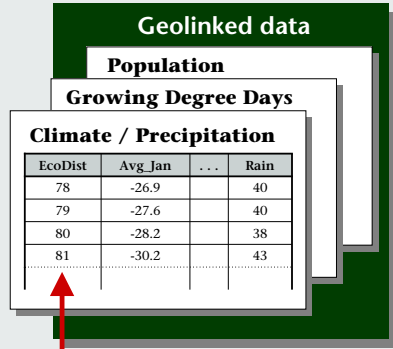


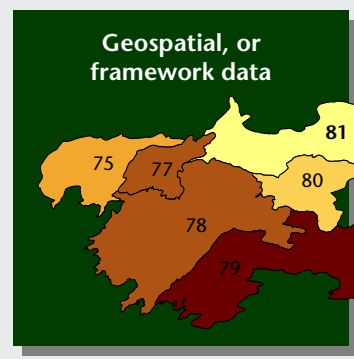
Geolinked Data Access Service (GDAS): Dynamic access to untapped data stores

What is Geolinked Data?

Geolinked data refers to all attribute data that are *not directly attached and bundled* with geographic coordinates. The data use a key identifier, or *geolinkage field*, to indicate the associated geographic unit in a geospatial dataset.



Geolinking
The merging or joining of an attribute dataset to a geospatial dataset by a shared key field.



Geospatial, or framework data, refers to data explicitly referenced with geographic positioning information. Geospatial data may or may not include attribute data that describe features found in the dataset.

What is GDAS?

- A new type of web service. A Geolinked Data Access Service (GDAS) provides a simple way to dynamically access the vast stores of geolinked data maintained by different organizations.
- A way to enable dynamic geolinking. A companion Geolinking Service (GLS) enables the client to take GDAS results and merge them with the associated framework data.

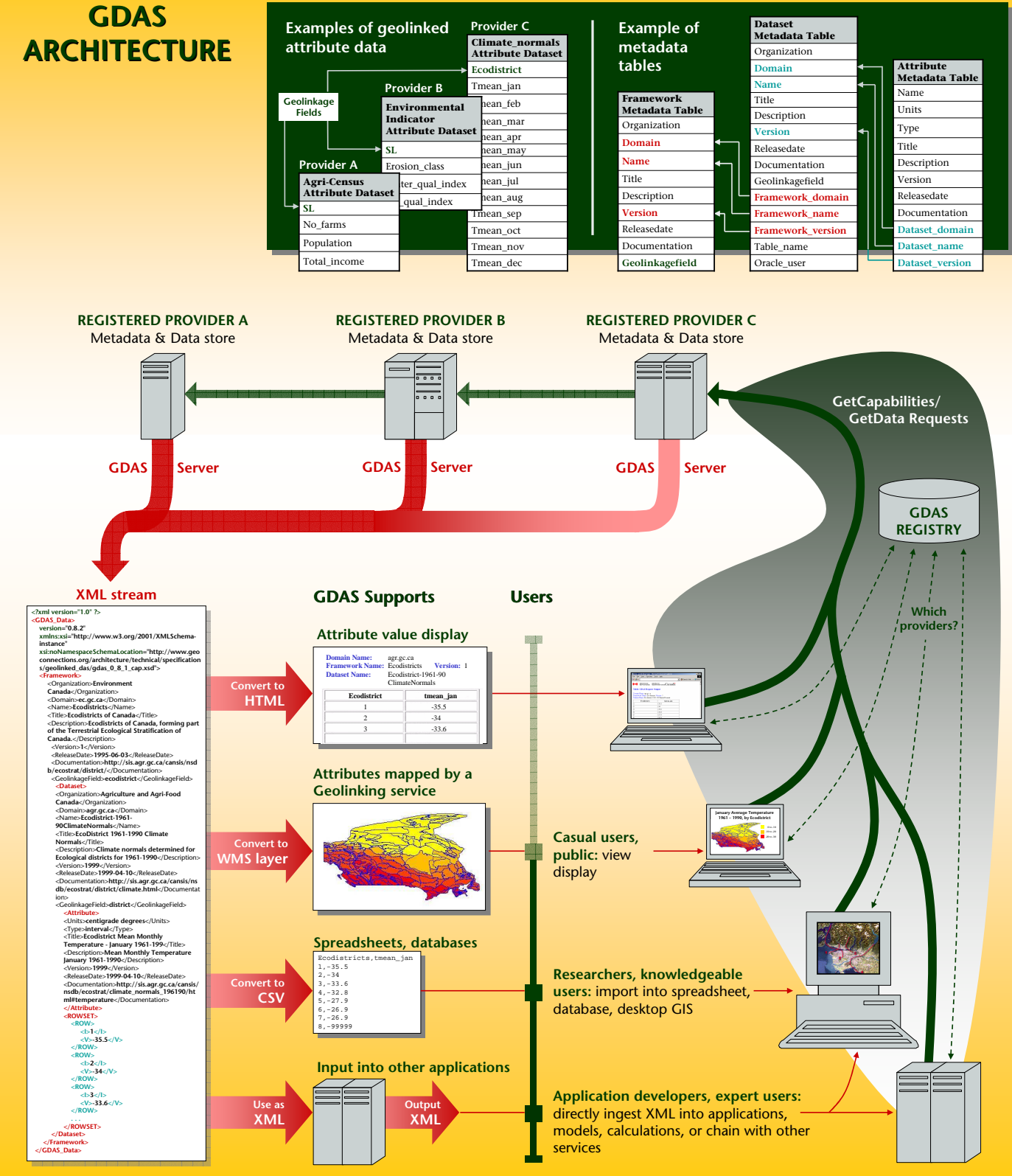
Examples of Geolinked data & associated framework

- Sales of products by retail outlet or by municipality
- Insurance payments by postal code
- Farm characteristics by Census Agricultural Region
- Student enrollment by school district

What are the advantages of using GDAS?

- Simple yet powerful.** GDAS uses standard HTTP and XML as a mechanism for data exchange; it is very lightweight, yet highly scalable and can be used for mapping, analysis, calculations, or data replication.
- Exploits the power of distributed computing.** GDAS is designed to facilitate distributed data management, enabling distributed processing of geospatial data located anywhere on the Internet.
- Fast, reliable access to "near real-time" information.** Because it is generated dynamically, the most up-to-date data will be accessed directly from the source organization responsible for its maintenance.

GDAS ARCHITECTURE



XML stream

```
<?xml version="1.0" ?>
<GDAS_Data>
  version="0.8.2"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="http://www.geoconnections.org/architecture/technical/specification/s/geolinked_das/gdas_0.8.1_cap.xsd"
  <Framework>
    <Organization>Environment
      Canada</Organization>
    <Domain>ec.gc.ca</Domain>
    <Name>Ecodistricts of Canada</Name>
    <Title>Ecodistricts of Canada</Title>
    <Description>Ecodistricts of Canada, forming part of the Terrestrial Ecological Stratification of Canada.</Description>
    <Version>1.0</Version>
    <ReleaseDate>1995-06-03</ReleaseDate>
    <Documentation>http://sis.agr.gc.ca/canids/nsd/b/ecostat/district/</Documentation>
    <GeolinkageField>ecodistrict</GeolinkageField>
    <Dataset>
      <Organization>Agriculture and Agri-Food
        Canada</Organization>
      <Domain>agr.gc.ca</Domain>
      <Name>Ecodistrict 1961-
        90ClimateNormals</Name>
      <Title>Ecodistrict 1961-1990 Climate
        Normals</Title>
      <Description>Climate normals determined for
        Ecological districts for 1961-1990.</Description>
      <Documentation>http://sis.agr.gc.ca/canids/nsd/b/ecostat/district/climate.html</Documentation>
      <GeolinkageField>ecodistrict</GeolinkageField>
      <Attribute>
        <Units>centigrade degrees</Units>
        <TypeInterval>Types
          <Title>Ecodistrict Mean Monthly
            Temperature - January 1961-1990</Title>
          <Description>Mean Monthly Temperature
            January 1961-1990.</Description>
          <Version>1999</Version>
          <ReleaseDate>1999-04-10</ReleaseDate>
          <Documentation>http://sis.agr.gc.ca/canids/nsd/b/ecostat/district/climate_normals_196190.html#Temperature</Documentation>
          <Attribute>
            <ROWSSET>
              <ROW>
                <V>1</V>
                <V>-35.5</V>
              </ROW>
              <ROW>
                <V>2</V>
                <V>-34</V>
              </ROW>
              <ROW>
                <V>3</V>
                <V>-33.6</V>
              </ROW>
              <ROW>
                <V>4</V>
                <V>-32.9</V>
              </ROW>
              <ROW>
                <V>5</V>
                <V>-27.9</V>
              </ROW>
              <ROW>
                <V>6</V>
                <V>-26.9</V>
              </ROW>
              <ROW>
                <V>7</V>
                <V>-26.9</V>
              </ROW>
              <ROW>
                <V>8</V>
                <V>-99999</V>
              </ROW>
            </ROWSSET>
          </Attribute>
        </Dataset>
      </Framework>
    </GDAS_Data>
  </Framework>
</GDAS_Data>
```

GDAS Supports

- Attribute value display
- Attributes mapped by a Geolinking service
- Spreadsheets, databases
- Input into other applications

Users

- Casual users, public: view display
- Researchers, knowledgeable users: import into spreadsheet, database, desktop GIS
- Application developers, expert users: directly ingest XML into applications, models, calculations, or chain with other services

How can my organization make its geolinked data Web-accessible?

- Identify the data.** Determine which data and associated metadata you want to publish.
- Install the GDAS APIs.** Install or create *GetCapabilities* and *GetData* application program interfaces (APIs) to interact with your corporate database system and produce XML streams according to the GDAS specification.
- Register the data.** Create a CGI service description document (RDF format) and publish it to a service registry.

Example API code: GetData.php

```
<?php
// Connect to the database
$conn = ora_logon("database instance", "password") or die("Couldn't
logon to database.");

// Retrieve the parameter values
$my_domain = $_GET['domain'];
$my_attr_name = $_GET['name'];
$my_frame_name = $_GET['frame'];

// Start building an XML tree based on GDAS specification
$tree = new XML_Tree();
$root =&$tree->addroot("GDAS_Data", "version=" . "0.8.1" );
$xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" );
$xmlns:noNamespaceSchemaLocation="http://www.geoconnections.org/architect
ure/technical/specifications/geolinked_das/gdas_0.8.1_cap.xsd" );

// Build the sql statement for metadata
$my_sql = "select framework.ORGANIZATION as f_org, framework.DOMAIN as
f_domain, framework.NAME as f_name, ";
$my_sql .= "framework.TITLE as f_title, framework.DESCRIP
framework.VERSION as f_version, ";
$my_sql .= "framework.
f_doc, framework.GE
... Etc.

// Fetch the Framework
while (ora_fetch($my
$framework =&$
$organization =&$
ora_getcolumn($my_c
$domain =&$ $dat
1));
$name =&$ $frame
... Etc.

$organization =&$
ora_getcolumn($my_c
$domain =&$ $dat
10));
$name =&$ $data
// Keep the value for
$my_geolink = c
$geolinkagefield
ora_getcolumn($my_c
$my_oracle_user=$
$my_table = ora
$attribute =&$ $
... Etc.
$rowset =&$ $d
// Create SQL state
rows
$attribute_sql = "
$my_oracle_user=$
while(ora_fetch($
$my_row =&$ $row;
$my_identifier =&$
$my_value =&$ $m
) //end of the att
ora_close($v_cursor);
//end of framework while loop
ora_close($my_cursor);
$tree->dump();
ora_logoff($connection);
?>
```

GDAS XML responses

```
<GDAS_Capabilities>
  ...Standard service metadata ...
  <GeolinkageLimit>ANNV
  </GeolinkageLimit>
  <AttributeLimit>N
  </AttributeLimit>
</Service>
<Capability>
  ...Standard capability metadata ...
  <Framework>
    ... Framework metadata ...
    <GeolinkageField>field
  </GeolinkageField>
  <Dataset>
    ... Dataset metadata ...
    <Attribute1 metadata ...
    </Attribute1 metadata ...
    <Attribute2 metadata ...
    </Attribute2 metadata ...
    ... more attributes ...
  </Dataset>
  ... more frameworks ...
</Framework>
</GDAS_Capabilities>
```