



Introduction to SDI technological components

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Acknowledgements to Danny
Vandenbroucke



Outline

1. Introduction to SDI technological components
2. What is interoperability and how to measure it
 - The importance of interoperability
 - Technical and semantic interoperability
3. Standards
 - The standardisation process: role of OGC and ISO
 - Overview of the relevant geo-standards



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2. What is interoperability and how to measure it

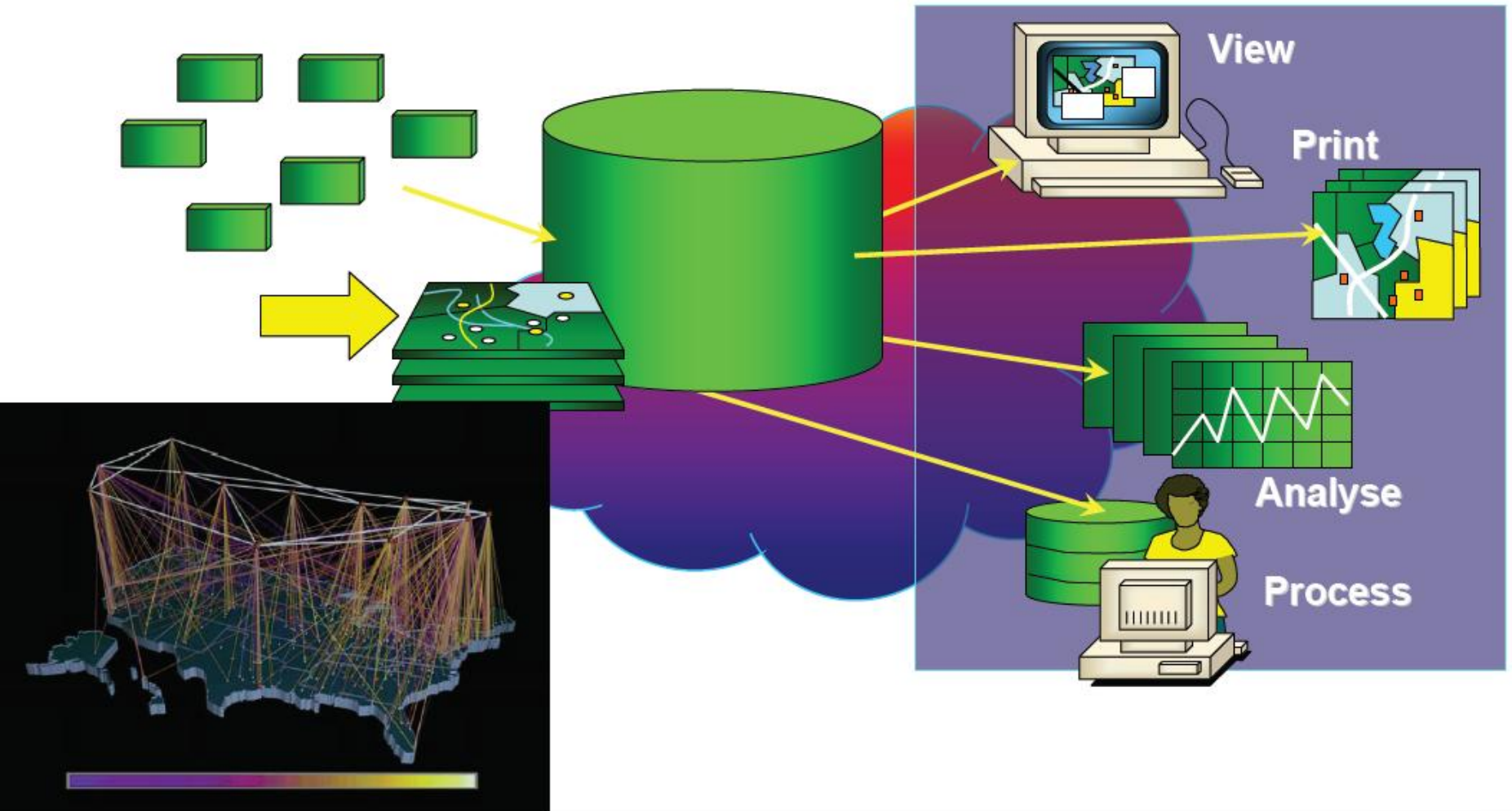
- The importance of interoperability
- Technical and semantic interoperability

3. Standards

- The standardisation process: role of OGC and ISO
- Overview of the relevant geo-standards



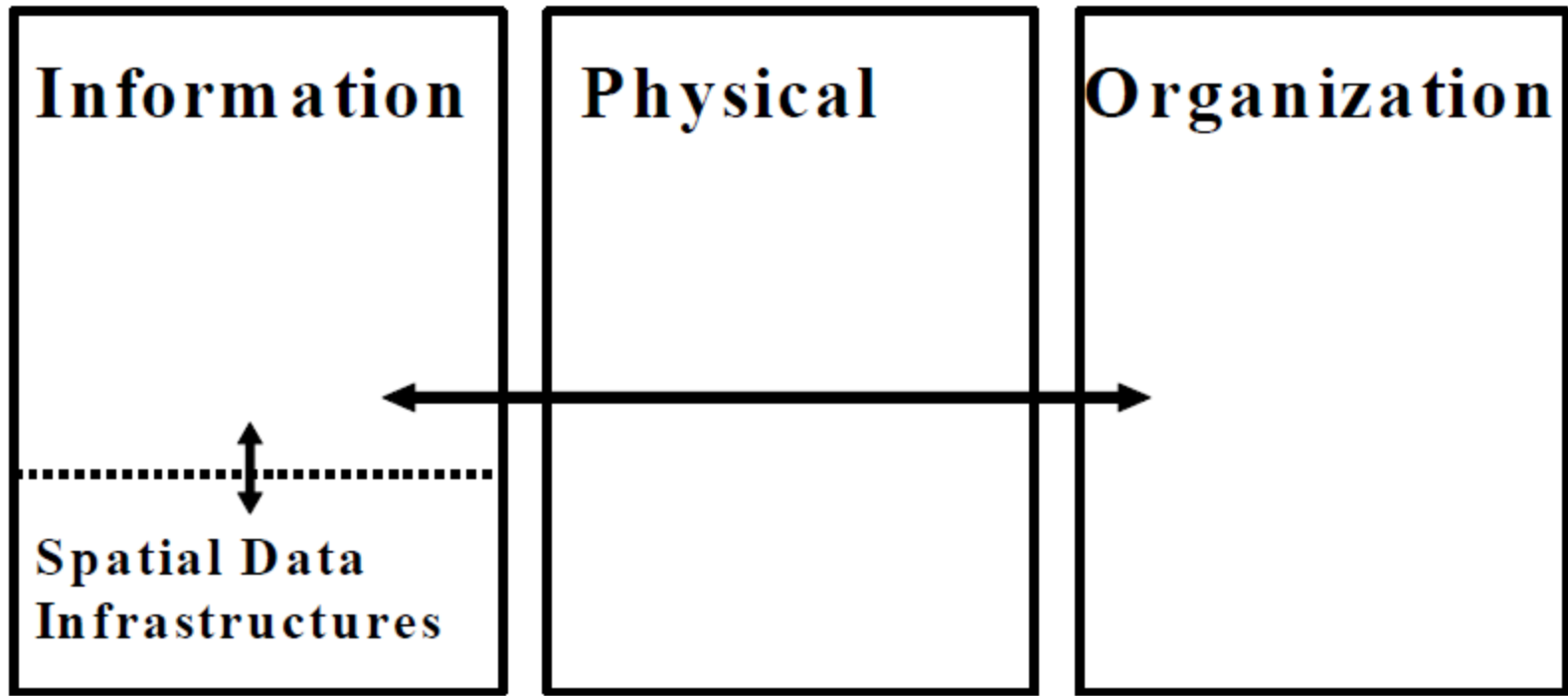
Data / Information infrastructures





Data / Information infrastructures

Infrastructures





The 5 components of every SDI

- Judicial and organisational framework
- Reference- and thematic datasets kept in data repositories/warehouses
- Meta-data about geodatasets
- Access services to metadata, data and other services
- Technical standards applicable to (2), (3) en (4)



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Interoperability

- In order for the components of an Information System to talk to each other:
 - Need for interoperability

"Interoperability is the ability of disparate and diverse organisations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge between the organizations via the business processes they support, by means of the exchange of data between their respective information and communication technology (ICT) systems." (EIF 2.0)



Interoperability

- Interoperability is not Integration, which is a means of changing loosely coupled systems to make them into more tightly coupled systems.
- Interoperability is not Compatibility, which is more about the interchangeability of tools in a particular context
- Interoperability is not Adaptability, which is a means of changing a tool, adding additional capabilities as needed even on an ad-hoc basis, whereas interoperability refers to inherent capabilities



Interoperability

Cooperating partners having compatible visions, and focusing on the same things.

Political Context

The appropriate synchronization of the legislation in the cooperating MS so that electronic data originating in any given MS is accorded to proper legal weight and recognition wherever it needs to be used in other MS.

Legal Interoperability

Legislative Alignment

The processes by which different organisations such as different public administrations collaborate to achieve their mutually beneficial, mutually agreed eGovernment service-related goals.

Organisational Interoperability

Organisation and Process Alignment

Ensuring that the precise meaning of exchanged information (concept, organisation, services, etc) is preserved and well-understood

Semantic Interoperability

Semantic Alignment

The technical issues involved in linking computer systems and services (open interfaces, interconnection services, data integration, middleware, data presentation and exchange, accessibility and security services, ...)

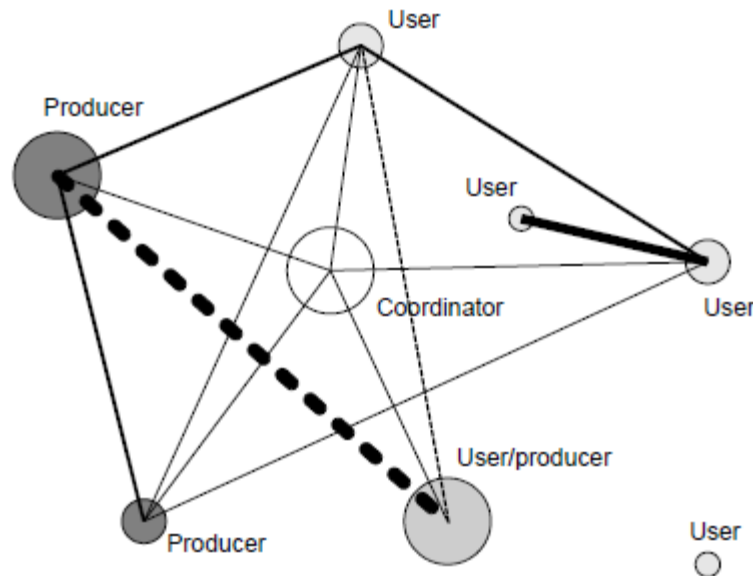
Technical Interoperability

Syntax, Interaction & Transport



Interoperability

- Technical interoperability
 - should guarantee that system components can interoperate
- Semantic interoperability
 - should guarantee that data content is understood by all in the same way





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Standards

- Definition (ISO)
 - Documented agreements containing technical specifications or other precise criteria to be used consistently as **rules, guidelines, or definitions of characteristics**, to ensure that materials, products, processes and services are fit for their purpose
- Several initiatives related to SDI
 - World Wide Web Consortium – W3C
 - Comité européen de Normalisation – CEN
 - International Standards Organisation – ISO
 - Open Geospatial Consortium - OGC



Standards – diverse and complex

- Standards: de facto or de jure
 - De facto:
 - e.g. SQL, SHP, KML
 - OpenGeospatial Consortium: www.opengis.org
 - De jure
 - ISO/TC 211: www.isotc211.org/scope.htm
 - CEN/TC 287 (Europe), FGDC (USA)
 - Dublin core metadata standard
- Standards: semantic and technical
 - Semantic: content
 - Technical: system



- Open Geospatial Consortium, founded 1994
- 385+ members worldwide
 - Australia and Asia: 42 (june 2008)
 - E.g. Google, Microsoft, Shell, NASA, ESRI, ...
- 25 standards adopted (june 2008), 4 became ISO standards
 - E.g. KML was adopted in 2008; CityGML in 2007
- Process
 - OGC Request for Comments (ORC)
 - Interoperability Program (IP) through hands on
 - Specification Program (SP) through working groups



Areas of Interest

- [Learn About OGC](#)
- [Membership Benefits](#)
- [Endorsements](#)
- [Join OGC](#)
- [OGC Standards](#)
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OWS Demonstrations

Watch the OWS-6 Interactive

Welcome to the OGC Website

The Open Geospatial Consortium, Inc.® (OGC) is a non-profit, international, voluntary consensus standards organization that is leading the development of standards for geospatial and location based services.

Recent News

- » [The OGC Announces Call for Participation in OWS-7 Testbed](#)
- » [OGC Joins World Standards Day, "Tackling climate change through standards"](#)
- » [GEOSS Interoperability Pilot Completed with OGC Leadership](#)
- » [OGC's CTO, Carl Reed, Inducted into URISA Hall of Fame](#)
- » [More...](#)



Upcoming Events

- » [Spatial Ontology Community of Practice Workshop](#)
- » [European Agencies Announce Workshop on Use of OGC Standards in Meteorology](#)
- » [More...](#)



Current Requests and Initiatives

- » [The OGC Announces Call for Participation in OWS-7 Testbed](#)
- » [OGC Calls for Industry Input on Geospatial Fusion](#)
- » [OGC Issues RFQ and Call for Participation in NGA "Plug Week" Pilot](#)
- » [OGC Calls for Comment on revision to OGC Web Services Common Standard](#)
- » [More...](#)



[Printer Friendly](#)

Updated: 2009-11-19 10:47:14 EST

Next OGC TC/PC Meetings

December '09 Technical and Planning Committee Meetings

Standards

- [OGC Reference Model \(ORM\)](#)
- [OGC Axis Order Policy](#)
- [Catalog Service \(CAT\)](#)
- [GML in JPEG 2000](#)
- [Filter Encoding](#)
- [Geography Markup Language \(GML\)](#)
- [OGC KML \(KML\)](#)
- [Sensor Model Language \(SensorML\)](#)
- [Sensor Planning Service \(SPS\)](#)
- [Styled Layer Descriptor \(SLD\)](#)
- [Symbology Encoding \(Symbol\)](#)
- [Transducer Markup Language \(TML\)](#)
- [Web Coverage Service \(WCS\)](#)
- [Web Feature Service \(WFS\)](#)
- [Web Map Context \(WMC\)](#)
- [Web Map Service \(WMS\)](#)
- [Web Service Common \(WSC\)](#)
- [More...](#)

New Members

- [LBS PLUS Co., Ltd.](#)
- [GeoEye, Inc.](#)
- [COMSOFT GmbH](#)
- [Avitech AG](#)



ISO/TC 211

- International Standardisation Organisation
- ISO/TC 211 – Technical Committee on Geomatics
- There are 32 participating members and 31 observing members
 - E.g. Norway, Belgium, Japan, Malaysia
- 44 standards published
- Process
 - Documents are worked out / working groups
 - Voting procedure



ISO



ISO/TC 211 Geographic information/Geomatics

[Internal Home](#)

- About ISO/TC 211
- Organization
- Programme of work
- Models
- Terms
- Presentations and articles
- FAQ
- Education and training
- Adoption and implementation
- User requirements and feedback
- Events
- Useful links
- Newsletters
- About AJMenu

Updated: 2009-11-19

Note: The link to "Models" is broken, please go directly to <http://www.isotc211.org/hmmg/HTML/root.html>

Meetings

Resolutions NEW
from the 29th plenary in Quebec City, Canada, 2009-11-05/06

Workshops NEW
in Quebec City, Canada, 2009-11-04

Next meeting week
Southampton, United Kingdom
2010-05-24/28

Order of St. Olav to Mr. Østensen NEW

ISO/TC 211 Standards Guide

CEN/TC 287

Special cooperation with **CEN/TC 287** with parallel work on several projects.

Latest publications

NEW **ISO 19126:2009 - Geographic information - Feature concept dictionaries and registers**

ISO 19111-2:2009 - Geographic information - Spatial referencing by coordinates - Part 2: Extension for parametric values

ISO 19144-1:2009 - Geographic information - Classification systems - Part 1: Classification system structure

UPDATED with Russian:
Multi-Lingual Glossary of Terms

Programme Maintenance Group

Special topics

Climate Change

Special items

Survey on using standards in education

The goal of the survey is to make an inventory of education given with GI standards and that it not take more than 5 to 10 minutes of your time.

[Click here to take the survey](#)

[Results of the survey on using standards in education.](#)

NEW **Wiki site on materials for trainers on geo-standards**

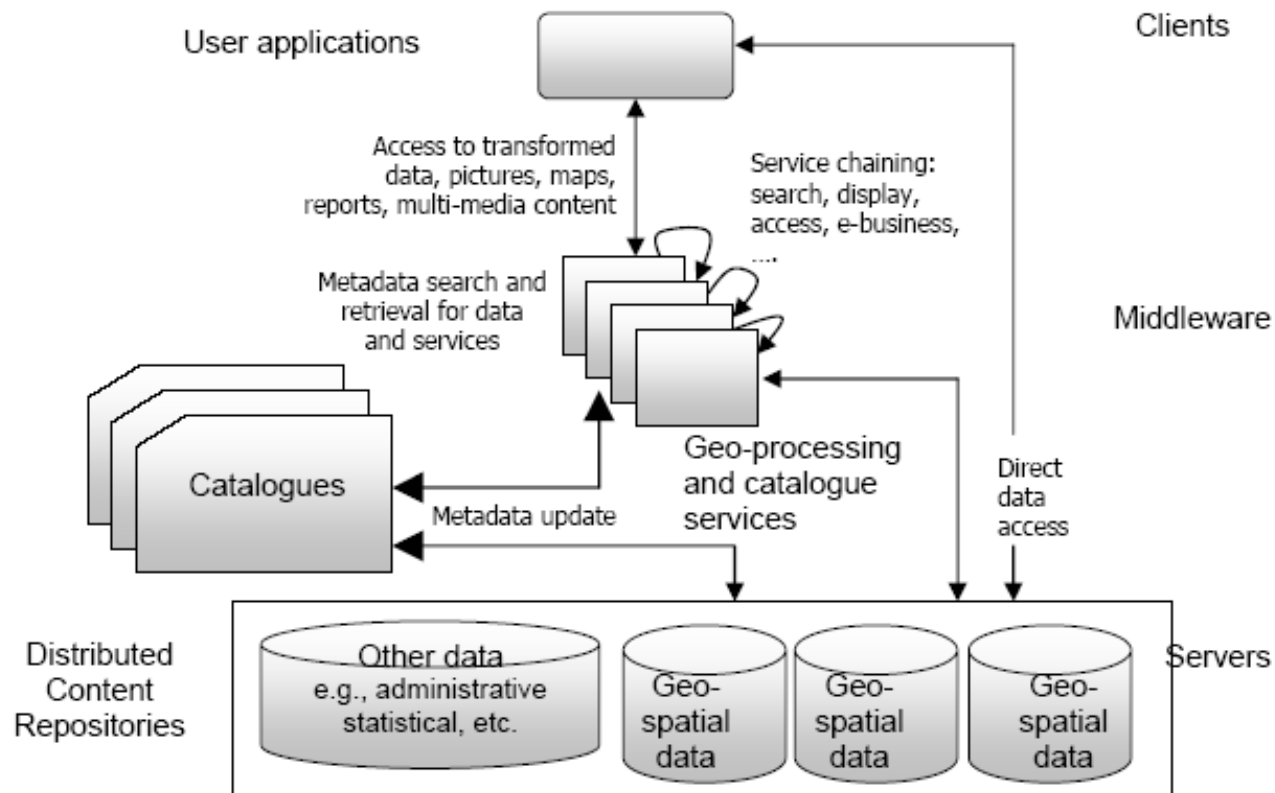
Events

We would like to **register meetings and conferences** of interest to the

 Norwegian mapping authority
Webmaster:
gend.mandal@statkart.no
SOSI-secretariat

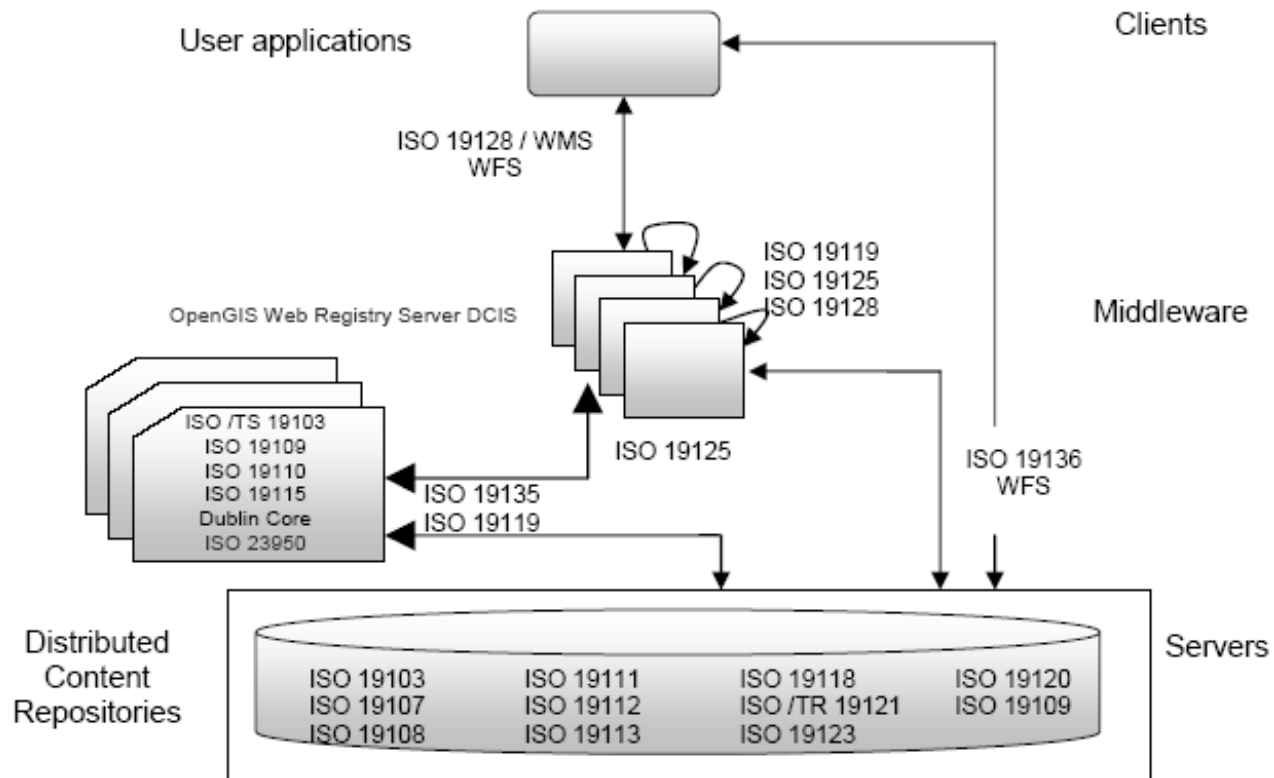


SDI architecture





SDI Architecture and standards





ISO-Standards for Metadata in SDI

- Published in catalogues
- For discovery, evaluation (exploration) and use (exploitation)
- Standards
 - ISO 19115:2003 – Geographic information metadata
 - ISO 19119:2005 – Geographic information services
 - ISO 19139 – Geographic information – metadata – implementation specification (XML schema)
 - CSW 2.0



ISO-Standards for Data in SDI

- Focus on data specifications and data models
- Is more than exchange format
 - GML for exchanging geographic data
- Standards and specifications related geographic objects
 - ISO 19101:2002 (reference model) & ISO 19103 (conceptual schema language) – conceptual model
 - ISO 19107 (spatial schema), ISO 19108 (temporal schema), ISO 19109 (rules for application schema), ISO 19110 (feature catalogues), ...
 - ISO 19123 (schema for coverage geometry & functions)
 - ISO standards for geo-referencing
 - ...



ISO and other Standards for Services in SDI

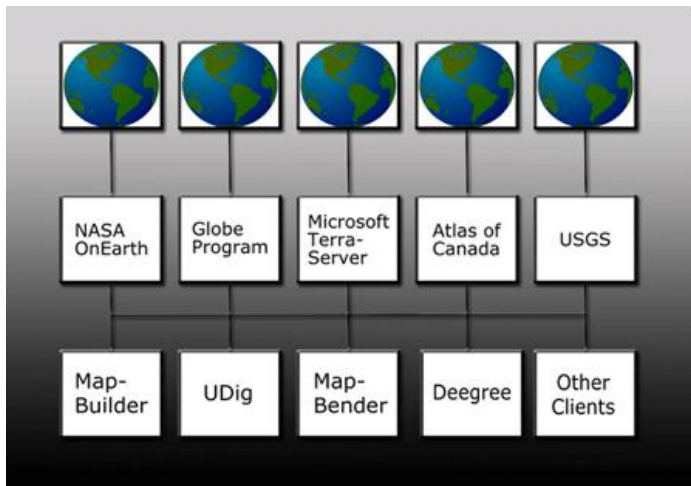
- Service Oriented Architecture (SOA) (wikipedia 6/2011)
 - SOA is a flexible set of design principles used during the phases of systems development and integration in computing. A system based on a SOA will package functionality as a suite of interoperable services that can be used within multiple, separate systems from several business domains
- Defining the way GI is represented to the user
 - ISO 19117 – Geographic information - Portrayal
 - Styled Layer Descriptor (SLD)
 - Encoding mechanisms (e.g. GML, GeoTIFF, SVG, ...)
- OGC standards (some of them ISO too)
 - Web mapping Service (WMS), Web Feature Service (WFS), Web Coverage Service (WCS)
 - Web Coordinate Transformation Service, ...



OGC Standards

Open Geospatial Consortium

- Solve the issue of spatial data sharing and interoperability



- Sets the standards that allow geographic systems to interoperate



Summary

- Interoperability is key to make distributed systems and data operate with each other
- Standards will make this work
 - Technical – make system components recognise each other and interact
 - Semantics – make understanding of data (content) unambiguous
- Two initiatives play a major role
 - Open Geospatial Consortium (OGC) – companies, academia, ...
 - International Standardisation Organisation (ISO/TC 211) – member countries



References

- <http://www.inspire-geoportal.eu/>
- <http://www.opengeospatial.org/>
- <http://www.iso.org/iso/home.htm>
- <http://www.ideo.es>
- <http://www.geoportail.fr/>
- <http://www.geonorge.no/Portal/ptk>
- <http://www.isotc211.org/>