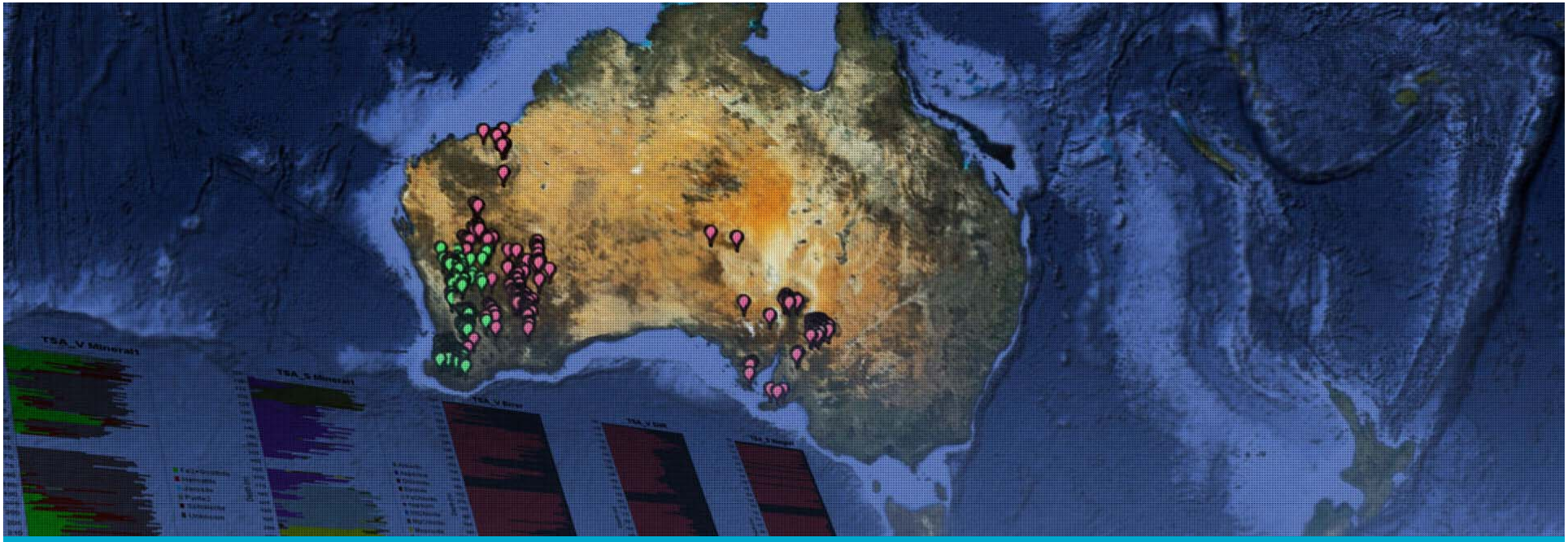


The framework under the hood

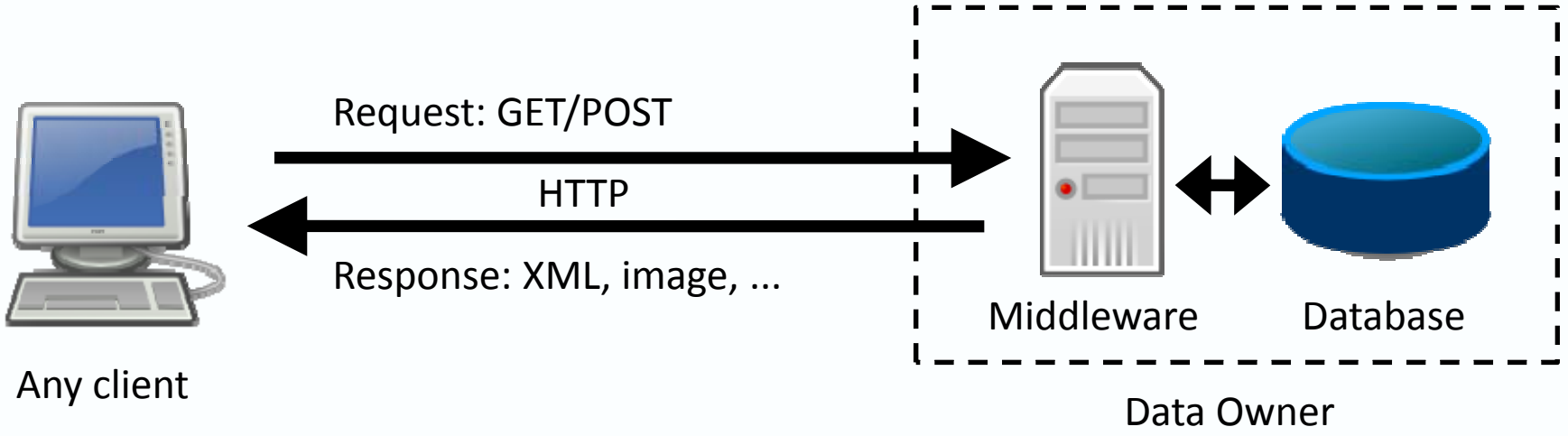
Web services and SISS

Originally produced by Pavel Golodoniuc | Computer scientist, CSIRO

Web services:
Why use them & how they work

Web services

Motivation



- **Interoperability**
  - Not tied to one data format or SQL dialect
- Avoid copying whole database
- Always up-to-date
- Select only subset of data you want

Spatial information standards

- Open Geospatial Consortium (OGC)
  - Open standards for spatial information
- Geography Markup Language (GML)
  - XML schema with support for spatial information
  - **Extensible** to create community-agreed **information models**
- Web Feature Service (WFS)
  - Retrieve **data** as **GML**
- Web Map Service (WMS)
  - Server-side **rendering** of data into **images**
- Many more:
  - Web Coverage Service (WCS), Web Processing Service (WPS), etc.
- **Interoperability**

Terminology

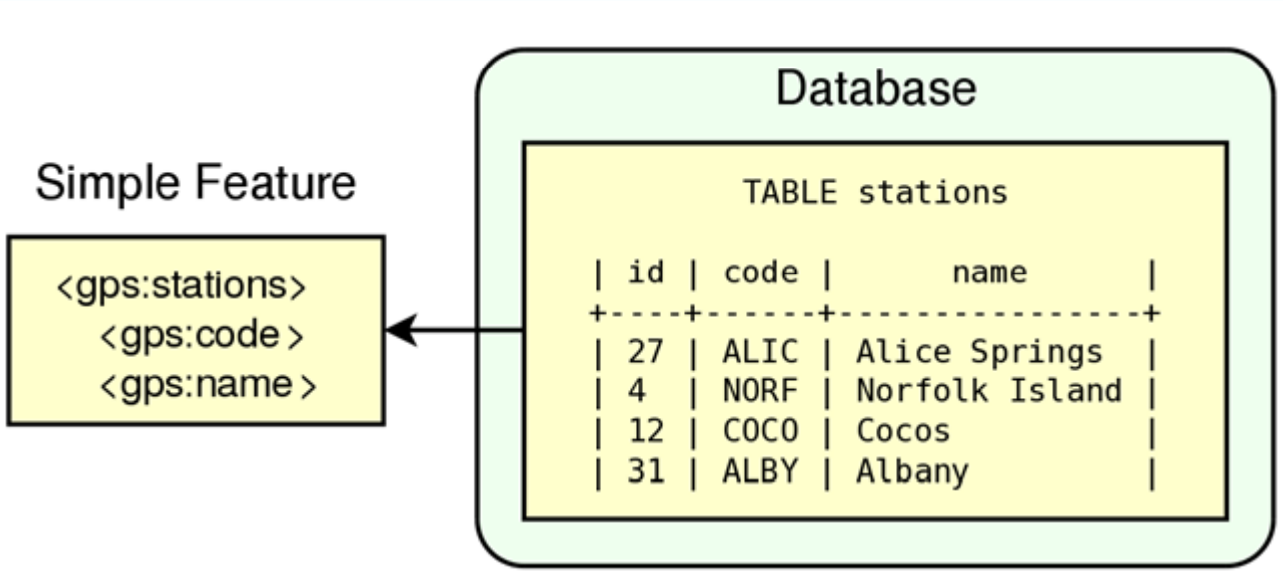
What is a feature?

- **Feature – fundamental unit of geospatial information**
- Something that can be drawn on a map
  - Not strictly true as not all features have a geometry
- Features have **identity**
- Features have **properties**

Simple features

OGC Simple Features Level 0

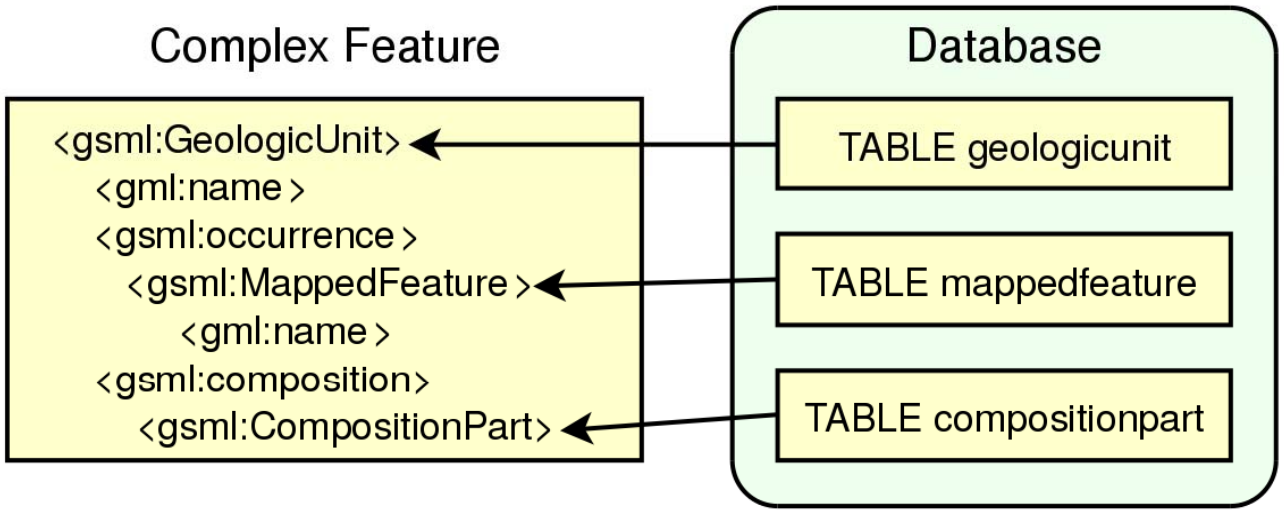
- Properties are only unstructured data (or geometries)
- “Flat” representation of table
- Cannot represent object relationships



Complex features

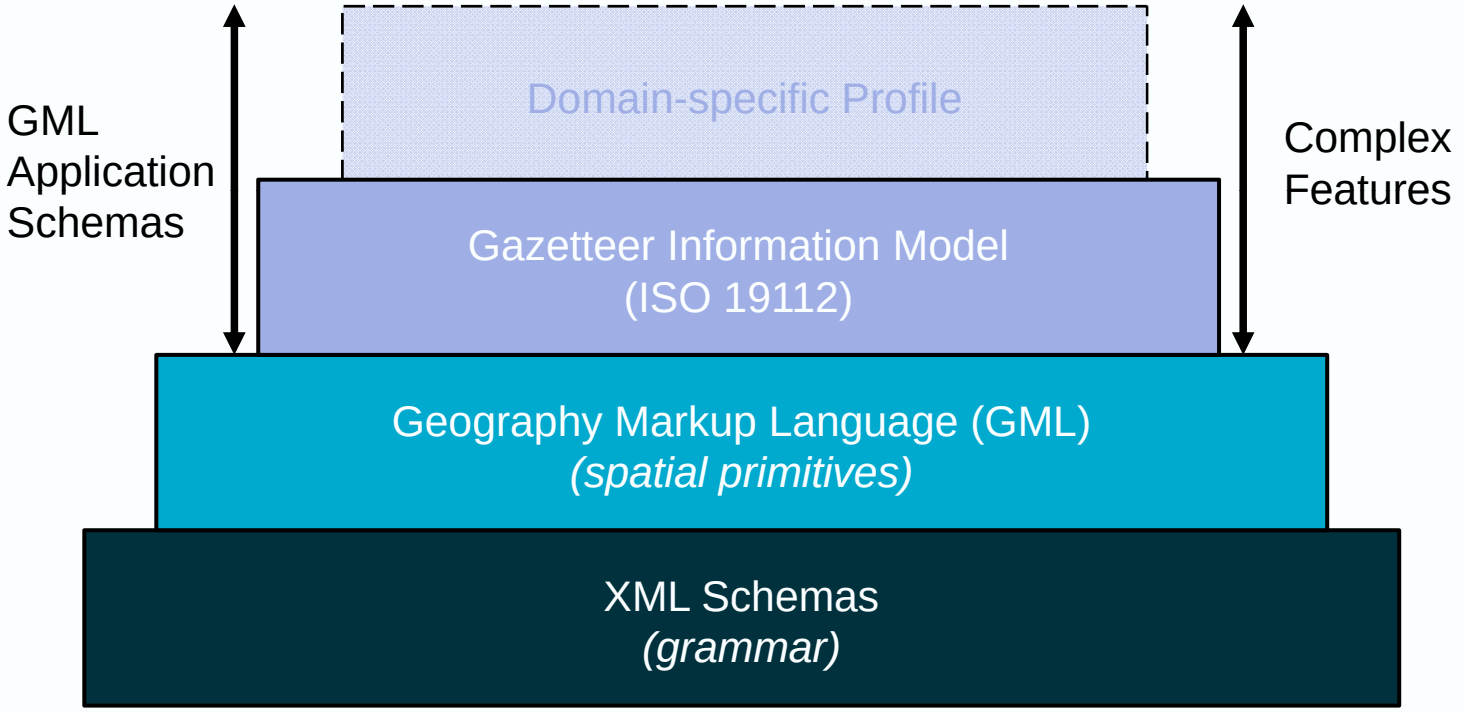
OGC Simple Features Level 1

- Properties can be features or structured types
- Can represent relationships between features
- Support **queries** based on feature **relationships**
- Support object-based information model



Community-agreed information models

GML Application Schemas



OGC spatial web services

Examples:

- Web Feature Service (WFS)
- Web Map Service (WMS)

Spatial filters

- Select features in a bounding box (BBOX)
- Intersects, contains, etc.

OGC spatial web services

Reprojection

- Conversion of geometries between Spatial Reference Systems
- Client selects Spatial Reference System in request
- World Geodetic System 1984 (WGS84)
  - Used for GPS, OpenLayers
  - EPSG:4326
- Geocentric Datum of Australia 1994 (GDA94)
  - Australian standard
  - EPSG:4283
- Datum Geodesi Nasional 1995 (DGN95)
  - Indonesian onshore and offshore geodetic datum
  - EPSG:4755

Web Feature Service

Provides access to underlying data

Query subset of features based on properties

- GetCapabilities
  - Available feature types
- GetFeature
  - Get the **features** of a given type matching a **filter**
- DescribeFeatureType
  - Get an **XML schema** for a feature type

Web Map Service

- Portrayal service
- Renders one or more feature types (layers) as an image
  - GIF, JPEG, PNG, KML/KMZ, ...
- Select subset of features based on properties

- GetCapabilities
  - Available feature types (layers)
- GetMap
  - **Render features** in a bounding box as an **image**
- GetFeatureInfo
  - Information about **features** used to render **one pixel** in an image
- GetLegendGraphic

OGC web service implementations

Servers

- **GeoServer** (WFS, WMS)
- deegree (WFS, WMS)
- Mapserver (WMS)
- ArcGIS Server (WMS)
- Oracle Mapviewer (WMS)
- Snowflake GO Publisher (WFS)
- etc.

OGC web service implementations

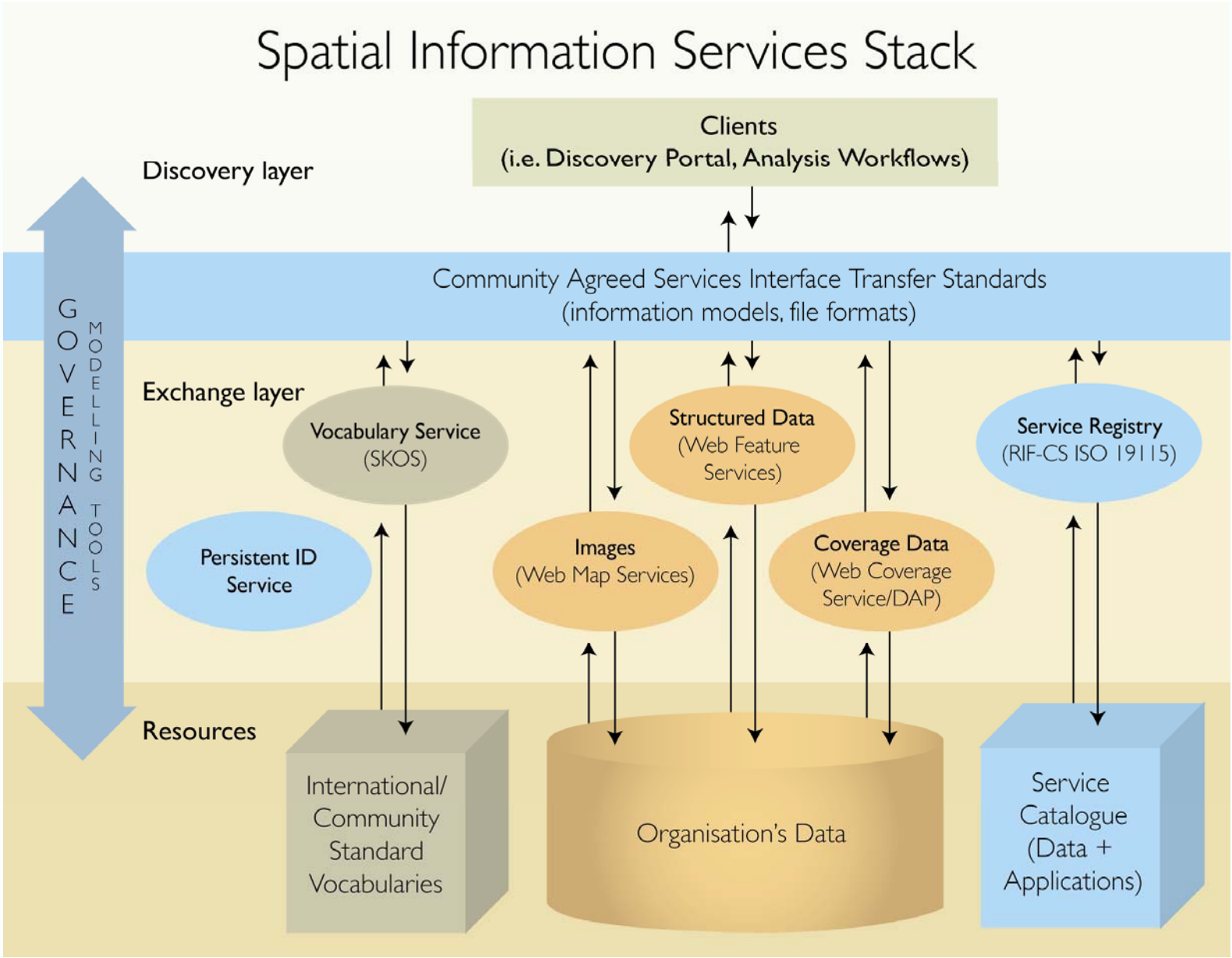
Clients

- uDig
- **OpenLayers**
- ArcGIS
- Google Earth
- Gaia (The Carbon Project)
- qGIS (Quantum GIS)
- Many, many more. OGC Web Services are very easy to consume:
  - Embed WMS URLs in HTML with IMG, consume WFS with JavaScript

GeoServer

- Java servlet (runs in Tomcat, Jetty, JBoss, etc.)
- Open Source (GPLv2, in OSGeo incubation)
- Built on GeoTools (LGPLv2, OSGeo project)
- Large international user and developer communities
- WFS, WMS, WCS
  - Reference implementation for WFS 1.1
- PostGIS, Oracle, ArcSDE, MS SQL, ESRI Shapefiles, etc.
- Core GeoServer supports only simple features
  - Web user interface for simple features only
- **app-schema plugin supports complex features**
  - Hand-edited XML configuration files

What is SISS:
Spatial Information Services Stack


Spatial Information Services Stack
Clients
(i.e. Discovery Portal, Analysis Workflows)
Discovery layer
Community Agreed Services Interface Transfer Standards
(information models, file formats)
GOVERNANCE
MODELLING TOOLS
Exchange layer
Vocabulary Service
(SKOS)
Structured Data
(Web Feature
Services)
Service Registry
(RIF-CS ISO 19115)
Persistent ID
Service
Images
(Web Map Services)
Coverage Data
(Web Coverage
Service/DAP)
Resources
International/
Community
Standard
Vocabularies
Organisation's Data
Service
Catalogue
(Data +
Applications)

Summary

- Spatial information standards
  - Open Geospatial Consortium
    - GML, WFS, WMS, SLD
  - Many server and client implementations
  - GML application schemas: community-agreed information models
  - **Interoperability**

- SISS
  - Web Feature Service for interoperable data sharing
  - Web Map Service for rendering maps from your data
  - Registry service for dissemination of data
  - Ontologies, persistent identifier services and others...
  - Tools to assist in implementation of spatial data infrastructures

Thank you

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