GeoConnections

Services Overview

Canadian Geospatial Data Infrastructure

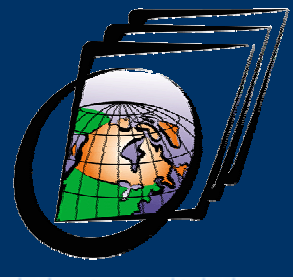
Infrastructure canadienne de données géospatiales

Jean François Doyon

Tom Kralidis

June 2003

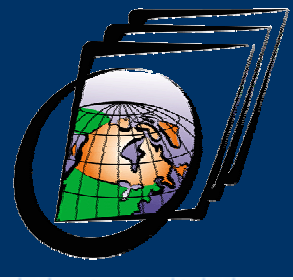
Services Overview



- Web Services
- OGC Web Services
- OGC Web Services Within CGDI
- CGDI Development Network

Canada

Services Overview



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Introduction

- GeoConnections
  - Federally coordinated program to facilitate the geospatial information highway in Canada
- Canadian Geospatial Data Infrastructure (CGDI)
  - Network of distributed data and services
    - See http://geodiscover.cgdi.ca/

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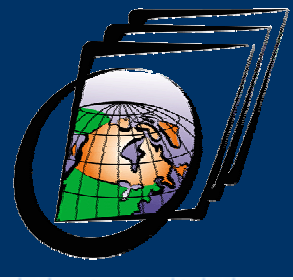
Web Services



- What's a Web Service??
  - **Service**: performs functions based on request, provided by an entity through an interface
  - **Interface:** a set of operations which characterize a service
  - **Web Service:** any software which makes itself available over the Internet and uses a standard XML messaging system
  - **Process**: request / response / process
  - Use of the **Internet** as the distributed computing platform (DCP)
  - Enabling "Plug and Play" Interoperability

**** Web Services Enable Infrastructure ****

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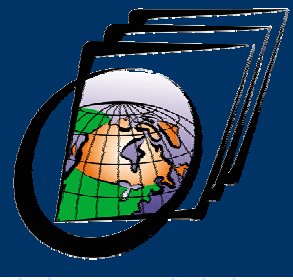
Web Services



- Independent of
  - operating systems
  - programming languages
  - Organizations
- How?
  - non-proprietary data / messaging standards
    - eXtensible Markup Language (XML)

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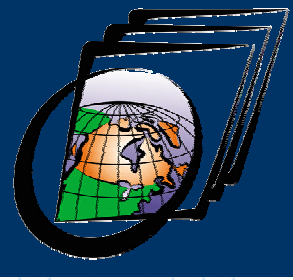
Web Services- Benefits



- Lower software integration costs
- Maintaining legacy systems
- Using standards lowers IT costs of collaboration with external partners, vendors, clients

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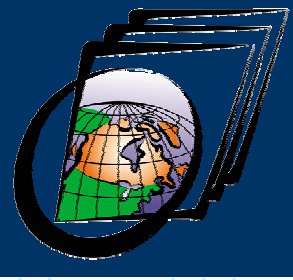
Web Services



- Web Service Protocol Stack
  - Transport
    - **HTTP**, SMTP, FTP
  - XML Messaging
    - Common XML (**XML-RPC, SOAP**)
  - Service Description
    - Web Services Description Language (**WSDL**)
      - » **Describes public interface**
  - Service Discovery
    - Universal Description, Discovery, and Integration (**UDDI**)
      - » **Centralized registry**
      - » **Provides publish / find mechanisms**

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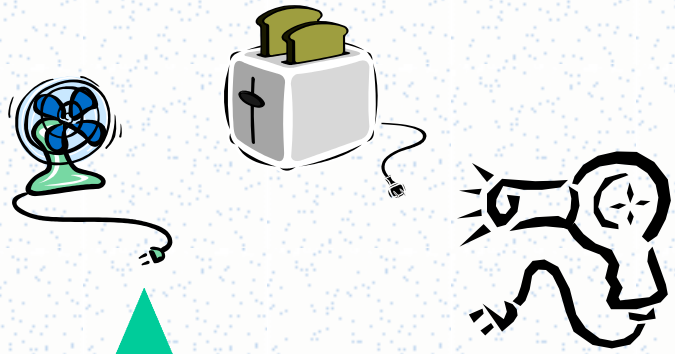
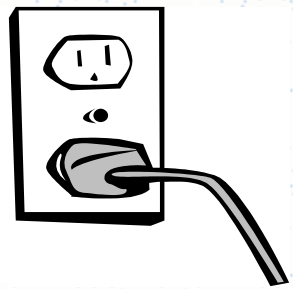
Services, Interfaces, Clients

Clients



Client Using Service

via Interface



BC hydro Service Provider

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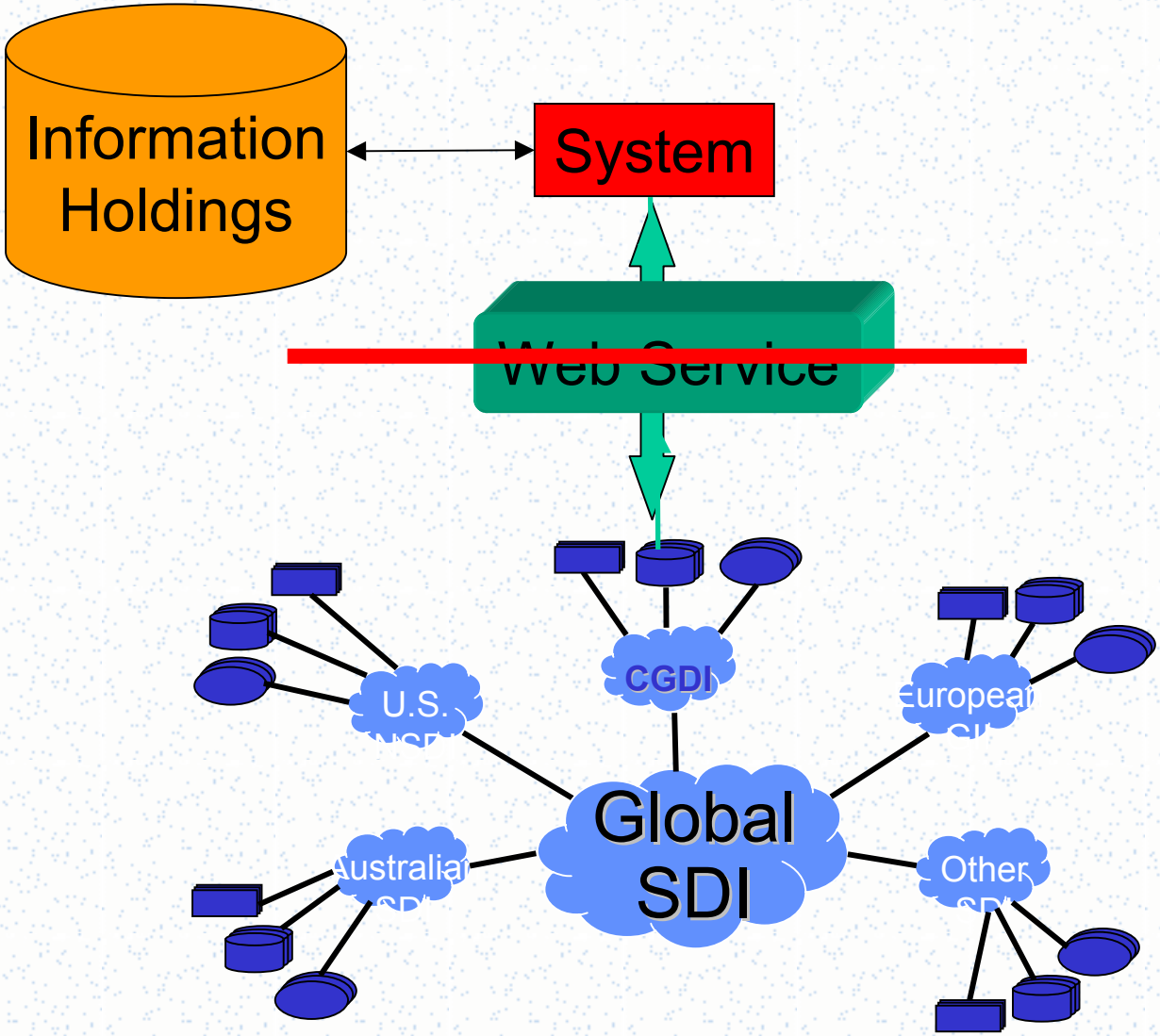
Web Services



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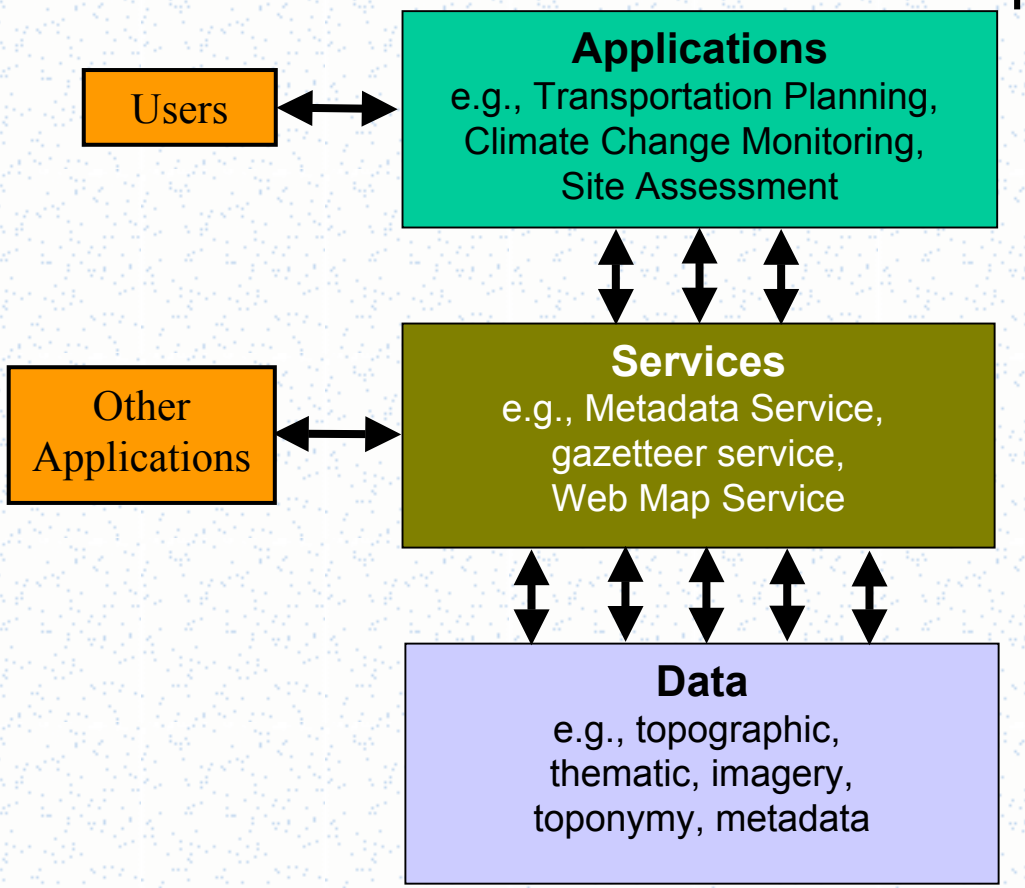
Service Architecture Approach



For Example…

A trip planning web site that calculates the best route between two cities

uses
Gazetteer service,
Road network server,
Web mapping service

based on
Geographical Names,
Road network features
Base maps

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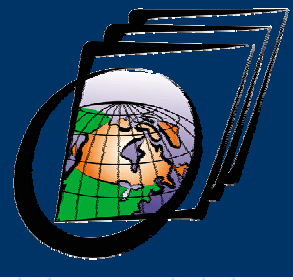
eXtensible Markup Language (XML)



- Markup language describing structured information
  - Meta Language
  - Self Describing Semantics
- Information Exchange / Messaging
- Human Readable
- Portable, non-proprietary
- Interoperable

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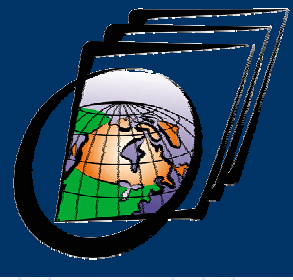
eXtensible Markup Language (XML)



- Allows for application-neutral communication
- Separates content from look and feel
  - Enables scaleable development for wide variety of applications
- Many XML processing / development tools

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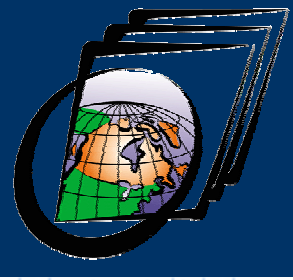
Web Services



- Mainstream Web Services Environments for Geospatial
  - Microsoft MapPoint.net
    - programmable XML Web Service for location intelligence into your applications, business processes, and Web sites
      - http://www.microsoft.com/mappoint/net/
  - ESRI Geography Network
      - http://www.geographynetwork.com/webservices/index.html
  - OpenGIS Consortium (OGC)
      - http://www.opengis.org/

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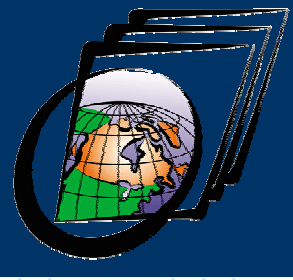
Services Overview



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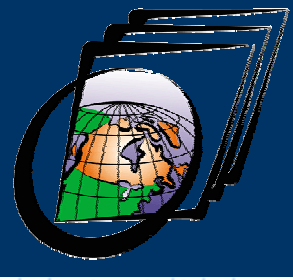
OpenGIS Consortium (OGC)



- Collaborative environment
  - industry, government, academia
- Public, open specifications for geospatial interoperability
- “Geo-Enable" the Web

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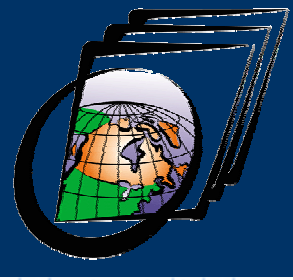
OGC Specifications (relative)



- Visualization *
  - OpenGIS Web Map Service (WMS)
- Data Access *
  - OpenGIS Web Feature Service (WFS)
- Data Encoding *
  - OpenGIS Geography Markup Language (GML)
- Viewer Client Bookmarks *
  - OpenGIS Web Map Context Documents
- Data Presentation **
  - OpenGIS Styled Layer Descriptor (SLD)
- Data Query **
  - OpenGIS Filter Encoding

* Supported by MapServer
** To be supported by MapServer

- All formally endorsed by CGDI

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Web Map Service (WMS)

- Provides images of map data defined by a geographic / spatial component
- Provides point based query functionality
- Interoperable means of map compositing

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Web Map Service (WMS)

- Interoperable, ‘just-in-time’ approach to map delivery
- Map compositing from multi-servers

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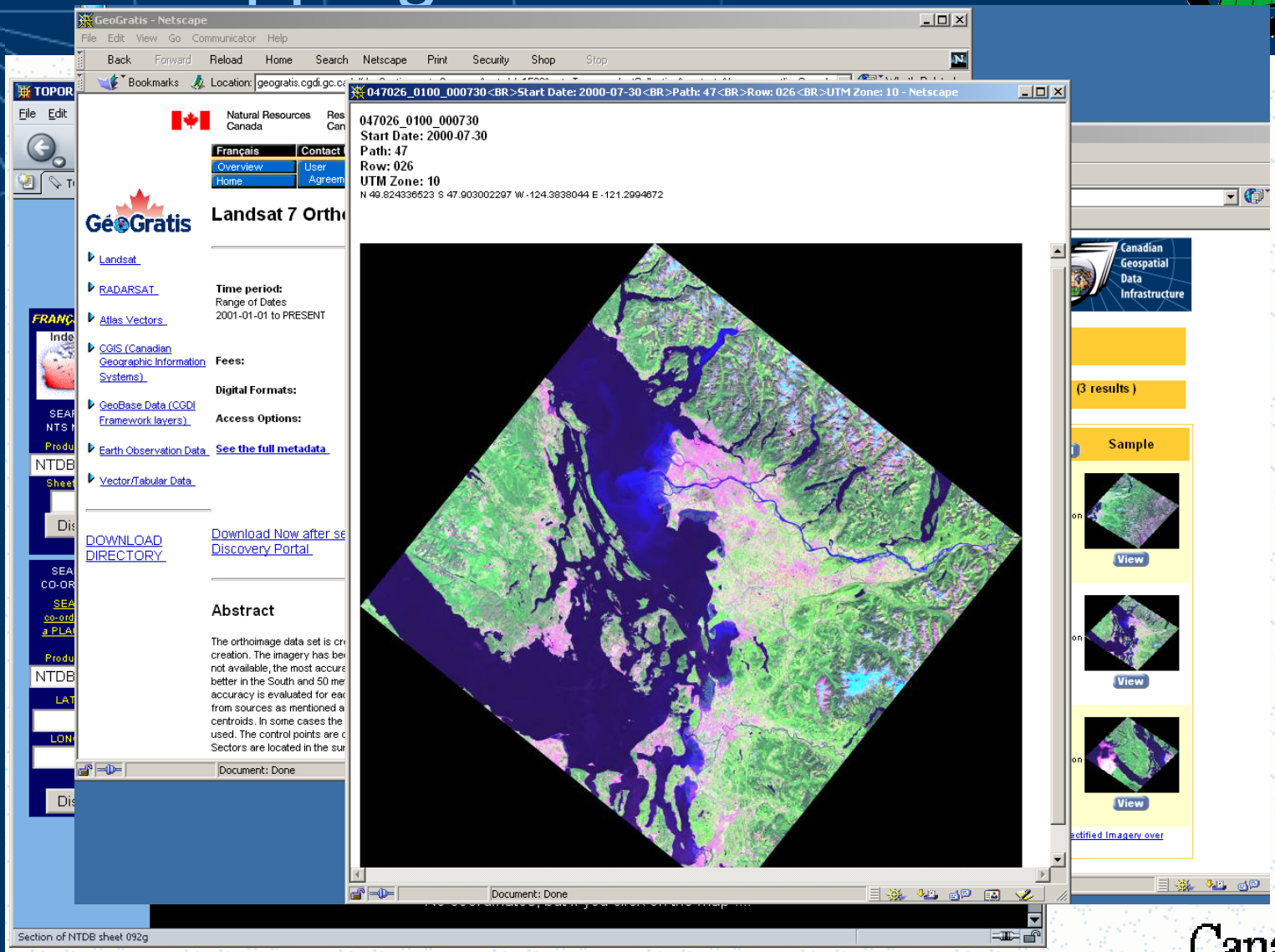
Web Mapping: Phase I



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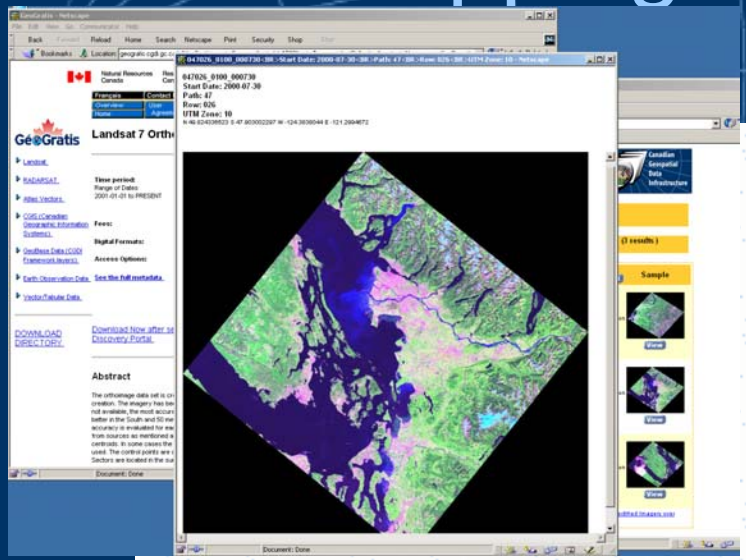
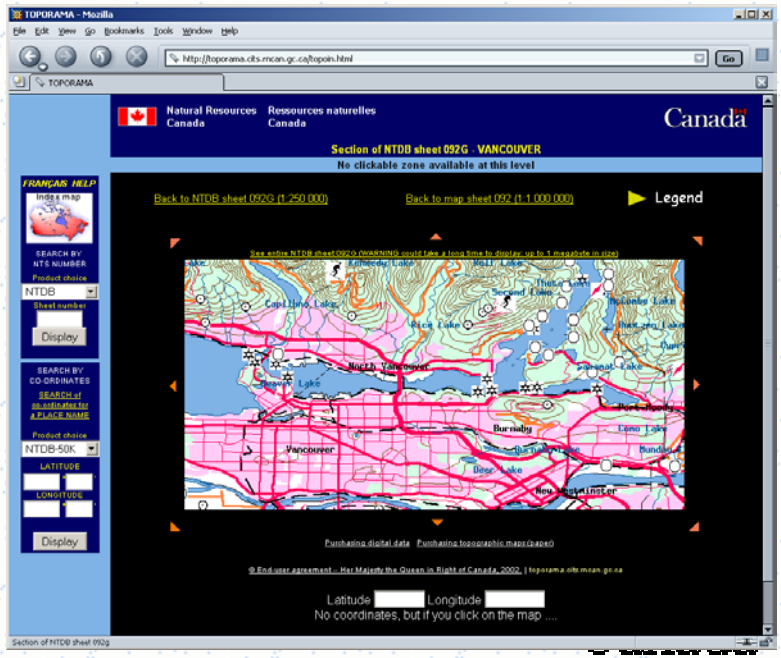
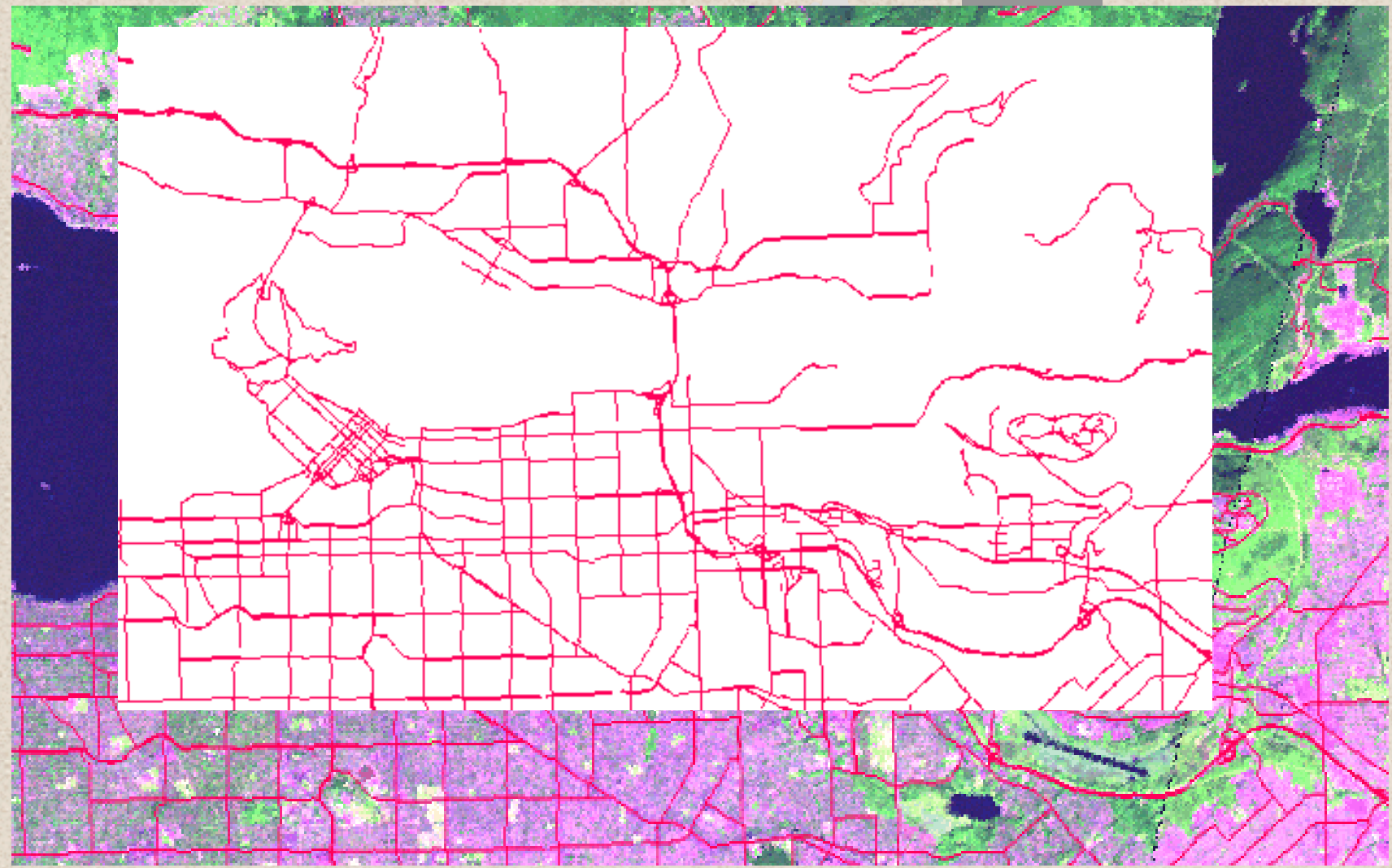
Web Mapping: Phase I



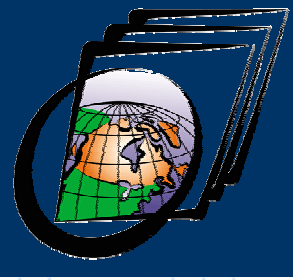
- ~~Interoperability~~
- ~~Common Standards~~
- ~~Services~~



Web Mapping with WMS



Web Feature Service (WFS)



- Feature level access to spatial data
  - Finer grained access and query
- Spatial and non-spatial query capability
  - Attribute and / or geometry
- Returns GML
  - Can further transform with XSLT to SVG, style with SLD, etc.
- Transactional capability
  - INSERT, UPDATE, DELETE, LOCK, …
- Security considerations

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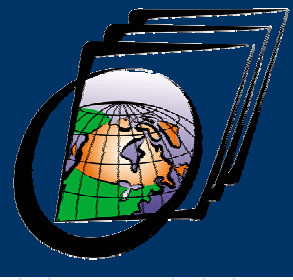
Geography Markup Language (GML)



- XML encoding of geospatial information
  - XML dialect
- Basic application framework for handling geospatial information
- Enables complex features & feature associations between data
- Human-readable
- Can be processed by many XML tools in various development environments

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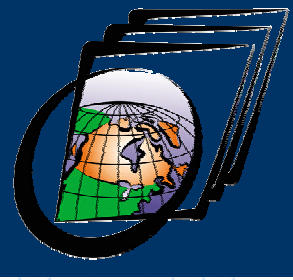
Geography Markup Language (GML)



Data Instance

Instance Document

As static data or through Service Instance

Information Community Definition

Application Schema

Geometry Definitions

GML Schemas

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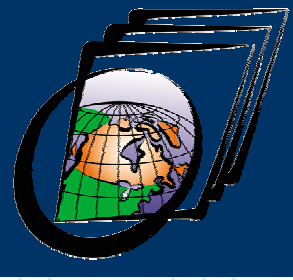
Geography Markup Language (GML)



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- <featureCollection xmlns:xlink="http://www.w3.org/TR/xlink"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:noNamespaceSchemaLocation="http://cgdi-
    dev.geoconnections.org/prototypes/schemas/cgdigaz/cgdigaz_1_0.xsd"
    xmlns:gml="http://www.opengis.net/gml">
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      <bbox>NULL</bbox>
      <key>FALSE</key>
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    </queryInfo>
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    - <GazetteerEntry>
      - <Geometry>
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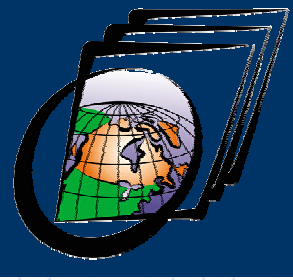
Geography Markup Language (GML)



- New features (GML3)
  - Topology
  - Temporal
  - Enhanced Geometry
  - Coverages
  - Units of Measure

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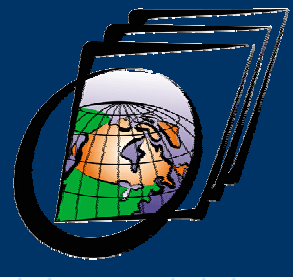
OpenGIS Web Map Context Documents - Need



- Growth of various WMS instances
- Growth of applications supporting WMS
- Need for saving state of a web mapping application for reuse, to enable user-friendly web mapping applications
- Any client should be able to generate a given view of data through WMS

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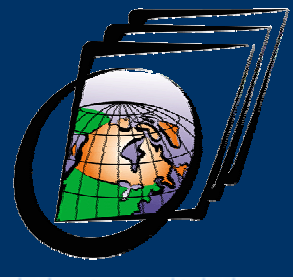
OpenGIS Web Map Context Documents - Overview



- ‘bookmarkable’ XML encoding of state of a web mapping application
- Analogous to ‘project’ files in most popular GIS software packages
- Enables sharing of application scenarios, demonstrative presentations, etc.
- DM Solutions, GeoConnections part of OGC specification working group

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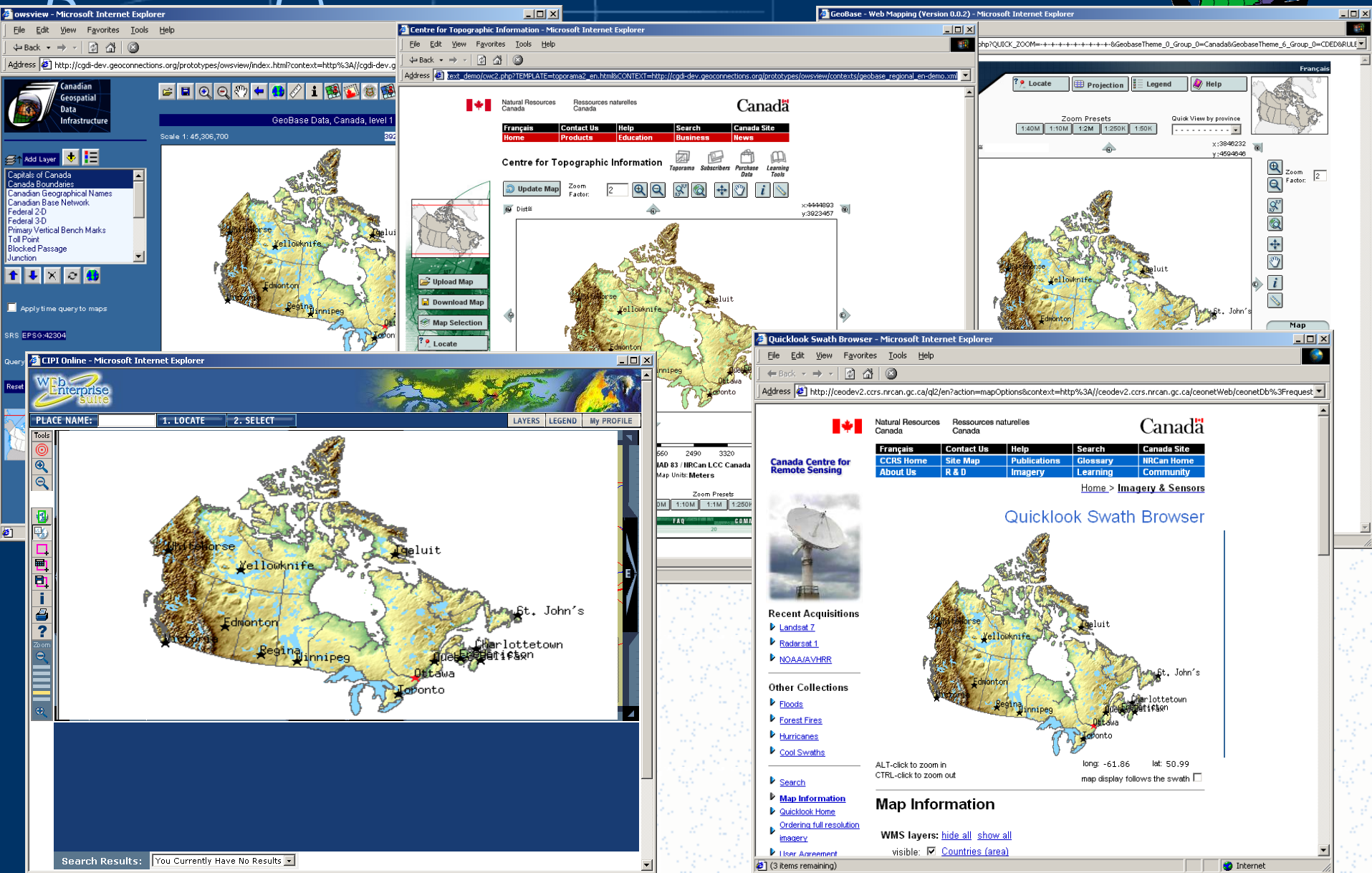
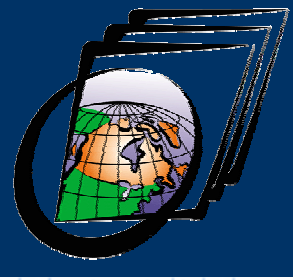
Web Mapping – Same data; multiple applications *(OpenGIS Web Map Context*



Styled Layer Descriptors (SLD)



- Symbolization to map data
- Styling
- Addresses lack of symbolization within current and past OGC services
- Cartographic design of GeoData
- Augments OpenGIS specifications
  - Can custom style WMS content
  - Can custom style WFS content

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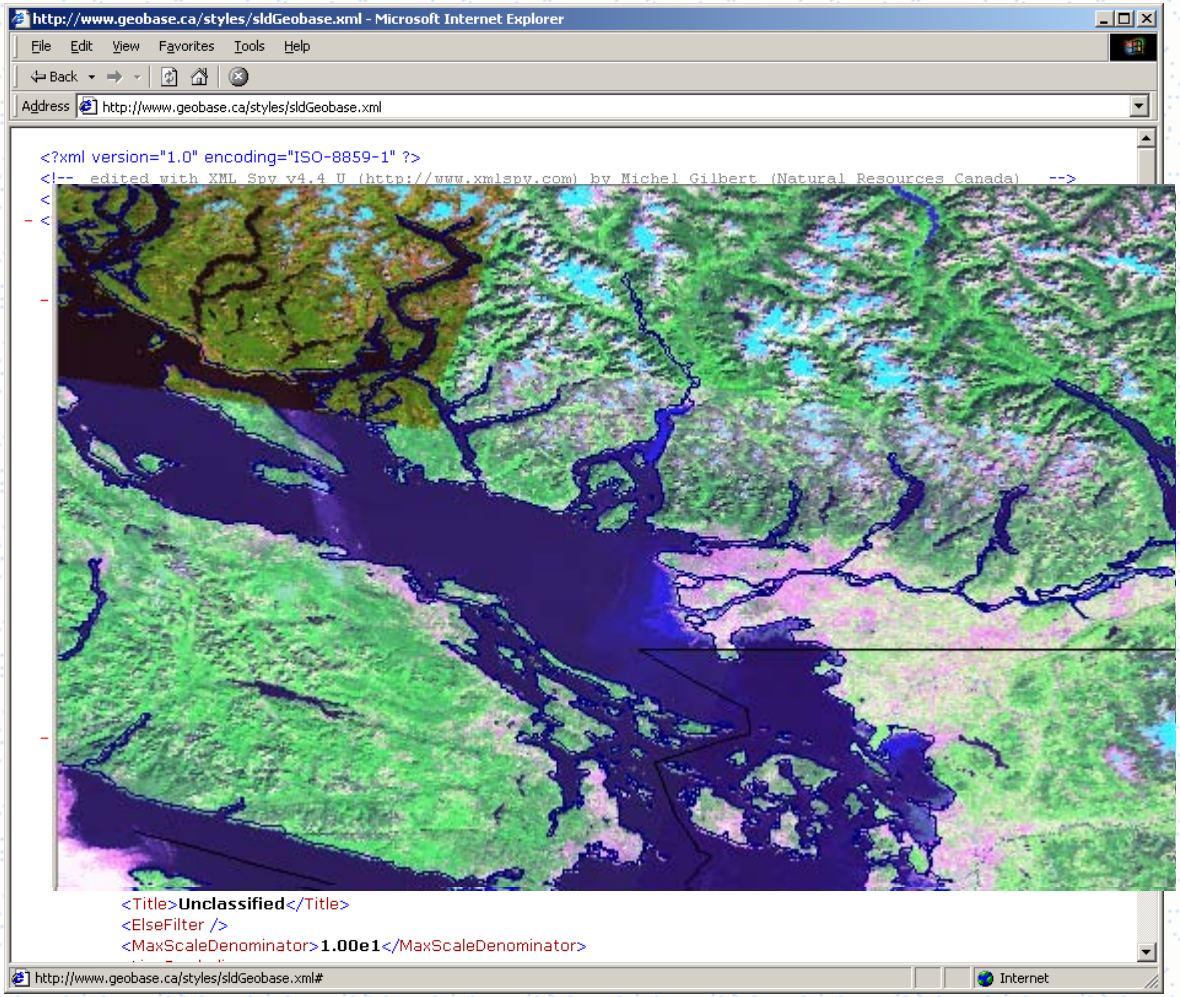
Styled Layer Descriptors (SLD)



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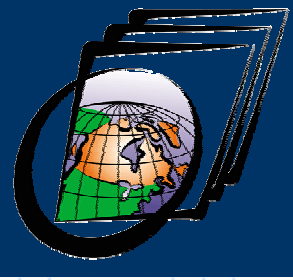
Filter Encoding



- XML Definition of data query language for online services
  - GML used for geometry querying semantics
  - Used as filter grammar for OpenGIS WFS
  - Stand alone specification
    - Can be applied to any service as a query interface

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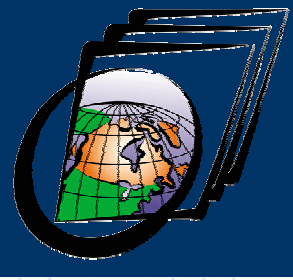
CGDI Services Growth



- Many services available within CGDI
  - WMS
  - WFS
  - WCS
  - GML
  - Catalog
  - Gazetteer
  - Tools

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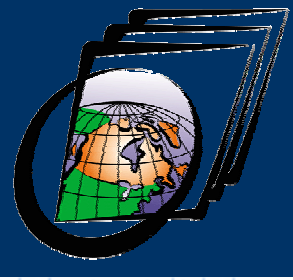
CGDI WMS Content Providers



- 28 WMS instances within CGDI within last 20 months
- From multiple agencies / application domains, varying content, vendor implementations
  - Topographic Data (CTIS NTDB 50K, 250K scales, CDED)
  - Atlas of Canada (1M, 7.5M scales)
  - Geology (Geological Survey of Canada)
  - Forestry (National Forest Information System [NFIS])
  - Agriculture (Agriculture and Agri-Food Canada)
  - EO Data (Landsat 7 Ortho Imagery, Radarsat-1 [CCRS])
  - (TRIM Orthos [BC Provincial Government])
  - Marine
- Multilingual Service metadata requirement
  - Currently in collaboration within CGDI, to be forward for recommendation into forthcoming OGC services

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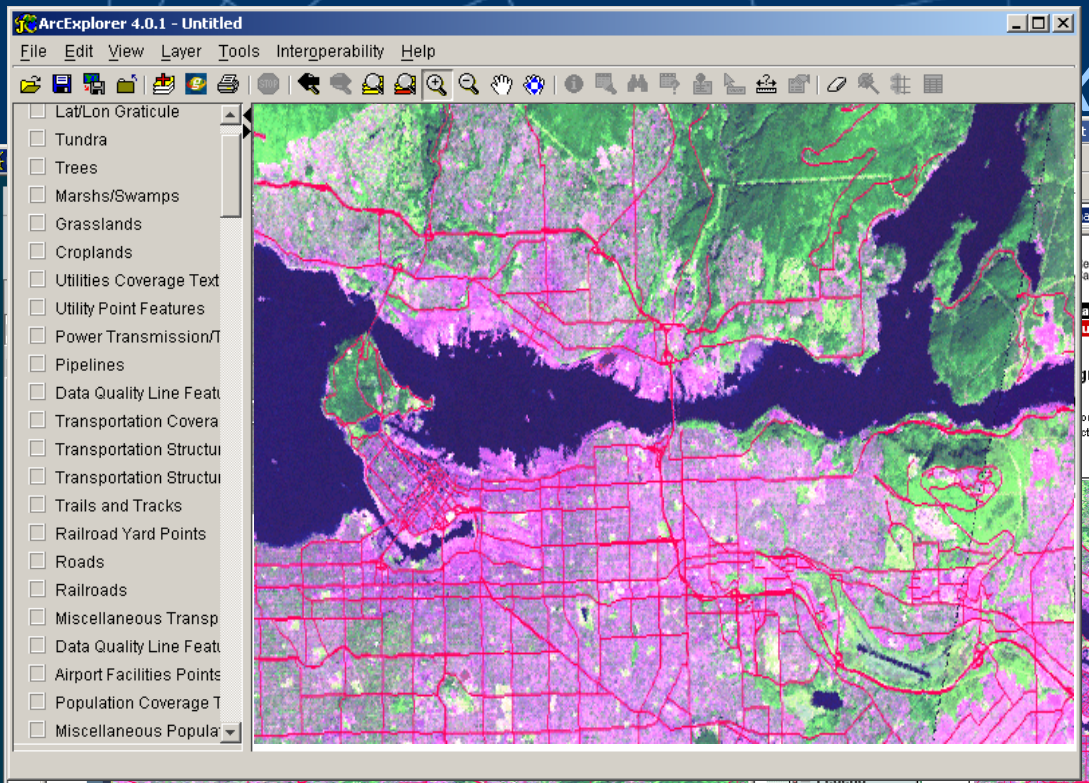
xamples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File Edit View Layer Tools Interoperability Help
Lat/Lon Graticule
Tundra
Trees
Marshs/Swamps
Grasslands
Croplands
Utilities Coverage Text
Utility Point Features
Power Transmission/T
Pipelines
Data Quality Line Featu
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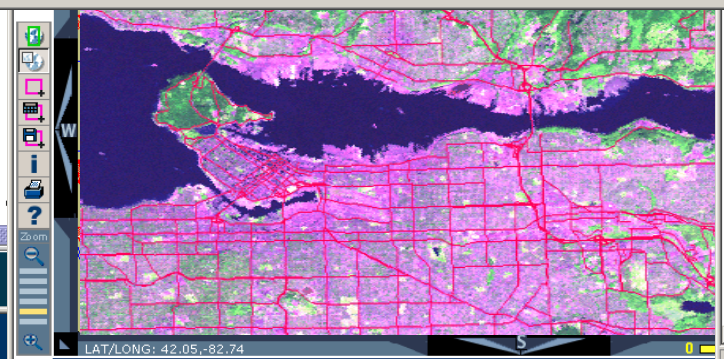
Trails and Tracks
Railroad Yard Points
Roads
Railroads
Miscellaneous Transp
Data Quality Line Featu
Airport Facilities Points
Population Coverage T
Miscellaneous Popula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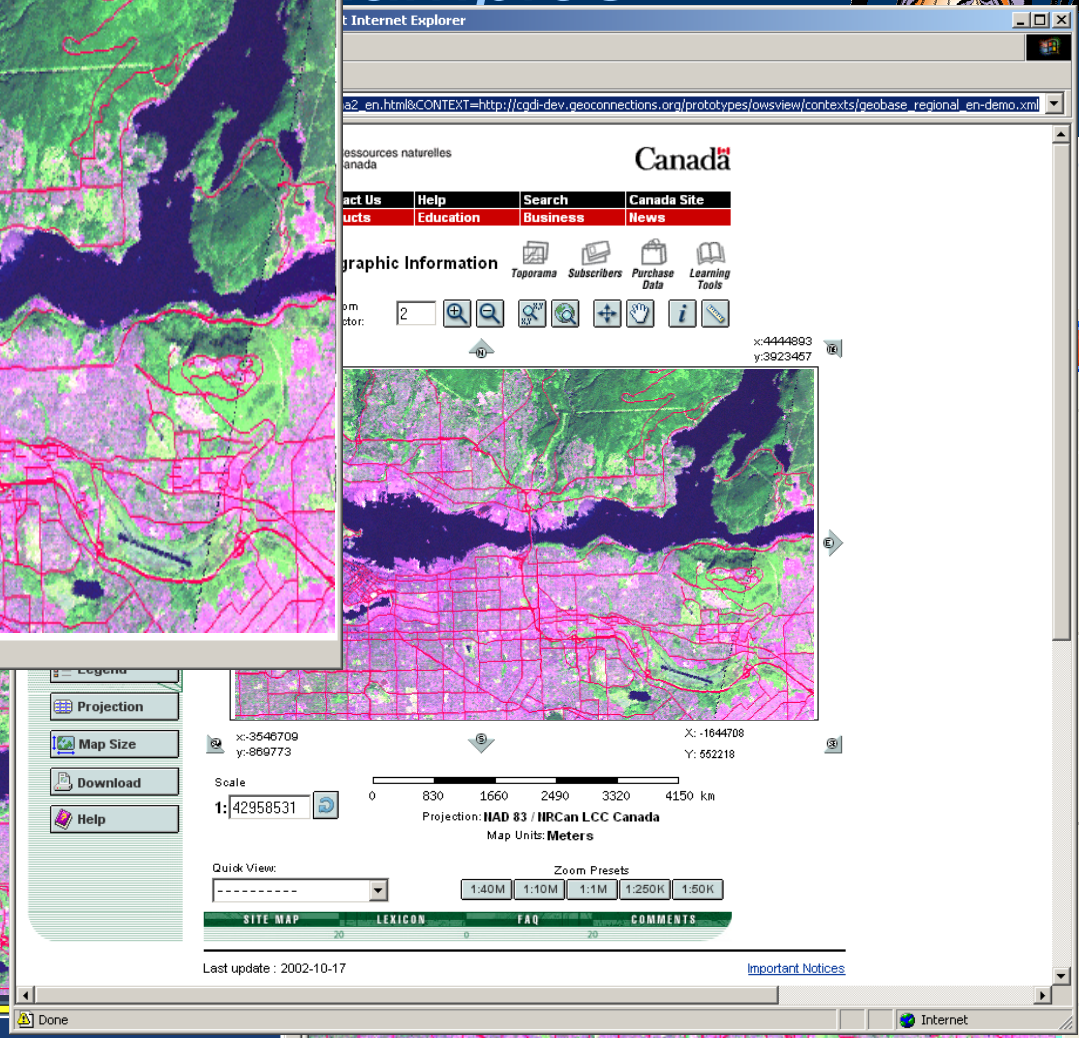
Search Results:
You Currently Have No Results


Internet Explorer
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Help
Search
Canada Site
Education
Business
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Toporama
Subscribers
Purchase Data
Learning Tools
Projection
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Download
Help
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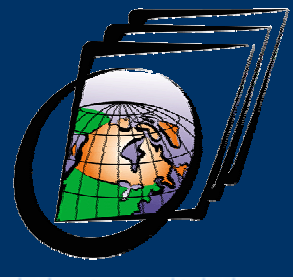
0 830 1660 2490 3320 4150 km
Projection: NAD 83 / NRCan LCC Canada
Map Units: Meters
Quick View:
Zoom Presets
1:40M 1:10M 1:1M 1:250K 1:50K
SITE MAP LEXICON FAQ COMMENTS
Last update : 2002-10-17
Important Notices
Done
Internet

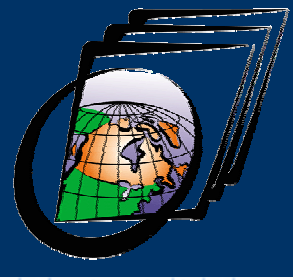
Services Overview



- Web Services
- OGC Web Services
- OGC Web Services Within CGDI
- CGDI Development Network

Canada

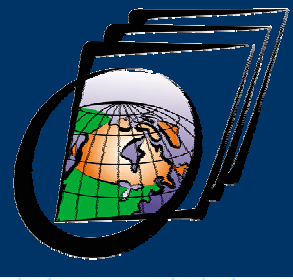
CGDI Development Network



- Collaborating geo-technology discussion / testing environment
- Initial focus to implement distributed set of Open GIS Consortium web services developed to support user communities of practice

Canada

CGDI Development Network



- Website:
  - http://cgdi-dev.geoconnections.org/
- Mailing List:
  - http://cgdi-dev.geoconnections.org/mailinglist/
    - Open to all
    - Collaborative environment
    - Test your components / tools
    - Free to join

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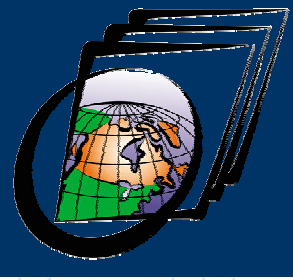
Services Overview



Thanks!

http://www.geoconnections.org/
http://cgdi-dev.geoconnections.org/
http://www.opengis.org/
http://www.ogcnetwork.org/

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