

# Geospatial Registry Service [*Prototype*]



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योग: कर्मसु कौशलम्

# Introduction

How do we Inform Others?



NSDI



Bhuvan



GSI



SOI



Where to find the road data service for my dataset ???



How do we Search?

Geo-Spatial service clients

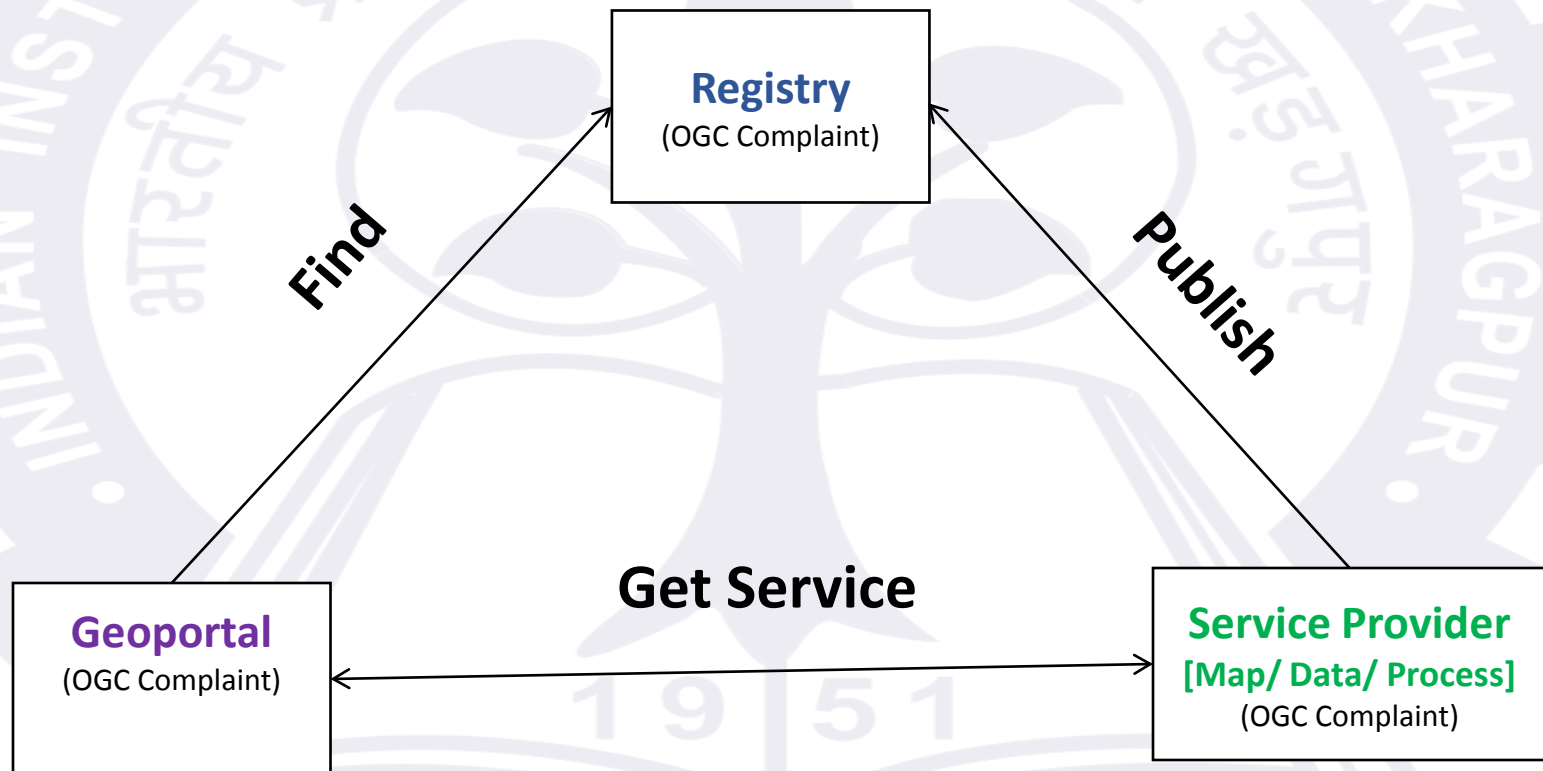
Where to find the Map ???



# Introduction

- A Web Registry Service a specialized catalogue that exemplifies a formal registration Geospatial services such as those described in applicable ISO standards
  - It is used by client applications to discover GIS information
- This service supports the ability to publish and search collections of descriptive information (metadata) for data, services, and related information geospatial objects
- Metadata
  - Provides generalised properties that can be queried
  - Supports invocation or retrieval of the referenced resource

# Essential Interactions of Service-Oriented Architecture(SOA)



# Geospatial Registry

- Geospatial Registry allows individuals and organizations to work interactively and visually with a vast wealth of map and related information
- It helps for finding, retrieving and using geographical information scattered over the world

## Examples of Registry entry

Land cover/use

Administrative boundaries

Crop zones

Soils

Population density

## Examples of Utilization of Registry

Early warning information

# Standards

- The ideal world: Interoperable portals

- How?

- By implementing common standards.

- Standards for:

- **Describing** data

- **Finding** data

- **Binding** data

# Metadata

- Metadata is often described as “**data about data**”, or the **who, what, where, and when**
- Benefits
  - Internal: local management
    - tracking dataset management
    - scheduling data updates
  - External: discovery
    - allowing your dataset to be used outside your organization
- ISO 19139 standard
  - Provides the XML implementation schema for ISO 19115 specifying the metadata record format and may be used to describe, validate, and exchange geospatial metadata prepared in XML.
- ISO 19115-1:2014 defines the schema required for describing geographic information and services by means of metadata

# Metadata Information

This section contains fields that describe general information about the metadata

- File identifier [M]** ➤ Unique identifier for the metadata file;
- Metadata standard and version [M]** ➤ Name and version of the metadata standard used to describe the data;
- Metadata character set [M]** ➤ Character set used to create the metadata;
- Metadata language [M]** ➤ Language used to create the metadata;
- Metadata date stamp [M]** ➤ Date when the metadata record was created;

[M] indicates *Mandatory* Fields.

**NOTE:** Of the above fields only metadata language needs the users interaction. The other fields are populated with default information.

# Metadata Information (cont...)

## Metadata author [M]

➤ The person who is associated with the metadata and who is the point of contact for data information.

Role	<input type="text" value="custodian"/>
	<ul style="list-style-type: none"><li>resourceProvider</li><li>custodian</li><li>owner</li><li>user</li><li><b>distributor</b></li><li>originator</li><li>pointOfContact</li><li>principallInvestigator</li><li>processor</li><li>publisher</li></ul>

**NOTE:** Before selecting the [ADD] link to insert any new fields into the Metadata form, [SAVE] must be selected first to save all text that has been entered since the last [SAVE].

**NOTE:** Many fields contain a drop-down list of options to complete the field. These make entering data quicker and easier.

# Dataset Identifier

This section contains fields to uniquely identify the dataset:

- Title** [M] ➤ Name by which the data is known;
- Dataset edition** ➤ Version of the data (i.e. first, second, etc.);
- Dataset reference date** [M] ➤ Date on which the data was published, created or revised;
- Dataset reference date type** [M] ➤ Type of date entered in the “Dataset reference date” field;
- Presentation format** ➤ Presentation format for the data (document, map, table, etc.);
- Dataset language** [M] ➤ Language of any text in the data.

# Dataset Identifier (cont...)

## Abstract <sup>[M]</sup>

➤ Brief narrative summary about the content of the data;

## Purpose

➤ Summary of intention with which the data was created;

## Supplemental information

➤ Additional information that is important for the correct use of the data;

## Status

➤ How complete is the data?;

## Topic category <sup>[M]</sup>

➤ One of 19 categories specified by the ISO 19115 metadata standard;

## Keywords

➤ One or more keywords describing the thematic content of the data.

# Dataset Identifier (cont...)

## Place Keywords <sup>[M]</sup>

➤ Keyword that describes the geographical extent of the data;

## Scale

➤ Scale of the map from which the data was derived;

## Graphic overview name

➤ Name of the file that contains a graphic illustration of the data;

## Graphic overview description

➤ Text description (i.e. Title) of the illustration;

## Graphic overview type

➤ Format in which the illustration is encoded;

## Resource provider <sup>[M]</sup>

➤ Person or organization that provides the data and that may be contacted for acquiring knowledge about the data

# Spatial Representation Information

This section contains fields that describe the mechanisms used to represent spatial information in a dataset:

**Spatial representation type**

➤ Digital mechanism used to represent spatial data (i.e. text table, vector, grid);

**Geographic bounding box <sup>[M]</sup>**

➤ Coordinates that define the extent of the data.

**Vector spatial representation information:**

**Topology level**

➤ Code which identifies the degree of complexities of the spatial relationships;

**Geometric object type**

➤ Name of point and vector objects used to locate zero-, one-, two-dimensional spatial locations in the data (ex. point, curve, surface, composite);

**Geometric object count**

➤ Total number of point and vector object type occurring in the data

# Spatial Representation Information

## Grid spatial representation information:

- Number of dimension** [M] ➤ Number of independent spatial-temporal axes;
- Dimension name** [M] ➤ Name of the axis;
- Dimension size** [M] ➤ Number of elements along the axis;
- Cell geometry** [M] ➤ Identification of grid data as point or cell;
- Resolution value** ➤ Degree of detail in the grid data;
- Transformation parameters availability** [M] ➤ Indication of whether or not parameters for transformation exists.

# Reference System Information

This section contains the description of the spatial reference system(s) used in a dataset:

- Name** <sup>[M]</sup> ➤ Name of the reference systems used;
- Projection** ➤ Identity of the projection used;
- Ellipsoid** ➤ Identity of the ellipsoid used;
- Datum** ➤ Identity of the datum used.

# Reference System Information

## Projection Parameters:

- Zone**
- Unique identifier for 100,000 meter grid zone;
- Standard parallel**
- Line of constant latitude at which the surface of the Earth and the plane or developable surface intersect;

## Ellipsoid parameters:

- Semi mayor axis**
- Identity of the ellipsoid used;
- Axis units**
- Identity of the datum used

# Constraints Information

The constraints information defines the metadata required for managing rights to information including restrictions on access and use.

## Data access restrictions

- Access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource

## Data use restrictions

- Constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource;

# Data Quality Information

This section defines the metadata required to give a general assessment of the quality of a resource. It also contains information about the sources and production processes used in producing a dataset

## Data quality scope

- Specific data to which the data quality information applies;

## Data quality report

- Quantitative quality information for the data specified by the scope;

## Lineage statement

- General explanation of the data producer's knowledge about the lineage of the data;

## Data source

- Information about the source data used in creating the data specified by the scope

# Maintenance Information

This section provides information about the frequency of metadata updates, and specific requirements for maintaining the dataset:

## Maintenance frequency

- Frequency with which changes and additions are made to the resource after the initial resource is completed;

## Date of next update

- Scheduled revision date for the data;

## Maintenance note

- Information on regarding specific requirement for maintaining the dataset;

# Distribution Information

This section defines metadata required for **accessing** the data and also contains information about the **distributor**.

## On line resource information

- Linkage** <sup>[M]</sup>
  - Location for on-line access using a URL address or similar addressing scheme;
- Protocol**
  - Connection protocol to be used;
- Profile**
  - Name of an application profile that can be used with the online resource;
- Name**
  - Name of the online resource;
- Description**
  - Detailed text description of what the online resource is/does;
- Function**
  - Code for function performed by the online resource

# Distribution Information

Distributor information

**Individual Name**

➤ Name of the person that distributes the data;

**Organization**

➤ Organization name

**Position name**

➤ Position or role in the organization

**Role**

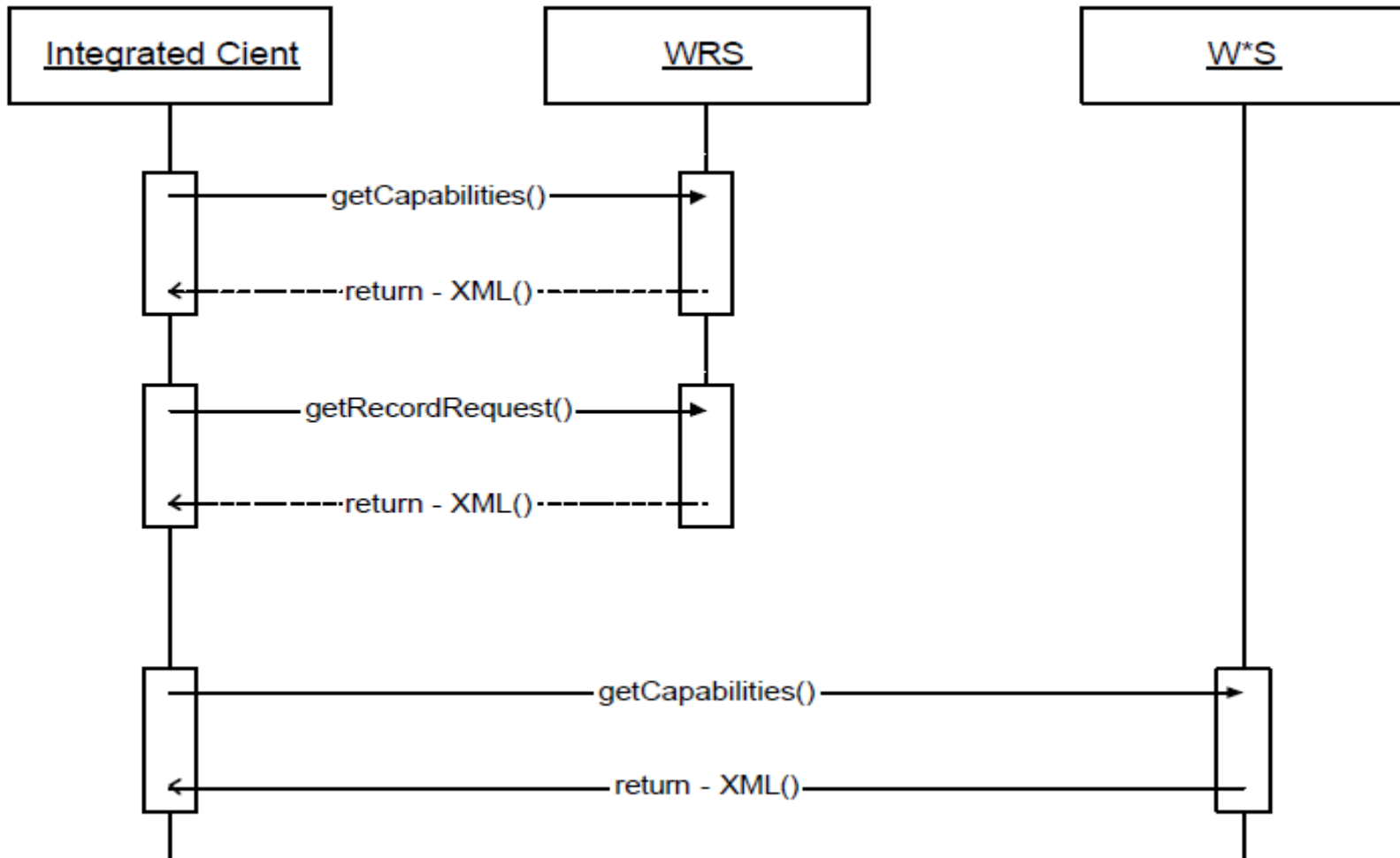
➤ Function in relation to the metadata;

For the point of contact it is recommended to add contact information such as telephone, address, electronic mail address, etc..

# Data Discovery

- **Client performs WRS search**
  - By specifying query elements to limit available information
  - Using a user interface to browse through organizations, subjects, time and location
- **Client retrieves metadata information**
  - Local: Search is limited to harvested Metadata contained on the Web Registry Service
  - Cascade: Search is extended to backing WFS, WMS and WRS

# Web Registry Service Data Discovery



# OGC Catalogue Service for Web (CSW)

- **Catalogue information model**

- It is based on the international standard for metadata description ISO 19115:2003.
- It provides a formal structure for spatial data description that can be managed by a catalogue service that complies with the application profile.

- **Capabilities**

- Since both the OGC\_Service and the Discovery functions must be provided by all, then WCS Capabilities offers OGC standard operations.

# OGC-CSW standard operations

- **GetRecords**

- Queries the catalog using a search for any occurrence of the string 'road' in any field
  - [http://ex.com/csw?service=CSW&version=2.0.2&request=GetRecords&typeName=csw:Record&constraintlanguage=CQLTEXT&constraint=\"csw:AnyText Like '%road%'](http://ex.com/csw?service=CSW&version=2.0.2&request=GetRecords&typeName=csw:Record&constraintlanguage=CQLTEXT&constraint=\)

- **GetRecordById**

- It is short form for retrieving and linking to records in a catalogue
  - <http://ex.com/csw?service=CSW&version=2.0.2&request=GetRecordById&id=http://ex.com/2342343>

# OGC Specification Standard (cont...)

- **GetCapabilities**

- Provides an XML file that has all the required information such as **list contact information**, and **describe the operations**, and **what URLs to use to access those operations**

- <http://ex.com/csw?service=CSW&version=2.0.2&request=GetCapabilities&outputFormat=application/xml>

- **DescribeRecord**

- It allows a client to discover the information model(s) supported by the catalogue and to retrieve type definitions

- <http://ex.com/csw?service=CSW&version=2.0.2&request=DescribeRecord&TypeName=csw:Record>

# CSW 'GetCapabilities'

<http://10.14.81.6:8080/iitkgp-georegistry/srv/eng/csw?SERVICE=CSW&VERSION=2.0.2&REQUEST=GetCapabilities>

```
- <ows:Capabilities version="2.0.2" xsi:schemaLocation="http://www.opengis.net/cat/csw/2.0.2/inspire_ds/1.0/inspire_ds.xsd">
- <ows:ServiceIdentification>
  <ows:Title/>
  <ows:Abstract/>
- <ows:Keywords>
  + <!------>
  <ows:Keyword>features</ows:Keyword>
  <ows:Keyword>WMS</ows:Keyword>
  <ows:Keyword>WFS</ows:Keyword>
  <ows:Keyword>GEOSERVER</ows:Keyword>
  <ows:Keyword>DECCMA_IBD_DIST</ows:Keyword>
  <ows:Keyword>Ganga_118Towns_STP_Status</ows:Keyword>
  <ows:Keyword>od_11_12_clip_rpj</ows:Keyword>
  <ows:Keyword>Srirangapatna_100M_buf</ows:Keyword>
  <ows:Keyword>DELTA_MHNDI_AGDRTO6_Clip</ows:Keyword>
  <ows:Keyword>DECCMA_IBD_RIVER_LINE</ows:Keyword>
  <ows:Type>theme</ows:Type>
</ows:Keywords>
<ows:ServiceType>CSW</ows:ServiceType>
<ows:ServiceTypeVersion>2.0.2</ows:ServiceTypeVersion>
<ows:Fees/>
<ows:AccessConstraints/>
</ows:ServiceIdentification>
- <ows:ServiceProvider>
  <ows:ProviderName>IIT Kharagpur Catalog</ows:ProviderName>
  <ows:ProviderSite xlink:href="http://localhost:8080/iitkgp-georegistry"/>
  + <ows:ServiceContact></ows:ServiceContact>
</ows:ServiceProvider>
- <ows:OperationsMetadata>
- <ows:Operation name="GetCapabilities">
  - <ows:DCP>
    - <ows:HTTP>
      <ows:Get xlink:href="http://localhost:8080/iitkgp-georegistry/srv/eng/csw"/>
      <ows:Post xlink:href="http://localhost:8080/iitkgp-georegistry/srv/eng/csw"/>
    </ows:HTTP>
    </ows:DCP>
    + <ows:Parameter name="sections"></ows:Parameter>
    + <ows:Constraint name="PostEncoding"></ows:Constraint>
  </ows:Operation>
  + <ows:Operation name="DescribeRecord"></ows:Operation>
  + <ows:Operation name="GetDomain"></ows:Operation>
  + <ows:Operation name="GetRecords"></ows:Operation>
  - <ows:Operation name="GetRecordById">
```

# CSW 'DescribeRecord'

<http://10.14.81.6:8080/iitkgp-georegistry/srv/eng/csw?SERVICE=CSW&VERSION=2.0.2&REQUEST=DescribeRecord>

```
-<csw:GetRecordsResponse xsi:schemaLocation="http://www.opengis.net/cat/csw/2.0.2 http://schemas.opengis.net/csw/2.0.2/CSW-discovery.xsd">
  <csw:SearchStatus timestamp="2016-03-04T17:15:34"/>
  -<csw:SearchResults numberOfRecordsMatched="1088" numberOfRecordsReturned="10" elementSet="full" nextRecord="11">
    -<gmd:MD_Metadata>
      -<gmd:fileIdentifier>
        <gco:CharacterString>1d9fa78acf5789682fc085e46875c76738ea2bbf</gco:CharacterString>
      </gmd:fileIdentifier>
      -<gmd:language>
        <gco:CharacterString>eng</gco:CharacterString>
      </gmd:language>
      -<gmd:characterSet>
        <gmd:MD_CharacterSetCode codeList="/resources/codeList.xml#MD_CharacterSetCode" codeListValue="utf8"/>
      </gmd:characterSet>
      -<gmd:hierarchyLevel>
        <gmd:MD_ScopeCode codeList="/resources/codeList.xml#MD_ScopeCode" codeListValue="dataset"/>
      </gmd:hierarchyLevel>
      -<gmd:contact>
        -<gmd:CI_ResponsibleParty>
          -<gmd:individualName>
            <gco:CharacterString>Bhuvan</gco:CharacterString>
          </gmd:individualName>
          -<gmd:organisationName>
            <gco:CharacterString>NRSC/ISRO</gco:CharacterString>
          </gmd:organisationName>
          -<gmd:positionName>
            <gco:CharacterString>Bhuvan Cell</gco:CharacterString>
          </gmd:positionName>
        </gmd:CI_ResponsibleParty>
      </gmd:contact>
    </gmd:MD_Metadata>
  </csw:SearchResults>
</csw:GetRecordsResponse>
```

# OGC Specification Standard (cont...)

- **GetDomain**

- It provides an interface to return all possible values for a given queryable metadata property or parameter

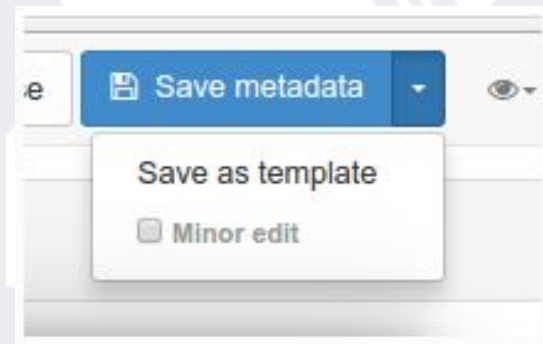
<http://10.14.81.6:8080/iitkgp-georegistry/srv/eng/csw?service=CSW&ersion=2.0.2&request=GetDomain&propertyname=dc:type>

- **Harvest**

- Create and update metadata by asking the server to ‘pull’ metadata from somewhere
- This operation only references the data to be inserted or updated in the catalogue
- It is the job of the catalogue service to resolve the reference, fetch that data, and process it into the catalogue

# Creating Service Template

- It is describe how to load and manage schemas
- The “**Metadata and Templates**” page in the Administration page allows to see available standards



# Registration Technique

- **Pull based/Harvesting** : Harvesting is the process of ingesting metadata from remote sources and storing it locally in the catalogue for fast searching. It is a scheduled process, so local copy and remote metadata are kept aligned.
- **Push based** : The push based registration of service metadata involves the manual interventions of the publishers in order to be discovered by the corresponding relevant consumers.

# Supported Service in Registry

- This harvester supports the following OGC services and versions
  - Web Map Service (WMS) - versions 1.0.0, 1.1.1, 1.3.0
  - Web Feature Service (WFS) - versions 1.0.0 and 1.1.0
  - Web Coverage Service (WCS) - version 1.0.0
  - Web Processing Service (WPS) - version 0.4.0 and 1.0.0
  - Catalogue Services for the Web (CSW) - version 2.0.2
  - Sensor Observation Service (SOS) - version 1.0.0

# IIT Kharagpur GeoRegistry

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## Get started

Search over 2319 data sets, services and maps, ...

## IIT Kharagpur Catalog Data Portal

Here you will find data, services and maps and more.

### Browse by topics







 Geoscientific information  
1093

Latest news Most popular

### Browse resources

 Dataset  
2311

 Service  
8

 <p>delta_bound Dataset</p>	 <p>delta_bound_v1 Dataset</p>	 <p>deccma_bound_v1 Dataset</p>
 <p>GANGA_WL Dataset</p>	 <p>GANGA_SAL Dataset</p>	 <p>GANGA_LN Dataset</p>

Powered by Geonetwork 3.0.3.0

# Service Registry for Data Source Searching

The screenshot displays a web browser window with the URL `10.14.81.6:8080/iitkgp-georeg/srv/eng/catalog/search?node=srv#/search`. The left sidebar contains filters for 'PROVIDED BY', 'YEARS', 'STATUS', 'SERVICE TYPES', and 'SCALE'. The main content area shows a grid of service cards, each with a 'Completed' badge, a compass icon, a title, a description, and the provider's name. An inset map in the bottom right corner shows the geographical context of the services.

Service Name	Description	Provider
Building_latlong	deegree demo WMS	Andreas Poth
health_report	deegree demo WMS	Andreas Poth
Road_latlong	deegree demo WMS	Andreas Poth
BHUVAN-satellite	Bhuvan OGC Web Service of satellite data in 56m,23m,6m	
Bhuvan	Bhuvan OGC Web Service of 2pt5m satellite data	
Bhuvan	Bhuvan OGC Web Service of 5m satellite data	

# IIT Kharagpur Georegistry

## Add-On Service: Map Service

The screenshot displays the IITKGP GISRCs web application interface. At the top, there is a navigation bar with the following elements: the IITKGP GISRCs logo, a search icon, a 'Map' button, a '+ Contribute' button, an 'Admin console' button, a user profile for 'admin admin (Administrator)', a 'Sign out' button, and a language dropdown set to 'English'. Below the navigation bar is a search input field with the placeholder text 'Search a place'. The main area is a map of West Bengal, India, with a blue network overlay representing a georegistry. The network consists of numerous red nodes connected by blue lines, forming a dense web across a central region. A 'Manage layers' panel is open on the right side of the map, showing three layers: 'bnk\_block\_hq', 'bnk\_road', and 'bnk\_district\_boundary', each with a checked checkbox and a settings gear icon. Below the layers, it indicates 'Background map: OpenStreetMap -'. The map shows various cities and towns, including Dhanbad, Asansol, Durgapur, Bardhaman, and Kolkata.



***Thank You !!!***

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