The Canadian Geoscience Knowledge Network
A Collaborative Effort for Unified Access to Geoscience Data

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Introduction

The rapid evolution and revolution of information technology and subsequent management of digital information have opened new avenues for capturing, managing and disseminating geoscience information. Geological surveys now routinely capture field data using digital technology, laboratory results are recorded automatically in digital form and the conventional geological map which was formerly presented in paper form is now a digital representation within databases, geographical information systems and satellite imaging systems. This fundamental change in how geoscience data are managed has impacted all geological surveys. As Canadian geological surveys adapt to the management of digital data, it is reasonable to expect that they can benefit by sharing their experiences and knowledge. Making geoscience information available over the Internet is an important way Canada can maintain its global competitiveness in attracting resource exploration. Also, by adopting common standards and data management tools, data can be more accessible to all.

The Canadian Geoscience Knowledge Network (CGKN) is designed to create a seamless network of information from government geoscience agencies in Canada. In 1998, a workshop, organized by the National Geological Surveys Committee (NGSC), brought together representatives of the 13 government surveys and they explored and endorsed the CGKN concept as a way to provide access to geoscience information holdings of Canada's federal, provincial and territorial geological surveys. Following the 1998 workshop, a CGKN Steering Committee was formed to develop a national strategy for geoscience data management. The Steering Committee evaluated how the geoscience agencies could participate and identified a number of priority areas in which cooperative development could begin.

During 2000, the CGKN organized a survey of the geoscience data management activities of Canadian geological surveys. This survey, which was funded by GeoConnections and carried out by a consulting firm, reported that there is a wide range of geoscience data models and data management methods in place in Can-
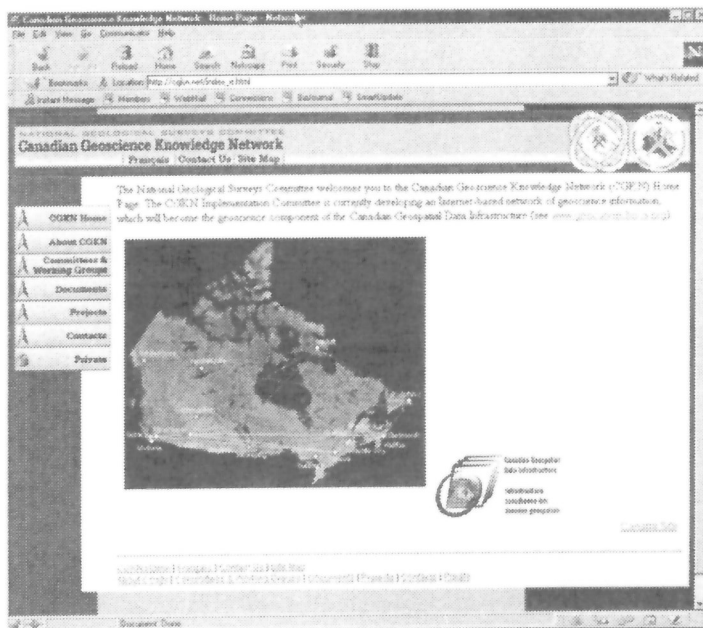

Figure 1: The CGKN Home Page is the on-line portal to CGKN services and activities. (http://www.cgkn.net)

ada. A second workshop was held in June 2000 to review the survey report, investigate standards, and develop implementation plans. At the workshop, priority areas for building the CGKN were identified and working groups were established to develop and implement specific components of the network.

From these workshops, and regular telephone conference calls, the working groups together with the National Geological Surveys Committee (NGSC) member agencies are implementing the CGKN. Information about CGKN and its initiatives can be found at the CGKN website (http://www.cgkn.net).

CGKN Business Plan

The CGKN has been identified by the NGSC as a key strategy of the Intergovernmental Geoscience Accord for the management and dissemination of geoscience knowledge. Following the endorsement of the CGKN from the NGSC, the Steering Committee was instructed to develop a business plan outlining objectives, benefits, stakeholders, and project priorities. Details of the CGKN initiative can be obtained from the CGKN website identified in Figure 1.

Objectives:

✔ Provide a single Internet portal that will facilitate discovery and evaluation of NGSC agency data and link the client to the data provider;

✔ Provide the infrastructure, tools, and standards required for capturing, managing and disseminating consistent and interoperable NGSC geoscience knowledge via the Internet;

✔ Implement a "loosely-coupled" architecture that allows participating agencies to exchange and provide access to consistent and interoperable geoscience information without the need for extensive changes to their existing systems and infrastructure.

✔ Provide national coverage at regional scales for key data types;

✔ Make NGSC data holdings accessible through CGKN and CGDI services;

✔ Enable each NGSC member agency to deliver geoscience information independ-

ently or through common services in conformity with CGKN national standards.

Benefits

✔ Cost savings through cooperative shared development of standards, tools, and systems for management and dissemination of geoscience data;

✔ Improved service by providing a single geoscience portal through which clients will be able to discover, view, evaluate, and obtain geoscience data from NGSC agencies;

✔ As national standards and tools are developed through the CGKN projects, the outcome will be improved internal management and analysis of geoscience data. As well, clients will have improved access to more, and better quality geoscience data;

✔ The resulting network of geoscience information will put the provinces and the nation in a globally competitive and leadership role;

✔ The CGKN is designed to create the geoscience component of the GeoConnections initiative (**www.geo connections.org**). This relationship to GeoConnections, which is developing the Canadian Geospatial Data Infrastructure, will allow Canadian geoscience organizations to participate and disseminate information beyond their traditional client base.

Stakeholders

✔ Data custodians whose main role is to capture, maintain and disseminate geoscience information;

✔ Data providers who are the contact points for receiving requests, and issuing geoscience products;

✔ Geological survey staff who play a key role in defining data capture and data management requirements;

✔ Geological survey managers who provide high level guidance and direction to ensure that activities meet the CGKN objectives.

Clients

- ✔ Traditional clients who represent the mining and exploration industry, consultants and service organizations;
- ✔ Survey management that uses existing geoscience knowledge for strategic planning;
- ✔ Scientific users who acquire unprocessed data and carry out additional analysis and interpretation;
- ✔ The general public who require knowledge about the geology of Canada in terms that are informative, educational and easy-to-understand;
- ✔ Other government agencies that require geoscience information for environmental, health, silviculture, agriculture, water and engineering programs.

Current CGKN Activities

CGKN On-line Geoscience Data Catalogue Project

This ongoing project will create comprehensive catalogues containing consistent metadata describing all government geoscience data and will implement a CGKN Internet search engine. This project is funded by the Earth Science Sector's Targeted Geoscience Initiative (TGI). Since the project was initiated in the summer

2000, the following progress has been made by the federal/provincial Implementation Working Group.

- ✔ Based on a survey of each agency's present level of metadata readiness, TGI funding has been allocated to all NGSC agencies to support creation of standard CGKN geoscience metadata catalogues and catalogue creation is underway.
- ✔ Software products for the CGKN online search tool are installed.
- ✔ CGKN Discovery Portal configuration and customization is underway.

To ensure timely completion of the project by January 2002, the project working group requests that all NGSC member agencies review their plans to utilize their allocated TGI funding for creation of their catalogue.

GeoConnections-Funded CGKN Projects

The federal-provincial CGKN Data Integration Working Group is coordinating the solution of technical issues related to CGKN Implementation. Subgroups involving both federal and provincial participants have been created to develop the CGKN standards and tools required by each discipline. In early 2001, the CGKN applied to GeoConnections for funding to enable the development support of the CGKN. CGKN working groups developed a number of proposals for GeoConnections funding based on de-
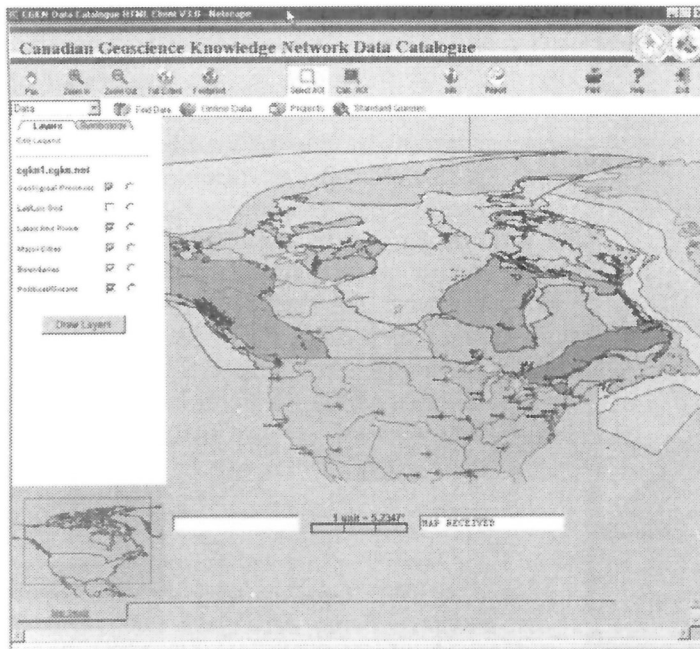

Figure 2: This is a prototype of the interface for the CGKN on-line search engine that will go online early in 2002.

tailed studies of agency requirements and experience with small pilot studies. These proposals were approved in July 2001. The CGKN will receive $290 000 from GeoConnections in fiscal year 2001/2002 which will be used to support the following CGKN projects and activities:

A) National Bedrock Geology Database Development;

B) National Surficial Geology Database Development;

C) Development of Toolkit for National Geochemical Database;

D) Development of XML-based Data Transfer standards for mineral occurrence and geochemical data;

E) Coordination and Web Site Improvements.

Project Details

National Bedrock Geology Database Development

A geological map database, based on the North American Data Model (NADM), is being developed. The database will contain maps for BC, Yukon, and parts of Nunavut, Labrador, and Newfoundland. This process will establish the protocols and standards which will be the foundation for a CGKN bedrock geology layer. In May, a two-day federal-provincial workshop was held in St. John's to establish the design and schedule Phase 1 of the project. Leaders of the geochemistry and surficial geology groups also attended. A new version of the "Geomatter" geological map data editor has been recently released.

National Surficial Geology Database Development

A preliminary logical data model for surficial geology data has been completed. Standards for language and structure are also nearing completion. The Ontario Geological Survey, Manitoba Energy and Mines, and Geological Survey of Canada are active participants. The bedrock and surficial geology data models and tools (Geomatter, *etc.*) are being developed in parallel. Development of a web site to provide access to preliminary data will commence in September.

Development of Toolkit for National Geochemical Database

At least six provinces and the GSC are participating in the "Geochemistry on-line" Project and meet regularly. Participants have agreed on Version 1.1.1 of the CGKN geochemistry data model. The project team is continuing development of a set of tools "GoldTools", based in part on XML, for the exchange of geochemical data between agencies. The future development of "GeoChemistry Online" will involve the mineral exploration industry, and BHP-
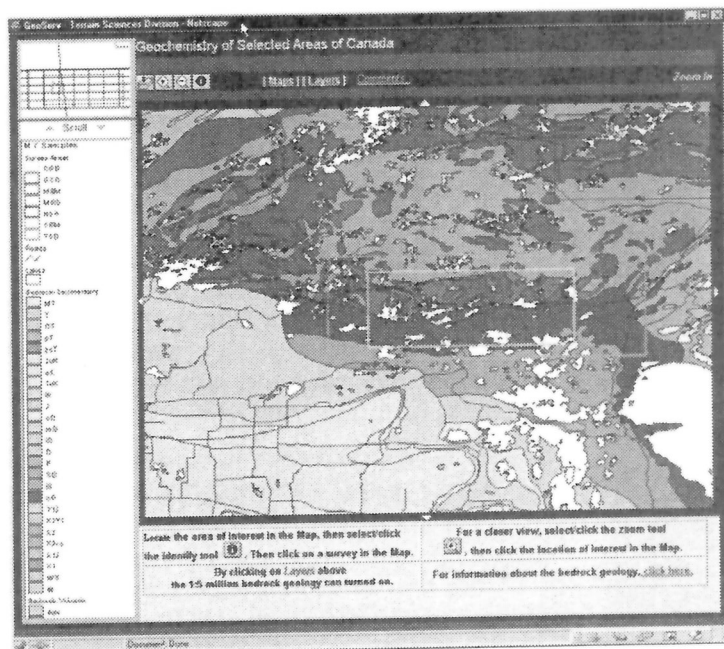

Figure 3: The "Geochemistry On-line" web site, currently being developed, will support web searches for Canadian geochemistry data.

Billiton, Inco, and Falconbridge have already expressed interest.

Development of XML-based Data Transfer standards for mineral occurrence and geochemical data

XML is becoming a standard protocol for transfer of data on the Internet. GML is an XML *schema*, or specification, for transfer of geographic information. The CGKN/GeoConnections have funded a project to develop a CGKN XML *schema* for geoscience data. This work will be done in partnership with Galdos Systems (Vancouver), an international leader in XML and GML development. The initial *schema* will be developed for mineral deposit data but may be extended to include geochemical and geophysical data. The project team is collaborating with the Australian CSIRO-led team developing XML geoscience schema for the mining community.

Other activities

The CGKN Geophysics Working Group is partnering with Geosoft and DM Solutions Group on a GeoInnovations proposal to develop systems for online visualization and delivery of geophysical, mineral deposits and geochemistry data types.

The Future

As the CGKN develops we can look forward to increased online availability of all types of geoscience information making Canada a leader in the provision of information and the management of information. By providing Canadian geological surveys with tools to manage and deliver their geoscience information, the CGKN initiative will improve their operational efficiency and enable their information to be globally accessible. This shared approach of inter-agency co-operation and the development of common standards and data models will ensure Canada's prominence in the global market place.