (e.g. NS Civic Addressing, Transportation and Public Works GIS Pilot, Target Nova Scotia) and the current work on a Provincial Discount Agreement for ESRI software, stakeholders have not seen action from GeoNOVA in a year or more.

In the midst of this, there is very strong support (over 90%) for the promotion of GeoNOVA. Stakeholders believe that efficiently building, maintaining and disseminating geographic information is worth promoting. The dilemma remains as to what GeoNOVA is and what exactly is to be promoted.

4.2. Geographic Data and Use

Geographic information and technology is a critical part of the GeoNOVA stakeholders' business. The use of and dependence on geographic data is growing. New applications and business needs (e.g. integrated resource planning) can only be effectively met with the integration of data based on location.

Stakeholders have many diverse geographic initiatives underway. There are non-geographic business applications incorporating geography as feature of the application. 79 major initiatives were identified by stakeholders consulted with countless small applications cited during discussion.

Geographic data maintenance is a critical or routine part of stakeholders business for 90% of all respondents and 50% of emerging users.

The "primary" datasets are an integral part of stakeholders business. The percentage of respondents viewing data as critical or routine in their business was 80% for topographic data, 70% for property records and 64% for civic addressing data.

Stakeholders rate the availability, relevance and accuracy of provincial data reasonably highly. Timeliness of updates to the data requires improvement.

Opinions on the accessibility of data are mixed. There is a definite demand to make more datasets accessible.

There is diverse opinion on costing and the affect of costing/licensing on access to data. This continues to be a serious issue that GeoNOVA will need to tackle. Stakeholders appreciate the tension between revenue to invest in data maintenance and the benefits of increased use of data based on free access. The desire and direction among users is towards free access to data. This issue will be heavily influenced by federal government policy shifts being contemplated.

It is noted that data providers believe there is a flexible approach to licensing data to academic users that makes data readily available within the current policy structure. Experience of academic users indicates that securing data is a cumbersome, bureaucratic effort that is executed repeatedly for new uses or additional datasets – there really is no process.

90% of stakeholders did not find data easy to access. There is demand to improve access, particularly for "thematic" data sets. The Nova Scotia Geomatics Centre (NSGC) received favourable comments for improvements made in providing "primary" data. Other departments were cited as still being difficult to obtain data from. Having said this, many departments do not have a mandate to disseminate data and dissemination of data occurs "on the side". Stakeholders' best success in accessing data is via personal relationships with data providers. This places new and emerging uses at a significant disadvantage.

Stakeholders reported a high level of awareness regarding provincial policies for geographic information. It is unclear from the focus group discussion whether the stakeholders really understand what the policies are. It is also unclear whether the reported adherence to policies is an accurate picture of compliance – particularly if respondents are unclear on what the policies really are. A more objective investigation would need to be conducted to gauge the level of compliance.

The Coordinate Referencing Policy is a major concern and source of frustration for a significant number of users. Particularly with the growing use of GPS positioning, stakeholders want to be on the NAD'83 datum with a UTM map projection. There are still questions as to whether this "is the standard" policy for the province. There are outstanding issues with securing the grid shift files from the Nova Scotia Geomatics Centre to enable stakeholders to migrate their data holdings.

The Data Distribution policy exhibited the highest level of awareness and adherence. It has had a significant impact on stakeholders. It is widely cited and followed, or consciously not followed.

30% of users rated policies and standards as a hindrance for their business. In the midst of this, 95% of stakeholders view standards as important to enable data access and integration. There is acknowledgement that extra effort is required for corporate benefit. It is unclear whether in the midst of operational pressures, short cuts are being taken which will negatively impact the value of data corporately.

4.3. The GeoNOVA Experience

Given the diversity of opinion regarding what GeoNOVA is and what GeoNOVA's objective is, it is difficult for stakeholders to provide a consistent evaluation of GeoNOVA's past accomplishments and lost opportunities. The following sections highlight the key concerns raised.

4.3.1. Past Accomplishments

Stakeholders believe that understanding and support was fostered within government for GeoNOVA and relationships were fostered with municipalities. It is unclear whether improved municipal relationships were a direct result of the GeoNOVA initiative.

The completion of provincial data coverage for topographic and property mapping is cited as a major accomplishment by stakeholders who were members of the GeoNOVA Advisory Committee in the past. Some see the drive for provincial coverage and determination of priority areas for data collection as valuable work by the Committee. There is a sense that once provincial coverage was complete, the Advisory Committee had satisfied its goal and lost direction. It became a forum for information sharing rather than grappling with issues. Interestingly, emerging users and those not directly involved in GeoNOVA do not perceive completion of provincial data coverage as a GeoNOVA accomplishment.

Stakeholders who were members of the GeoNOVA Advisory Committee in the past cite agreement on a provincial data distribution policy with free access to data between provincial departments as a major accomplishment. The development of the Nova Scotia Directory of Geographic Information is considered an accomplishment although there are mixed reviews on the extent to which the directory was actually used.

Projects to introduce the use of geographic information into non-traditional areas are considered positive. When the list of GeoNOVA pilot projects is presented there are concerns expressed regarding the sustainability of these projects. Was true technology transfer done and capacity built within the agency involved or were these one off projects?

The use of the Map Fund for data maintenance and to leverage additional funding was seen as positive. The development of a Provincial Discount Agreement (PDA) for ESRI software is another accomplishment.

4.3.2. Lost Opportunities

Too much emphasis was seen to be placed on the GeoNOVA concept and not enough on concrete outcomes. There is concern that the Deputy Ministers have not bought into the concept.

There was very poor communication from the GeoNOVA Advisory Committee representatives to department staff. There was a disconnect between management and technical levels, and relationships were not developed at the working level. Municipal and private sector partners were not engaged in GeoNOVA.

Standards work was not sustained or enforced. Standards have fallen out of date and the level of compliance is questionable.

The Nova Scotia Geomatics Centre (NSGC) is seen by many as the “arms and legs” of GeoNOVA but this has never been clearly stated. NSGC have done a number of pilot projects with new users but questions remain about the level of transfer of technology/expertise to the user departments and whether these projects are sustainable. As well, not enough has been done to expand the use of GIS to emerging and new users.

Expectations have been high regarding access to data. There is disappointment that there is no single “portal” to access all geographic information and no infrastructure to disseminate all different types of geographic data for the province. There is no way to determine what data is available or is planned to be collected. The sharing and access to data between provincial departments is problematic.

Stakeholders expected to save money on their technical infrastructure through GeoNOVA. Many believe GeoNOVA should have secured money through the GeoConnections program to fund information infrastructure developments.

4.3.3. Effectiveness of GeoNOVA

It is interesting to note that the closer a stakeholder is to the GeoNOVA Advisory Committee and the GeoNOVA process, the higher the level of frustration with the ineffectiveness of GeoNOVA. This appears to be directly related with the ineffectiveness of the GeoNOVA Advisory Committee in recent years. Upon completion of provincial data coverage, the Committee appeared to lose its “reason to be”. Focus was on information sharing. Members delegated their seat to lower level staff in their organization. Director-level representatives wanted to deal with policy issues, lower level staff wanted to deal with technical issues and both were frustrated.

The way in which the GeoNOVA Advisory Committee is structured is not working. The issue of GeoNOVA's governance and structure is critical and must be resolved if GeoNOVA is to move forward.

Stakeholders outside of the GeoNOVA process, particularly municipal stakeholders, believe that significant progress has been made. These stakeholders want to be part of the GeoNOVA process. Frustration with the GeoNOVA initiative has discouraged many provincial stakeholders. There is a higher level of interest and energy in GeoNOVA among municipal, federal and academic participants than among provincial participants consulted.

4.4. Future Directions and GeoNOVA

Access to data dominates stakeholders thinking of what they envision in 5 years. The majority envision a single on-line access point, or portal, where they can discover, access and analyze geographically related data about Nova Scotia. This would be based on a seamless provincial database that integrates a variety of provincial datasets.

These simple statements involve a lot of work to make them a reality. This future state implies, among others, a technical infrastructure for data access and dissemination, a directory of geographic data holdings to enable discovery of data available, standards for data which enable integration of data sets, policies addressing access and use of data, agreements with data custodians, data which meets the requirements of the foregoing, and a support organization to assist users and sustain the initiative.

There is broad based support for GeoNOVA to continue. To varying degrees, stakeholders appreciate the work that needs to be done to achieve what they envision in 5 years. They see the need for focus and leadership to move GeoNOVA forward. As indicated by one stakeholder, "Everything we've complained about what's not done – won't happen without GeoNOVA." Stakeholders see SNSMR leading the GeoNOVA initiative.

There is strong agreement and support for GeoNOVA's 5 guiding principles. It is the strength of these principles that has sustained interest in and commitment to GeoNOVA. The concept of "create data once at source and use it many times" is one thing that is closely tied to the GeoNOVA name.

There are some updates suggested to the principles. Stakeholders would like to see data shared freely to all, not just amongst provincial departments. They want to ensure standards are industry or national standards where possible. Stakeholders want a more flexible and accessible way to access an inventory of geographic data than the current Nova Scotia Directory of Geographic Information.

In identifying GeoNOVA's top priorities stakeholders focused on data access, use and improvement. They focused on items required, over the next 5 years, to achieve access to all geographic data from the desktop. As well, the promotion of GeoNOVA is priority and vital to securing and applying resources to achieving GeoNOVA's goals.

Given all of the work and investment in developing data, making this data accessible is the top priority. This must be done in the context of an ongoing data maintenance program. Without ongoing maintenance the value of the data will be lost. Having said this, the bias must be to provide access. We cannot afford to hold data back from users while it is being "improved". Data must be labeled accurately to enable it to be properly used. Accessible data of mixed accuracy or completeness is better than no data at all.

One important point raised by emerging users is the need for "people" to provide support. It is fine for an experienced user to access data from a web portal. Emerging users aren't sure where to look, what questions to ask, what opportunities may be available that they are not aware of. In order to foster new applications of geographic information, there needs to be a means to talk with knowledgeable, helpful support staff.

Given the broad scope and implications of GeoNOVA, stakeholders see a need to broaden participation beyond provincial government departments, particularly among municipal stakeholders. This is a key governance question. Increased participation must only be done within a structure that enables GeoNOVA to communicate, engage issues, make decisions and take action in an effective and timely fashion. Simply adding seats to an already unwieldy committee is not a viable approach.

4.5. Conclusions

There is a widespread and growing need for geographic information and the integration of different sources of geographic information.

There is a strong commitment to the principles of GeoNOVA.

Stakeholders want a single on-line access point, or portal, where they can discover, access and analyze geographically related data about Nova Scotia.

There is much work to be done to achieve this.

The current structure of GeoNOVA is ineffective.

There is strong support for SNS&MR to lead the GeoNOVA initiative for the next 5 years provided:

- A clear direction is set
- A workable governance model is employed
- Stakeholders are engaged as partners
- A realistic plan is set with achievable results
- Constraints stakeholders are working within are recognized

Stakeholders are looking to the future with anticipation. They want to see GeoNOVA as part of that future.

5. WHAT OTHERS ARE DOING

The following sections highlight activities in other jurisdictions and compare them with the current GeoNOVA initiative. Detailed source material for this section can be found in Appendices C - F.

The review is organized around the following topics:

- Objective – what are the jurisdiction's objectives with respect to geographic information
- Structure – what organizational structure is employed
- Principles – what principles are used to guide the process
- Components – what components are being addressed to meet the objectives

5.1. Canadian Geospatial Data Infrastructure (CGDI)

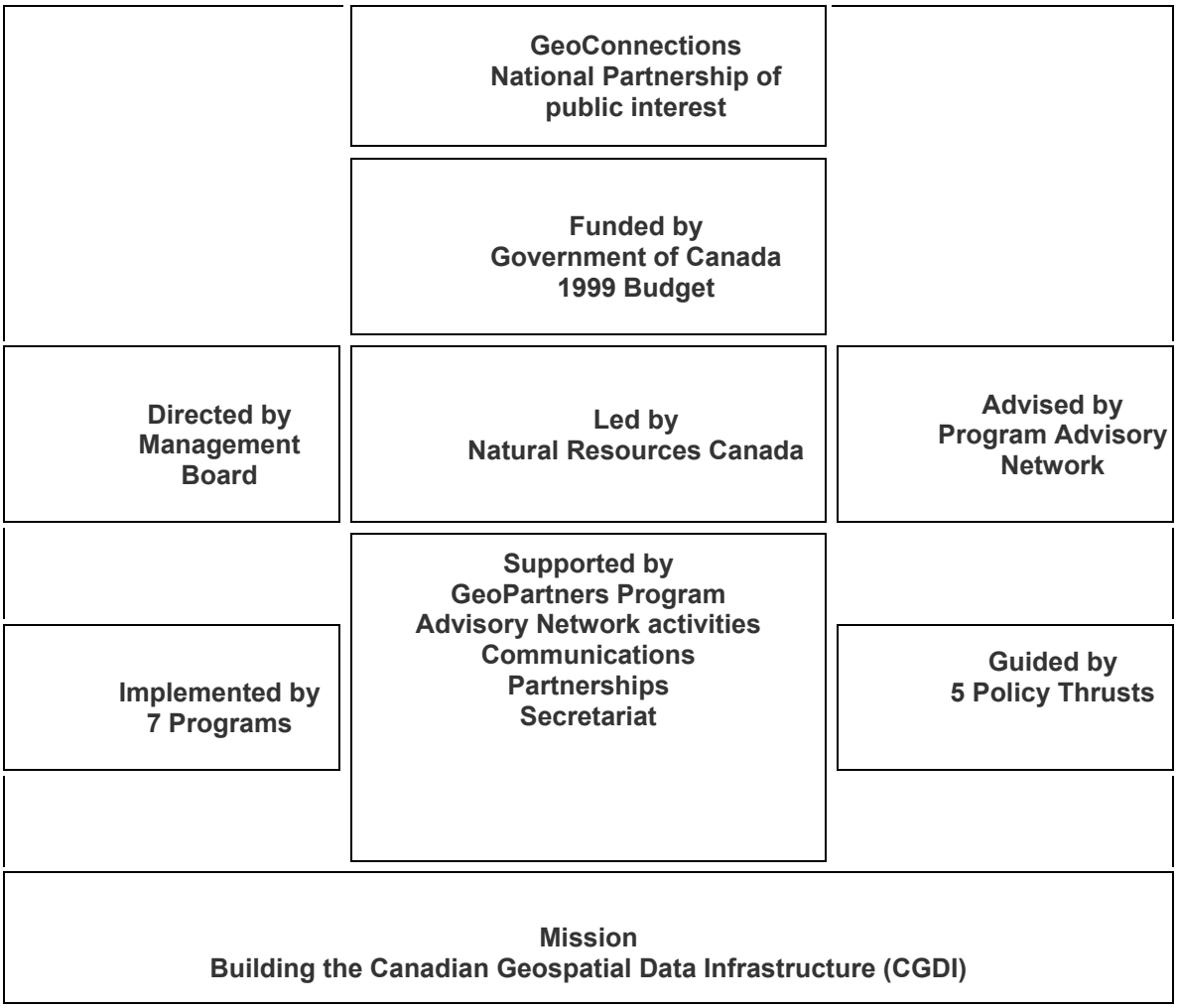
5.1.1. Objective

CGDI Vision - to enable timely access to geo-info data holdings and services in support of policy, decision-making and economic development through a co-operative interconnected infrastructure of government, private sector and academia participants.

5.1.2. Structure

The CGDI is being delivered through the federal GeoConnections program. It is a multi-faceted initiative with a multi-layered structure. Figure 2 depicts this structure.

Figure 2 GeoConnections Structure



5.1.3. Principles

The CGDI is based on a set of principles for Data Partnership

1. Data should be collected once, closest to the source and in the most efficient way possible, with a view towards increasing the vertical integration of the data.
2. Geo-info data should be as seamless as possible, with co-ordination across jurisdictions and boundaries when possible.
3. Data should be collected, processed and maintained according to international standards to maintain data integrity across databases, and to enable the addition of value, further enhancement and easy access and use.
4. Upon agreement, partners should contribute equitably to the costs of collecting and managing the data, and should be allowed to integrate the resulting information into their own databases, for their own use and for further distribution to their stakeholders.
5. There should be an attempt to harmonize terms and conditions for use where practical. In the absence of such agreement, each agency should be free to establish its own terms and conditions for such information.
6. Agreements between agencies will normally be negotiated on a case-by-case bilateral or multi-lateral basis, according to these principles of partnership.
7. Partnerships between agencies should be simple and support the principles of the CGDI, open to the participation of interested stakeholders within any level of government, the education communities or the private sector.
8. A group or agency within each province and within the federal government should be designated to promote and co-ordinate the development of a common geospatial data infrastructure, both within its jurisdiction and between jurisdictions.
9. CGDI is national in scope, and must meet the needs of a wide range of geospatial user communities, data producers and different areas of the private sector.
10. CGDI must consist of a set of co-ordinated and interrelated policies, practices and possibilities that build on the vision.

5.1.4. Components

GeoConnections recognizes that many important technologies, standards, protocols and maintenance procedures are required to make geospatial information accessible, and to give Canadians a world-leading information technology infrastructure. These requirements will be fulfilled through five policy thrusts.

1. Access Data: Making geospatial data accessible on the Internet so that businesses, governments and Canadians can find and download geospatial information on demand, 24 hours a day, 365 days a year.
2. Framework Data: Establishing a framework of data that will make it easier to integrate information to speed decision making and develop new information products.
3. Geospatial Standards: Ensuring that information matches international standards, so that Canada can share information with other nations, and Canadian businesses can sell geospatial information technology and services in the global marketplace.
4. Partnerships: Collaborating in partnership with various levels of government, the private sector and the academic community to capitalize on their collective expertise and to ensure seamless delivery of geospatial information.
5. Supportive Policy: Developing supportive policy at all levels of government to accelerate private-sector commercialization of geospatial information, and to develop e-commerce, integrated technologies and services.

The CGDI is a national initiative that ultimately is seeking to link with other national spatial data infrastructures to form a Global Spatial Data Infrastructure (GSDI). Information on the GSDI initiative can be found at www.gsdi.org.

5.2. Alberta

5.2.1. Objective

Government of Alberta (GOA) objectives related to coordinating geomatics efforts, include:

- exploring the potential to develop a cooperative approach to increase interoperability related to sharing of geomatics information and derivatives
- improving access to the geomatics information both internally and externally
- reducing duplication and redundancy of effort related to geomatics data
- reducing/optimizing investment in geomatics development and maintenance initiatives

5.2.2. Structure

Currently, there is no formal organizational structure for 'coordinated' geomatics efforts, though there is a recognized need from both within government and private industry for more coordination.

Historically, there has been one Government of Alberta (GOA) organization with the mandate for implementing and managing provincial topographic and cadastral mapping programs. These responsibilities are legislated in the provincial Surveys Act, whereby the Director of Surveys is responsible for coordinating the establishment, maintenance and preservation of a land survey system, geographical positioning system, mapping system and a land-related information system for Alberta.

In June 1996 the Spatial Data Warehouse Ltd. (SDW) was created to carry out the activities involved with updating, storing and distributing Alberta's digital base map data. GOA's current objectives regarding base mapping are to ensure that SDW activities are performed with the public interest in mind, and that base mapping products meet provincial mapping standards regarding accuracy, content and quality.

Historically, the coordinating role was well defined and assigned to a particular department program area. With the implementation of the SDW, there is a sole GOA representative on the SDW Board of Directors. The need for an 'overseeing' committee has been recognized and several inter-departmental groups have been struck to provide guidance for geomatics activities.

Lead agencies, include:

- Alberta Sustainable Resource Development (SDW Inter-departmental committee)
- Alberta Government Services (SDW Board of Director Representation)
- Innovation & Science (Land Information – Corporate)

5.2.3. Principles

Based on the questionnaire response two key principles were inferred:

- Approaches to maintenance and update need to ensure capture of data closest to source.
- Adoption of a 'one-window' approach to providing government services

5.2.4. Components

Although the components for coordinating geomatics activities were not specifically listed in the questionnaire response, the following topics address the fundamental areas:

- Catalogues/inventories of geographic information exist, but no formal coordinated catalogue implementations are available. Currently, there is some development of metadata cataloguing for access on the web. Metadata capture has not yet been formalized across government (no standards exist).
- Generally, geomatics type of information is available, though format, timeliness of delivery and/or currency may be an issue.
- Access and sharing of geographic information is varied – typically distribution costs only are recovered for data distributed by GOA, though for some products, cost of compilation is also recovered. Technologies employed vary from Web-based interfaces to hard copy printing, CD distribution, e-mail and ftp.
- Government standards are perceived to be lacking, though Departmental standards exist. Standards and specifications for base mapping products likely need revision. Technology standards have not been formally addressed across the GOA enterprise, nor have standards related to Data Administration been formalized.
- The adoption of a 'one-window' approach to providing government services has become a priority within government, and has resulted in the development of innovative systems, such as SPIN within Government Services for accessing land titles, and related information. Currently planning is focused towards developing an application architecture for sharing and updating common 'corporate' spatial data

5.3. British Columbia

The review of British Columbia followed a case study model where a number of projects were examined. Similar to Alberta, there is no single geomatics coordination initiative. This section seeks to highlight key aspects of the projects examined to obtain a picture of the situation in British Columbia. The projects examined were:

- INCOSADA (Integrated Corporate Spatial & Attribute Database)
- Tantalis (Crown Land Management)
- Resource Inventory Review
- Legal Encumbrance (Registry) Review
- Corporate Base Map (Contents, Standards & Governance) Review

5.3.1. Objective

The objectives of the INCOSADA project are representative of the objectives of the projects reviewed. These objectives are focused on a particular business application area rather than broad coordination of geomatics information.

The INCOSADA Vision - A Fully Integrated (Spatially Enabled) RDBMS, Managed at the Operational Level.

INCOSADA Goals:

- Well defined standards.
- Fully integrated “analysis ready” spatial and attribute information.
- Controlled data integrity & security.
- Common data management & analysis tools that are extensible to meet changing business requirements.
- Improved access to information.

5.3.2. Structure

Based on a major program review, the Ministry of Sustainable Resource Management (MSRM) was established in June, 2001. MSRM is based on a shared services model where program areas retain responsibility for stewardship of geographically related data holdings and MSRM provides services for the maintenance, management and access to these holding. It is believed that improved service and cost efficiencies will be realized by pooling the resources currently performing geographic data management from each of the individual program areas in one central ministry.

Recommendations from the Corporate Base Map review indicate that the Base Mapping and Geomatics Services (BMGS) Branch of MSRM should be assigned responsibility for topographic and ortho-image base mapping. It also recommended the establishment of a new not-for-profit agency, Integrated Cadastral Initiative (ICI), with membership from provincial government, municipal government and utility companies to assume responsibility for the cadastral basemap. ICI would follow a similar model to Alberta's Spatial Data Warehouse (SDW). British Columbia does not have uniform cadastral map coverage for the province. The ICI initiative is an attempt to integrate Crown land parcel mapping from the province with private parcel mapping from municipalities and utilities into one provincial parcel database and provide a shared funding model for parcel maintenance.

5.3.3. Principles

The following guiding principles were developed as part of the Legal Encumbrance Review:

- Senior executive support
- Clear decision-making authority
- Consistent with government policy and objectives
- Governance leads to results
- Clear delineation of roles and responsibilities
- Ease of access
- Build on current strengths
- Integrity of programs is maintained
- Common technology standards
- Promotes new e-government services
- Cost-effective
- Minimal, easily and widely available training
- Visible, early results

Although not focused on coordinating geographic information, these principles highlight the importance of executive support, policy, governance, ease of access and common standards.

5.3.4. Components

Based on the case study of British Columbia it is evident that advancements are being driven by major business applications. The key components are:

- Integrated spatial and attribute data for Crown Lands
- Common provincial topographic and ortho-image base map
- Move to an integrated cadastral parcel map for the province incorporating Crown and private parcels
- Consolidated registry system for all Crown land holdings and interests
- Move to consolidate geographic data management resources under the Ministry of Sustainable Resource Management
- Focus on streamlining business process and supporting e-government initiatives

Given the major restructuring and "right sizing" underway in British Columbia it is difficult to anticipate which initiatives will more forward and at what pace.

5.4. Land Information Ontario (LIO)

5.4.1. Objective

Land Information Ontario (LIO) has as its mission, to see that all geospatial data in Ontario are managed, accessible, integrateable, and affordable.

Land Information Ontario is working to ensure that:

- Certain fundamental data sets exist
- All existing data sets are discoverable
- Mechanisms and organizational structures are in place to allow for easy sharing of data
- Creators of geospatial data are encouraged to follow standards

LIO also works directly with provincial government ministries and agencies to improve the quality of geospatial data and reduce redundancy.

5.4.2. Structure

The Ontario Ministry of Natural Resources, Science and Information Resources Division, Information Resource Management Branch, has been declared to be the lead agency with respect to geomatics interests. Land Information Ontario acts as a secretariat to coordinate the efforts of the large number of initiatives and their respective boards, steering committees, review committees, working groups, user groups, and advisory groups. Overall management is in the hands of the Inter-Ministry Committee on Land Information (ICLI), a formal group of Assistant Deputy Ministers from 13 Ontario government ministries. This group meets four times each year.

Each ministry within the government of Ontario has its own geomatics unit or units, the largest of which is the Ministry of Natural Resources (MNR). MNR has also taken on the role of providing consulting services through a number of Geomatics Service Centres, which provide analysis, reports and small systems on a fee-for-service basis to the entire provincial public service. All ministries and agencies of the Ontario government, as well as any other public sector organizations (municipalities, Ontario region of federal government, Conservation Authorities, etc) and post-secondary institutions are joining the Ontario Geospatial Data Sharing Exchange (see below for details), to share data among themselves easily and at no cost. So far, this structure has met with the acceptance of all of the participants.

5.4.3. Principles

A set of principles was not present in the material provided. This does not indicate a set of principles is not in place for LIO.

5.4.4. Components

The Ontario Land Information Infrasturcture (OLII) is comprised by the following core components:

- Policy Framework
- Planning Framework
- Access Infrastructure
- Georeferencing Infrastructure
- Fundamental Data

Major undertakings of interest to GeoNOVA are:

- Ontario Geospatial Data Exchange (OGDE) - a multi-party agreement to radically improve the ability of government (provincial, federal, municipal), broader public sector agencies, and aboriginal communities, to share geospatial data amongst themselves for non-commercial purposes.
- Ontario Land Information Directory (OLID) - is a Metadata input tool provided at no cost to allow any geospatial data holder to catalogue their data holdings. It is also a query tool available through the public Internet and linked to other Metadata directories through a Z39.50 protocol designed to allow searchers to discover data sets appropriate to their needs.
- Ontario Land Information Warehouse (OLIW) - provides an Extranet-based secure deposit (Publication) and withdrawal (Subscription) of both structured and unstructured data. Structured data are made available through Internet views designed to meet specific user needs. Structured data are also available through an interoperable OGC-compliant Map Server.

Priorities over the next 5 years will be:

- cataloguing all geospatial data holdings
- standardizing data quality within the government of Ontario
- increasing membership in OGDE to increase data sharing activities
- ensuring the self-sustaining existence of important geospatial data sets
- encouraging more direct interaction among various levels of government
- encouraging more universal use of geospatial data in all walks of life.

5.5. Observations

The CGDI is a major force for the discovery and dissemination of a wide range of geographic information in Canada. Policies and standards developed for the CGDI will impact developments in Nova Scotia. Engaging with the CGDI and GeoConnections is an effective means to ensuring Nova Scotia is in step with national and international standards and initiatives. Integration with the CGDI and GeoConnections initiatives provide opportunities to increase GeoNOVA's presence as a node on the CGDI. Working with GeoConnections provides opportunities to obtain access to expertise, technologies and dollars to build Nova Scotia's geographic infrastructure and contribute to the national geospatial infrastructure.

Alberta has a similar set of objectives to Nova Scotia with respect to geographic information. It is pursuing these objectives without a formal coordinated effort, although there is a recognized need for such coordination. The establishment of the Spatial Data Warehouse (SDW), to manage and maintain the base mapping for the province through partnerships with agencies outside of the provincial government, appears to have clouded the issue of who should lead a coordination effort. Provision of access to geographic information and data sharing is occurring in varied ways at the initiative of individual agencies. The move by the province to "one window" access and electronic service delivery may drive the need for coordination.

British Columbia is focused on streamlining major business applications and ensuring that the geographic component of these applications is appropriately managed. The predominance of Crown land in the province causes British Columbia to focus on Crown land management applications and the resource sector more heavily than Nova Scotia. The principles, standards and policies employed are similar but more narrowly focused around business applications. It will be interesting to see the impact over time of consolidating the services for geographic information management into a single ministry. In particular, whether this will foster an increased corporate approach to geographic information across business areas.

Ontario's initiative to develop the Ontario Land Information Infrastructure is the most comprehensive and focused effort of the three provinces. It's aim and components are very similar to GeoNOVA's. The Land Information Ontario (LIO) secretariat is the focal point for coordinating the effort. Major partnerships are being established under the Ontario Geospatial Data Exchange. Major data and technical infrastructures are being established in the Ontario Land Information Directory and Ontario Land Information Warehouse. LIO is clearly leading the way.

Relative to Alberta and British Columbia, Nova Scotia has a vision, set of guiding principles, lead agency and base of data holdings that position it to move steady toward implementing a geographic infrastructure for the province. Relative to Ontario, Ontario has more dedicated focus, more resources, a comprehensive plan and initiatives underway to deliver access to all of its provincial data holdings.

6. GEONOVA PROGRAM EVALUATION

The key challenge in evaluating the GeoNOVA program is defining what GeoNOVA is. As identified in the user evaluations, stakeholders, even those within SNSMR, have difficulty articulating what GeoNOVA is. For the purposes of this review, the presentation "GeoNOVA – A Geographic Infrastructure for Nova Scotians" was used to define GeoNOVA and will act as a framework for the evaluation. The GeoNOVA program presentation was developed by Nancy Vanstone, Executive Director of RIMS and Rob Doiron, Director of Information Management, RIMS. It is contained in Appendix H – GeoNova Program Presentation. In Sections 6.2 to 6.5, each subsection title is taken from the GeoNOVA Program Presentation.

GeoNOVA, a geographic infrastructure for Nova Scotians, is comprised of:

- Institutional Framework - defines the policy and administrative arrangements for building, maintaining, and distributing the data
- Foundation Databases - common databases used for many different applications and produced to comply with the technical standards
- Policies and Standards - define the technical characteristics of the data and supporting policies
- Access Infrastructure - means by which the data is made accessible, and to the agreed upon technical standards and policies

6.1. GeoNOVA Concept

The GeoNOVA vision is "a corporate approach to the creation, maintenance, and distribution of geographic information. GeoNOVA encourages the creation of corporate geographic information resources collected, maintained, and distributed to accepted standards and shared amongst all users within the Province to support decision making and to reduce duplication of effort.", is a compelling concept. The GeoNOVA principles ring true and garner wide spread support.

Based on the users' perception of GeoNOVA, its resources, and its accomplishments, GeoNOVA is more of a concept than a program.

By communicating these principles and working them into the thinking of geographic information managers in the province, a mindset has developed that fosters agencies, whether working independently or in loose collaboration, to act in ways that move the province towards realizing the GeoNOVA concept.

Given the low level of resources dedicated to GeoNOVA in recent years, there have been no new "GeoNOVA initiatives" but as SNSMR and other stakeholders do work that contributes to the

development of the GeoNOVA concept it is labeled as GeoNOVA work. The resulting paradox is that GeoNOVA is not undertaking work but work is being done which advances the aims of GeoNOVA. Hence the stakeholder comment that "There has been nothing done in GeoNOVA that would not have been done without GeoNOVA." The positive side of this is there are things being done which are moving the province towards the GeoNOVA concept and are in line with the principles of GeoNOVA.

So the issue is not whether the province is moving in the right direction – it is. The question is whether the current movement is efficient, effective, keeping pace with the requirements of the stakeholders and building a sustainable infrastructure for the future.

The following sections will not be as much concerned about whether GeoNOVA is the reason or driving force behind accomplishing an objective, as much as, whether the objective is being accomplished.

6.2. Institutional Framework

The institutional framework is concerned with the policy and administrative arrangements for building, maintaining, and distributing the data. On the institutional front, the pieces are in place but the leadership and governance of GeoNOVA is ineffective.

6.2.1. SNSMR as lead provincial department for GeoNOVA

SNSMR is the lead for GeoNOVA. Users believe that SNSMR should be the lead. In recent years, SNSMR has not invested the necessary management resources in GeoNOVA to move it forward as an initiative in the eyes of the stakeholders. Good work in building data and applications has been done by SNSMR but it has not invested in "leading" GeoNOVA.

6.2.2. SNSMR builds and maintains "foundation" data

SNSMR takes its responsibilities for "foundation" or "primary" datasets seriously and has done so as a critical component of its mandate.

6.2.3. "Thematic" databases by other Departments

Other departments are developing "thematic" databases as part of their program delivery. These datasets are generally based on or incorporate elements of the "foundation" data. There are instances of duplication, e.g. Crown and private parcel boundaries, between agencies but there is a willingness to rationalize these over time.

In order for "thematic" databases to be accessible via GeoNOVA, they need to adhere to agreed standards and policies.

6.2.4. Data distributed freely within provincial government

Free distribution of data within the provincial government is considered a major accomplishment of GeoNOVA. There are instances where data from some departments is not freely available – these are the exception. Users are looking for this arrangement to be extended beyond provincial departments to all government users or even to all users.

6.2.5. GeoNOVA Advisory Committee provides policy advice

As is clearly stated in the user evaluations of GeoNOVA, the current GeoNOVA Advisory Committee is considered ineffective. It does not advise on policy and is grappling with its "reason to be". For GeoNOVA to move forward, a more effective governance model must be employed.

The issue of expanding the participation outside of provincial agencies, particularly to municipalities, must be addressed.

6.2.6. Standards committee(s) develop technical standards

Standards work was a major component of GeoNOVA from 1993 to 1998. There is currently no active standards committee and no resources allocated to leading the standards effort. As with data, standards are constantly changing. Without a focus on staying current, the existing standards will continue to diminish in value over time. With stakeholder focus on access and integration of data, standards are a key requirement. This is a major gap in the current GeoNOVA program.

6.2.7. Partnerships allow for cost efficiencies in building the infrastructure

SNSMR, and other provincial departments, see partnerships as a means to accomplish more with less. There appears to be good success occurring in this area. Municipal/provincial data sharing agreements and the Target Nova Scotia development are good examples. Focus needs to continue on ensuring a good deal for all partners.

Lack of success in securing funding through the GeoConnections program is a shortcoming. SNSMR provided an opportunity to partner with groups in submitting proposals to GeoConnections, where matching contributions would be made by SNSMR from the Map Fund. Stakeholders, and some SNSMR representatives, involved in this initiative believe that it was hastily put together and executed, and the failure to secure funds was not unexpected.

6.3. Foundation Databases

On the foundational database front, Nova Scotia scores high marks.

The "foundation" or "primary" databases are the responsibility of SNSMR. Based on the user evaluations and in comparison with other jurisdictions, SNSMR has done a good job of creating and maintaining the "primary" databases.

As noted in the user evaluations, there is a demand for digital ortho-photography. Users are frustrated with the lack of movement on NAD'83 and UTM as a provincial coordinate referencing standard. Topographic data is critical to stakeholders' business operations and receives a good review. Property data, particularly via the Nova Scotia Property Records Database (NSPRD) On-line application, also receives a solid review. Continuing issues with AAN-PID matches are a concern. The Nova Scotia Civic Addressing File initiative is particularly important when you consider the high level of importance placed on civic addressing in the user evaluation, especially among emerging users.

6.4. Policies and Standards

On the policies and standards front, Nova Scotia is not making progress, which implies it is losing ground.

The results of a review of current geomatics policies and geographic information standards are contained in Appendix A - Geomatics Policies in Nova Scotia and Appendix B - Geographic Information Standards in Nova Scotia. The following are comments regarding their overall effectiveness.

6.4.1. Policies

Policies have been developed for Coordinate Referencing, Topographic Data, Property Records Data, and Pricing and Distribution of Geographic Information. As indicated in the user evaluations, there is a reasonably high level of awareness and perceived adherence to the policies. The policies range in age from 6-8 years old and contain dated material. There does not appear to be an emphasis or resources allocated to updating existing policies or developing new policies. New policies regarding data warehousing, metadata, web delivery of geographic information, or freedom of information and protection of privacy issues have not been tackled.

There is frustration amongst stakeholders regarding the stalled implementation of the provincial policy on coordinate referencing. Coordinate referencing is "the" foundation for data integration. Many stakeholders are anxious to move to NAD'83 and UTM but have not received the final grid shift files or software to migrate their datasets.

Pricing and distribution continues to be a "hot" topic. Clarification is required on issues such as academic use and discounts. Federal directions on pricing and distribution will have an impact.

6.4.2. Nova Scotia Geographic Information Standards

Standards work was a major component of GeoNOVA from 1993 to 1998. There is currently no active standards committee and no resources allocated to leading the standards effort.

Standards for metadata, for example, are critical topics that must be addressed. There are significant initiatives federally and internationally that have a bearing on work in Nova Scotia, provincial departments are moving forward in this area with federal funding. Coordination is required to ensure groups are not heading off in different directions and to foster the capture of metadata as part of everyday business processes.

Standards are critical for data access and integration. The absence of a focus on standards is a serious gap in GeoNOVA. Having said this, the approach to standards must be pragmatic and take full advantage of industry initiatives. There is little energy among provincial department managers for an elaborate standards development initiative. Standards work must take industry norms and adapt them to specific Nova Scotia requirements.

6.4.3. Technical Specifications - NSCRS, NSPRD, NSTDB, Civic Addressing

Technical specifications are the "nuts and bolts" workings of program delivery. It is unclear the level to which stakeholders are engaged in the development of technical specifications. In the absence of a standards process, technical specifications are the means to document and communicate the organization and content of data. They are not a substitute for policies or standards.

6.5. Access Infrastructure

On the access infrastructure front, Nova Scotia is doing well for "primary" datasets but is lagging behind in access to "thematic" datasets.

6.5.1. 5 Land Information Centres For Public Delivery

The land information centres provide a public access point for SNSMR's "primary" data holdings and base map products from other agencies (e.g. federal NTS map series). They are not yet a "one stop shop" for all provincial data holdings.

In addition, the Nova Scotia Geomatics Centre (NSGC) and individual provincial departments act as access points for delivery of data to the public and other stakeholders. Stakeholders see progress in the level of service provided by the Nova Scotia Geomatics Centre in delivery and access to "primary" datasets. There are frustrations expressed when accessing data from some other provincial departments. There are some provincial departments that excel at data dissemination. There does not appear to be a coordinated plan to make provincial data accessible. In addition to accessing data from a government office, users are looking for "one stop shopping" and a single point of access via the Internet for all data holdings.

6.5.2. Directory Of Geographic Information Holdings

The Nova Scotia Directory of Geographic Information, as a printed guide, is dated and does not have a sustained process for updates. A geographic data directory is a critical requirement as users demand a means of data discovery access via the Internet.

6.5.3. Digital Licensing To Use The Data

Data licenses are employed for SNSMR data distribution. Often these licenses are "one off" arrangements and no uniform process is in place. Other provincial departments are using standard or "simplified" licenses. There is a very high awareness of provincial data distribution policy and a high level of adherence professed by stakeholder data suppliers. Data licensing is the norm.

6.5.4. Internet Applications To Access The Data

SNSMR has achieved great success with the Nova Scotia Property Records Database On-line application. The DataDirect service for downloading digital basemap data is well received by its limited set of users. There are a growing number of applications delivering provincial geographic data on the Internet. Some of these applications are developed in conjunction with the Nova Scotia Geomatics Centre; others are developed independently. There are no policies, standards,

common architecture or common infrastructure in place in Nova Scotia to foster access to geographic data via the Internet. This area will continue to grow aggressively and presents great opportunities for common access to a wide range of data holdings. Without appropriate attention, this opportunity to unify access to data could be lost.

6.5.5. Value Added Resellers/Distributors

The issue of value added resellers and distributors did not surface during the user evaluations. The stakeholders did not identify as this as an issue to be addressed by GeoNOVA. From the study findings, there is no basis for comment. It is unclear how this issue fits within GeoNOVA.

6.5.6. Approximately $1M Annual Sales For All Foundation Data

The existence of the Map Fund, where revenues from the sales of SNSMR map and data products are re-invested in data improvement, is a tremendous asset to Nova Scotia. The Map Fund is credited with sustaining "primary" data maintenance in the midst of very tight government budgets. There are opportunities to use the Map Fund to leverage additional funds, e.g. GeoConnections, to develop not only data but the infrastructure to provide improved access to data.

6.6. Issues for the Future

In order for GeoNOVA to move forward a number of key issues must be addressed:

- Develop and employ a governance model that works within the constraints of the current environment
- Determine program resources to lead/support GeoNOVA
- Effectively engage and partner with agencies outside the provincial government
- Develop a sustainable data directory and metadata process
- Develop single window access to all geographic data holdings
- Address requirements for policy and standards
- Ensure effective maintenance programs for primary databases
- Communicate and promote GeoNOVA

6.7. Conclusions

Great progress has been achieved within SNSMR in the development, maintenance and access to the "primary" databases.

Much work remains to enable the discovery and access to "thematic" databases in the province. Stakeholder requirements are ahead of the province's ability to deliver and these requirements are growing by the day.

GeoNOVA has not created a sustainable environment for policy, standards, a directory of geographic information holdings, or the technical infrastructure for provincial geographic data discovery, access and dissemination. These areas must be addressed to realize GeoNOVA's vision of "a corporate approach to the creation, maintenance, and distribution of geographic information. GeoNOVA encourages the creation of corporate geographic information resources collected, maintained, and distributed to accepted standards and shared amongst all users within the Province to support decision making and to reduce duplication of effort."

There is strong support for SNS&MR to lead the GeoNOVA initiative for the next 5 years provided:

- A clear direction is set
- A workable governance model is employed
- Stakeholders are engaged as partners
- A realistic plan is set with achievable results
- Constraints stakeholders are working within are recognized

Stakeholders are looking to the future with anticipation. They want to see GeoNOVA as part of that future.

APPENDIX A: GEOMATICS POLICIES IN NOVA SCOTIA

APPENDIX B: GEOGRAPHIC INFORMATION STANDARDS IN NOVA SCOTIA

APPENDIX C: CANADIAN GEOSPATIAL DATA INFRASTRUCTURE PRESENTATION

APPENDIX D: ALBERTA QUESTIONNAIRE RESULTS

Note: The results of the questionnaire are for Service Nova Scotia and Municipal Relations Internal Use Only. Permission was not secured from the respondent for public distribution of the results.

APPENDIX E: BRITISH COLUMBIA PRESENTATION

APPENDIX F: ONTARIO QUESTIONNAIRE RESULTS

Note: The results of the questionnaire are for Service Nova Scotia and Municipal Relations Internal Use Only. Permission was not secured from the respondent for public distribution of the results.

APPENDIX G: LAND INFORMATION ONTARIO (LIO) PRESENTATION

This presentation, prepared in the year 2000 by Brian Maloney of Land Information Ontario, outlines the Ontario Land Information Infrastructure initiative.

APPENDIX H: GEONOVA PROGRAM PRESENTATION

The following presentation material is an abbreviated version of a presentation made by Nancy Vanstone, Executive Director, RIMS and Rob Doiron, Director of Information Management to the Deputy Ministers on the GeoNOVA Initiative in September, 2000.