GeoNetwork Orientation

Finding your way with GeoNetwork

Author: Jody Garnett

Date: February 2020





Spatial Data publication and discovery following the free and open source source software philosophy.

We are a Software Development Company based in Bennekom, with developers in the Netherlands, Spain and Canada.





Jody Garnett

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Open Source Projects

GeoServer, GeoTools, JTS, uDig

Open Source Geospatial Foundation

Incubation Committee Chair GeoTools Project Officer Marketing Committee Chair

Eclipse Foundation

LocationTech Technology Project Chair



I am new to GeoNetwork

This is the presentation I wanted to read!

- How do I make it go :)
- What does GeoNetwork actually do?
- Who is GeoNetwork for?
- What do they do with GeoNetwork?



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As an open-source technologist:

- Who makes this thing, what is the community like?
- What kind of quality or maturity are we looking at?
- What makes GeoNetwork go, what is it's super-power?



GeoNetwork

First impressions



geonetwork-opensource.org

Vendor-neutral foundation!





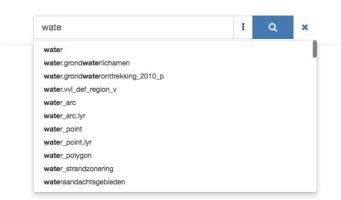
News | Documentation | Download | Community | Gallery | Search

GeoNetwork is a catalog application to manage spatially referenced resources. It provides powerful metadata editing and search functions as well as an interactive web map viewer. It is currently used in numerous Spatial Data Infrastructure initiatives across the world.

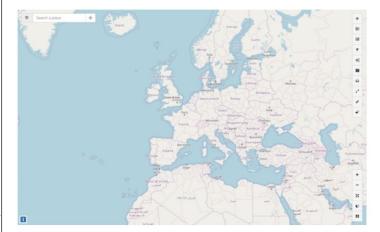
Find & get information

GeoNetwork provides an easy to use web interface to search geospatial data across multiple catalogs. The search provides full-text search as well as faceted search on keywords, resource types, organizations, scale, ... Users can easily refine the search and quickly get to the records of interest

GeoSpatial layers, but also services, maps or even non geographic datasets can be described in the catalog. Easily navigate accross records and find sources or services publishing a dataset.



Make your maps



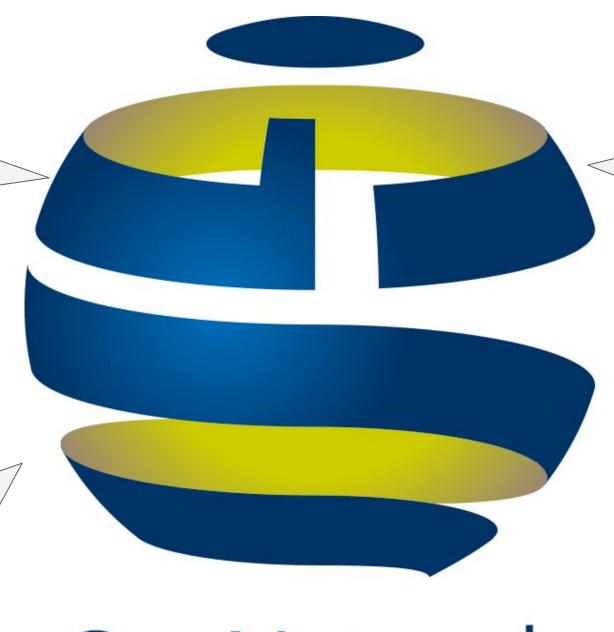
The interactive map viewer based on <u>OpenLayers 3</u> provides access to OGC services (WMS, WMTS) and standards (KML, OWS). Connected to the catalog, users can easily find new services, layers and even dynamic maps to combine them together. User maps can be annotated and printed and shared with others.

"Open source" in the title?



Logo: Zen and the art of metadata

Wrapping the Globe



Metadata monk enjoying the "zen" of contemplating data

Letter "G" (look sideways)





Trying it out

Part I - Installation and setup



Official Distributions

User-guide "Quickstart" assumes we have GeoNetwork installed already!

Before you start:

- Java web-application
- OpenJDK 8
 - Use the one from your Linux distribution
 - Or use <u>adoptopenjdk.net</u> for Linux and macOS
 - Java 11 not supported yet!

Distributions:

- Installer
- WAR
- Source-code
- Docker

Maintenance guide has many more details.



Official Distributions: Java Installer

1. Download geonetwork-install-3.10.0-0.jar, double-click to run, or:

```
java -jar geonetwork-install-3.10.0-0.jar
```

2. I ended up running on the terminal:

cd /Applications/geonetwork/bin

./start.sh

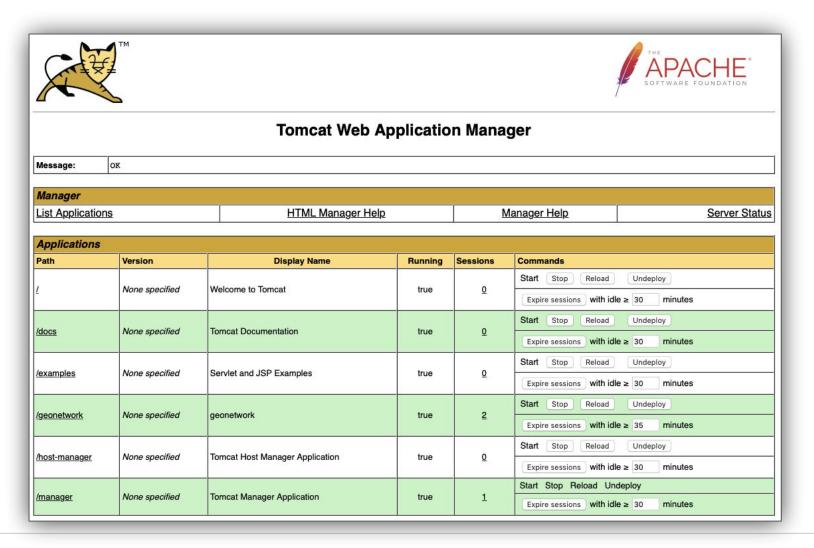




Official Distributions: Web Application

Bring-your-own application server:

- 1. Download geonetwork.war
- 2. Install in your application server
 - a. The examples assume Tomcat





Official Distribution: Source-code

Building from source:

1. Checkout

git clone --recursive https://github.com/geonetwork/core-geonetwork.git

2. Build:

```
cd core-geonetwork
mvn install -DskipTests
```

3. Run:

```
cd web
mvn jetty:run -Penv-dev
```

```
[INFO] Reactor Summary:
[INFO] GeoNetwork opensource 3.11.0-SNAPSHOT ...... SUCCESS [
[INFO] common utils 3.11.0-SNAPSHOT ...... SUCCESS [
[INFO] Caching xslt module 3.11.0-SNAPSHOT ...... SUCCESS [
                                                                0.117 sl
[INFO] ArcSDE module (dummy-api) 3.11.0-SNAPSHOT ...... SUCCESS [
[INFO] GeoNetwork domain 3.11.0-SNAPSHOT ...... SUCCESS [
[INFO] Oaipmh modules 3.11.0-SNAPSHOT ...... SUCCESS [
[INFO] GeoNetwork Events 3.11.0-SNAPSHOT ...... SUCCESS [
[INFO] GeoNetwork schema plugins 3.7 ..... SUCCESS [
[INFO] GeoNetwork schema plugins core 3.7 ...... SUCCESS [
[INFO] GeoNetwork schema plugin for ISO19139/119 standards 3.7 SUCCESS [ 0.621 s]
[INFO] GeoNetwork index using Elasticsearch 3.11.0-SNAPSHOT SUCCESS [ 0.007 s]
[INFO] GeoNetwork index Elasticsearch client 3.11.0-SNAPSHOT SUCCESS [ 0.108 s]
[INFO] GeoNetwork core 3.11.0-SNAPSHOT ...... SUCCESS [ 4.130 s]
[INFO] GeoNetwork Events 3.11.0-SNAPSHOT ...... SUCCESS [ 0.256 s]
[INFO] GeoNetwork schema plugin for Dublin Core records retrieved by CSW 3.7 SUCCESS [ 0.023 s]
[INFO] GeoNetwork schema plugin for Dublin Core standard 3.7 SUCCESS [ 0.083 s]
[INFO] GeoNetwork schema plugin for ISO19110 standard 3.7 . SUCCESS [ 0.077 s]
[INFO] GeoNetwork schema plugin for ISO19115-3:2018 standard 3.7 SUCCESS [ 10.924 s]
[INFO] GeoNetwork CSW server 3.11.0-SNAPSHOT ...... SUCCESS [ 0.599 s]
[INFO] GeoNetwork harvesters 3.11.0-SNAPSHOT ...... SUCCESS [
[INFO] GeoNetwork health monitor 3.11.0-SNAPSHOT ...... SUCCESS [ 0.298 s]
[INFO] GeoNetwork Digital Object Identifier (DOI) client 3.11.0-SNAPSHOT SUCCESS [ 0.217 s]
[INFO] GeoNetwork services 3.11.0-SNAPSHOT ...... SUCCESS [02:53 min]
[INFO] Geonetwork Web Resources 4 Java 3.11.0-SNAPSHOT .... SUCCESS [05:12 min]
[INFO] GeoNetwork INSPIRE Atom 3.11.0-SNAPSHOT ...... SUCCESS [ 0.824 s]
[INFO] GeoNetwork dashboard app based on Kibana 3.11.0-SNAPSHOT SUCCESS [ 0.019 s]
[INFO] Release module 3.11.0-SNAPSHOT ...... SUCCESS [ 0.022 s]
[INFO] messaging 3.11.0-SNAPSHOT ...... SUCCESS [02:50 min]
[INFO] workers 3.11.0-SNAPSHOT ...... SUCCESS [ 0.005 s]
[INFO] WFS features harvester 3.11.0-SNAPSHOT ...... SUCCESS [02:24 min]
[INFO] GeoNetwork Slave 3.11.0-SNAPSHOT ...... SUCCESS [ 0.202 s]
[INFO] Tests for schema plugins 3.11.0-SNAPSHOT ...... SUCCESS [
[INFO] GeoNetwork user interface module 3.11.0-SNAPSHOT ... SUCCESS [ 26.261 s]
[INFO] GeoNetwork Web module 3.11.0-SNAPSHOT ...... SUCCESS [01:36 min]
[INFO] BUILD SUCCESS
[INFO] Total time: 15:59 min
[INFO] Finished at: 2020-01-29T14:14:51-08:00
```

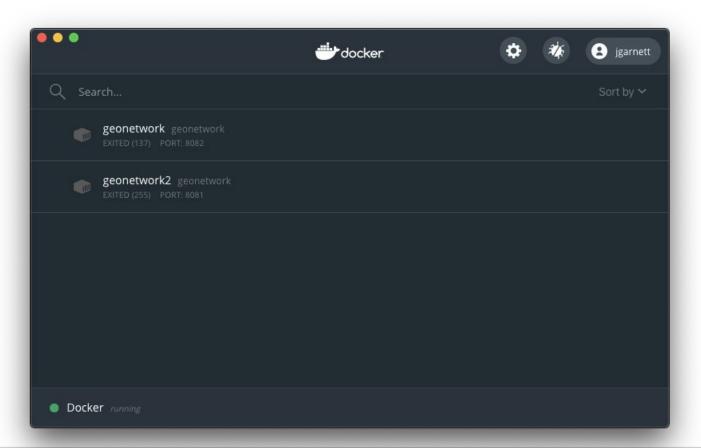


Official Distributions: Docker

Running docker:

- 1. Visit <u>hub.docker.com//geonetwork</u>
- 2. Run, being sure to map port 8080:

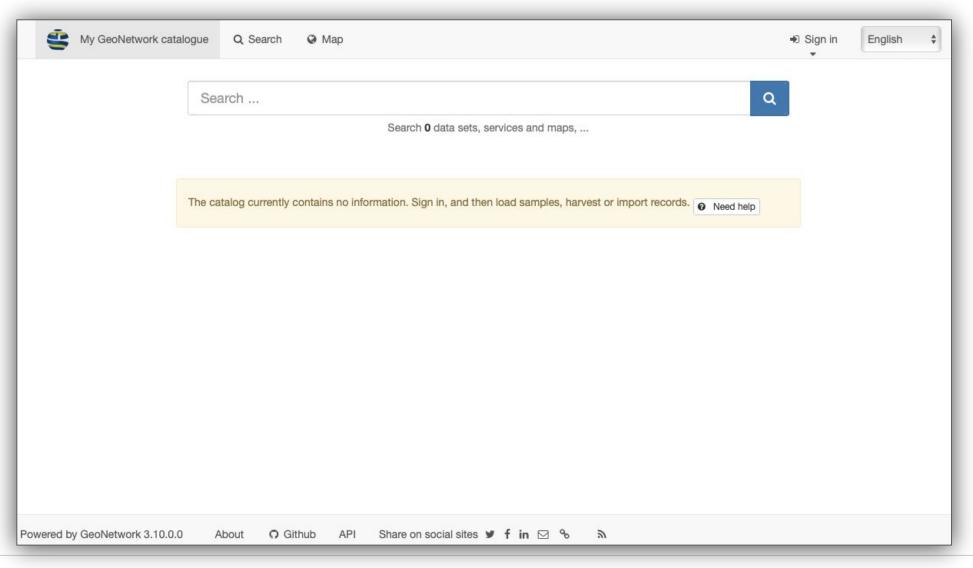
docker run --name netnetwork -d -p 8080:8080 geonetwork





Setup

Starting with localhost:8080/geonetwork

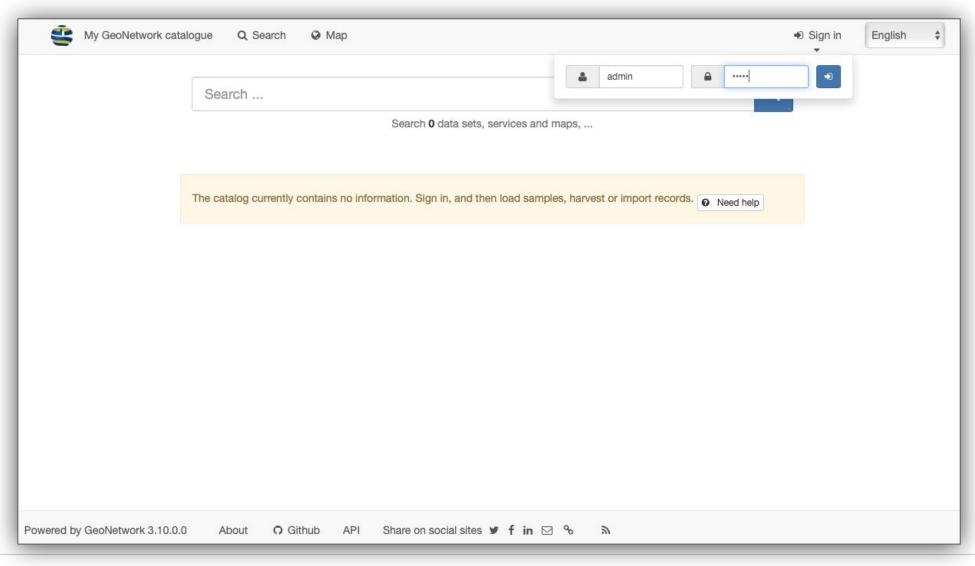


- 1. Sign-in
- 2. Admin console
- 3. Load samples
- 4. Search
- 5. View record
- 6. Map



Setup: Sign-in

Sign in as "admin"...



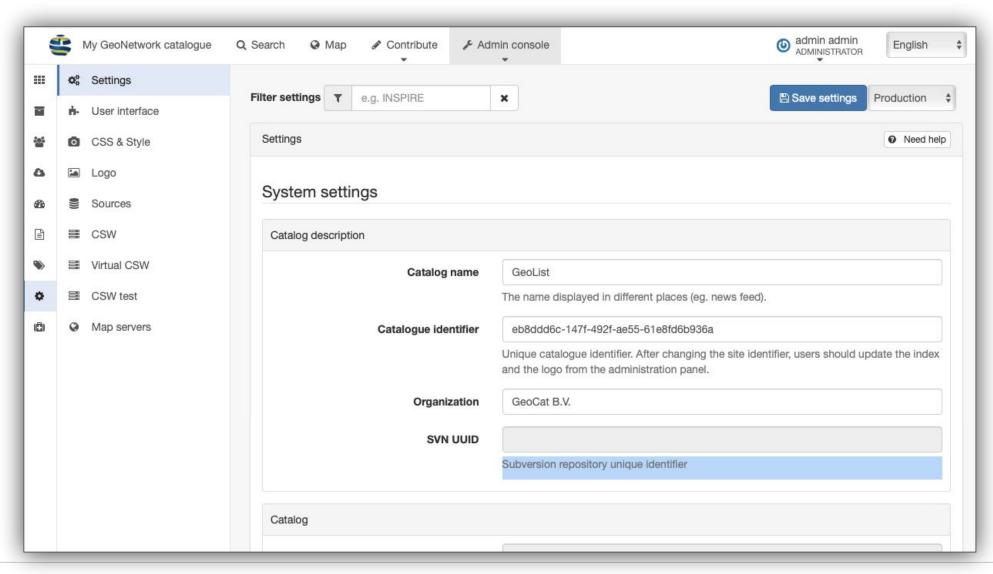
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Setup: Settings

Admin console → Settings

Rename catalog and fill in some details



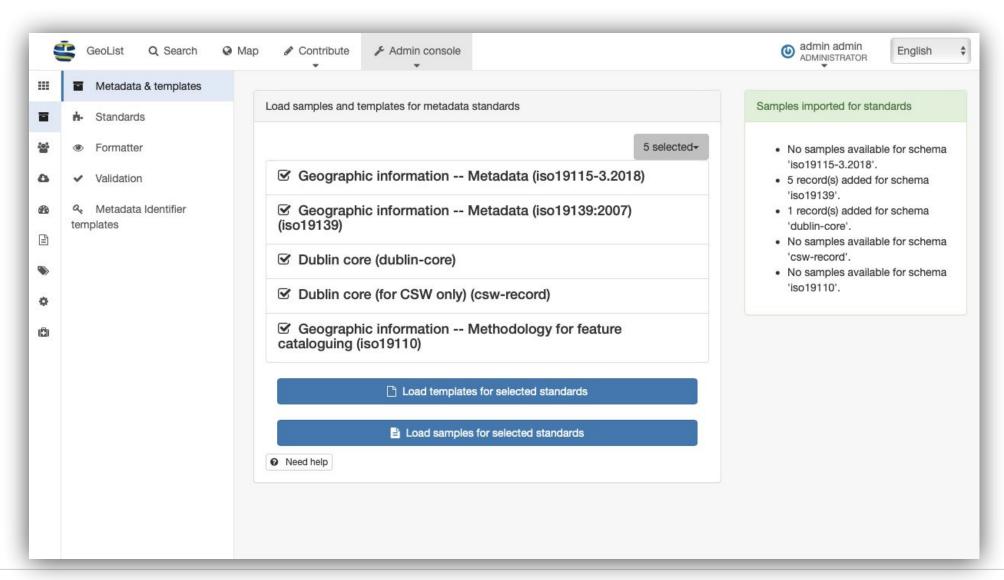
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Tour: Load samples

Admin console → Metadata and templates

Load samples for selected standards



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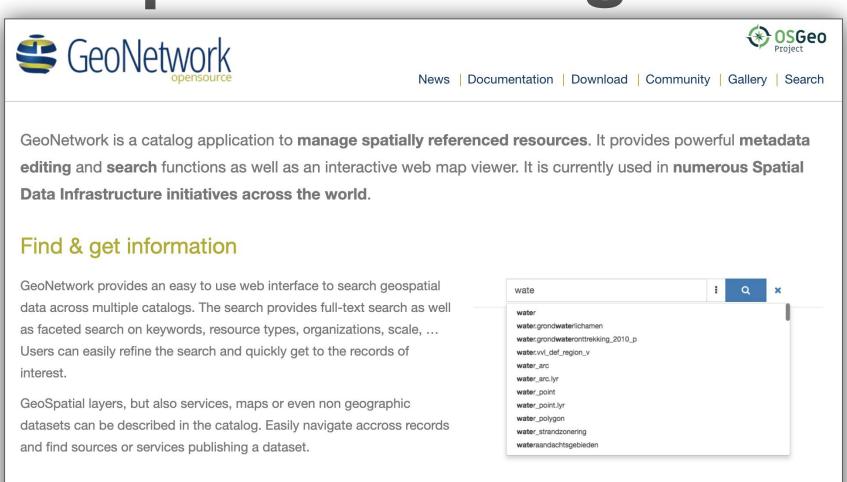
Trying it out

Part II - GeoNetwork for Visitors

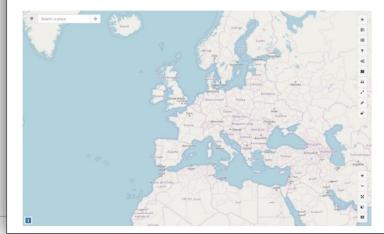


geonetwork-opensource.org

Search for spatial records



Make your maps



The interactive map viewer based on <u>OpenLayers 3</u> provides access to OGC services (WMS, WMTS) and standards (KML, OWS). Connected to the catalog, users can easily find new services, layers and even dynamic maps to combine them together. User maps can be annotated and printed and shared with others.

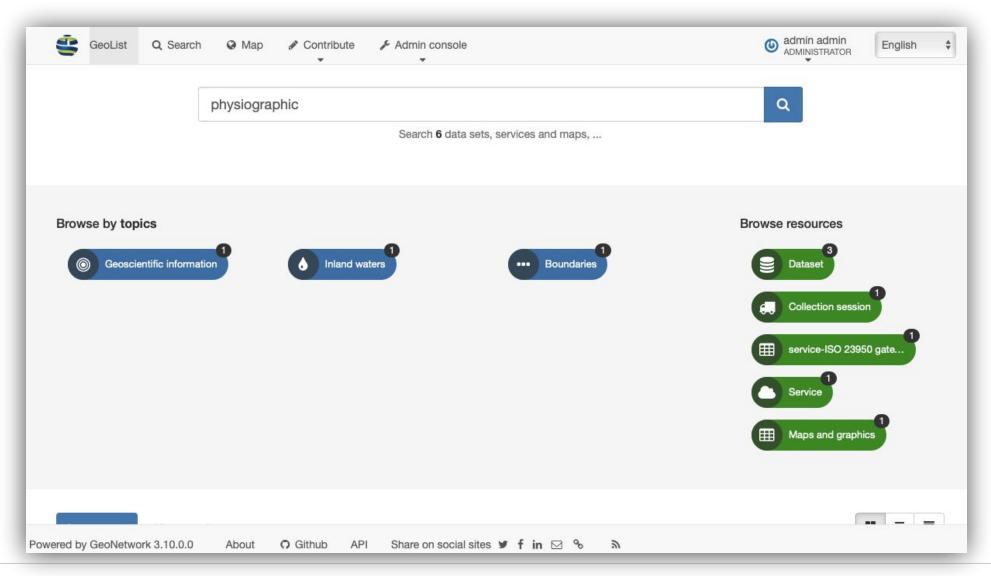
Also a map portal



Quick-search by topics or resource type

We can now try out the application

Use topic or resource facets



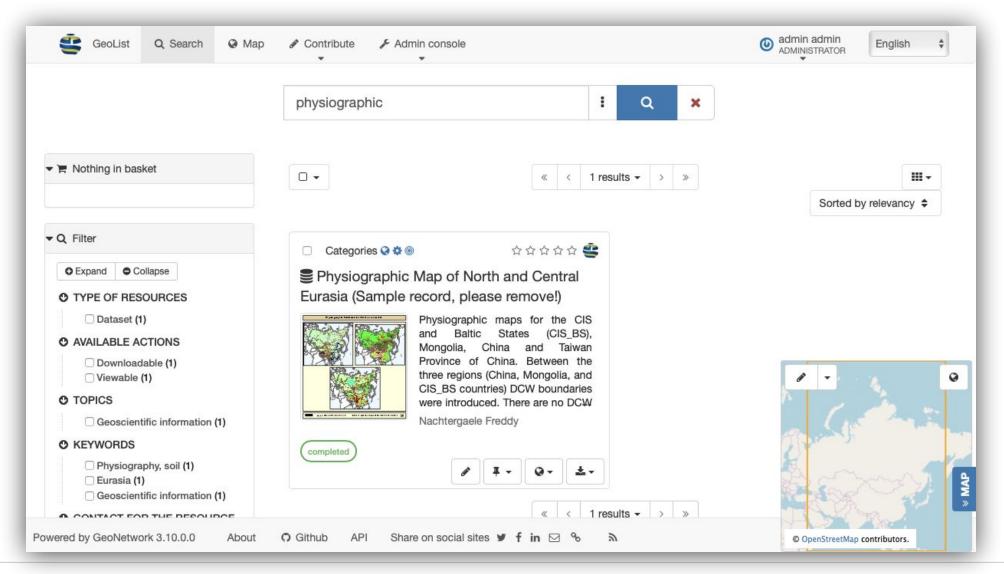
- 1. Sign-in
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- 6. Map



General search using Text

We can now try out the application:

Use text search

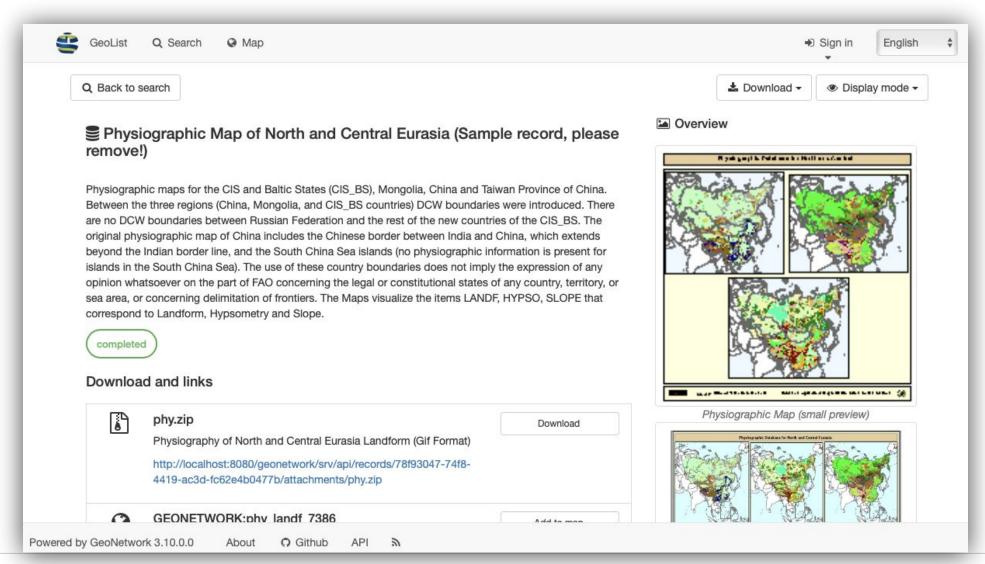


- 1. Sign-in
- 2. Admin console
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- 4. Search
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- 6. Map



View a record

Viewing an individual record



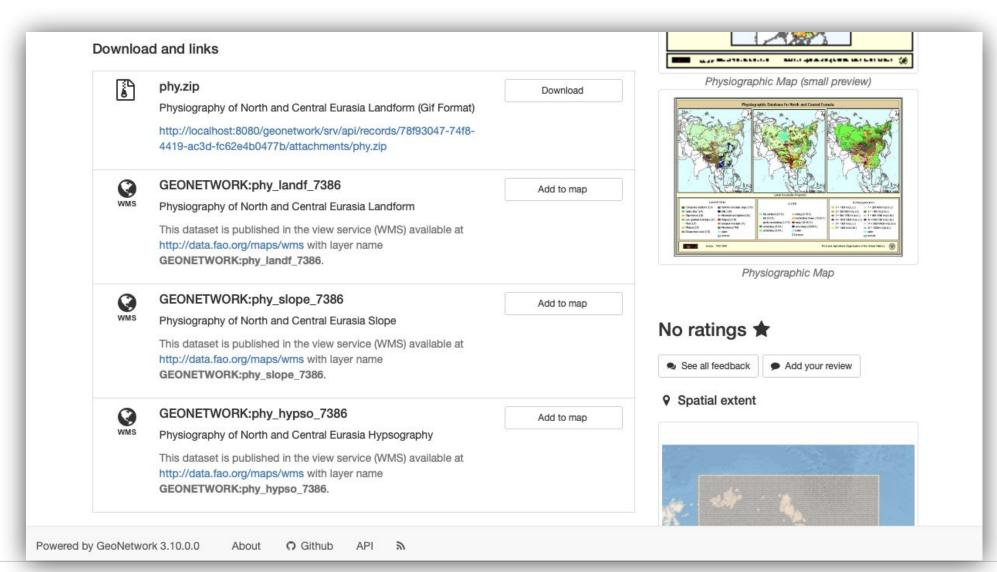
- 1. Sign-in
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Record downloads

Records contain lots of detail:

Extent, source of data, download link



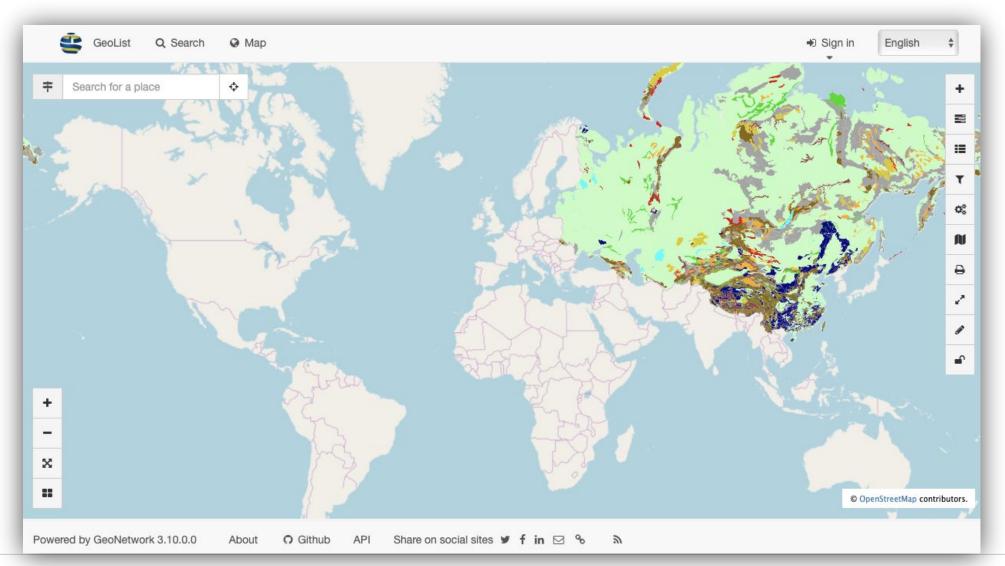
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Review data with "Add to map"

From record, we can "Add to Map"

Opens a map to review external data



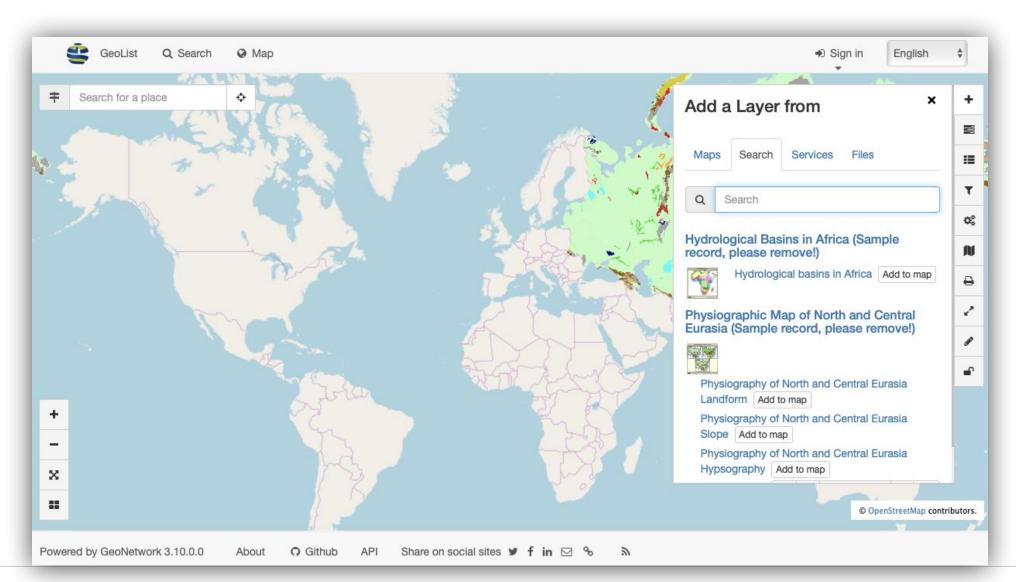
- 1. Sign-in
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Use a map to mix and match content

Map lets us explore more content

Search the catalog, upload KML

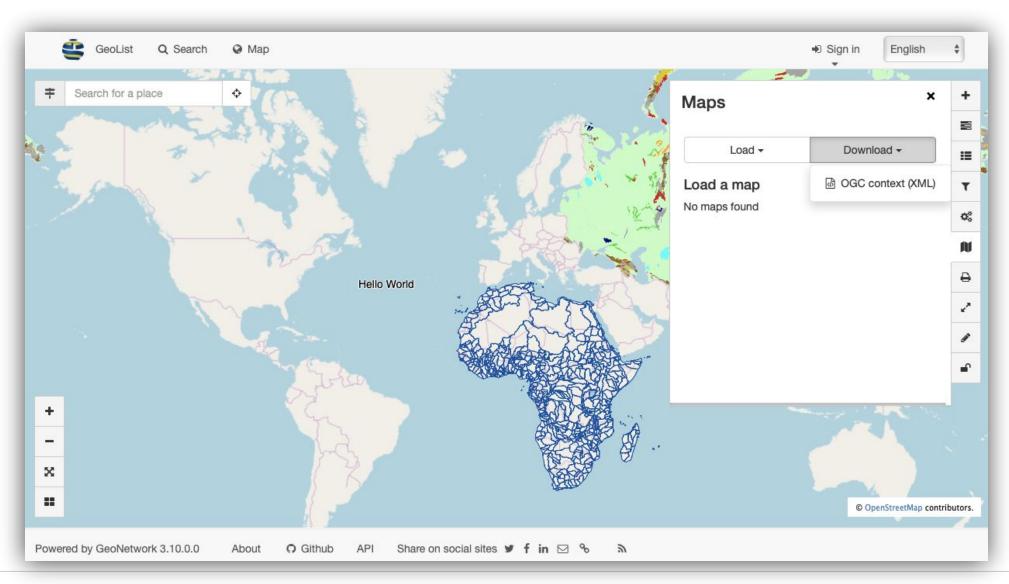


- 1. Sign-in
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- 4. Search
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Manage and download maps

Download map when done!



- 1. Sign-in
- 2. Admin console
- 3. Load samples
- 4. Search
- 5. View record
- 6. Map



GeoNetwork is a Catalog

GeoNetwork is built up as a catalog

- Manages thousands of records
- Visitors search and browse content
 - Some content is stored in the catalog
 - Some content is provided by external documents or web services

GeoNetwork as a map portal

- Maps can be used to visualize spatial data



Managing your Records



geonetwork-opensource.org

Editing and publishing records



OSGeo

News Documentation Download Community

Publish & describe resources

Describe information using the online metadata editing tools. The metadata editor support ISO19115/119/110 standards used for spatial resources and also Dublin Core format usually used for opendata portals.

Based on user profiles (eg. reviewer, editor), a dashboard provides easy access to their informations and tasks. Online editing of metadata is based on a powerful template system and directories of information (eg. contacts, thesaurus).

The editor provides uploading of data, graphics, documents, pdf files and any other content type. It supports among others:

- · multilingual metadata editing,
- validation system,
- suggestion to improve metadata quality
- geopublication of layers to publish geodata layers in OGC services (eg. GeoServer)

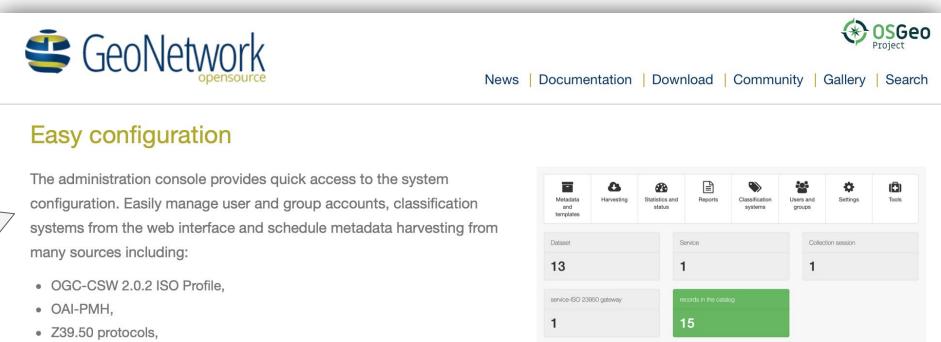
A bunch of standards

Data and documents

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System and security config

"Harvest" from other catalogs



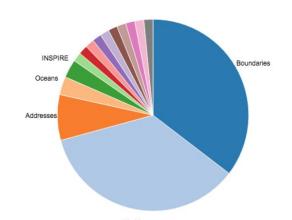
Analyze information

· Web Accessible Folders.

· Other GeoNetwork node.

ESRI GeoPortal

Thredds,Webdav.



Monitoring and reporting tools provide summarized information about the content of the catalog and statistics on the search. System maintainer can easily access the system status.

Figure out what is used

It is 6am do you know where your data is?

Helps your team

- Find out what information is available in your organization?
 - Do you have shared directories of shapefiles of dubious lineage?
 - Get a handle on duplicate information
- · Perhaps you have a obligation to share information with the public
 - Open data is happy data .. but can anyone find it?
 - For example government directive?

•



Do you know where your map came from?

Helps your team:

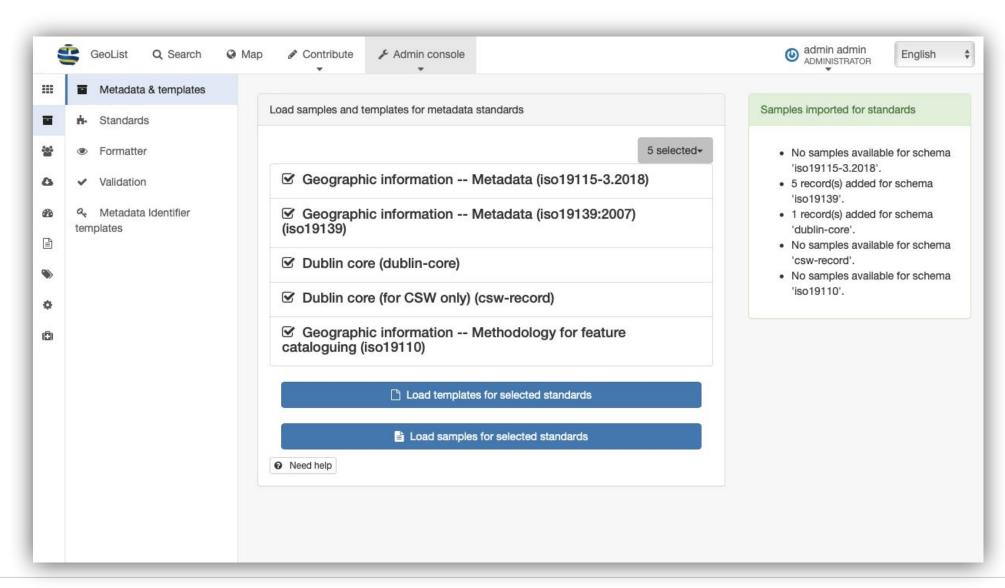
- Keep track of the information used within the organization
 - Information you generate and are responsible for
 - Information you have purchased or maintained
 - Information you publish to share with other parties
- Do you trust your map?
 - Who collected the data?
 - What was the data collected for? How recently was it collected?
 - Has it been processed along the way?
 - Was it hand edited with a sharpie?



Preflight: Load templates

Admin console → Metadata and templates 1. default templates

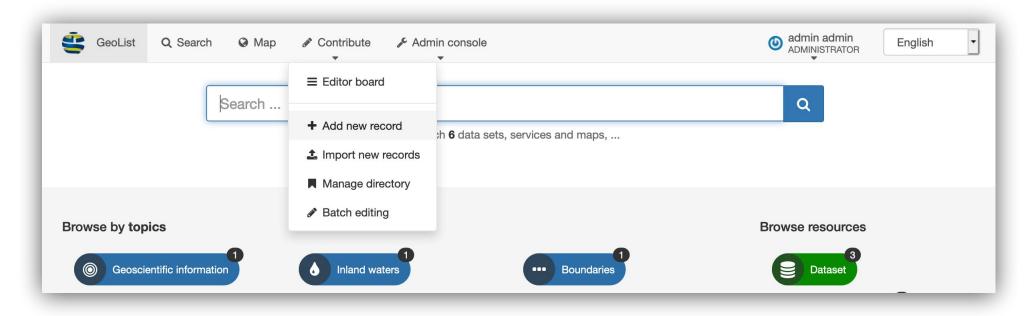
Load templates and samples for all





Creating a record

Contribute → Add new record

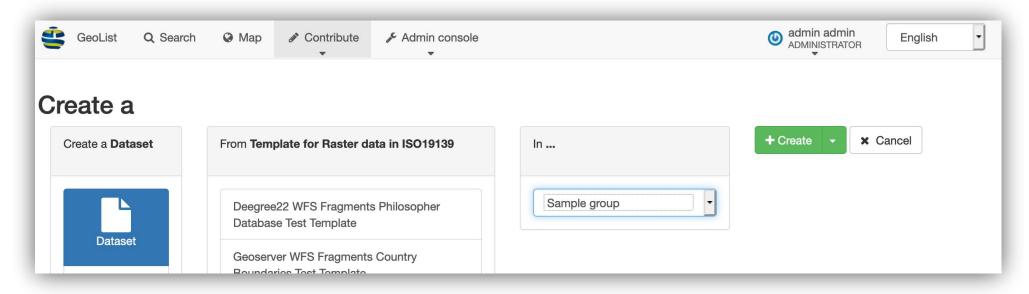


- 1. default templates
- 2. Add new record
- 3.



Creating a record

Template for Raster data in ISO19139

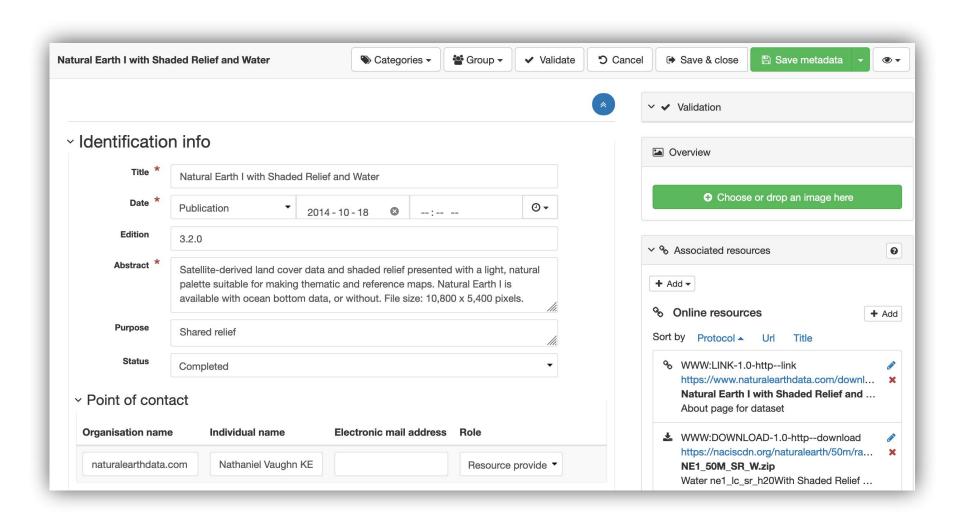


- 1. default templates
- 2. Add new record
- 3. Raster ISO19139



Creating a record

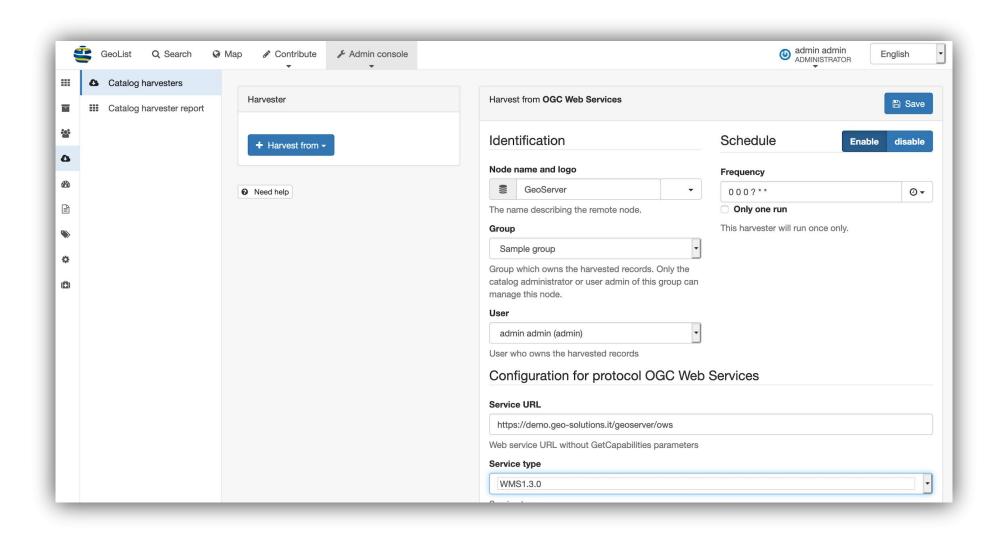
Fill in details!



- 1. default templates
- 2. Add new record
- 3. Raster ISO19139
- 4. Fill in details!



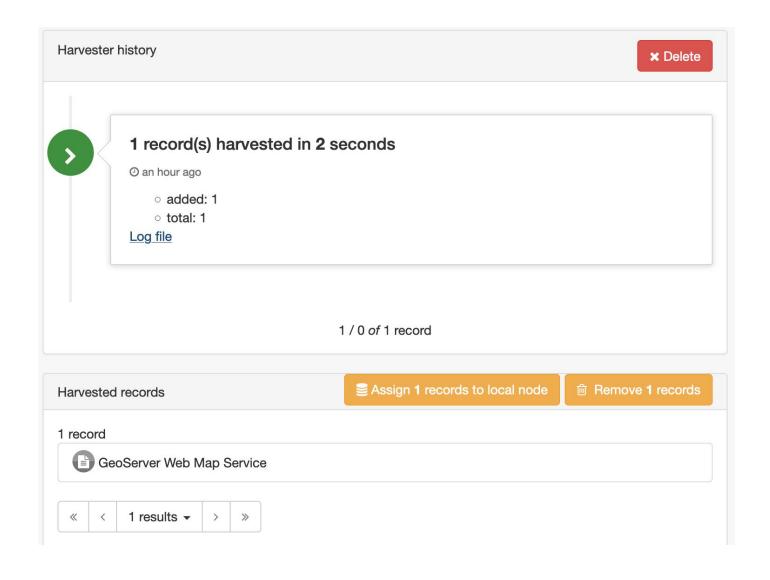
Harvest from a Web Service



- 1. Harvest from WMS
- 2. Run once



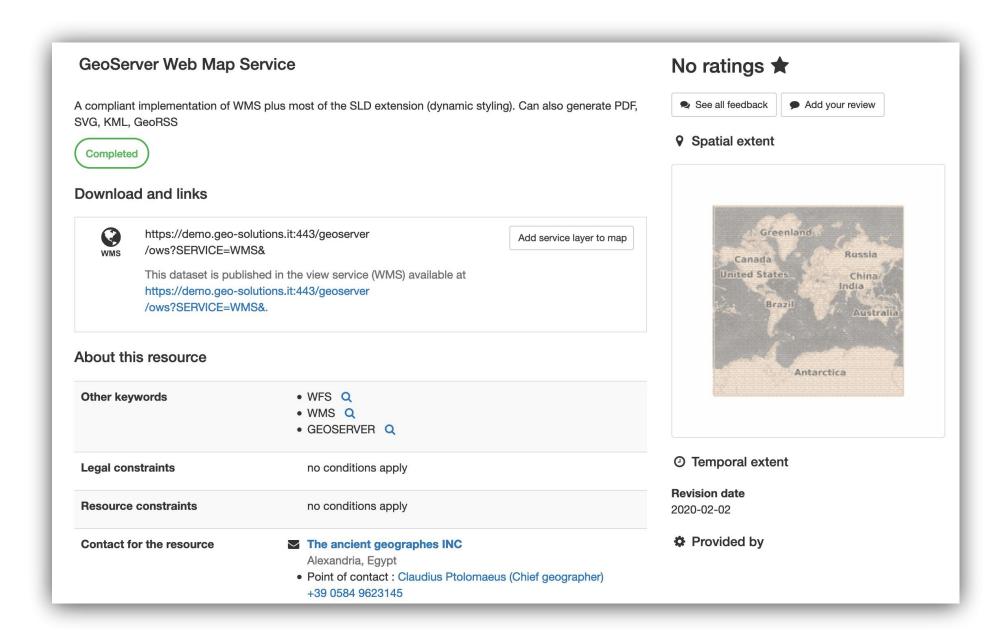
Harvest from a Web Service



- 1. Harvest from WMS
- 2. Run once
- 3. Harvest Results



Harvest from a Web Service



- 1. Harvest from WMS
- 2. Run once
- 3. Harvest Results
- 4. Review Record



Technical Approach

How does it work?



geonetwork-opensource.org



OSGeo

News | Documentation | Download | Community | Gallery | Search

Open all the

things!

Developer Friendly

API

GeoNetwork implements the following protocols:

- OGC CSW
- OAI-PMH
- OpenSearch
- Z39.50

and also provides its own API to interact with other systems and a DCAT/RDF search service.

Customise & extend

With version 3, you can easily customise the appearance of your GeoNetwork using Bootstrap themes.

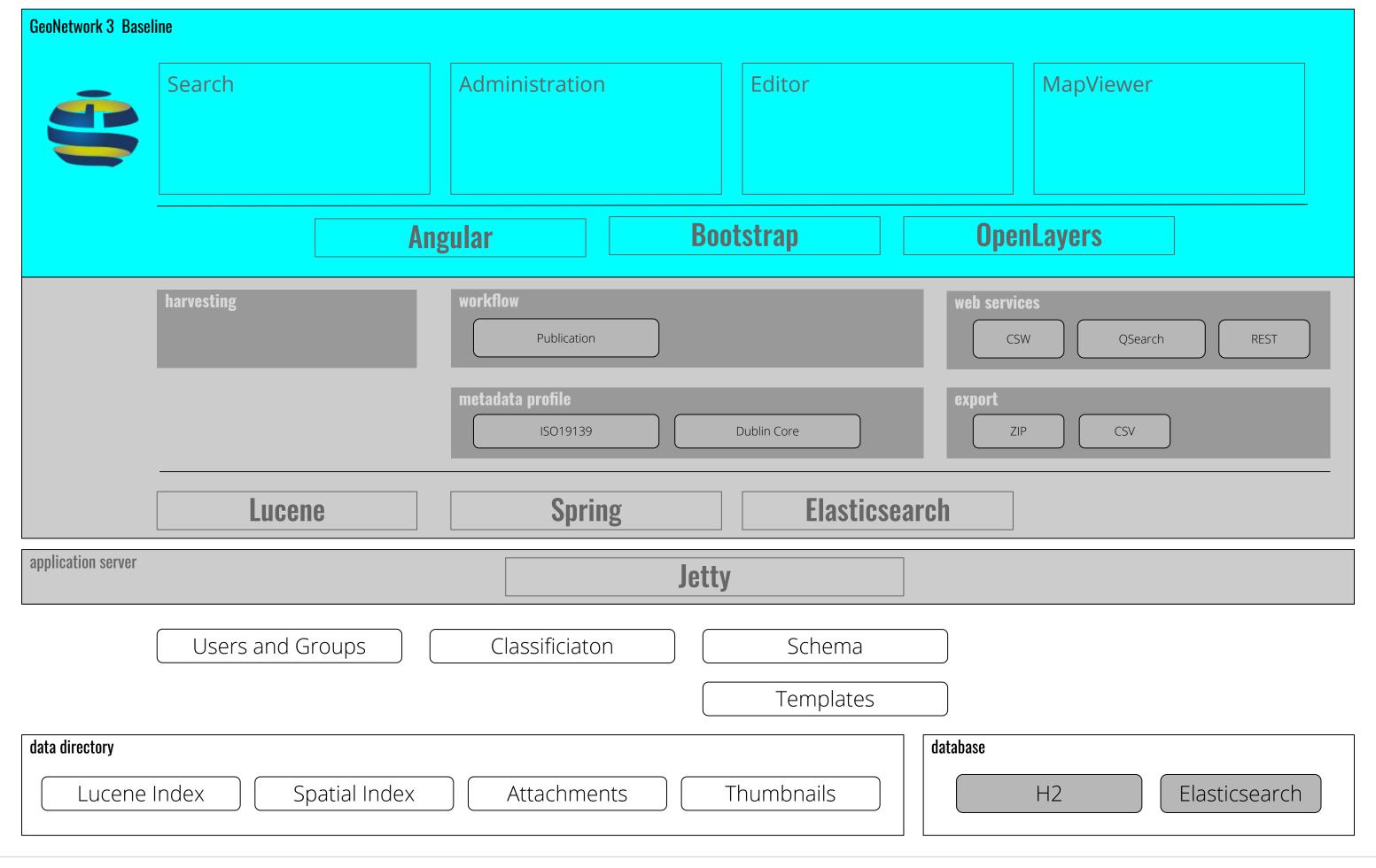
GeoNetwork provides a plugin mechanism for creating your own metadata schema (eg. ISO19115-3 plugin).

OpenSource & standards

GeoNetwork has been developed to connect spatial information communities and their data using a modern architecture, which is at the same time powerful and low cost, based on the principles of Free and Open Source Software (FOSS) and International and Open Standards for services and protocols (a.o. from ISO/TC211 and OGC).

Extend and customize







Technology Takeaways

Well structured java application

- Clear architecture boundaries
- popular spring framework

Can see evidence of maturity

- Investment in the codebase
- Lucene → Elasticsearch

Strong architecture boundaries:

- Ability to swap out databases (example: PostGIS)
- Ability to swap data directory (example: S3 buckets)



Heavy use of XML technologies

- "As expected" for validation
 - XML Schema Definition to define structure for each standard
 - Schematron rules used to capture interactions between document elements
- Plug-ins for each standard
 - "Metadata 101" repo for the XSD (attempt to be vendor-neutral)

```
<!-- Title is truncated if longer than maxLength. -->
  <xsl:variable name="maxLength" select="'40""/>
  <xsl:variable name="ltitle">
   <xsl:call-template name="escapeString">
    <xsl:with-param name="expr">
     <xsl:choose>
      <xsl:when test="string-length($metadata/title) &gt; $maxLength">
        <xsl:value-of
         select=
"concat(substring(normalize-space($metadata/title), 1, $maxLength), ' ...')"
      </xsl:when>
      <xsl:otherwise>
        <xsl:value-of select="normalize-space($metadata/title)"/>
      </xsl:otherwise>
     </xsl:choose>
    </xsl:with-param>
   </xsl:call-template>
  </xsl:variable>
```



Expert use of XML technologies

- "Oh wow you went there"
 - XSLT is used to process documents into other forms
- Typical use
 - Process a record into HTML page
 - Process a record into a PDF
- Unexpectedly cool use
 - Dynamically make the HTML editor!

XML that makes

XML is the

happiest XML



Who makes it



geonetwork-opensource.org





News | Documentation | Download | Community | Gallery | Search

More than a license

Community and OSGeo

The GeoNetwork community has been expanding quickly over the last years. The current release has been possible because of all those that contributed to the project through code contributions, testing, bug reports and fixes as well as many suggestions.

GeoNetwork is part of the Open Source Geospatial Foundation (OSGeo, http://www.osgeo.org) software stack, providing software you can trust tobe free, open and sustainable. Voluntary support is provided through mailing lists, websites and online forums.

More: Community

Good to see multiple vendors

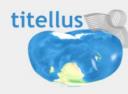
Professional Support

Several companies also provide commercial support to help organizations to implement, integrate and maintain the software. You can find them in the Service Provider directory on the OSGeo website.

Acknowledgements





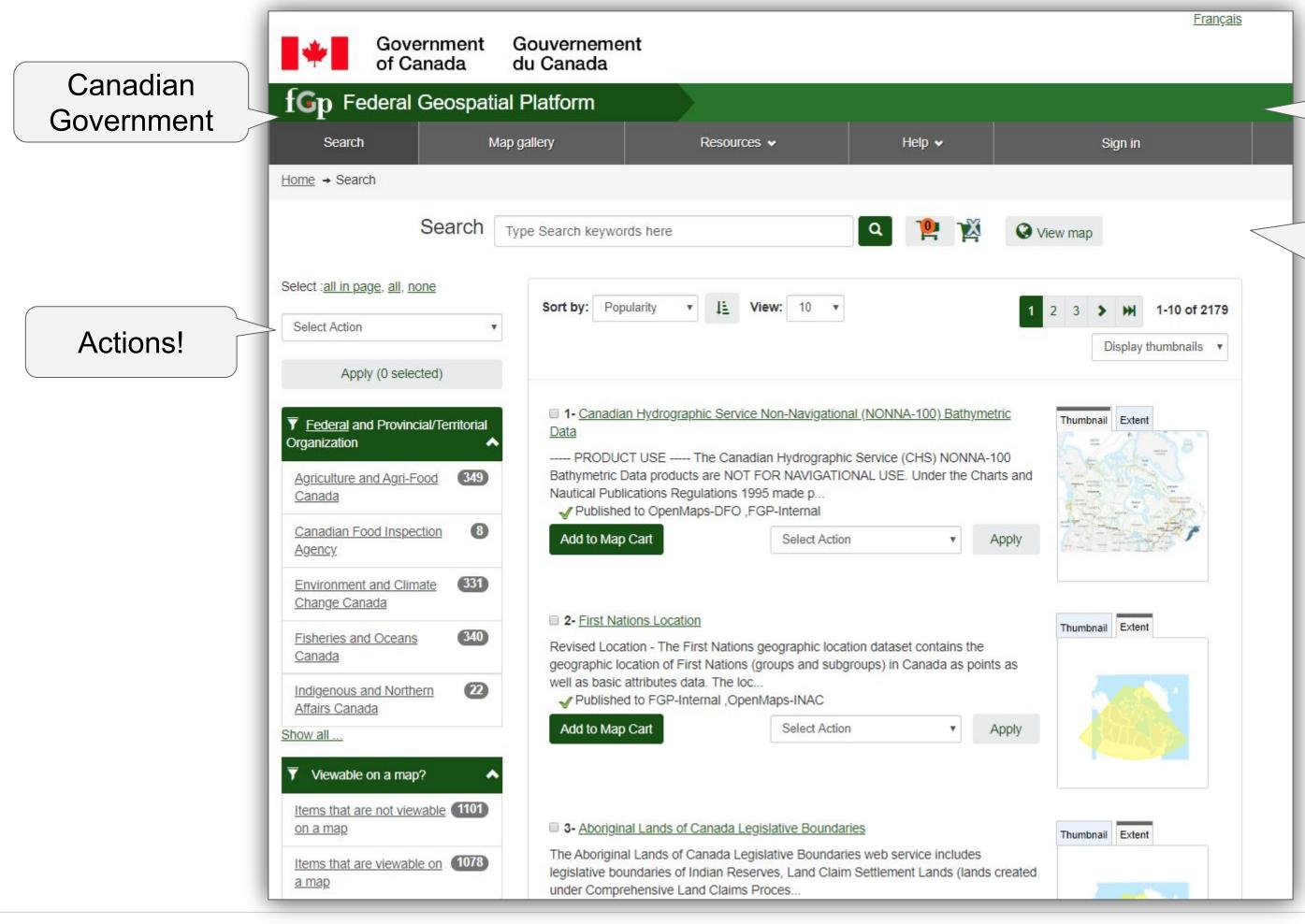


Organization based



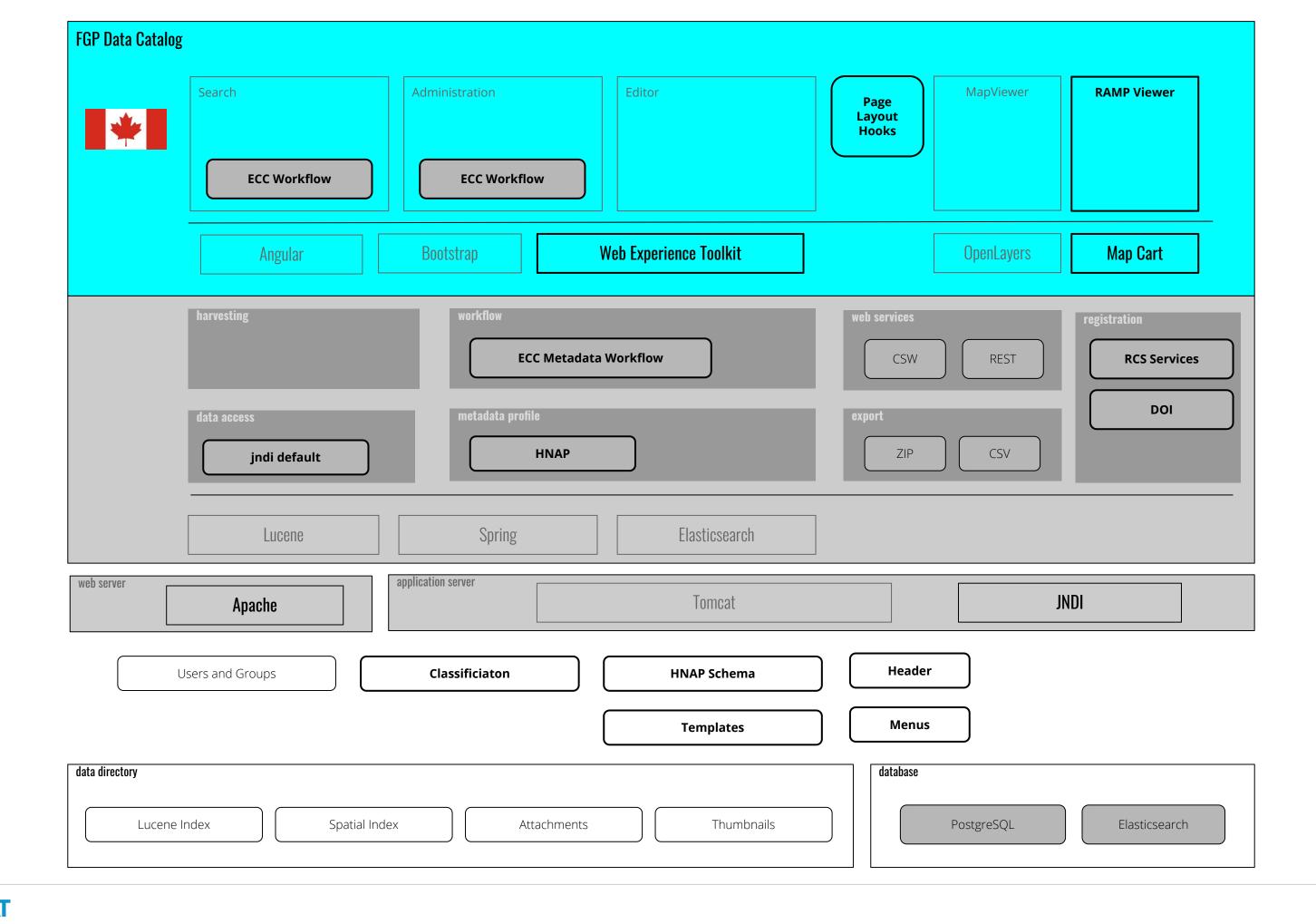
GeoNetwork in the Wild





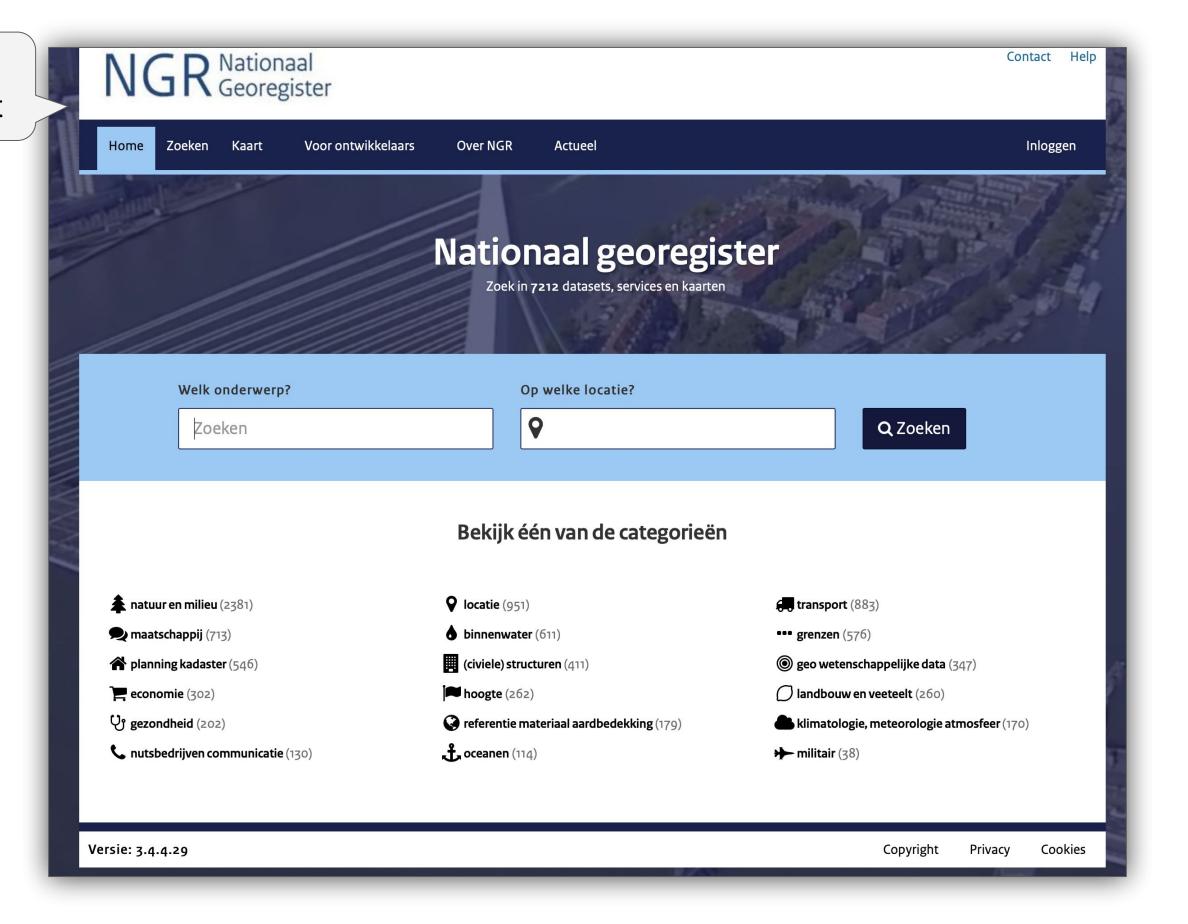
Multilingual user interface

They added a shopping cart for data!





Dutch Government





United Nations





Thank you!

