



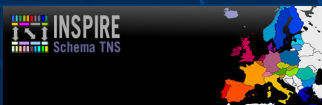
Transformation for INSPIRE

Robin Waters, *RSW Geomatics*

Matt Beare, *1Spatial*

Rob Walker, *Rob Walker Consultancy*

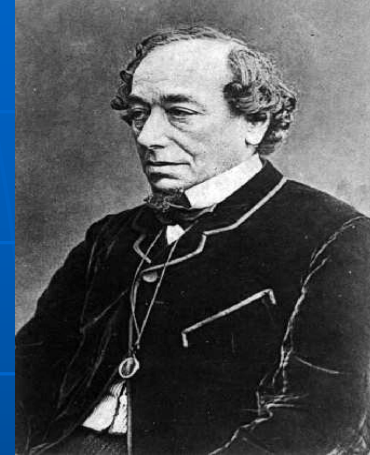
Michel Millot, *EC Joint Research Centre*



Why transform?

- “As a general rule, the most successful man in life is the man who has the best information.”

Benjamin Disraeli,
19th C prime minister.



“It is the unexpected re-use of information which is the value added by the web .”

Sir Tim Berners-Lee, W3C



The Semantic Web

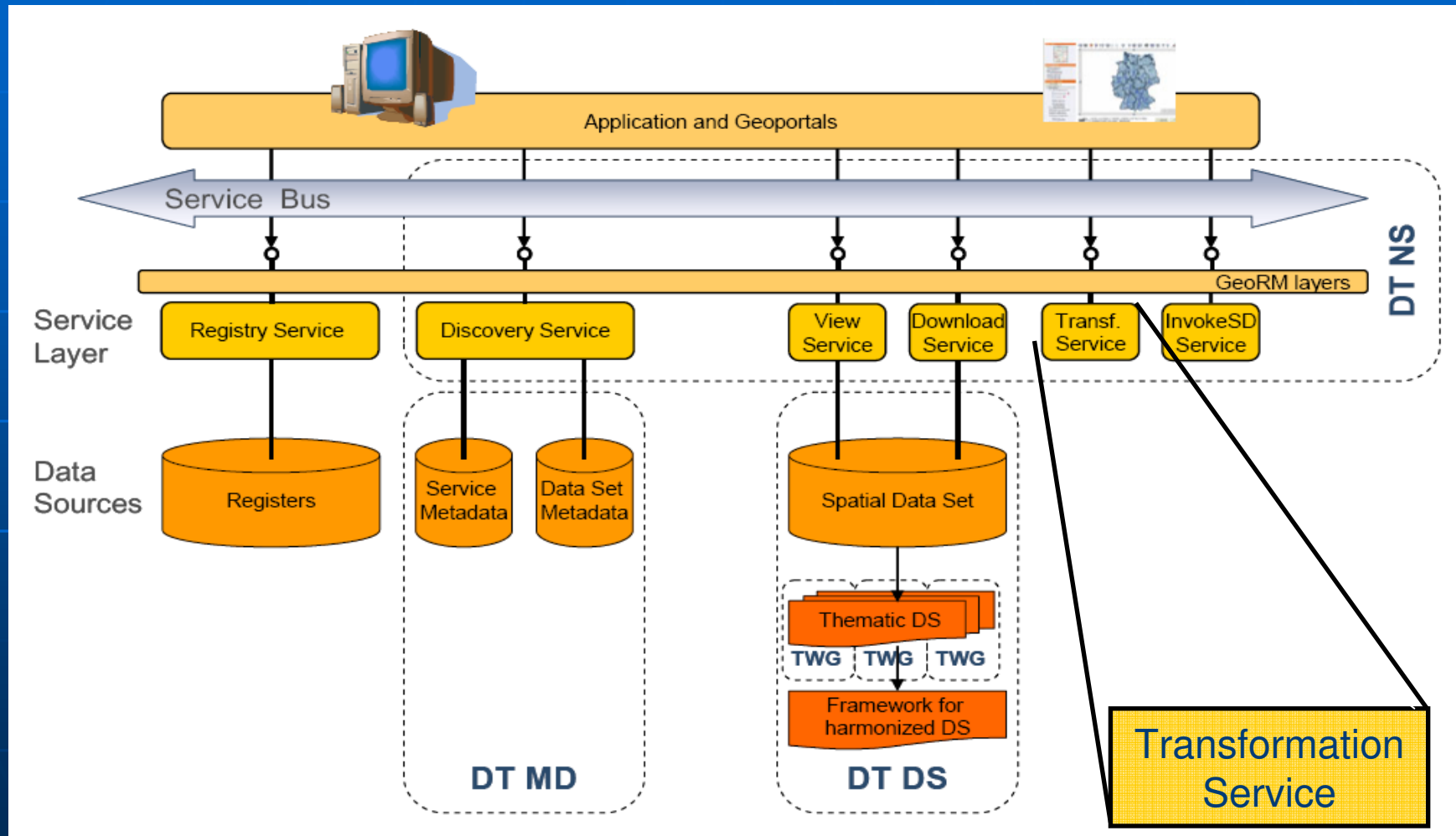
- The web of data
- Needs semantic interoperability
- Real features provide vital links
- But how do features match?
 - Your **river** is my **stream**
 - Your **buildings** are my **factory**
 - Your **region** is my **'devolved'**
 - Your **intersection** is my **roundabout**

Schemas & Data Models

- **Existing datasets** conform – more or less – to data models (or schemas) devised by providers – but may not be publicly known or available.
- **INSPIRE** provides a **public set** of well specified schemas/data models in order to facilitate common understanding & interoperability
- Therefore we must transform from one to the other :

Schema transformation!

INSPIRE Technical Architecture



From INSPIRE Regulations

- Draft Commission Reg. amending Regulation (EC) No 976/2009 .. download & transformation services 14.12.2009.
- Article 12 of the INSPIRE Directive states that:
 - *Member States shall ensure that public authorities are given the technical possibility to link their spatial datasets and services to the network referred to in Article 11(1). This service shall also be made available upon request to third parties whose spatial data sets and services comply with implementing rules laying down obligations with regard, in particular, to metadata, network services and interoperability.*
- However Draft IR for INSPIRE Transformation Services [4] state that this does not apply to transformation services:
 - *The technical possibility to link services referred to in the Article 12 does not apply to the Transformation Service as transformations cannot be aggregated in a straightforward manner, as data content can be.*
- The State of the Art Report discusses this contradiction.

Technical Guidance for Schema Transformation

- **INSPIRE has:**

- Implementing Rules with Technical Guidance

- **Network Services IR**

- Discovery, View, Download, *Invoke* and Transform

- **Transformation of:**

Coordinate Systems

Natural Languages

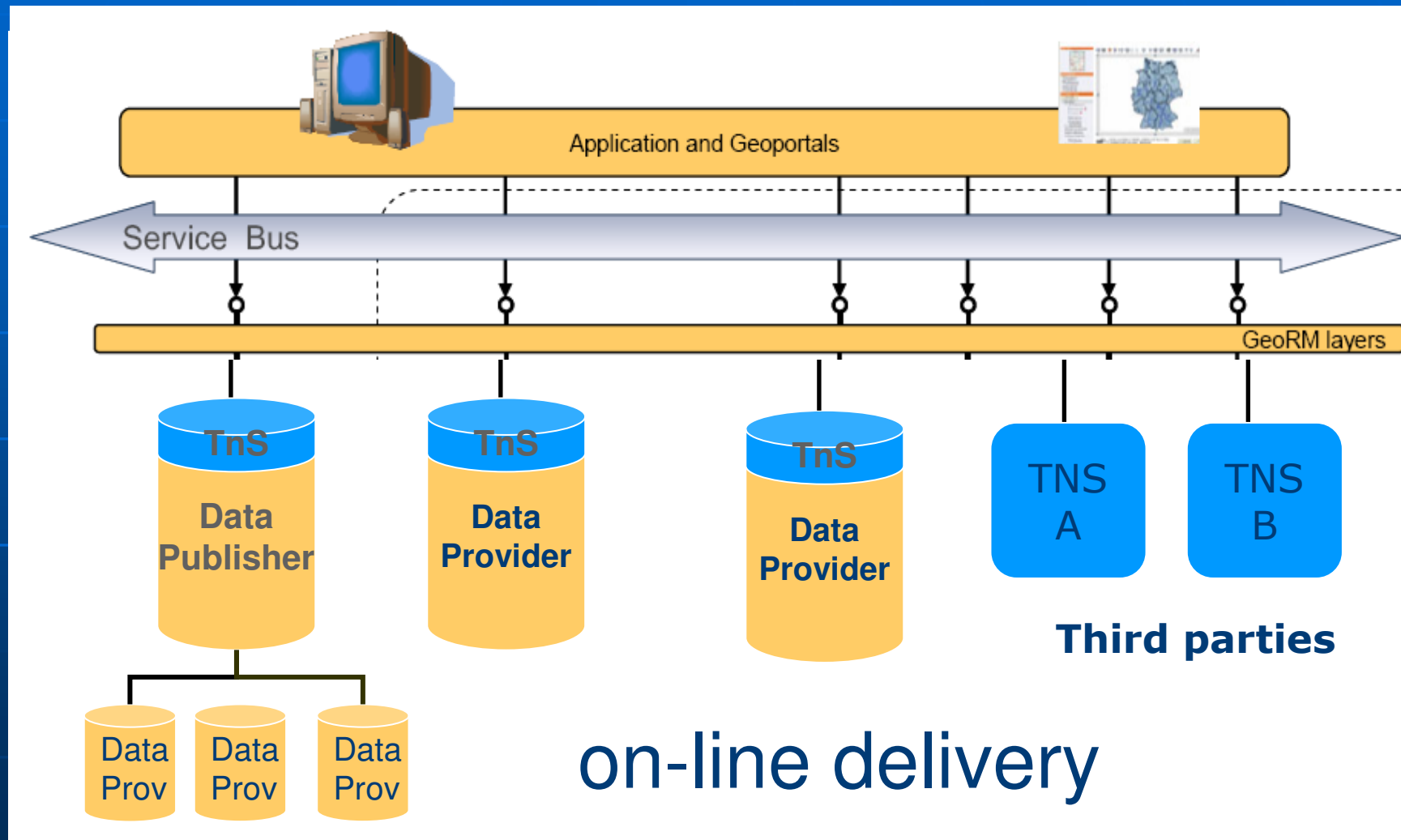
File Formats

Geometries

and

Schemas

Transformations – Who Provides?



TG Contract – 2009/10

- Tendered in August 2009
- Awarded November 2009
- Winning consortium –



**Rob Walker
Consultancy**

- Delivery
 - Dec 2009 – July 2010

TG Progress – 2010

- Analyse & report on the State of the Art
 - Existing standards and vendors
 - Rules and languages
- Draft Technical Guidance
- Produce Prototype demonstrator
- Incorporate TG stakeholder comments
 - Initial TNS, TNS, TNS
 - Krakow workshop
- Final Technical Guidance and Video

Completed

Completed

In progress

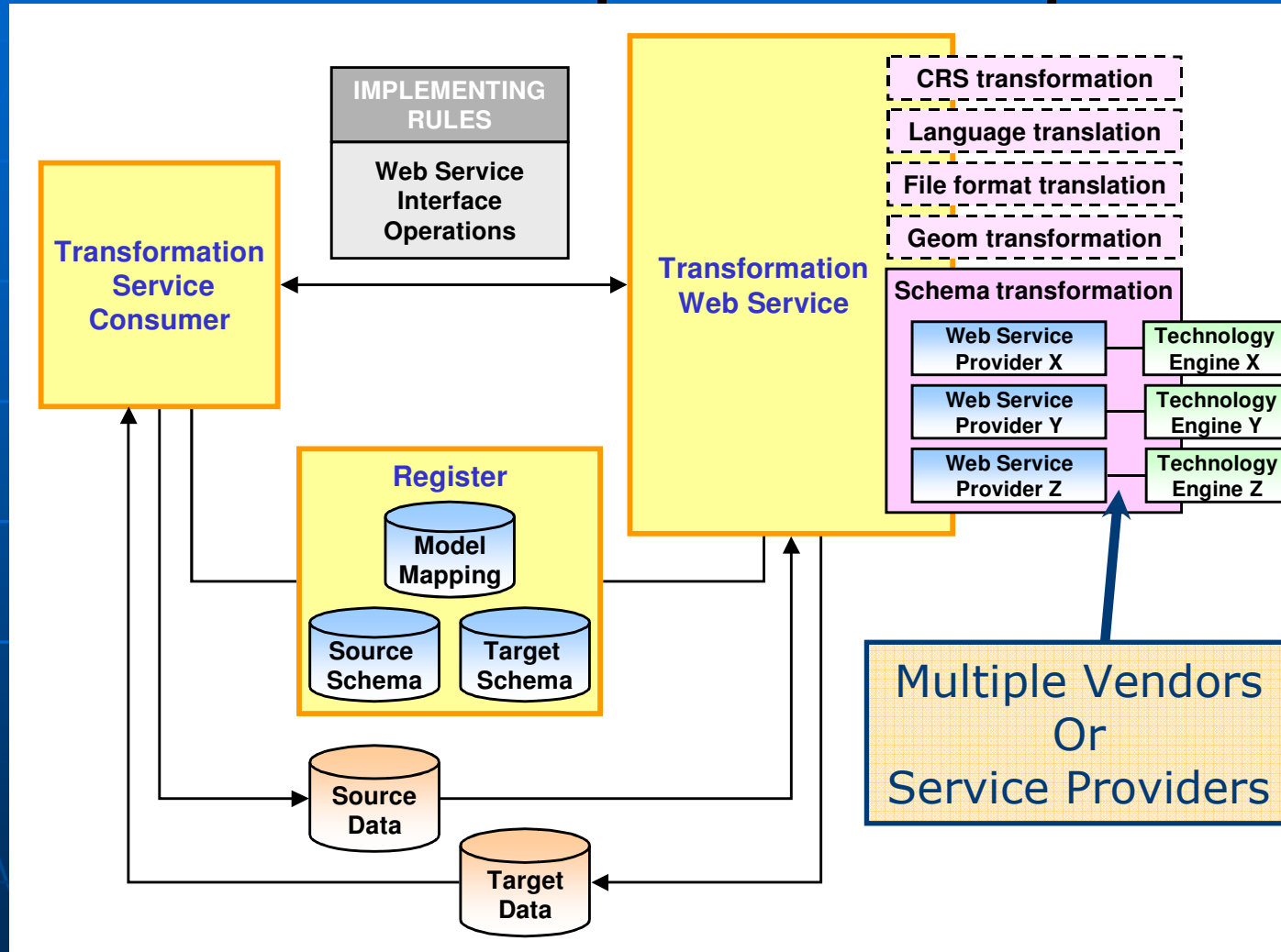
By end July

State of the Art Analysis

- Schema Description Languages
- Model Mapping Languages
- Transformation Tools
- Enterprise Architecture

<http://inspire.jrc.ec.europa.eu/index.cfm/newsid/10001>

Conceptual Scope



Schema Description Languages

Name / Version of Language	From
Unified Modelling Language (UML) 2.2 XML Metadata Interchange (XMI) 1.1	OMG
XML Schema Definition (XSD) 1.1 Geography Markup Language (GML) 3.2.1	W3C
Resource Description Framework (RDF) 1.0 Web Ontology Language (OWL) 2.0	W3C

Model Mapping Languages

Language	Vrsn/Date	Originator	Category
Extensible Stylesheet Language for Transformations (XSLT)	2.0	W3C	Standard
Web Ontology Language (OWL)	2.0	W3C	Standard
Rule Interchange Format (RIF)	1.0	W3C	Standard
Semantic Web Rule Language (SWRL)	21/05/2004	W3C	Standard
Query/View/Transform (QVT)	1.0	OMG	Standard
Common Logic (CL)	ISO/IECIS2470 7:2007	ISO	Standard
Ontology Mapping Language (OML)	06/10/2005	DERI OMWG	Specification
Rewerse II Rule Markup Language (R2ML)	0.5	WGI1	Specification
Tefkat	2.1.0.lawley266	DSTC Australia	Other

Vendors/projects contacted

- **SAFE Software**
- **Snowflake Software**
- **interactive instruments GmbH**
- **1Spatial**
- Geodan
- GIS4EU
- **con terra GmbH (using SAFE)**
- **lat / long GmbH**
- **Talend**
- **Humboldt**
- Oracle
- ERDAS
- Altova
- GeoTools
- 52° North
- GeoServer
- **AuScope**

Bold indicates response

Key results of survey - 1

- **No** widely used standards for schema descriptions or model mappings
 - Justifies contract remit !
- **Most** vendors claim support for many levels of transformation functionality
 - Rich mapping language with necessary 'expressiveness' assured by most vendors.
- **Most** support GML, Oracle, ESRI Shape files.
 - But - check GML versions supported for INSPIRE
- Mapping definition process
 - From intuitive user interfaces > editing structured text

Key results of survey - 2

- Schema compliance
 - **Most** support syntactic validation of model mapping, (for target schema).
 - **Few** support semantic validation to ensure target data is compliant with specs.
- Deployment
 - **Most** run on several platforms in desktop or batch.
 - **Some** tools provide web accessible interfaces.
- Performance
 - **Most** claim support for scalable processing, inc. multiple simultaneous requests.
 - Performance requirements therefore **likely to be met.**

SAA Conclusions

■ Core capability

- Need source & target schemas and desc. of model mapping.
- **Several** capable open standards do exist
- But **most** tools don't use these open standards
- However, **many** tools can perform highly expressive transformations.

■ Business processes

- details are vital to operational deployment of INSPIRE transformation services.

Technical Guidance

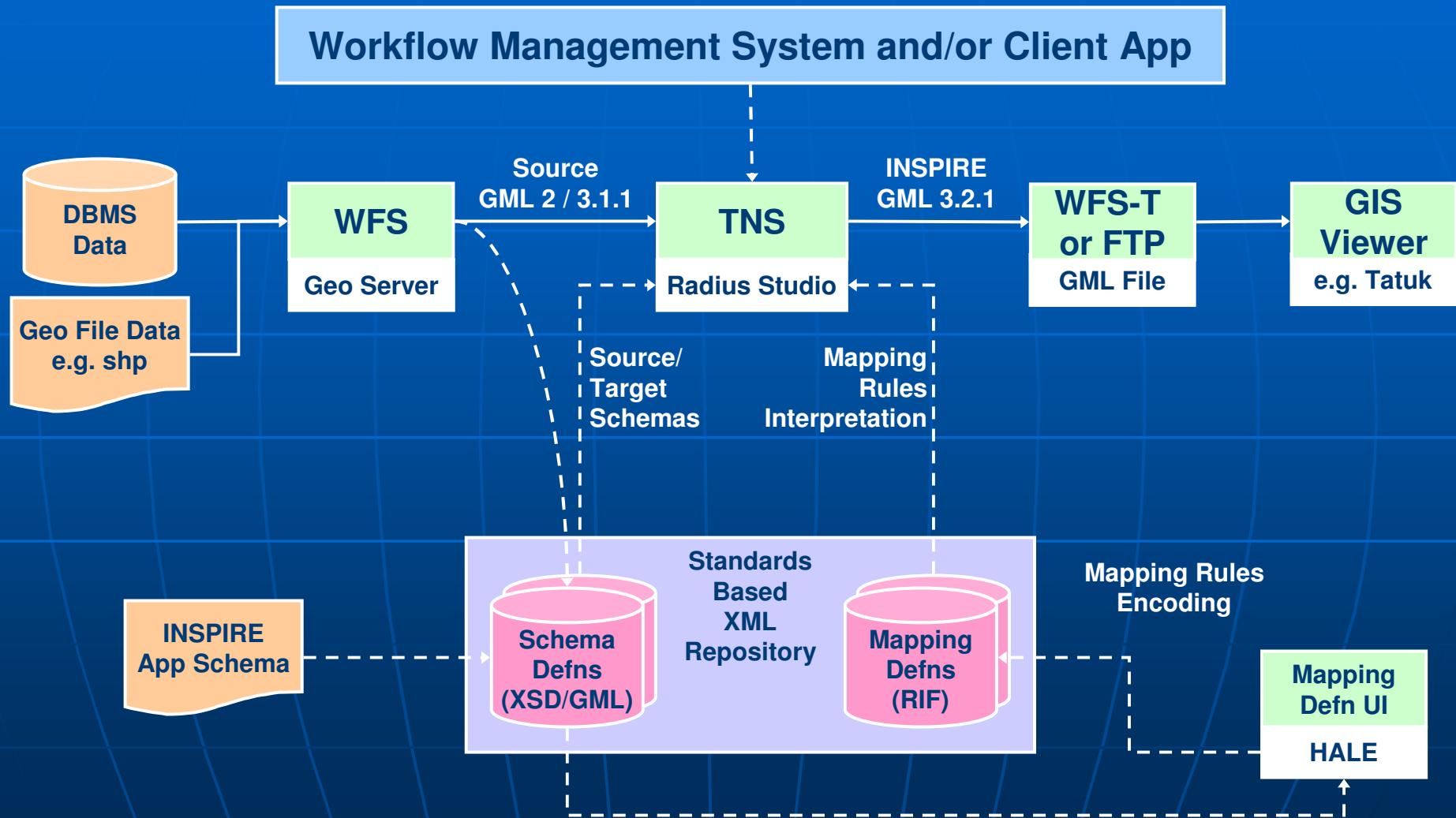
- Architectural Goals & Constraints
- Use Case View
- Logical View
- Data View
- System Qualities
- Implementation & Deployment View

<http://inspire.jrc.ec.europa.eu/index.cfm/pageid/5>

Architectural Constraints

- **EC Regulations**
- **Mapping Flexibility & vendor neutrality**
- **Open Interfaces** - enables 'Plug and Play'
- **Statelessness**
- **Control Messages separate**
(from Data & Schema Transfer – size, reference, audit)
- **Schema & Data Agnostic**
- **Automated Process**
In overall integrated network: orchestration, security, rights management and quality of service provisions.

Prototype Components



Prototype datasets

Theme	Data Provider	Data Format
Cadastral Parcels	NLS Sweden (Lantmäteriet)	SHP
	NLS Finland	GML
	Belgium Cadastre	
	France Cadastre	
	Dutch Kadaster	SHP, GML
Hydrography	NLS Sweden	SHP
	Statens Kartverk Norway	SOSI
	NVE Norway	SHP
Transport Networks	OS Ireland	AutoCAD DWG
	LPS Northern Ireland	SHP

mandatory

Prototype demonstrates

- **Vendor neutrality**
- **Decoupling of 'rule authoring' from 'execution'**
- **Defined interfaces that meet ANY INSPIRE schema transformations**
 - Even if implementations have own 'local' constraints

Enabled by standards

■ GML/XSD

- for source & target schema descriptions
- Established standards; good tool support
- Physical data model closely tied to data itself
- Reinforces INSPIRE use of GML

■ RIF (Rules Interchange Format)

- Output from rule authoring process
- Rigorous academic backing
- Final stages of W3C adoption
- HALE > RIF open source from this project

Ultimately: Do we want our own 'geoweb' or
Do we participate in the real web?

Thank you



For

Rob Walker
Consultancy



European Commission
Joint Research Centre
Institute for Environment and Sustainability

