



Co-ordination committee seminar of the national focal points

# Basic Principles of MedWIS - WISE interoperability

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# Agenda



- **WISE vs MedWIS**
  - WISE
  - WISE DS
  - WISE vs WISE DS
  - MedWIS
  - WISE / WISE DS vs MedWIS
- **Base of WISE Interoperability**
  - Principles of Interoperability
  - WISE Interoperability
    - The WISE Technical Committee & the GIS Guidance Document
    - Current and future WISE interoperability
- **WISE Interoperability in non WFD countries**
  - Common principles

# WISE System



- Facts about the WISE System

- Acronym: **Water Information System for Europe**
- "**Your Gateway to water**": European database encompassing all water-related data across the continent.
- **Principle**: Information should be collected once and shared with others for many purposes.
- Initial focus centered on mandatory reporting elements associated to WFD implementation. Progressively moving towards a wider approach: EIONET (SOE), INSPIRE, etc.
- It compiles a number of data and information collected at EU level by various institutions or bodies which has either not been available or only been fragmented over many places
- Maintained and developed by the
  - **DG Environment**: strategy, legislation, mandatory reporting obligations
  - **EEA**: water data centre and host the public WISE web page which has as a central feature the section on "themes and data".
  - **JRC**: is responsible for the data synchronisation and has developed a number of useful tools, including the CCM2 database.
  - **Eurostat**: is collecting water statistics and provides significant input in the development of the GIS part of WISE and in particular ensuring the link to INSPIRE
- SEIS Strategy
  - WISE is part of a broader vision towards interoperable Environmental Information Systems (water & non-water)

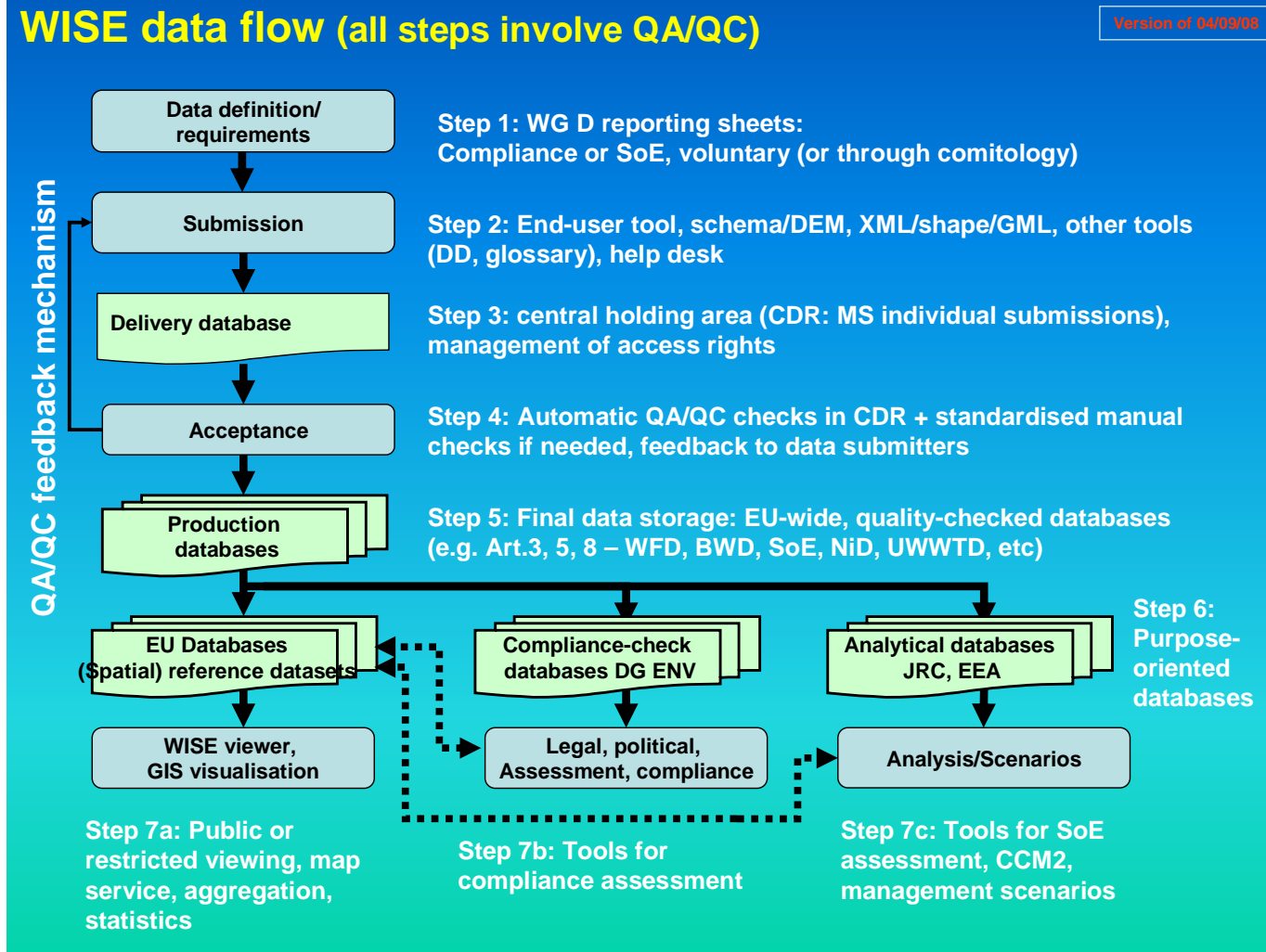


# WISE System



- **Scope of WISE**
  - 2 main WISE data flows:
    - **Reporting obligations** information of the member states of the EU
      - Water Framework Directive Reporting
      - Bathing Water Directive
      - Marine Water Directive
      - Nitrate Directive
      - Urban Waste Water Directive
      - ...
    - **Voluntary reporting** of the member states to the EU to contribute to statistics and general reporting at the EU level
      - WISE SoE (State of the Environment, EIONET)
  - 4 main WISE datasets:
    - **Spatial data submitted by MS according to Directives:**
      - Named by the Directive e.g. "WFD River Basin Districts".
    - **WISE Reference GIS datasets:**
      - Aggregated from MS submissions;
    - **Background GIS datasets:**
      - refer to datasets such as administrative borders of the Member States, coastline, main cities/towns and roads. They provide the background and context for mapping the WISE Reference GIS datasets;
    - **External GIS datasets:**
      - these can be used to support further analysis and the visualisation of the WISE Reference GIS datasets, such as CCM2, Corine Land Cover and EEA European River Catchments.

# WISE System



# WISE DS

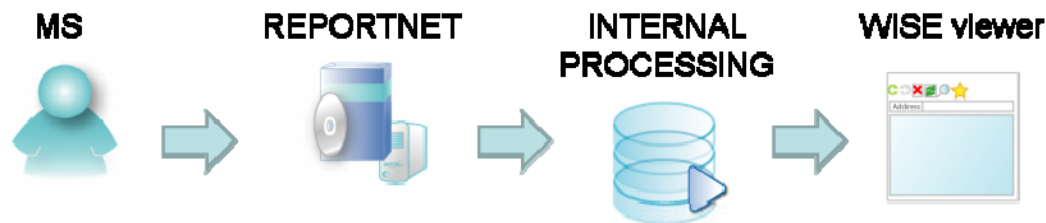


- WISE Distributed System (WISE DS)
  - WISE 2.0
  - Evolution of current WISE System, based on INSPIRE guidelines, and with the aim of developing a real INTEROPERABLE infrastructure in Europe for Water Information.
    - Distributed system: infrastructure existing out of many components which are communicating through a Service Oriented Architecture (SOA).
    - Data is stored in each country (only) and used only when it's needed.
    - Systems are connected and can use the data and capabilities of each other without human intervention.
  - Components of WISE DS
    - Undetermined number of national interoperable systems
    - A central GEOPORTAL to federate all data and capabilities in a single catalog (indexing service)

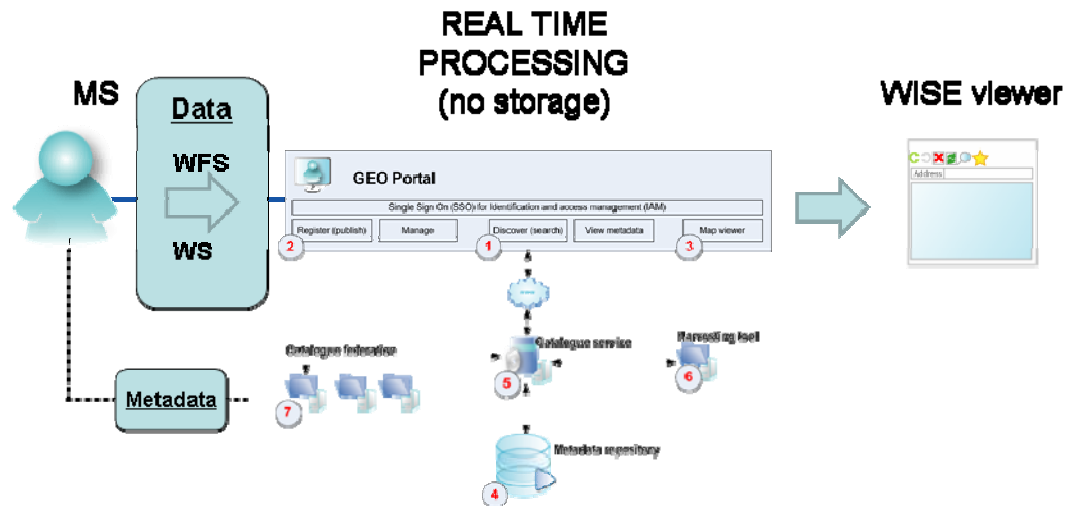
# WISE DS



- Differences between WISE and WISE DS
  - Traditional WISE architecture: information is replicated



- WISE DS Architecture handles processing directly from the source



# WISE DS



- Currently, WISE data exchange is based on compliance of data formats (data transfer): XML schemas based on WFD reporting obligations
  - Data is replicated
  - Data Models are not consistent across countries: even if XML are compliant there is room for ambiguity.
  - No real time integration: XML are typically uploaded only twice a year
  - Time consuming and not very effective but easy to implement at NWIS level
- In the future, WISE DS interoperability will mean direct, real time integration of systems (semantic & network integration):
  - No need for a centralized repository for all data (only aggregated)
  - Data will be accessed where it is produced when it is needed
  - Much more robust and integrated system
  - This interoperability is being defined collectively and together with INSPIRE
  - The requirements towards national systems are much more strict and complex though



# MedWIS System



- Definition of MedWIS
  - Acronym: **M**editerranean **W**ater **I**nformation **S**ystem
  - Regional system that federates shared data between Med Countries.
- Need for NWIS
  - **Knowledge is a prerequisite to action**, but knowledge about fresh water resources and their uses, co-ordinated between all the Mediterranean countries, is currently insufficient especially on groundwater, abstractions and water quality.
  - A regional Water Information System:
    - Would improve and harmonize information exchange and sharing within participating countries
    - Will have a direct impact on the quality, availability and flow of information from participating countries to EMWIS



# MedWIS System

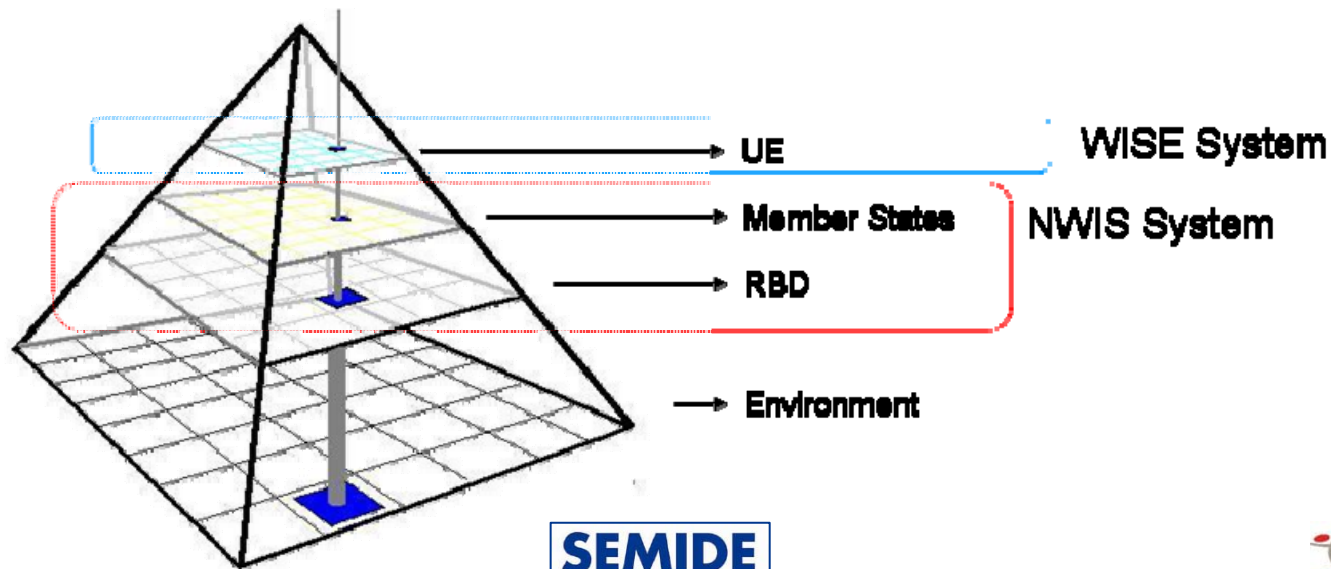


- MedWIS main characteristics
  - Voluntary reporting of information
  - Focus on regional information. Two identified data flows:
    - Datasets: defined at regional level to observe Mediterranean most relevant phenomena
    - Indicators: key measures for water management and policy evaluation
  - Based on an interoperable infrastructure at semantic level, local data can be obtained through national systems
    - Common data set for all countries
    - Common metadata and format requirements for all datasets
    - Common set of services to share information
  - Constructed around a regional metadata catalog
  - Build around a cooperative network of NFP
    - Cooperative development
  - Strong focus on the development of local capabilities and infrastructure

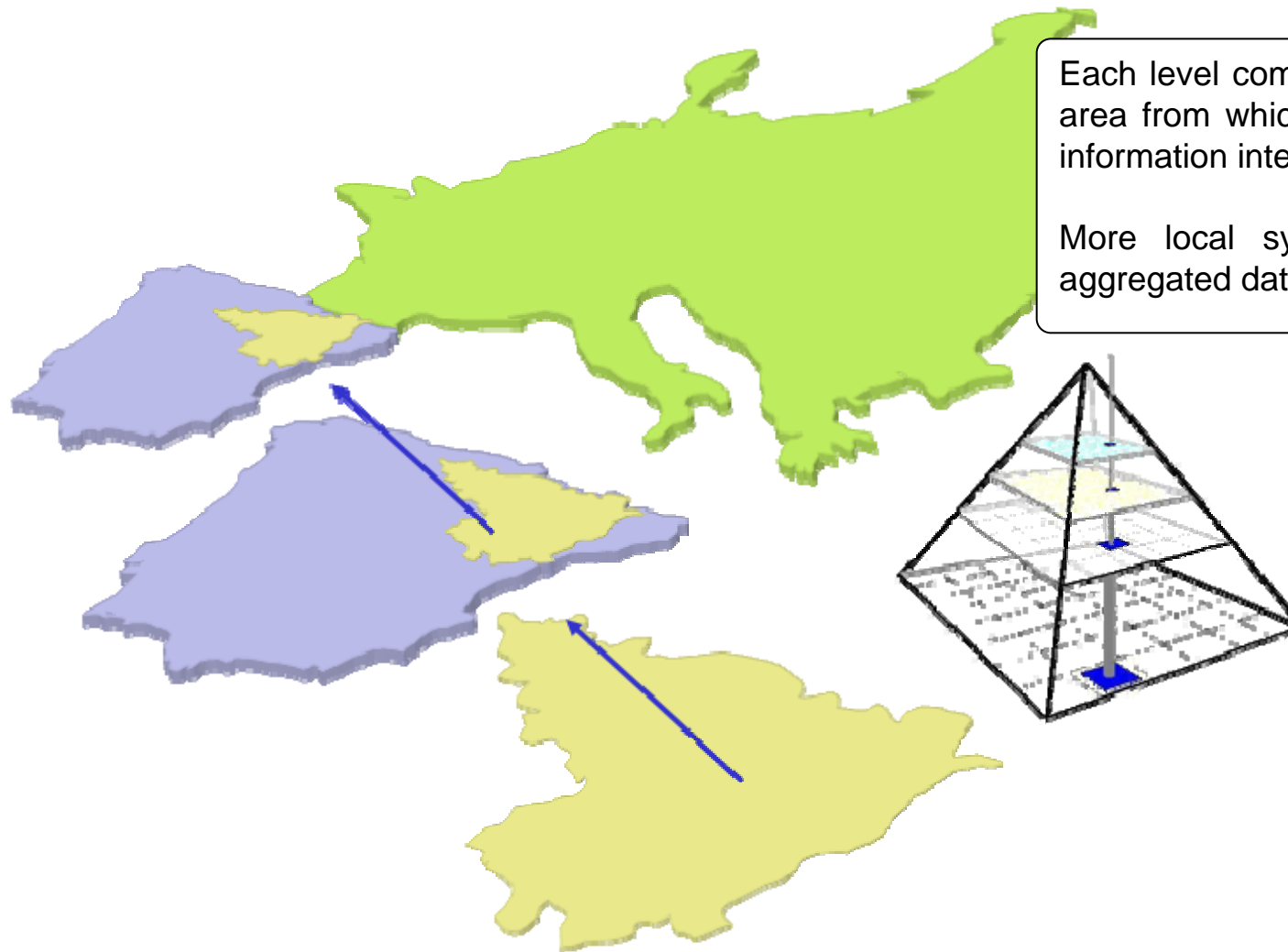
# MedWIS vs. NWIS



- Regional vs. national focus
  - National systems are typically focused on management and control. The level of granularity of data is defined accordingly:
    - Control is a RBD responsibility: measured data, observational data, etc.
    - Management is usually at State level: analyzed data, indicators, etc.
  - Regional systems are centered on information sharing, reporting, benchmarking and policy effectiveness analysis.
    - Highly aggregated data for key environmental and WFD indicators.



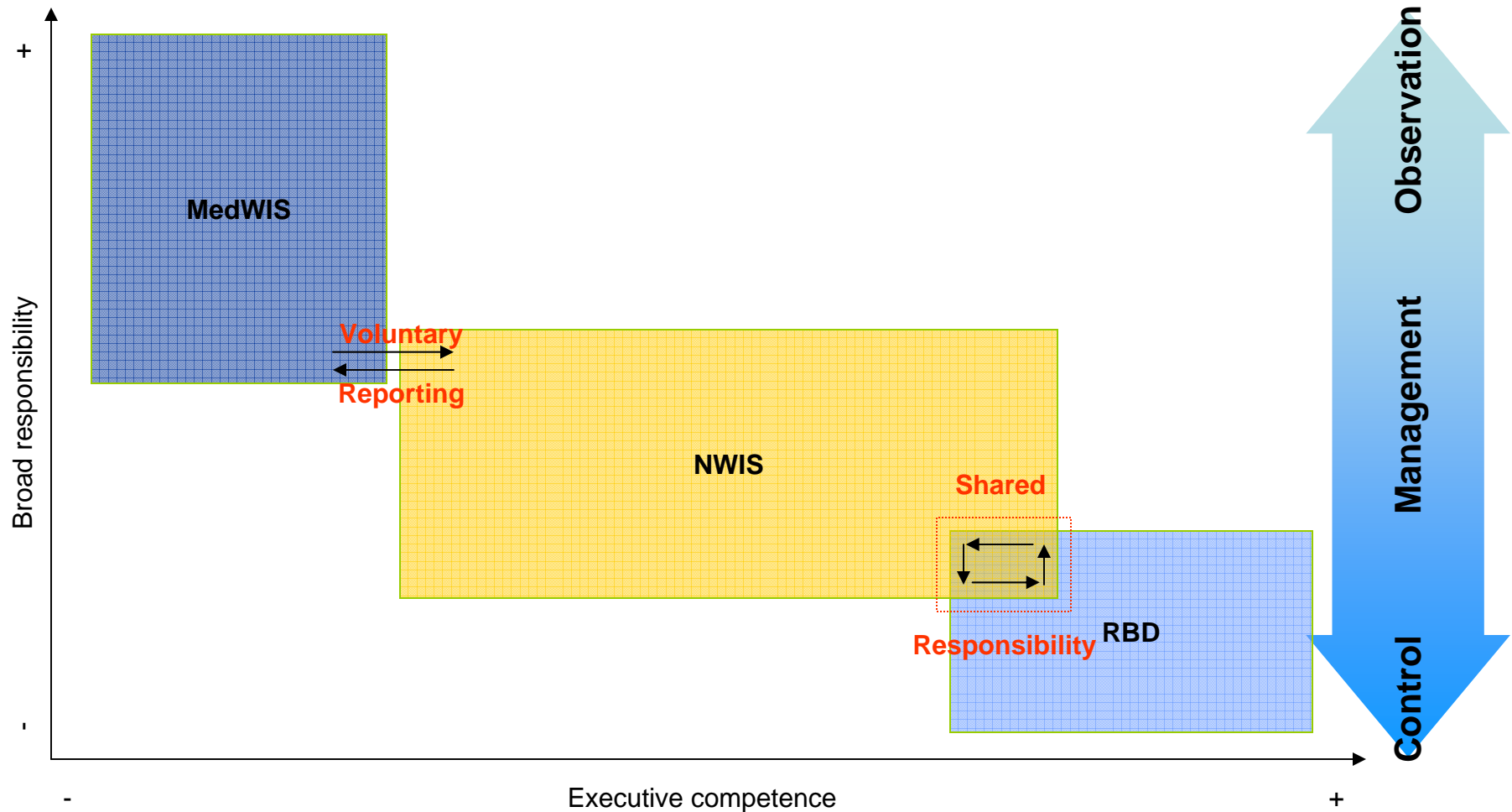
# MedWIS vs. NWIS



Each level comprises a geographical area from which derives the level of information integration required.

More local systems manage less aggregated data

# Regional vs. national



# MedWIS vs WISE



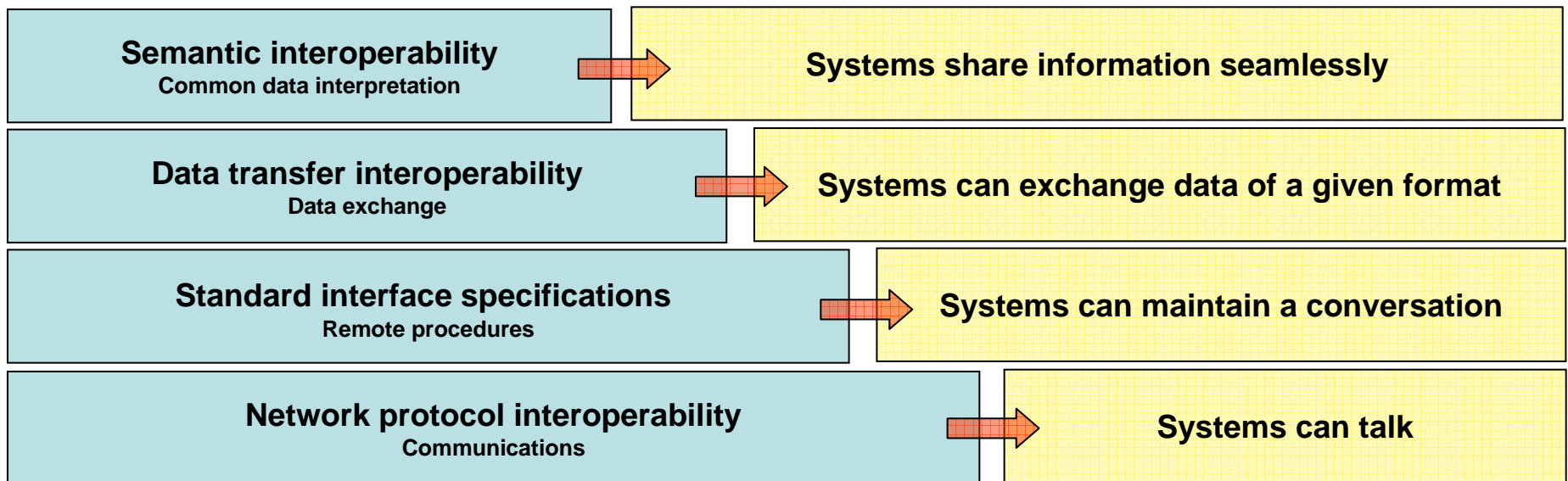
	WISE	WISE DS	MedWIS
<i>Sponsor</i>	EEA EU JRC	EEA EU	EMWIS Med Countries
<i>Objective</i>	<ul style="list-style-type: none"> <li>•Compliance checking</li> <li>•Information publication</li> </ul>	<ul style="list-style-type: none"> <li>•Compliance checking</li> <li>•Regional observation</li> <li>•Information publication</li> </ul>	<ul style="list-style-type: none"> <li>•Regional observation</li> <li>•Information publication</li> <li>•Promote the development of NWIS systems</li> </ul>
<i>Dataflows</i>	<ul style="list-style-type: none"> <li>•Mandatory reporting</li> </ul>	<ul style="list-style-type: none"> <li>•Mandatory reporting</li> <li>•Voluntary reporting</li> </ul>	<ul style="list-style-type: none"> <li>•Regional Water Observation Mechanism &gt; voluntary reporting</li> </ul>
<i>Datasets</i>	<ul style="list-style-type: none"> <li>•Datasets from MS according to Directives</li> </ul>	<ul style="list-style-type: none"> <li>•Datasets from MS according to Directives</li> <li>•Reference datasets</li> <li>•Background GIS datasets</li> <li>•External compliant GIS datasets</li> </ul>	<ul style="list-style-type: none"> <li>•Voluntary datasets from MS according agreed for the region</li> <li>•Indicators</li> <li>•Reference datasets</li> </ul>
<i>Interoperability</i>	No	WFD + OGC + INSPIRE	WISE + OGC + INSPIRE
<i>Scope</i>	<ul style="list-style-type: none"> <li>•EU member states</li> </ul>	<ul style="list-style-type: none"> <li>•EU member states</li> <li>•EIONET states</li> </ul>	<ul style="list-style-type: none"> <li>•Voluntary EMWIS Countries</li> </ul>

# Basics of WISE interoperability



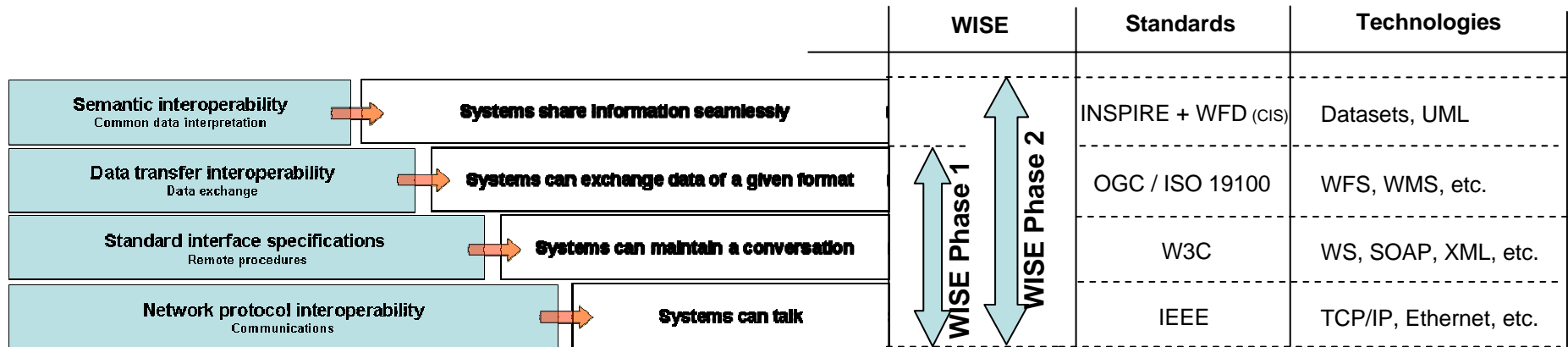
- Interoperability according to ISO [CEN technical Report 15449[1]] *"is the capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units."*
- Interoperability can be built at various levels:
  - network-protocol interoperability allows **communication** between components;
  - standard interface specifications can enable clients to perform **procedures** on a remote system;
  - **data transfer** interoperability allows access to data, sharing of geographic databases and other services independent of the proprietary format;
  - **semantic interoperability** concerns an application's ability to interpret data consistent for common representation or processing.

# Basics of WISE interoperability





# Basics of WISE interoperability



# WISE DS Interoperability



- WISE interoperability will be based on compliance with
  - **Network, procedures & data exchange:**
    - use of OPEN GIS Specifications (from OGC)
      - View: WFS, WMS, etc.
      - Discovery services
  - **Formats and feature definition requirements:**
    - Use of ISO 19100 family of standards for geographic information (projection, metadata, etc.)
  - **Data model and semantics:**
    - Definition of a pan-European water data model by the CIS WorkGroup D (interoperability requirements are compiled in the "*Guidance on Implementing the Geographical Information System (GIS) Elements of the EU Water policy*" document)
      - Coding
      - Hierarchies
      - Structures
      - Symbols
      - etc.
    - WFD reporting obligations (XML Schemas)
    - INSPIRE Data Model Requirements
    - Other UE / EEA WorkGroups: SOEr, 91/271, etc

# ISO / CEN Standards relevant for WISE

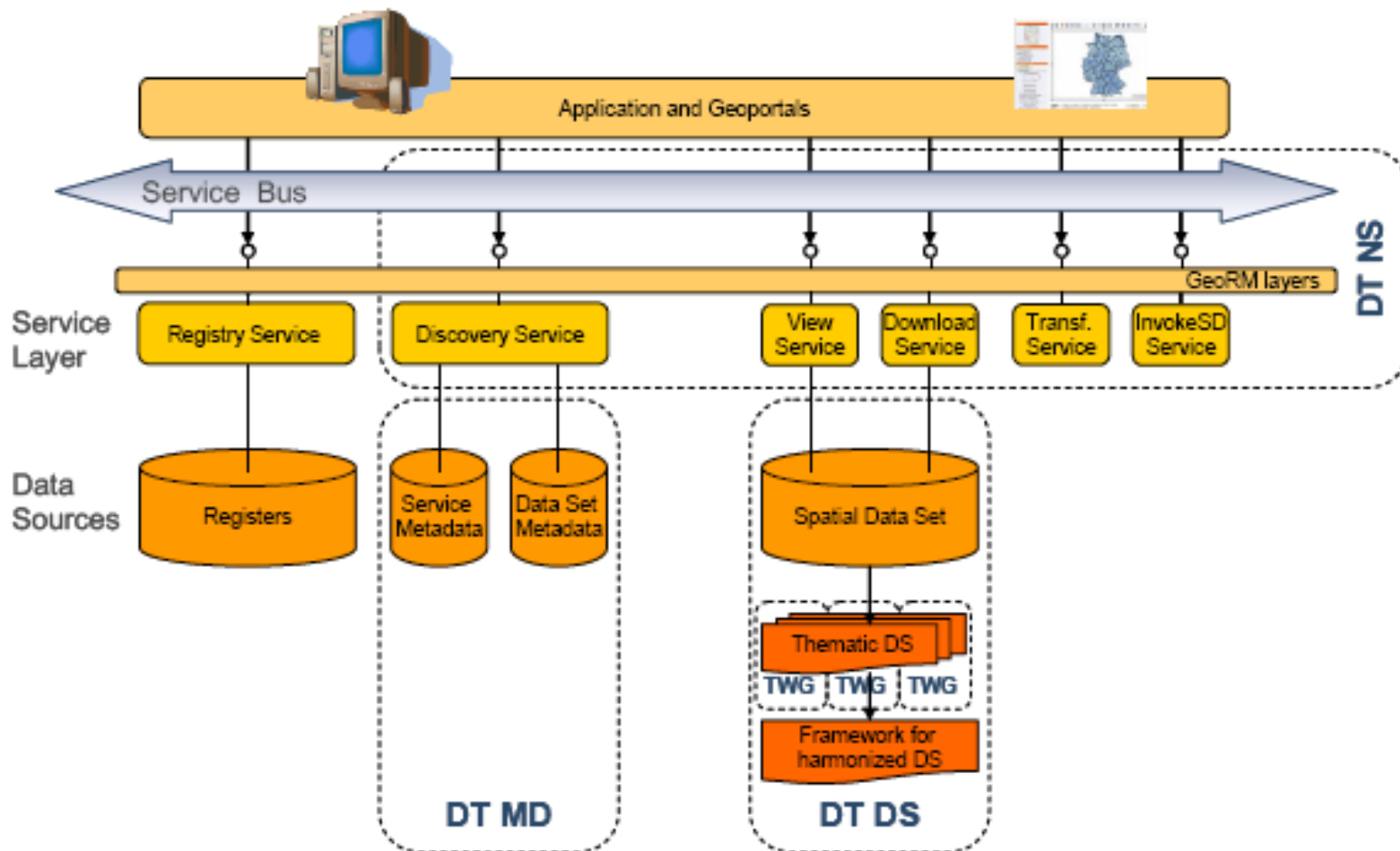


Status 20:06-09 -15	See also <a href="http://www.cen.eu/research/">http://www.cen.eu/research/</a> CEN/TC 287 – Geographic Information
Standard reference	Title
EN ISO 19101:2006	Geographic information - Reference model (ISO 19101:2006)
EN ISO 19105:2005	Geographic information - Conformance and testing (ISO 19105:2005)
EN ISO 19107:2006	Geographic information - Spatial schema (ISO 19107:2006)
EN ISO 19108:2006	Geographic information - Temporal schema (ISO 19108:2006)
EN ISO 19112:2006	Geographic information - Spatial referencing by geographic identifiers (ISO 19112:2006)
EN ISO 19113:2006	Geographic information - Quality principles (ISO 19113:2006)
EN ISO 19114:2005	Geographic information - Quality evaluation procedures (ISO 19114:2005)
EN ISO 19115:2005	Geographic information - Metadata (ISO 19115:2005)
EN ISO 19106:2006	Geographic information - Profiles (ISO 19106:2006)
EN ISO 19116:2006	Geographic information - Positioning services (ISO 19116:2006)
EN ISO 19126-1:2006	Geographic information - Simple feature access - Part 1: Common architecture (ISO 19126-1:2006)
EN ISO 19125-2:2006	Geographic information - Simple feature access - Part 2: SQL option (ISO 19125-2:2006)
CEN/TR 15449:2006	Geographic information - Standards, specifications, technical reports and guidelines, required to implement Spatial Data Infrastructure
EN ISO 19111:2007	Geographic information - Spatial referencing by coordinates (ISO 19111:2007)
EN ISO 19119:2006	Geographic information - Services (ISO 19119:2006)
EN ISO 19109:2006	Geographic information - Rules for application scheme (ISO 19109:2006)
EN ISO 19110:2006	Geographic information - Methodology for feature cataloguing (ISO 19110:2006)
EN ISO 19117:2006	Geographic information - Portrayal (ISO 19117:2006)
EN ISO 19118:2006	Geographic information - Encoding (ISO 19118:2006)
EN ISO 19123:2007	Geographic information - Schema for coverage geometry and functions (ISO 19123:2007)
EN ISO 19133:2007	Geographic information - Location-based services - Tracking and navigation (ISO 19133:2007)
EN ISO 19135:2007	Geographic information - Procedures for item registration (ISO 19135:2007)
EN ISO 19128:2006	Geographic information - Web map server interface (ISO 19128:2006)
EN ISO 19134:2008	Geographic information - Location-based services - Multimodal routing and navigation (ISO 19134:2007)
EN ISO 19131:2008	Geographic information - Data product specifications (ISO 19131:2007)
EN ISO 19137:2008	Geographic information - Core profile of the spatial schema (ISO 19137:2007)
EN ISO 19132:2008	Geographic information - Location-based services - Reference model (ISO 19132:2007)
EN ISO 19114:2005/AC:2006	Geographic information - Quality evaluation procedures (ISO 19114:2005/Cor.1:2005)

## Technical programme (standards under development)

WI number	Project reference	Title	Current status	Foreseen date of availability
287034	EN ISO 19113:2005/prA1	Geographic information - Quality principles	Under Drafting	Oct-10
287040	prEN ISO 19142	Geographic information - Web feature service	Under Drafting	
287046	prEN ISO 19118 rev	Geographic information -- Encoding	Under Drafting	Apr-09
287047	prEN ISO 19146	Geographic information - Cross-domain vocabularies	Under Drafting	Oct-09
287049	EN ISO 19110:2006/prA1	Geographic information - Methodology for feature cataloguing - Amendment 1	Under Drafting	Nov-09
287050	prEN ISO 19148	Geographic information - Location Based Services - Linear Referencing System	Under Drafting	Oct-10
287054	EN ISO 19114:2005/prA1	Geographic information - Quality evaluation procedures (ISO 19114:2005/NP_Amd 1)	Under Drafting	Sep-10
287056	prEN ISO 19103	Geographic information - Conceptual Schema Language	Under Drafting	Oct-10
287057	prEN ISO 19136	Geographic information - Geography Markup Language (GML) (ISO 19136:2007)	Under approval	Mar-09
287060	prEN ISO 19141	Geographic information - Schema for moving features	Under Drafting	Jul-09
287059	EN ISO 19131:2008/prA1	Geographic information - Data product specifications (ISO 19131:2007)	Under Drafting	Mar-11
287 C02	EN ISO 19115:2005/prAC	Geographic information - Metadata (ISO 19115:2005)	Under Drafting	Oct-2008

# WISE Future Interoperability (INSPIRE)



# WISE Interoperability for MedWIS



- Basic WISE interoperability principles are valid to non-WFD countries
  - **Network & procedures:** OGC Open GIS Specification
  - **Semantic:**
    - ISO Standards
  - Data model will comprise all WFD reporting obligations
    - It could be simplified to match only the basic set of data required
- Interoperability principles are a safe bet for future MedWIS development
  - Complies with INSPIRE principles
  - Are based on international well recognized solid standards
    - A good starting point for a local implementation
  - Allow to easily exchange data within national and international institutions
- At this point, implementing regional interoperability has lower cost than developing non-interoperable strategies
  - Capability to take advantage of European / International developments and tools
  - More likely to raise funding for a regional program
  - Not reinvent the wheel: focus on collecting and maintaining an up-to-date, high quality set of data.

# Roadmap to WISE vs MedWIS interoperability



		WISE Interoperability requirements	WISE DS interoperability requirements	MedWIS interoperability
Networking, procedures & data exchange	<i>Standards</i>	XML	XML Open GIS Consortium	Open GIS Consortium
	<i>Technologies</i>	File interchange	WS / File Interchange	WS
	<i>Systems</i>	REPORTNET	REPORTNET WISE GEOPORTAL	MedWIS GeoPortal
Formats and feature definition requirements	<i>Standards</i>	"2006 WFD CIS GIS Reporting guidance" ISO 19100	"2009 WFD CIS GIS Reporting guidance" ISO 19100	MedWIS Datamodel MedWIS Metadata ISO 19100
	<i>Technologies</i>	XML	XML / GML?	XML / GML?
Data model and semantics	<i>Standards</i>	WFD Reporting Sheets	WFD Reporting Sheets → "2009 WFD CIS GIS Reporting guidance" INSPIRE	MedWIS Datasets  INSPIRE
	<i>Technologies</i>	WFD reporting XML schemas	WFD reporting XML schemas / UML / GML?	UML / GML

# References



- CIRCA:  
[http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework\\_directive/w-wise\\_background/11062008\\_consolidation&vm=detailed&sb=Title](http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/w-wise_background/11062008_consolidation&vm=detailed&sb=Title)
- WISE: <http://water.europa.eu>
- INSPIRE: <http://www.ec-gis.org/inspire/>
- OGC: <http://www.opengeospatial.org/>