

Report to

**Service Nova Scotia &  
Municipal Relations**

**GeoNOVA Portal Architecture and Implementation  
Plan**

Target Vision

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# 1. INTRODUCTION

Service Nova Scotia and Municipal Relations (SNSMR), through its Geographic Information Services Division, is responsible for delivering the GeoNOVA Program. Corporate geomatics is the focus for the GeoNOVA Program and its wide range of stakeholders. This focus is clearly articulated in GeoNOVA's vision statement:

A Corporate approach to the creation, maintenance and distribution of geographic information. Encouraging 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.

GeoNOVA's focus for the coming 5-year cycle is to make geographic data accessible at the desktop.

In keeping with that focus, the Province has recently entered into a partnership arrangement with GeoConnections, the national partnership program designed to foster the development of the **Canadian Geospatial Data Infrastructure** (CGDI). The CGDI is intended to provide Canadians with on-line access to the discovery, sharing and use of geospatial information and services. The goal is to harmonize Canada's geospatial databases and make them accessible on the Internet as well as offer geospatial services.

GeoNOVA supports the CGDI vision and guiding principles and sees the development of a provincial geoportal as a key element in achieving its objectives. The GeoNOVA Portal is envisioned as a point of entry for clients and stakeholders and the general public to directly access Nova Scotian geospatial data, services and applications.

## 1.1. Purpose and Scope of Document

This *GeoNOVA Portal Architecture and Implementation Plan – Target Vision* document describes the vision, guiding principles, high-level business requirements and conceptual model for the GeoNOVA Portal. It is the overarching description of the GeoNOVA Portal, and thus contains high-level material to frame and guide thinking and decisions regarding the portal.

This document is a deliverable of the *GeoNOVA Portal Architecture and Implementation Plan* Project. This project is conducted by the GeoNOVA Program and managed by Service Nova Scotia & Municipal Relations (SNSMR).

The ultimate objective of the project is to provide a roadmap for the GeoNOVA Program in moving forward with the development and implementation of a GeoNOVA portal.

Other deliverable documents for this project are:

*GeoNOVA Portal Architecture and Implementation Plan – Architecture Framework*

*GeoNOVA Portal Architecture and Implementation Plan – Implementation Plan*

The planning for and development of a GeoNOVA Portal is a critical element of the GeoNOVA Vision articulated in the *GeoNOVA Initiative - Five Year Strategy* conducted in 2002.

The purposes of this document are to:

- Provide a non-technical description of the purpose, guiding principles, and requirements for the planning, design, development and implementation of the GeoNOVA Portal infrastructure and applications;
- Facilitate the identification of possible on-line services and applications that might emerge from the implementation of a shared, public geographic access portal for Nova Scotia; and
- Generate critical response and support from GeoNOVA stakeholders, and other parties, regarding the use of the GeoNOVA Portal in accomplishing their operational mission, delivering their services or sharing their information with those who need it.

## 1.2. Intended Audience

This document will be of value to anyone with an interest in facilitating access to geographic data in Nova Scotia. Existing and potential GeoNOVA Program participants, in particular, will want to understand the direction, opportunities and implications of a GeoNOVA Portal being deployed in the province.

## 1.3. Authors

This document was written by Robin Mullin, Clare Caldicott and Brian Drew of Sierra Systems for the GeoNOVA Portal Architecture and Implementation Plan Project Committee, Mr. Ed Light chair. The GeoNOVA Program is delivered by Service Nova Scotia & Municipal Relations through its Geographic Information Services Division.

Significant material in this Target Vision document was provided by the GeoNOVA Initiative – 5 Year Strategy ([www.gov.ns.ca/snsmr/land/strategy](http://www.gov.ns.ca/snsmr/land/strategy)), notes from SNSMR internal discussions in 2002 on the GeoNOVA Portal, U.S. Geospatial One Stop Initiative ([www.geo-one-stop.gov](http://www.geo-one-stop.gov)) and by the Canadian Geospatial Data Infrastructure (CGDI) ([www.GeoConnections.org](http://www.GeoConnections.org)).

## 1.4. Analysis Approach

Our overall approach to developing the *Target Vision* was to engage people involved in planning for and delivering GIS implementations in Nova Scotia government and municipal departments to determine the guiding principles, business requirements and non-technical issues around an envisioned GeoNOVA portal.

The analysis began by soliciting business requirements from key GIS data providers and a broad cross-section of GeoNOVA participants and then closely examining initiatives within the CGDI. This formed the basis for the target vision.

## 2. VISION OF THE GEONOVA PORTAL

The GeoNOVA Portal is envisioned as the provincial gateway for all geographic information about Nova Scotia. The GeoNOVA Portal provides key elements required to realize the GeoNOVA Program's focus for the current 5-year cycle, which is to make geographic data accessible at the desktop. The vision includes enabling inter-organizational and inter-application sharing of Nova Scotia geographic data.

The Portal is the primary component of a dynamic, province wide, computing and organizational infrastructure that places emphasis on making geographic data and services easily accessible from a basic desktop. The potential scope of the infrastructure is access to all geographic data holdings in and about Nova Scotia. The Portal provides centralized services where needed, and also provides for inter-organizational access to distributed data and systems.

The client base for the GeoNOVA Portal is envisioned to be both widely geographically dispersed and highly varied in term of communities of interest, as the Portal provides for data access to governments at all levels, to public and private sectors and also to academic sectors.

The GeoNOVA Portal is not intended to replace agency websites nor any other government portal. The GeoNOVA Portal will, however, provide additional means by which those sites might be accessed by a possibly wider and more varied client base. In fact, it is anticipated other portal sites will see increased visits/activity as a result of the GeoNOVA Portal, through the GeoNOVA Portal's ability to foster awareness and use of other portals and applications. The GeoNOVA Portal opens opportunities for multiple agencies to participate in web delivery and development opportunities.

As a web-based gateway for all geographic information about Nova Scotia, the GeoNOVA Portal supports all five elements of the GeoNOVA Program Vision:

- Seamless Desktop Access – The GeoNOVA Portal is a primary access point for use of geographic data from personal computers via the Internet or Intranets;
- Expand Accessible Data – The GeoNOVA Portal enables the inclusion of new data sets by providing a complete infrastructure for data access and by removing barriers to participation;
- Foster Use – The GeoNOVA Portal fosters use by simplifying access to data and by fostering awareness of the multitude of geographic data resources available in the Province;
- Primary Data Sets – The GeoNOVA Portal enhances awareness of and access to the provincial primary data sets – control surveys, aerial photographs, topographic mapping, property mapping, and civic addressing; and
- Canadian Geospatial Data Infrastructure (CGDI) Node – The GeoNOVA Portal acts as a primary node for Nova Scotia in the CGDI network, thus enabling Canadian and international users to discover and access Nova Scotian geographic information.

### 3. GEONOVA PORTAL GUIDING PRINCIPLES

Guiding Principles identify the behaviors we will adopt to achieve our objectives. The GeoNOVA Program is based on the following six principles:

- Create data once, as close to the source as possible, and use it many times;
- Take a “corporate” approach to the creation, management, dissemination and use of geographic data and information;
- Adhere to the approved Standards for Geographic Information in Nova Scotia;
- Share data and information freely among provincial government users;
- Make Nova Scotia’s geographic data discoverable and ensure metadata is managed in a sustainable way; and
- Maximize the use of partnerships to build collaborative working relationships and optimize the use of our collective resources.

As a component of the GeoNOVA Program, the GeoNOVA Portal must embrace these six principles. In developing a set of principles specific to the GeoNOVA Portal, the following were adapted and enhanced from the Canadian Geospatial Data Infrastructure (CGDI) guiding principles. The principles remain consistent with the CGDI guiding principles and are listed in priority sequence:

**Open:** The GeoNOVA Portal will be based on open and shared specifications for operational transactions and information exchange. Open and shared in this context means that the specifications are available for the world to take, to use, and to modify for other purposes. These specifications will be based on national and international standards where available.

**Cooperative:** The GeoNOVA Portal will facilitate the cooperation and interoperability of autonomous participating organizations while respecting the specific mandate of each organization. The GeoNOVA Portal will define common technologies and standards rather than proscribing single or proprietary implementation solutions.

**Self-sustaining:** The GeoNOVA Portal will ensure its long-term sustainability through its relevance to the needs of the participating agencies and users. The establishment of a sustainable infrastructure is critical to fostering business application integration with the portal and supporting the associated dependencies upon the portal.

**Evolving:** The network of participating organizations will continue to encompass new requirements and business applications for information and service delivery to their respective users. The GeoNOVA Portal will evolve to meet these changing requirements while remaining open to new models of delivering services.

**Best Available Data:** The GeoNOVA Portal will provide data and services based on the best available data, in particular the most current data available. Provision of more timely or accurate data than currently available, or the definition of minimum levels of service that must be met by participants in order to offer a service to the infrastructure, will be negotiated between participants as part of the GeoNOVA Program not the GeoNOVA Portal.

**Transparent:** The GeoNOVA Portal will allow users to access data and services seamlessly in a manner that removes the complexities of the underlying technology and information infrastructure. By seamless is meant the elimination or hiding of artificial spatial boundaries introduced by jurisdictional organization structure or by technical artifacts such as scale or quality of information.

**Self-organizing:** The GeoNOVA Portal will enable various levels of participating organizations to contribute geospatial information, metadata, services and applications without the requirement for centralized administration, access, and warehousing. SNSMR will provide leadership in establishment and operation of the portal. Management and administration of data will remain as close to source as possible.

**Balanced Data Access:** The GeoNOVA Portal, as a powerful means of integrating a wide range of data holdings, must balance freedom of information with the protection of privacy for citizens within existing legislation and policy.

## 4. GEONOVA PORTAL REQUIREMENTS

The GeoNOVA Portal is envisioned as a point of entry for clients and stakeholders to directly access Nova Scotia geospatial data, services and applications. Within this scope there is a broad range of business needs and priorities to be addressed. The following sections identify initial priorities for the GeoNOVA Portal. Additional definition of business requirements will be required prior to the design of the portal.

### 4.1. Business Requirements

To assess the geoportal stakeholders' view of the high-level business requirements, stakeholders were asked to allocate \$1,000 expenditure across the major geoportal areas identified in the US Geospatial One-Stop Portal ([www.geo-one-stop.gov](http://www.geo-one-stop.gov)) initiative (see section 4.4 Functional Requirements for additional information on Geospatial One-Stop).

The high-level business requirements are identified as:

- Search – search for data based on data type, location, place name, coordinates, or map interface;
- Map Display – directly display map data on-line;
- Meta Data Access – view data about available data and services;
- Data Access – data download and access;
- Transformation and Processing – various services for data format or coordinate system transformation, analysis, geocoding;
- Publication – self-registering new data and services;
- Product Ordering – ordering hardcopy products via index map or attribute search;
- Information Service – publishing web content relative to GeoNOVA and fostering on-line communities or discussion lists; and
- Other – providing access for individuals with disabilities, role based access, payment capabilities, and personalization.

Two stakeholder groups were consulted. Key Providers were organizations currently collecting, maintaining and providing access to major GIS data holdings. Emerging Users were organizations in the early stages of GIS adoption or groups primarily acting as consumers of geographic information.

Spending Category	Average		
	Key Providers - Workshop 1	Emerging Users - Workshop 2	Overall
Map Display	\$ 219	\$ 294	\$ 244
Search	\$ 236	\$ 244	\$ 239
Data Access	\$ 164	\$ 167	\$ 165
Transformation and Processing	\$ 88	\$ 112	\$ 96
Meta Data Access	\$ 109	\$ 57	\$ 92
Product Ordering	\$ 85	\$ 15	\$ 62
Information Service	\$ 43	\$ 43	\$ 43
Publication	\$ 38	\$ 21	\$ 32
Other	\$ 20	\$ 47	\$ 29
Total	\$ 1,003	\$ 1,000	\$ 1,002

**Figure 1 - Breakdown of Stakeholder Spending of \$1,000 on GeoNOVA Portal Functions**

From Figure 1 - Breakdown of Stakeholder Spending of \$1,000 on GeoNOVA Portal Functions we see that searching for geographic information and on-line display of maps are the dominant and relatively equal requirements for the geoportal. It is important to note that emerging users place a very high priority on on-line map display. These are followed closely by data access, or data downloading, capabilities.

Metadata access along with transformation and processing services form the second tier of priorities. It is interesting to note the significantly higher importance placed on metadata by key data providers perhaps driven by their need to capture and manage metadata. It is important to note product ordering as a higher priority for key providers, perhaps to off load hardcopy sales functions from their operations.

## 4.2. Communities of Interest

Interest in particular applications and sets of data are often directly related to the users' perspective and area of interest. For example, municipal planners may be constant users of topographic, property boundary, zoning, land use, municipal services and demographic data. Similarly, social workers may be constant users of civic address, administrative boundary, social service provider, affordable housing and demographic data. These types of users, or Communities of Interest, can be used to predefine the GeoNOVA Portal content to be presented to a user based on their interest.

Some Communities of Interest may already have web portals, which serve their needs. These existing portals may benefit from access to geographic data in Nova Scotia.

Initial workshops with GeoNOVA Portal stakeholders resulted in a lengthy and very diverse list of communities of interest. A list of communities of interest identified during workshop discussion is contained in Appendix C Communities of Interest List in the *GeoNOVA Portal Architecture and Implementation Plan – Architecture Framework* document. Often these communities were identified on the basis of the data they accessed rather than business application or organization. The following defines the five general categories identified, with Government Departments and Agencies envisioned as the dominant initial users of the GeoNova Portal:

- **Government Departments and Agencies** - Government agencies, be they federal, provincial, or municipal, are the primary providers of data within this portal and thus they must be the first priority group to be addressed in delivering the GeoNOVA Portal. They are also recognized as heavy users of the various data sets, information, services, etc. which will be linked or offered up via the portal;
- **Citizens** - The general public must have a place they can go to understand geographic information and where required, to get “basic mapping information”. The portal will enable them to order this information and the products they require to do things such as recreation, travel, etc.;
- **Businesses and Professionals** - There will be client groups who will seek to access broad, and in some instances very specific, geographic data and services. They will also look to understand the programs and opportunities they might have to become involved / partner in geomatics efforts. The portal will thus deliver information, data and services to both general business interests as well as the geomatics sector;
- **Academia** - The Portal must address the needs and interests of varied age and interest groups within the academic community. It must be both educational and an access point for research. By providing education on what geographic data and technology can do and how user friendly it can be, the opportunities for the geographic data investments will grow. By placing some emphasis on academic issues the GeoNOVA Portal will help ensure a growing geomatics community; and
- **Cross Disciplinary Teams with Geographic Interests** – There are communities of interest whose members span a wide range of disciplines that are focused on general or specific geographic areas of interest. For example, planners, biologists, engineers, economists and social scientists may collaborate on the coastal zone issues or a specific watershed to ensure sustainable management. The provincial government has a major emphasis on multi-disciplinary approaches to integrated resource management which would be served by the portal.

### 4.3. Data

In identifying data to be accessible via the GeoNOVA Portal, there will be common data sets of interest to a wide range of users. Additional data sets would be incorporated on a priority basis over time. These data sets may be available on a fee or free basis depending upon the current licensing arrangements between agencies.

The GeoNOVA Portal business requirements consultation sought to gauge, which data sets are of highest priority to GeoNOVA Portal users and via what means. The data could be provided as:

- Hardcopy product order;
- Data down load;
- On-line map service (for example, you would see a map image in a web browser); and
- On-line feature service (for example, map features would be streamed directly from the source system to your GIS desktop).

Specific questions were asked regarding the provincial primary data sets (i.e. control surveys, topographic mapping, property mapping, and civic addressing). As well, stakeholders listed other data sets of interest. This resulted in an extensive and very diverse list of data products with no clearly dominant data sets apart from the primary data sets. It is clear that access to thematic data sets is a high priority for GeoNOVA stakeholders but specific requirements are tied to communities of interest.

Results for the questions around the importance of the primary data sets are listed in the table below. Importance is denoted as 3.0 - High, 2.0 - Medium, 1.0 - Low and 0.0 - Not Applicable.

<b>Data Set and Delivery Mechanism</b>	<b>Importance</b>
Topographic Data-Data Down Load	1.70
Property Mapping-Map Service	1.59
Air Photos-Hardcopy Order	1.56
Property Mapping-Data Down Load	1.52
Property Mapping-Feature Service	1.52
Topographic Data-Feature Service	1.37
Topographic Data-Map Service	1.33
Air Photos-Data Down Load	1.22
Topographic Data-Hardcopy Order	1.22
Property Mapping-Hardcopy Order	1.15
Civic Addressing-Map Service	1.15
Air Photos-Map Service	1.11
Civic Addressing-Feature Service	1.11
Civic Addressing-Data Down Load	1.00
Air Photos-Feature Service	0.78
Coordinate Control System-Data Down Load	0.74
Ortho Photos-Data Down Load	0.74
Ortho Photos-Hardcopy Order	0.67
Ortho Photos-Map Service	0.67
Ortho Photos-Feature Service	0.59
Coordinate Control System-Map Service	0.56
Civic Addressing-Hardcopy Order	0.52
Coordinate Control System-Feature Service	0.44
Coordinate Control System-Hardcopy Order	0.37

**Figure 2 – Primary Data Set and Data Delivery Mechanism Sorted by Importance**

It is interesting to note that the primary data sets do not rank above a medium level of importance via any of the data delivery mechanisms. The GeoNOVA Initiative – 5 Year Strategy found that GeoNOVA stakeholders have a high level of satisfaction with the current delivery of primary data sets and significant concerns in accessing other thematic data. Experience with the Property On-line application indicates that clients who were accustomed to viewing topographic mapping as a backdrop to property mapping raised immediate and vocal concerns when the topographic backdrop was not provided. Thus it appears that the lower than expected ratings are more a function of satisfaction with current data delivery than with the business need for the service.

Having said this, the key priority is for data downloading of topographic data. Next tier of priorities is for access to property mapping via on-line map display, data down loading and on-line access to property map features along with ordering of hardcopy air photographs. Interest in access to other forms of primary data diminishes in a consistent manner.

#### 4.4. Functional Requirements

Rather than starting with a “blank sheet” a common set of functional requirements was identified and stakeholder consultation provided input on the relative priorities. We used the US Geospatial One-Stop Portal ([www.geo-one-stop.gov](http://www.geo-one-stop.gov)) tentative functional requirements as a starting point and augmented these based on Sierra Systems’ experience with other clients and discussions with the SNSMR Project Lead. The Geospatial One-Stop Portal initiative’s focus is to develop an online access point to a collection of geospatial data spanning local, state, tribal and federal government agencies in the United States. They have identified 41 specific functional requirements in the categories of search, map display, data and metadata access, transformation and processing, publication and other. These requirements provided an excellent basis for discussion and enabled maximum feedback in a minimum amount of time.

A complete list of the identified functional requirements and their importance (3.0 - High, 2.0 - Medium, 1.0 - Low and 0.0 - Not Applicable) can be found in Appendix B Functional Requirements List of the *GeoNOVA Portal Architecture and Implementation Plan – Architecture Framework*.

The following is a list of the main functional requirements organized by high-level business requirement category:

- Search – Search by data type, location, map interface and gazetteer (place name look up);
- Map Display – Display an image of a map in a web browser, overlay several maps, specify the geographic extent of the map, view a printable map, reorder the display of multiple maps in layers, and save and restore a map view for later use;
- Metadata Access – View detailed metadata for a map or data of interest;
- Data Access – View information about features on a map and down load data for future use;
- Transformation and Processing – No functional requirements identified as early priorities;
- Publication – Publish, or register, a new map/data service given proper authority;
- Product Ordering - No functional requirements identified as early priorities;
- Information Service - No functional requirements identified as early priorities; and
- Other - Restrict access to particular map or data servers based on user authentication criteria.

## 5. GEONOVA PORTAL CONCEPT

The GeoNOVA Portal is envisioned as a point of entry for clients and stakeholders to directly access Nova Scotian geospatial data, services and applications.

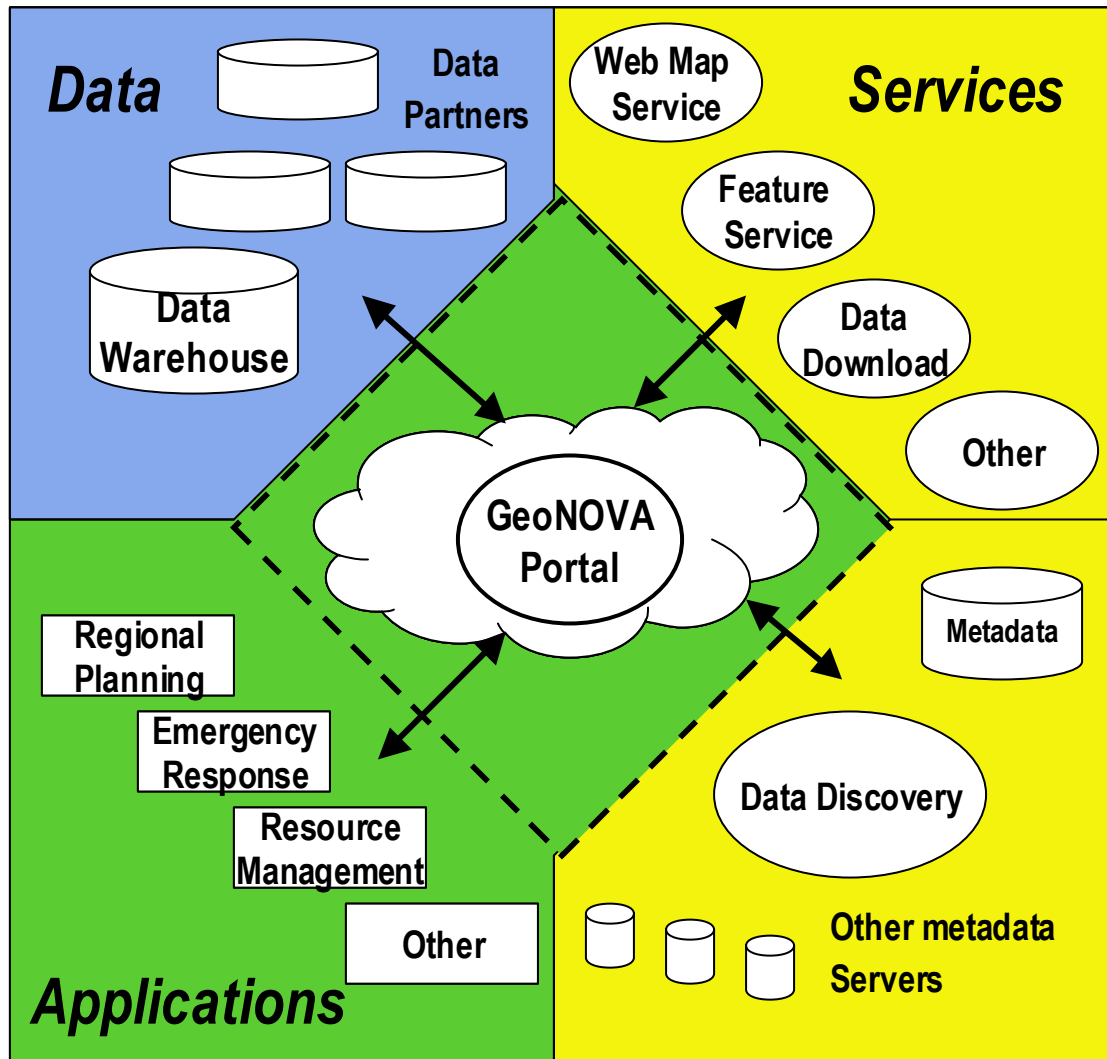
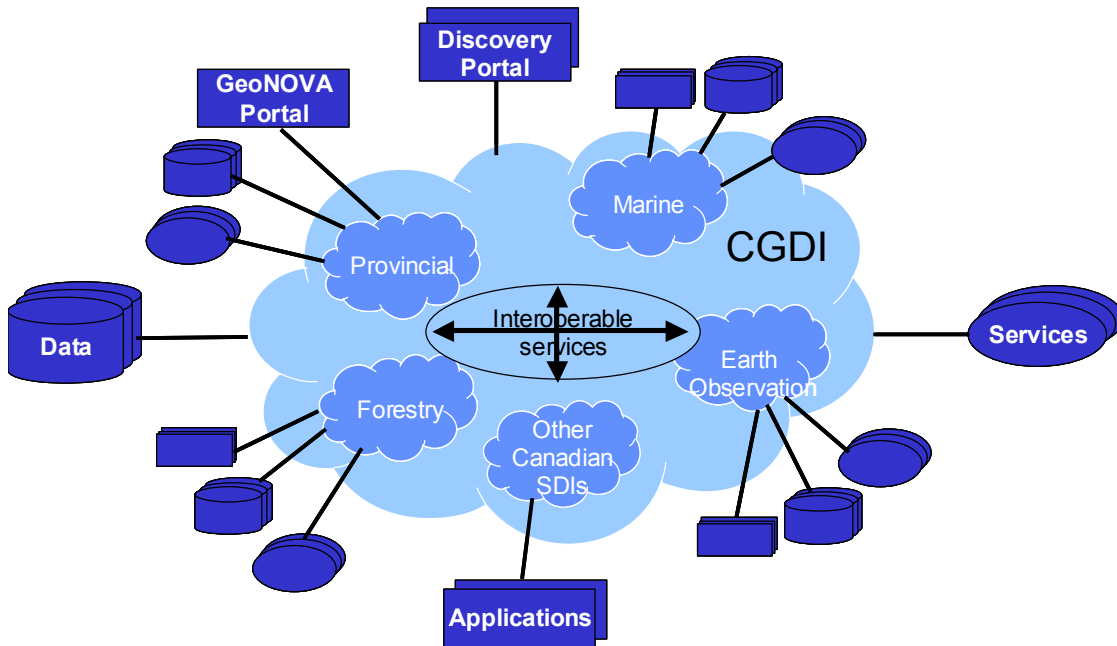


Figure 3 – GeoNOVA Portal Concept Diagram

The GeoNOVA Portal places emphasis on making data and services easily accessible from the basic desktop. As seen in Figure 3 – GeoNOVA Portal Concept Diagram, the GeoNOVA Portal in fact is made up of three primary components: Applications, Data and Services. All components use the Internet as the means upon which to deliver geographic information to clients/users. Therefore, the Portal provides a gateway to all geographic data holdings in and about Nova Scotia.

The GeoNOVA Portal is a part of Canadian Geospatial Data Infrastructure (CGDI) and the GeoNOVA Program is an active participant organization in GeoConnections. GeoConnections is a national initiative to facilitate broad-based collaboration among federal, provincial, municipal governments as well as the private sector, that is fostering the development of the CGDI. CGDI works on top of existing Internet technology, and is that portion of the Internet related to the discovery, sharing and use of Canadian geospatial information and services.

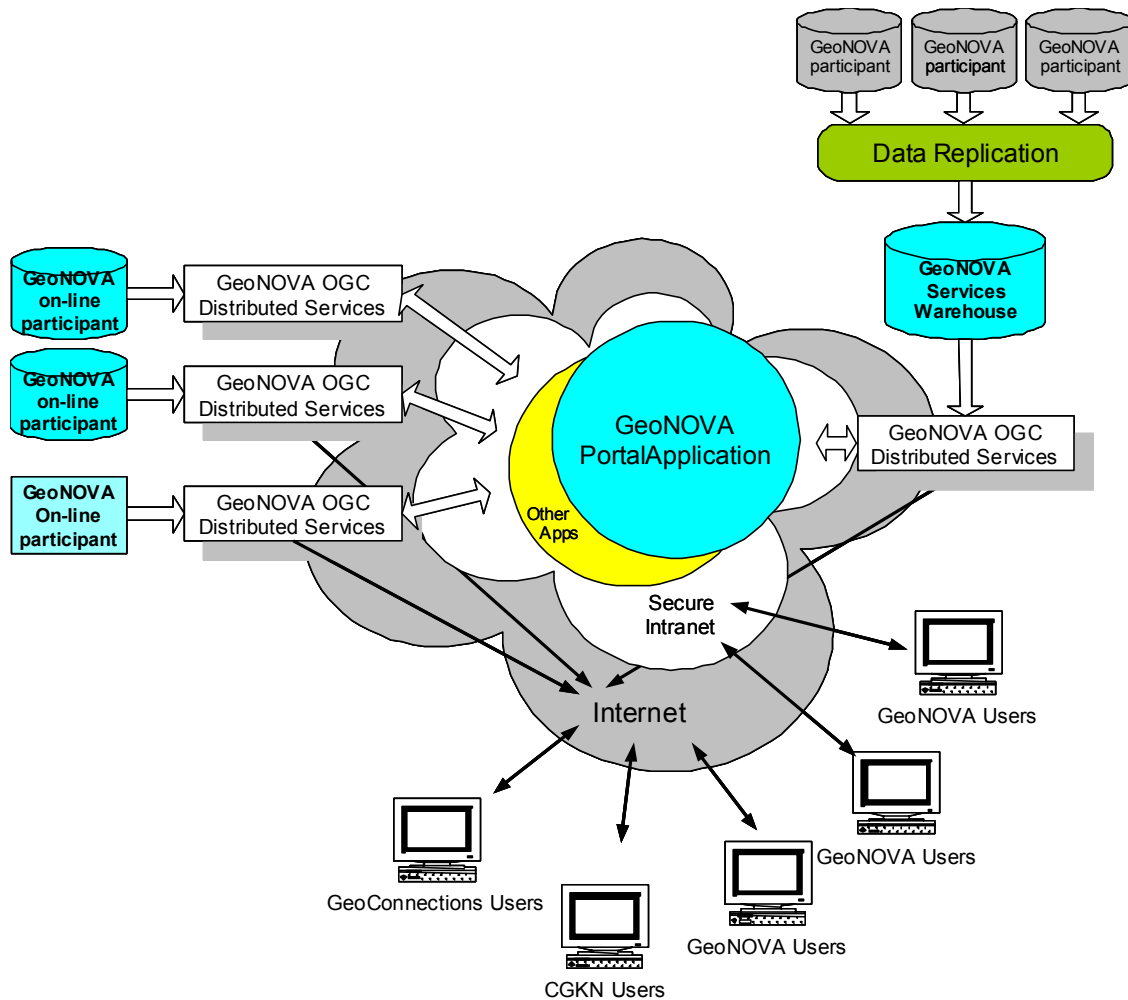


**Figure 4 – GeoNOVA Portal - Part of the Canadian Geospatial Data Infrastructure (CGDI)**

The CGDI makes extensive use of open industry standard definitions, like those developed by the Open GIS Consortium (OGC), for making data and services available to users. GeoNOVA is using CGDI/OGC specifications to implement the GeoNOVA Portal operational systems. This ensures GeoNOVA Portal’s ability to share and use geospatial information and services.

While the GeoNOVA Portal may provide centralized services, it is not strictly a centralized repository. It is intended to provide access to distributed data and systems.

Figure 5 – GeoNOVA Portal Architecture Framework illustrates the role of the portal as the window into multiple geospatial data holdings accessible to the portal via standard interfaces. Additionally it is envisioned that a data warehouse facility will be provided to enable organizations to make their data accessible to the GeoNOVA Portal without need to establish their own CGDI/OGC standard services.



**Figure 5 – GeoNOVA Portal Architecture Framework**

Figure 5 shows several aspects of the GeoNOVA Portal and associated data sources. These are:

- The Portal is an application operated in parallel with other applications, which are based on network access to the services;
- The Services can be accessed from the Internet as well as from within secure networks. The Portal and the Services are aware of the identity (or access group) of the client; and
- The Services can be accessed independently of the Portal application. Such availability is at the discretion of the providing organization.

Over time, the GeoNOVA Portal will expand the data available and the services provided to meet the evolving business requirements previously identified. Key to the success of the GeoNOVA Portal will be its ability to allow users to access data and services seamlessly in a manner that removes the complexities of the underlying technology and information infrastructure.

## 6. CONCLUSIONS

The GeoNOVA Portal is a web-based gateway for all geographic information about Nova Scotia. It is a powerful means to address GeoNOVA's focus for the coming 5-year cycle so as to make geographic data accessible at the desktop.

The portal contributes to all five elements of the GeoNOVA Program Vision:

- Seamless Desktop Access;
- Expand Accessible Data;
- Foster Use;
- Primary Data Sets; and
- Canadian Geospatial Data Infrastructure (CGDI) Node.

Stakeholders identified on-line display of maps and searching for geographic information as dominant and relatively equal requirements for the geoportal. It is important to note that emerging users place a very high priority on on-line map display. These are followed closely by data downloading capabilities. A clear understanding of specific capabilities of the GeoNOVA Portal is to be developed based on available data and specific communities of interest to be served.

GeoNOVA stakeholders are keen for SNSMR to provide the leadership required to make the GeoNOVA Portal a reality and to ensure Nova Scotia's place as part of the Canadian Geospatial Data Infrastructure.