Interoperability

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Co–chair of the OGC Met Ocean Domain Working Group

Support de présentation Interoperability
Validation par MF Voidrot
13/03/2013

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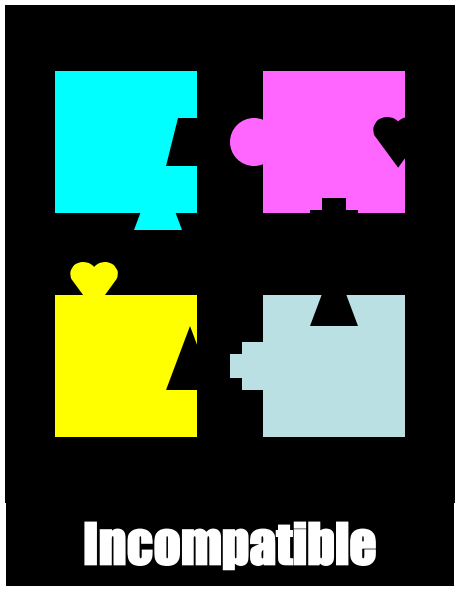
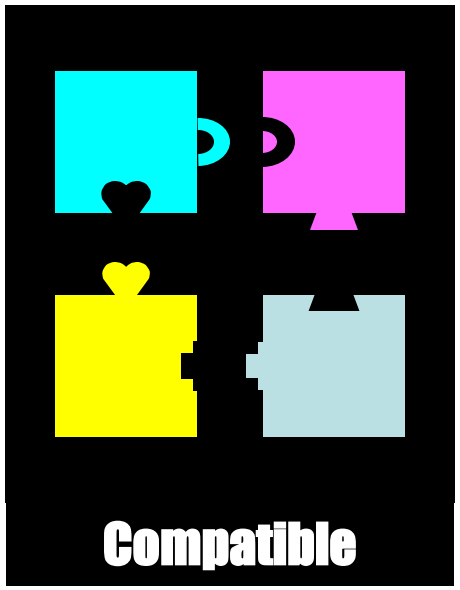
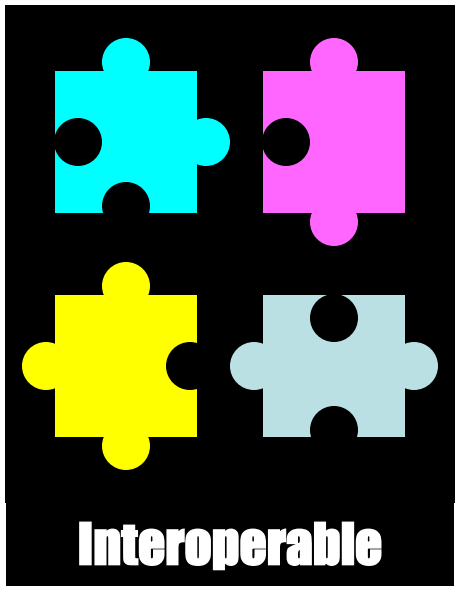
Summary

- What is interoperability?
- Is it new?
- The different initiatives pushing interoperability development
- Which benefits can we get from interoperability?
- Where are we now?
- Conclusion

What is interoperability?

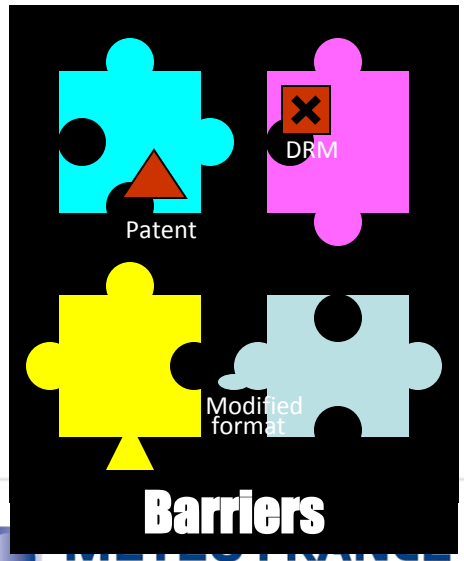






Interoperability allows to open your information system

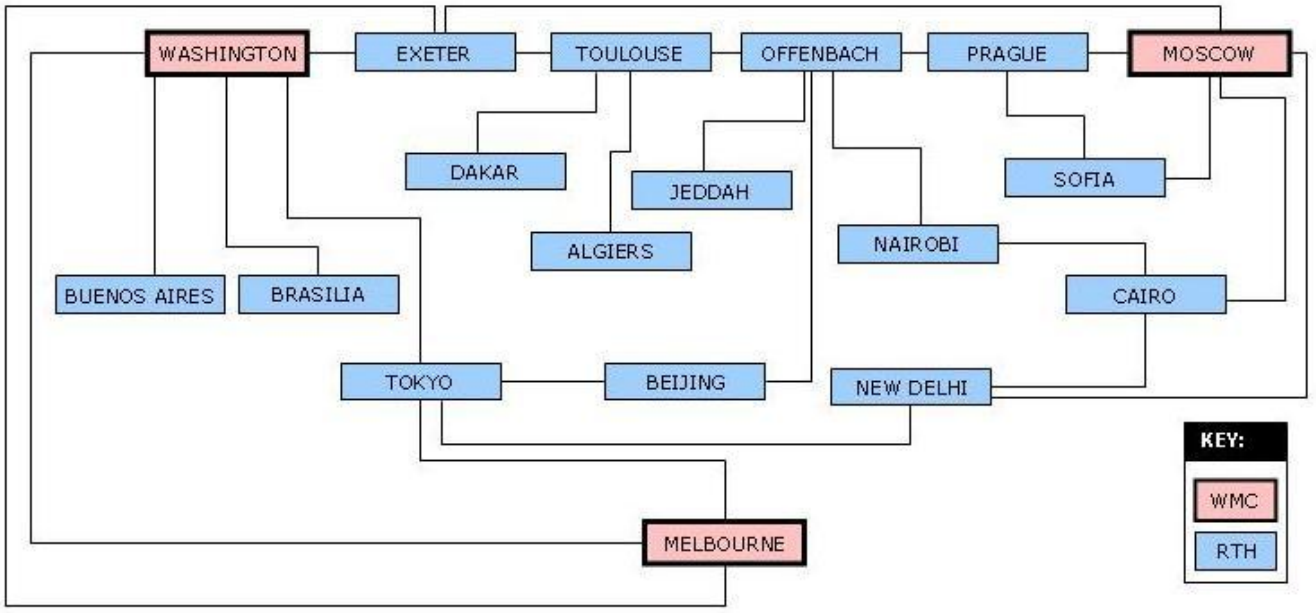
- In input : ⇐
- In output : ⇒



Is it new? Not really within Met services…

WMO OMM

- defines standards,
- organises the exchanges of data in real time,
- defines the catalogues and conditions of the exchanges,
- supports knowledge transfers
- and generally facilitates exchanges between Met services since decades



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…but yes with other domains

WMO OMM

1

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2

INSPIRE - Infrastructure for Spatial Information in Europe

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3

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1 - WMO Information System (WIS)

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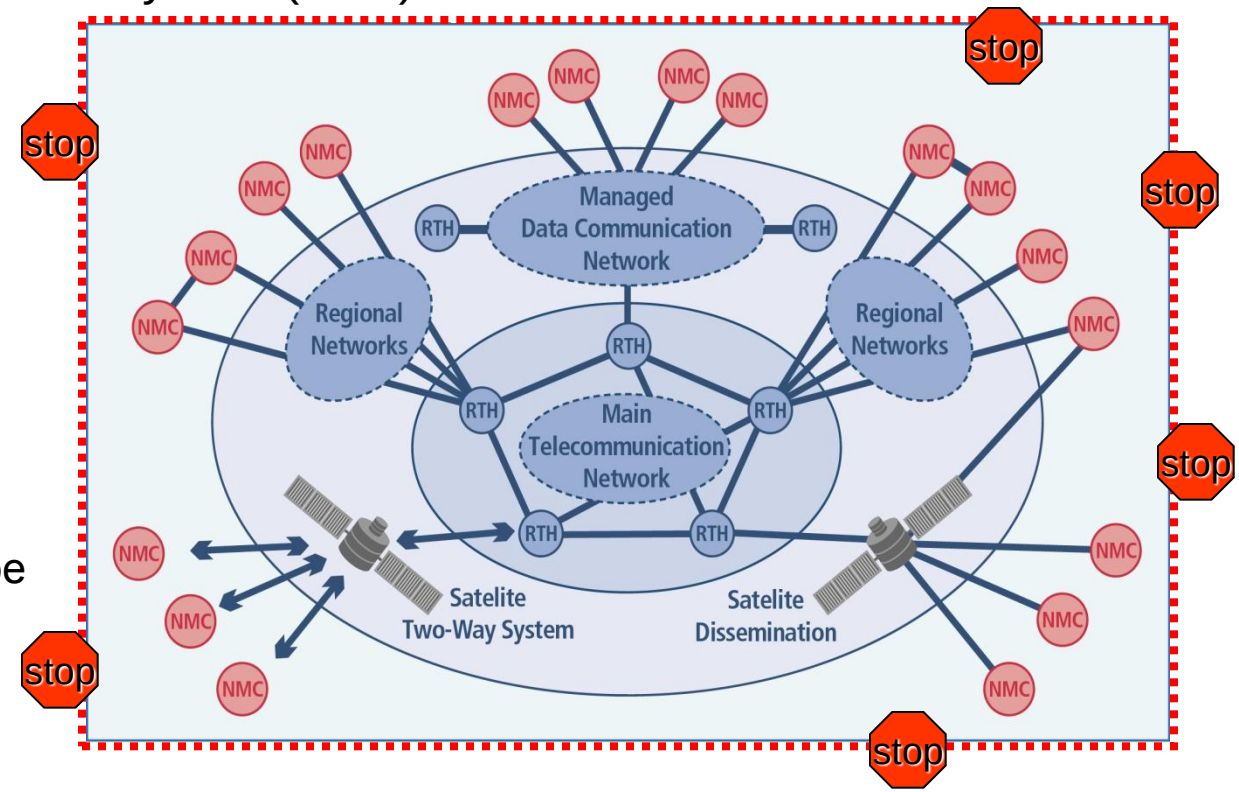
Today : the Global Telecommunication System

- Global Telecommunications System (GTS)
  - Observations
  - Forecasts
  - Warnings
  - …



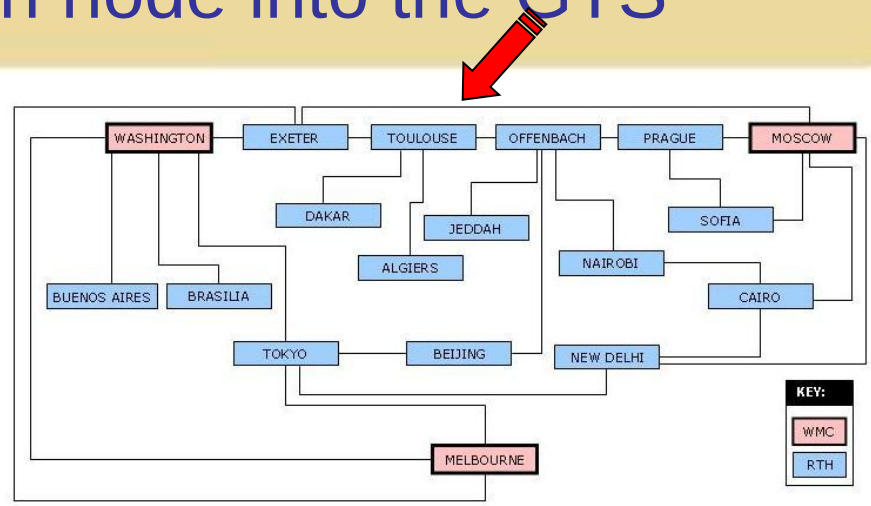
- Standardized Message switching system
- Private Network
  - Node to Node network
  - Based on a "push" type technology
  - Inflexible

stop Not available to:

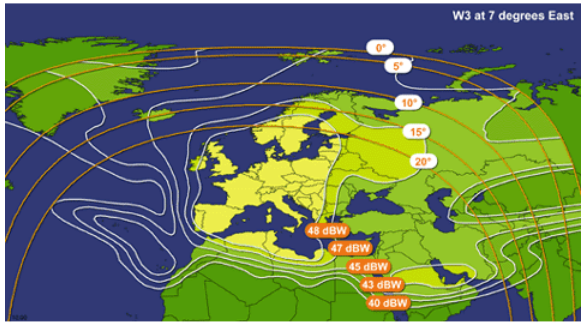
- Universities, International Organizations (IAEA, CTBTO, UNEP, FAO..), Climate research institutes, Regional Climate Centres, Commercial Service Providers…

Meteo-France : a main node into the GTS

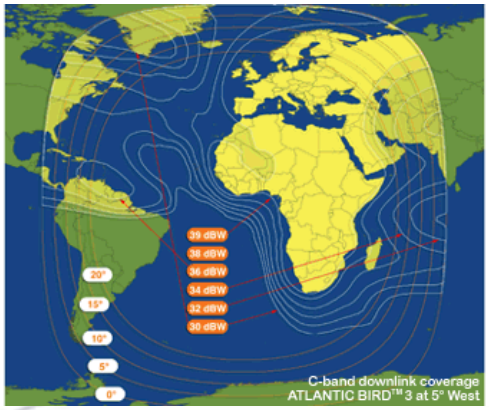
- Météo-France : node of the GTS
  - Relying on a message switching system (TRANSMET)
  - Data catalogs defined for each telecommunication link



- Completed by satellite broadcasts included into Eumetcast broadcast
  - Over Europe



  - Over Africa



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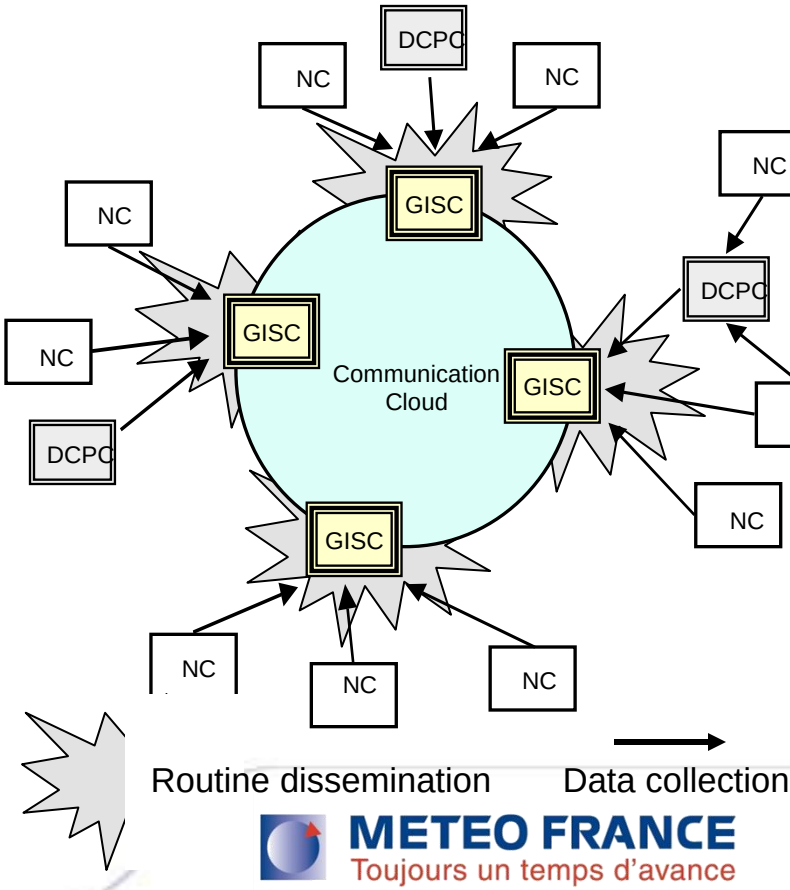
WMO Information System (WIS)

- 2003 : Decision to update the GTS : concept of “WMO Information System” (WIS)
  - “*A single, co-ordinated global infrastructure for the collection and sharing of information in support of all WMO and related international programmes*”
  - Data and products oriented
  - Discovery services and Portal to access the data

- 3 main components
  - National Centres (NC)
  - Data Collection or Production Centres (DCPC)
  - Global Information System Centres (GISC)
    - 10 max :
    - Collect the data,
    - disseminate them through their area of responsability,
    - real time exchange,
    - archive,
    - discovery and availability via a catalog



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OpenWIS will be used for different roles

- GISC
- DCPCs
  - Regional Telecom Hub Toulouse on MTN : *Collect, distribute, and exchange data and products on GTS*
  - Regional Specialized Meteorological Centre on Atmospheric Transport Modeling products for environmental emergency response and backtracking : *Produce transport simulation of hazardous substances in the atmosphere. Direct dissemination of products to relevant NMHSs*
  - Regional Specialized Meteorological Centre on Tropical Cyclones in La Réunion : *Produce and Provide information on tropical cyclones in the South indian Ocean*
  - Volcanic Ash Advisory Centre : *Provide ash advisory on Africa on extended Europe*
  - Regional Climate Centre : *Provide climate products to support climate services of NMHSs in the Europe region*
  - Global Production Centre for Long-Range Forecast : Produce regional analysis and long-range forecast
  - Regional Radar Data Centre : Collect radar data and produce radar mosaic to support NMHSs in the Europe region
  - Regional NWP support
- NC : French National Center
  - Data
  - Services

Endorsed by CBS

Under review by ET-GDDP

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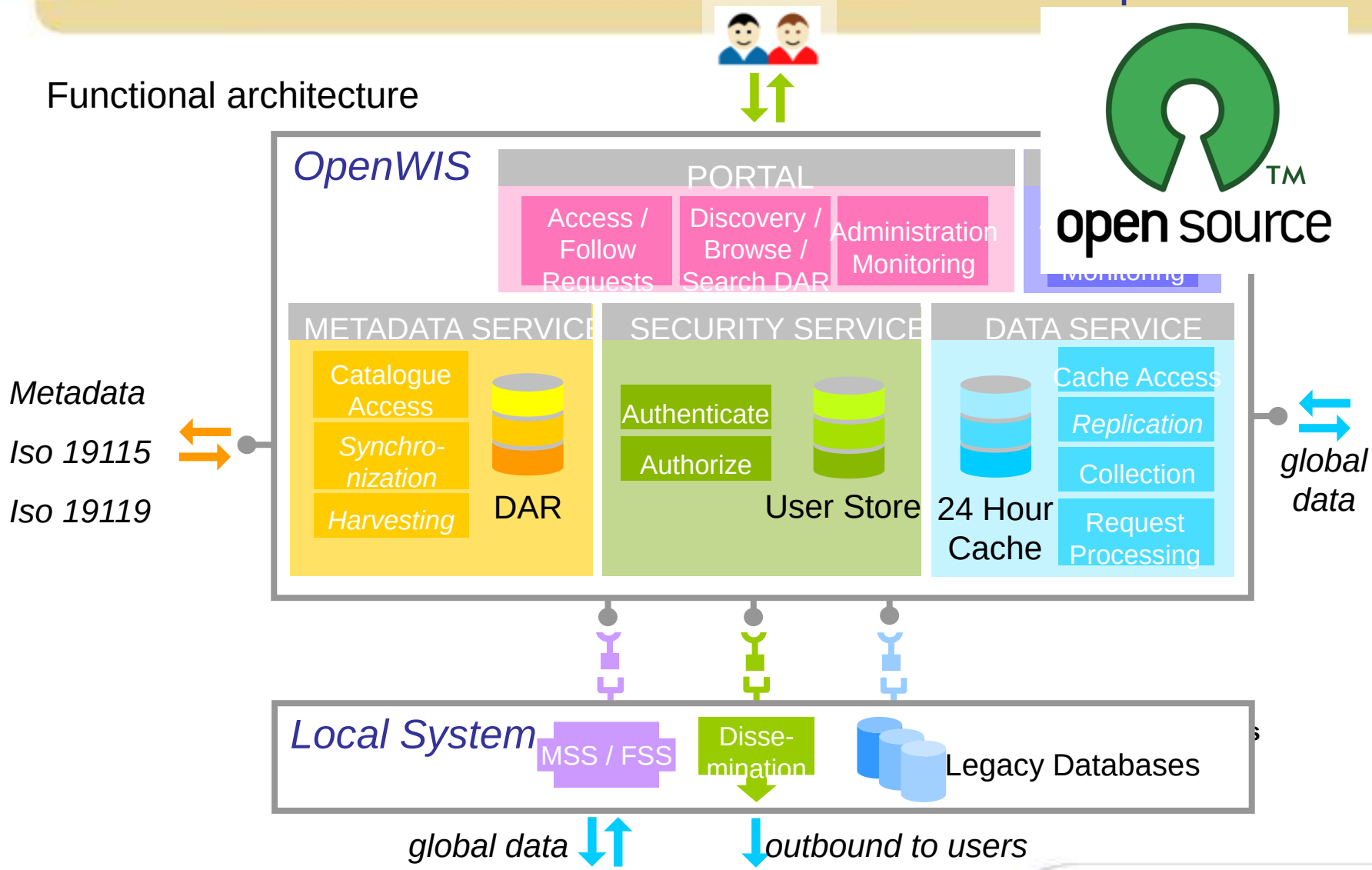
Meteo-France contribution to the WIS via OpenWIS* :

Functional architecture



* Consortium Meteo-France, UK Met Office, KMA, BOM, MFI

Main WIS milestones

- **Mid 2012 :**
  - GISC Operations : Current GTS implementation
- **End 2012 :**
  - DCPCs operations
- **2015**
  - Visualisation
  - INSPIRE

Some WIS portals URL

- Meteo-France : : http://wisp.meteo.fr:8080/openwis-user-portal/srv/en/main.home
- Met Office : http://wis.metoffice.gov.uk/openwis-user-portal/srv/en/main.home

- Japan Meteorological Administration : http://www.wis-jma.go.jp/cms/
- China : http://wisportal.cma.gov.cn/wis/jsp/systemManage/Register.jsp

2 – EC INSPIRE directive and infrastructure

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INSPIRE Overview

- **IN**frastructure for **SP**atial Info**R**mation in **E**urope (INSPIRE)

- Laid down
  - in a **European Community Directive** accepted May 2007 – so called…the INSPIRE Directive,
  - in **Implementing Rules**,
  - (many !) guideline documents …

- **Aim**: *"establishing an infrastructure for spatial information in Europe to support Community environmental policies, and policies or activities which may have an impact on the environment"*
  - enable exchange of spatial information between the member states to support environmental policies
  - Keywords: Harmonization, Metadata, Services, Infrastructure …

- This leads to Interoperability, **standards** (and OGC !)

ISO

OGC™
Open Geospatial Consortium, Inc.

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INSPIRE data specification

- What data ?

- A Drafting Team has provided a high level definition of data themes, laid down in 3 annexes :

  - **Annexe I and II** : “Basic” geographic data
    - CRS, Grid Systems, Addresses, Cadastral Parcels, Hydrography…
    - Elevation, Orthoimagery, Geology…

  - **Annexe III :**
    - Human Health and Safety (Air quality : O3, NO2, SO2, UV, aerosols)
    - Natural Risk Zones
    - Atmospheric conditions (Precipitation, wind, clouds, lightning, temperature, UV)
    - Meteorological geographical features (Synoptic observations, clouds, precipitation.)
    - Oceanographic geographical features
    - Sea Region (Sea water temperature, sea level)

Main INSPIRE milestones

- **December 2013 :**
  - Metadata available for spatial data corresponding to Annex III
- **January 2015 :**
  - Newly collected and extensively restructured Annex II and III spatial data sets available
- **May 2019**
  - Other Annex II and III spatial data sets available

3 – Open Geospatial Consortium Met Ocean Domain Working Group

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What is the Open Geospatial Consortium : OGC ?

- A non-profit international organization founded in 1994,
- Develop publicly available interface standards for geospatial data and services
- Based on consensus from governments, private Industry, Academia, NGOs
- Some standards fast tracked in ISO

- The aim : ensure interoperability for geospatial data and services

OGC Standards Working Groups (2011)

Standards Working Groups

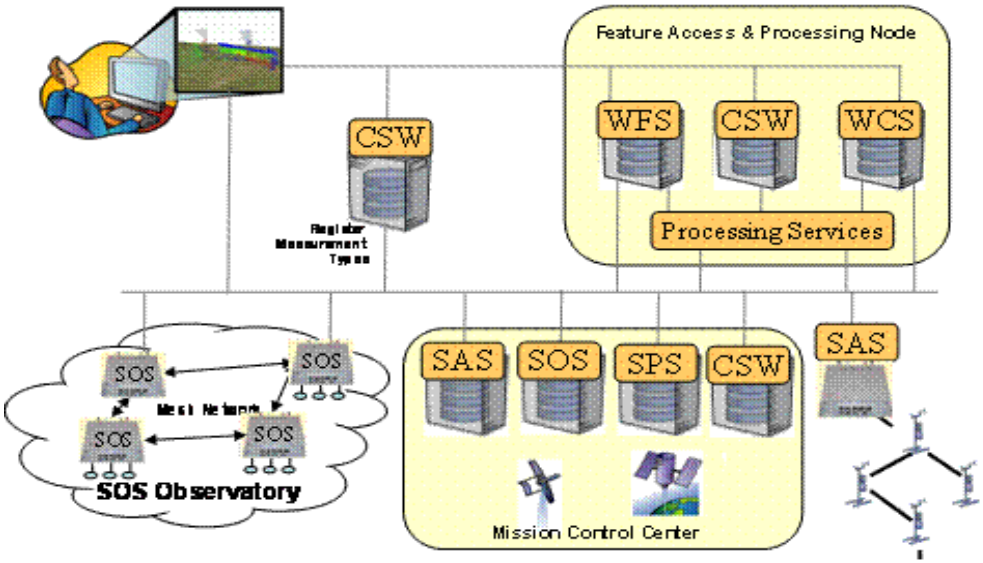
Standards Working Groups (SWG) have specific charter of working on a candidate standard prior to approval as an OGC standard or on making revisions to an existing OGC standard.

Name	Lead **
Catalogue Services 3.0 SWG (Cat 3.0 SWG)	Doug Nebert, US Geological Survey (USGS)
CF-NetCDF 1.0 SWG (CF-NetCDF1.0SWG)	Ben Domenico, National Center for Atmospheric Research (NCAR)
CityGML SWG (CityGML SWG)	Carsten Roensdorf, Ordnance Survey
ebRIM AP of CSW SWG (ebRIM AP of CSW)	Frédéric Houbie, ERDAS, Inc.
ebXML RegRep SWG (ebXMLRegRepSWG)	Frédéric Houbie, ERDAS, Inc.
GeoAPI 3.0 SWG (GeoAPI 3.0 SWG)	Martin Desruisseaux, GEOMATYS
Geographic Linkage Service 1.0 SWG (GLS 1.0 SWG)	Peter Schut, GeoConnections - Natural Resources Canada
GeoSPARQL SWG (GeoSPARQL SWG)	Carl Reed III, Open Geospatial Consortium, Inc.
GeoSynchronization 1.0 SWG (Geosync SWG)	Panagiotis (Peter) A. Vretanos, CubeWerx
GeoXACML SWG (GeoXACML SWG)	Jan Herrmann, Technische Universität München, Dept. of Informatics
GML 3.3 SWG (GML 3.3 SWG)	Clemens Portele, interactive instruments GmbH
GMLJP2 1.1 SWG (GMLJP2-1.1SWG)	David Burggraf, Galdos Systems Inc.
O&M 2.0 SWG (OM 2.0 SWG)	Simon Cox, CSIRO
OLS 1.3 SWG (OLS 1.3 SWG)	Carl Stephen Smyth, MAGIC Services Forum
Open GeoSMS SWG (Open GeoSMS SWG)	Kuo-Yu Chuang, Industrial Technology Research Institute
Ordering Services for Earth Observation Products SWG (order-eo1.0.swg)	Daniele Marchionni, European Space Agency (ESA)
OWS Common 1.2 SWG (OWSCommon1.2SWG)	James Greenwood, SeiCorp, Inc.
OWS Context SWG (OWScontextSWG)	David Wesloh, US National Geospatial-Intelligence Agency (NGA)
PubSub SWG (PubSub SWG)	Johannes Echterhoff, International Geospatial Services Institute (iGSI) GmbH
PUCK 1.0 SWG (PUCK 1.0 SWG)	Thomas O'Reilly, Monterey Bay Aquarium Research Institute
Sensor Model Language (SensorML) 2.0 SWG (SensorML2.0SWG)	Mike Botts, Botts Innovative Research
Sensor Observation Service (SOS) 2.0 SWG (SOS SWG)	Arne Broering, 52° North Initiative for Geospatial Open Source Software GmbH
Simple Features SWG (SF SWG)	John Herring, Oracle USA
Styled Layer Descriptor and Symbology Encoding 1.2 SWG (SLDSE 1.2 SWG)	Olivier Ertz, School of Business & Engineering Vaud (HEIG-VD)
SWE Common SWG (SWECommonSWG)	Alexandre Robin, Spot Image
WCS 2.0 SWG (WCS 2.0 SWG)	Steven Keens, PCI Geomatics Inc.
Web Mapping Service 1.4 SWG (WMS 1.4 SWG)	Satish Sankaran, ESRI
Web Processing Service 2.0 SWG (WPS 2.0 SWG)	Bastian Schäffer, University of Muenster - Institute for Geoinformatics
WFS Gazetteer Profile 1.0 SWG (WFSgaz1.0 SWG)	Doug Nebert, US Geological Survey (USGS)

** - There may be Co-Chairs or Vice-Chairs that are not listed in this table

« Core » OGC standards

- Catalogue Service for the Web (CSW)
- Web Map Service (WMS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- *Web Processing Service (WPS)*
- Sensor Observation Service (SOS)
- Sensor Planning Service (SPS)
- Sensor Alert Service (SAS)



- **Geography Markup Language (GML)**

OGC Domain Working Groups (2011)

Domain Working Groups

Domain Working Groups (DWG or WG) provide a forum for discussion of key interoperability requirements and issues, discussion and review of implementation specifications, and presentations on key technology areas relevant to solving geospatial interoperability issues.

Name	Lead **
3DIM WG (3DIM WG)	Tim Case, Case, Tim
Architecture DWG (Arch DWG)	Doug Nebert, US Geological Survey (USGS)
Aviation DWG (Aviation DWG)	Navin Vembar, FAA System Operations Airspace and AIM Office
Catalog WG (Cat WG)	Doug Nebert, US Geological Survey (USGS)
Coordinate Reference System WG (CRS WG)	Victor Minor, Blue Marble Geographics
Coverages WG (Cover WG)	Peter Baumann, FORWISS (Bavarian Research Centre for Knowledge-Based Systems)
Data Preservation WG (PreservWG)	Steve Morris, North Carolina State University
Data Quality WG (DQ WG)	Victor Minor, Blue Marble Geographics
Decision Support WG (DS WG)	Stan Tillman, Intergraph Corporation
Defense and Intelligence DWG (D and I DWG)	Richard Pearsall, US National Geospatial-Intelligence Agency (NGA)
Earth Systems Science DWG (ESS WG)	Phillip Dibner, Ecosystem Research
Emergency & Disaster Management DWG (EDM DWG)	Lewis Leinenweber, Evolution Technologies, Inc.
Geo Rights Management (GeoRM) WG (GeoRM WG)	Roland Wagner, BHT-Berlin (Beuth Hochschule für Technik Berlin)
Geography Markup Language (GML) WG (GML WG)	Ron Lake, Galdos Systems Inc.
Geometry WG (GeometryWG)	John Herring, Oracle USA
Geosemantics DWG (Semantics)	Joshua Lieberman, Traverse Technologies, Inc.
Hydrology DWG (Hydrology DWG)	David Lemon, CSIRO
Location Services WG (LS WG)	Marwa Mabrouk, ESRI
Mass Market Geo WG (MassMarket)	Ed Parsons, Google
Metadata WG (Metadat WG)	David Danko, ESRI
Meteorology & Oceanography DWG (Met Ocean DWG)	Chris Little, UK Met Office
Oblique Imagery DWG (ObliqueImageryD)	Shayne Urbanowski, Lockheed Martin
Security DWG (SecurityDWG)	Andreas Matheus, University of the Bundeswehr - ITIS
Sensor Web Enablement WG (SensorWeb)	Mike Botts, Botts Innovative Research
University WG (Univ WG)	Chris Higgins, Open Grid Forum
Web Feature Service WG (WFS WG)	Martin Daly, cadcorp (Computer Aided Development Corp.) Ltd.
Workflow DWG (Workflow DWG)	Stan Tillman, Intergraph Corporation
** - There may be Co-Chairs or Vice-Chairs that are not listed in this table	

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A Met Ocean Domain Working Group

- Created in 2009 to improve interoperability for Met Ocean data and services
  - A MoU signed between WMO and OGC on November 2009
  - 2 co chairs : Chris Little (UK Met) and Marie-Françoise Voidrot (Meteo-France)

- First aims :
  - Agree on Best Practices recommendations for the Web Map Service Specification
  - Contribute to the development of a model of data consistent with all stakeholders initiatives

- Resources
  - Public TWIKI : http://external.opengis.org/twiki_public/bin/view/MeteoDWG/WebHome
  - Teleconferences
  - Face to face meetings each 3 monthes during OGC Technical Comittees

- Meteo-France is fully involved to support the consistency of the works

Challenges for OGC standards in Meteorology *

- Long history of interoperability at human/paper level
- Spatial & Temporal, 2D, 3D, 4+D, constantly changing
- Not MBytes, but GB, TB and PBytes of data daily.
- Regular & Irregular time intervals
- Timescales: hours,.., seasons,.., centuries, + & -
- Multiple Time attributes
- 'Regular' grids are not always regular
- Continual change of coordinate systems & re-projecting
- Eulerian versus Lagrangian viewpoints
- Vertical coordinates
- Cross-sections, height-time diagrams, T/φs, etc
- Ensembles: probabilistic distributions
- Significant 'Objects', features of interest
- Meteorology specific terminology

*Courtesy Chris Little

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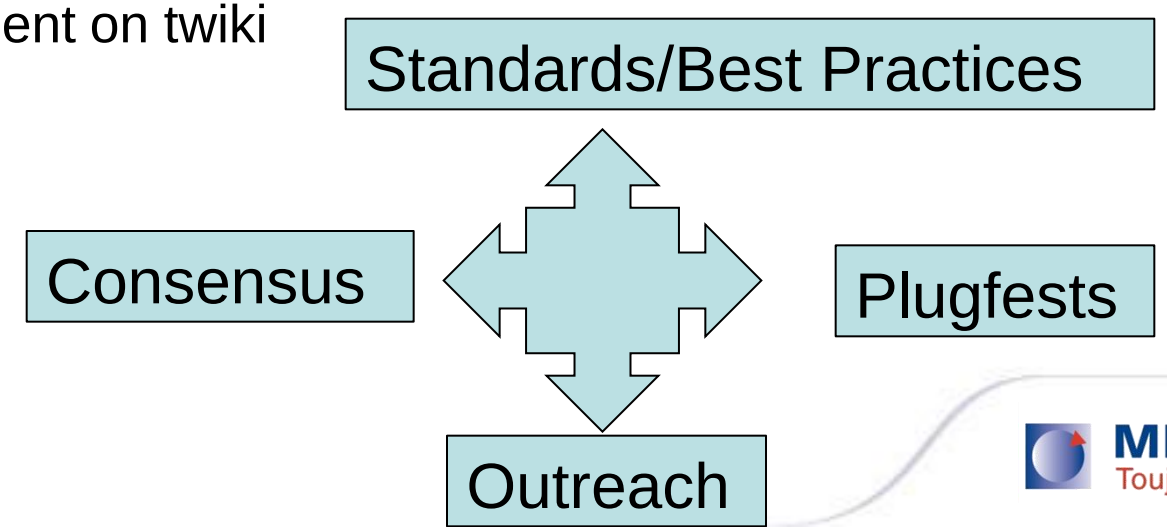
Activities

- Support communication between Met and OGC communities
- Workshops on the “Use of GIS/OGC standards in meteorology” once a year to identifiy issues and priorities of work
- Develop OGC experts awareness on Met issues to improve future standards
- Work on Best practices and repositories of vocabulary, symbols, …
- Plugfests
- Contributing to 2D versus 4D debate in OGC
- Meetings, teleconferences, to push works
- Document on twiki



Met Ocean Achievements

- WMS 1.3 Best Practice published, no Met terminology
  - Published : http://www.opengeospatial.org/standards/wms
  - Successful EGOWS plugfest 2014 Oslo, next one in ECMWF oct 2015
- SVG Met symbols repository on GitHub
  - https://github.com/OGCMetOceanDWG/WorldWeatherSymbols] incorporated into gvSig distribution, QGIS next!
- Aviation/Meteorology Conceptual modelling published founded on O&M
- WCS 2.0 Extensions and profile progressing (slice, dice, curtain, …)
- Met Ocean DWG and Hydro DWG collaboration
  - Hydro WaterML is now WMO standard
  - TimeSerieML on works
- Météo-France participated in OGC IE Test bed

4 – Which benefits can we get from interoperability

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Interoperability aims

- Make heterogeneous systems compatible
- Facilitate the exchanges and collaboration within your own information system or with external systems
- Quality
- Evolutivity
- Modularity
- Reduce costs and risks

Interoperability benefits

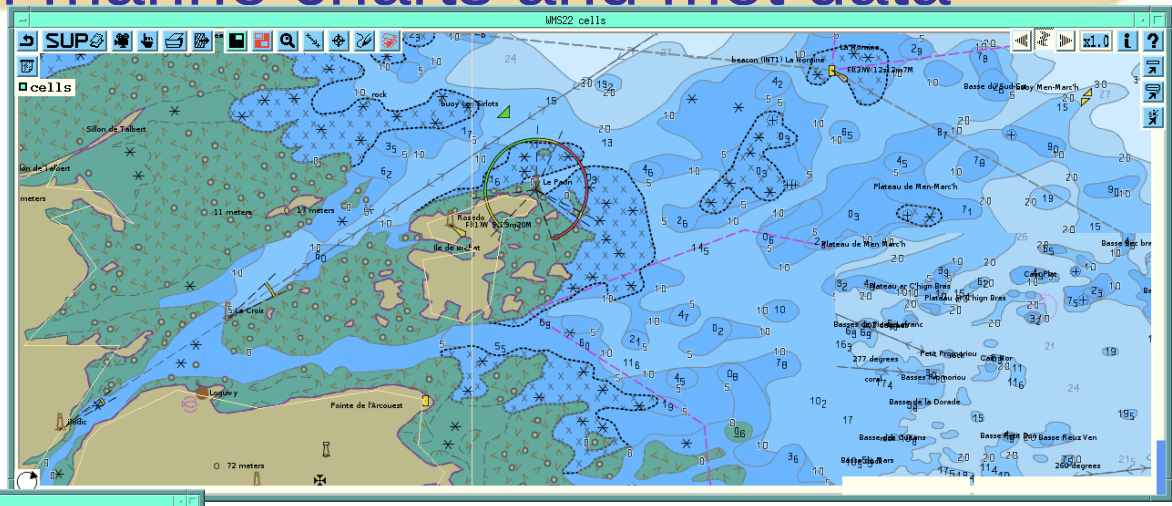
Interoperability allows to open your information system :

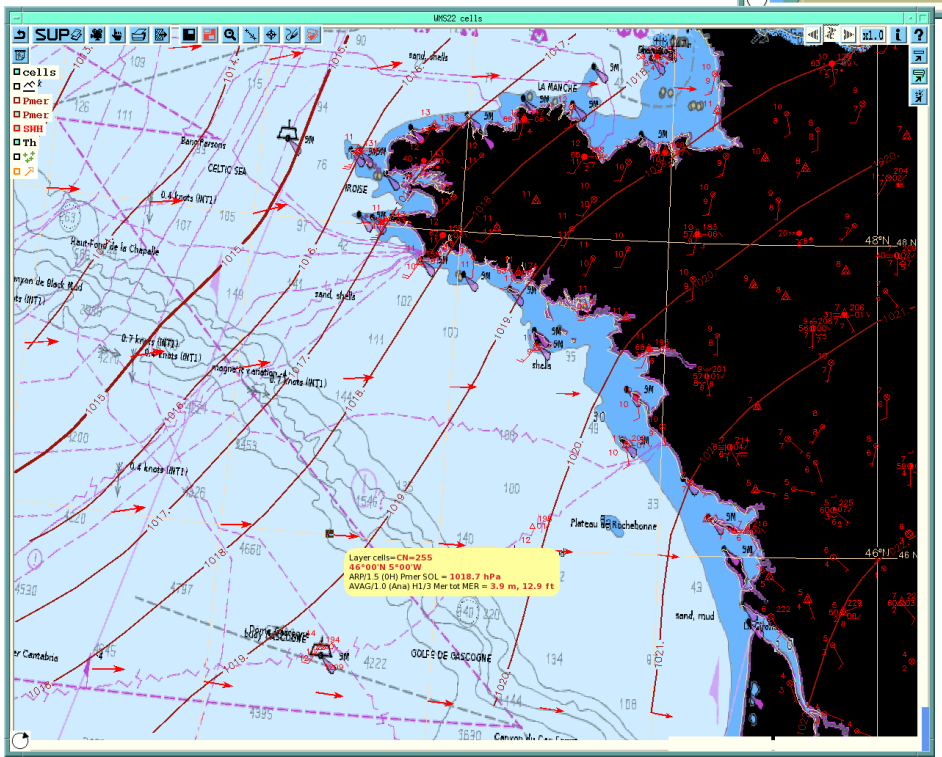
- In output : 
  - make your data and services available to other informations systems

- In input :
  - benefit from more external data , meteorological or not
  - Open streetmap,

- To benefit from open-source developments
  - Openlayers, geoserver, webmap server…

Example :
Combination of marine charts and met data





Marine charts provided by

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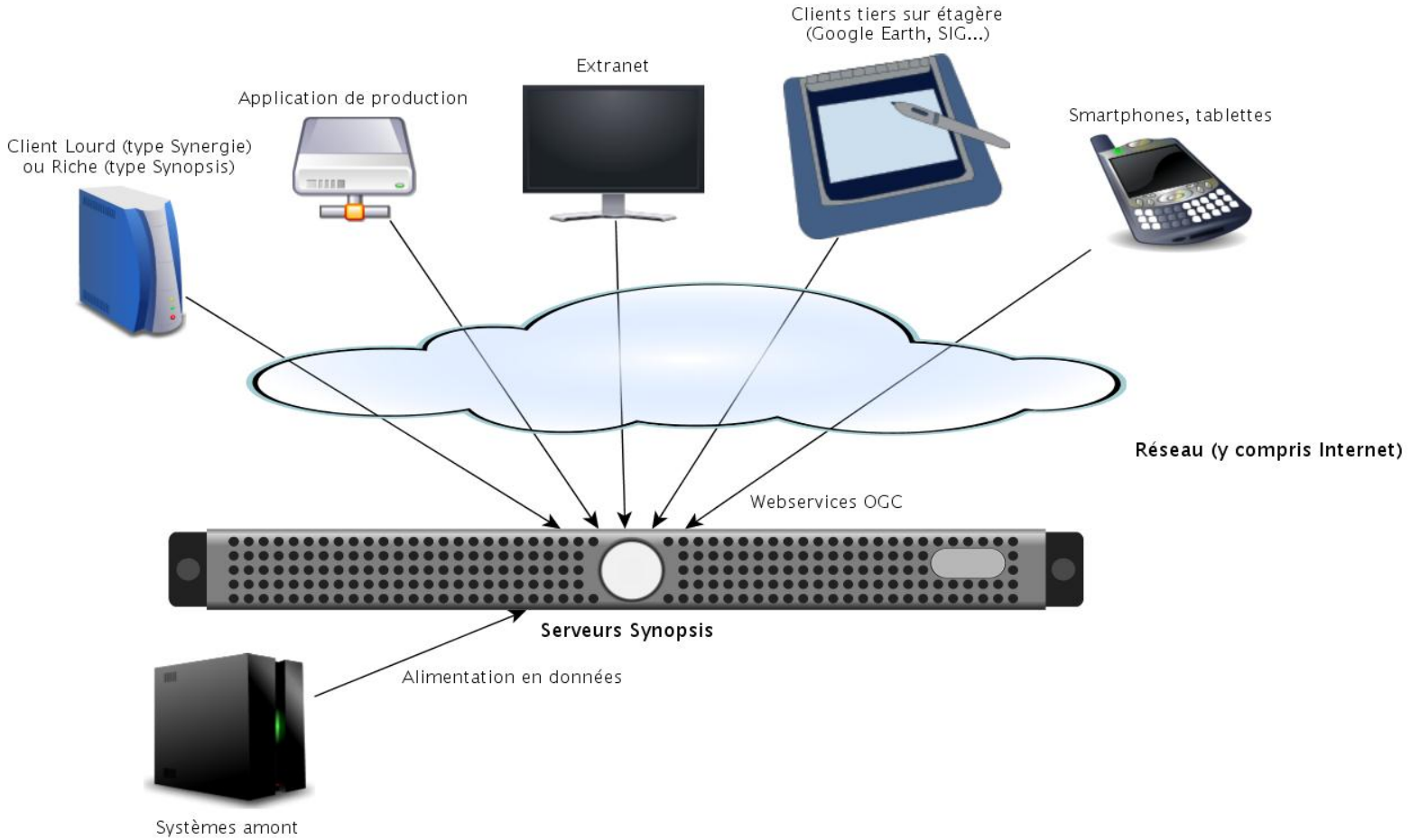
From developpement to integration to provide more services

More easily available

- mobile clients



5 – Where are we now?

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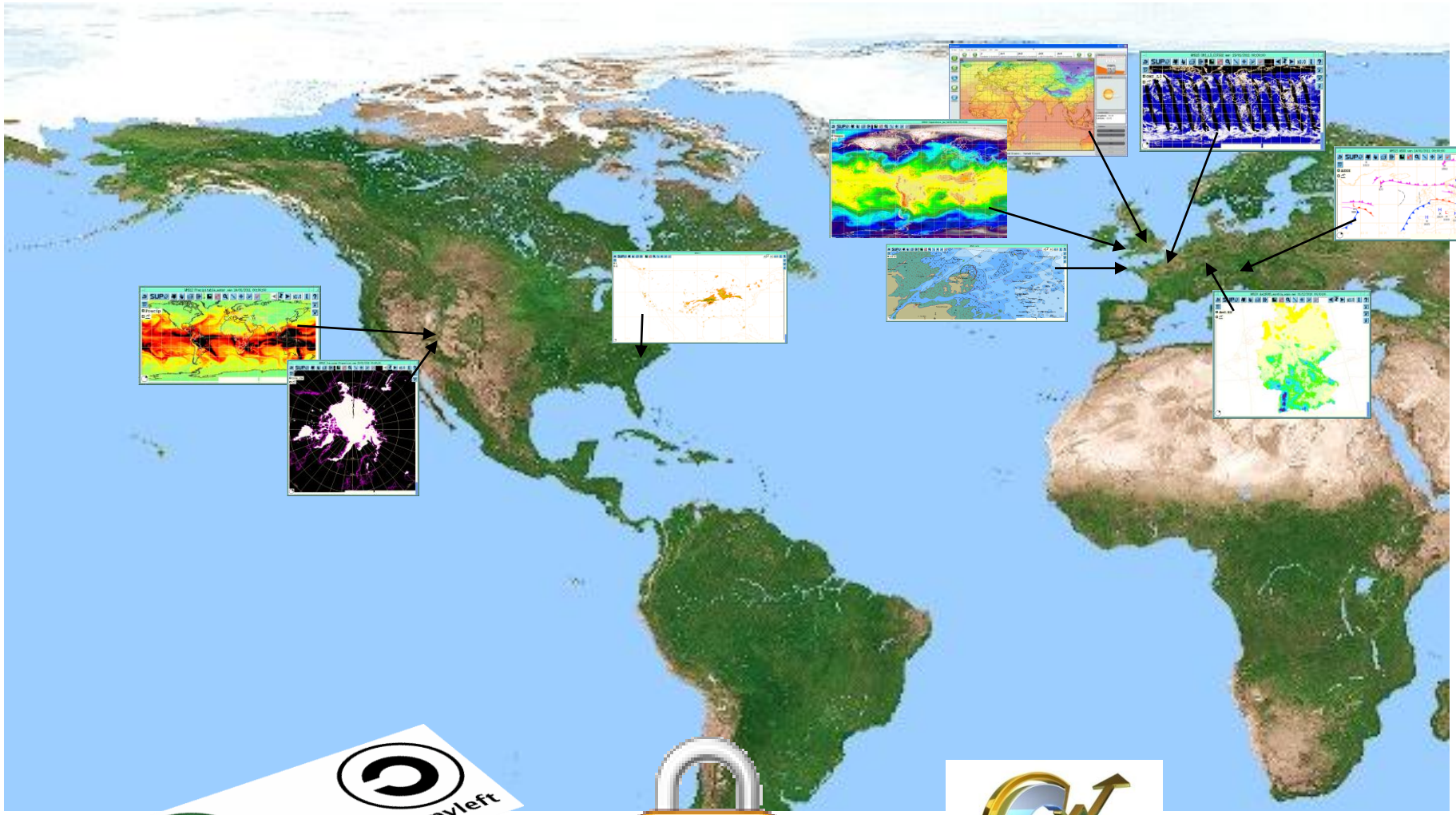
A blooming of servers



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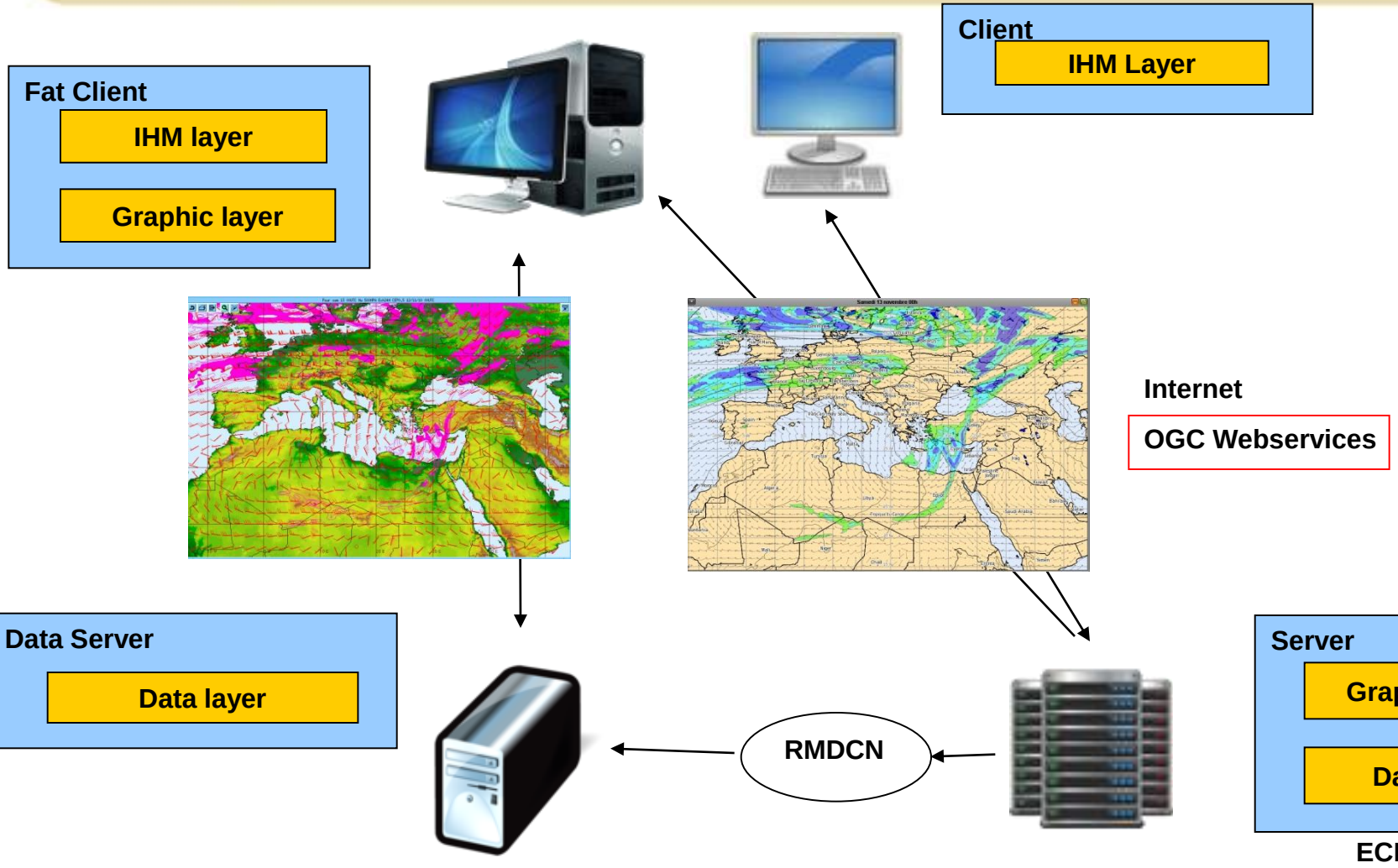
Validation and quality issues



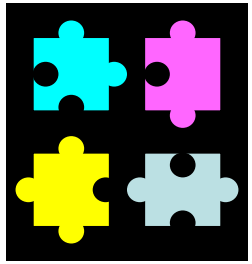
4 - Conclusion

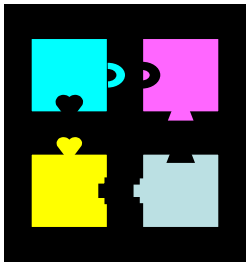
Conclusion : Web services begin to

- Can change the trades off between push and pull dissemination
- Raise up new issues : discovery of the data, selection of the products (quality information…),…
- Change the bases of competence in term of :
  - Services
  - Products
  - Data fusion
- Raise the risks (relyability of the network, reliability of the producer…)
- Develop new possibilities
  - in house
  - towards the outside
- Requires the definition of SLA = Service Level Agreement
  - On our products, data, processes (rights and services commitments)
  - On our providers (requirements of quality level for data, services, …)

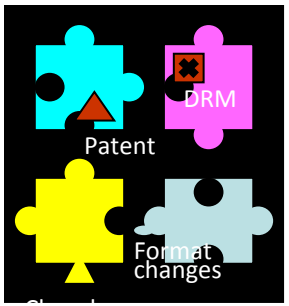
A major transition phase supported by several initiatives

- Past :
  - interoperability between meteorological services
  - Compatibility with institutional customers





- Future
  - More interoperability with heterogeneous domains
    - Hydrology
    - Agriculture
    - Roads
    - Politics
    - …



Some challenges nevermind…

- Always very constrained Time response

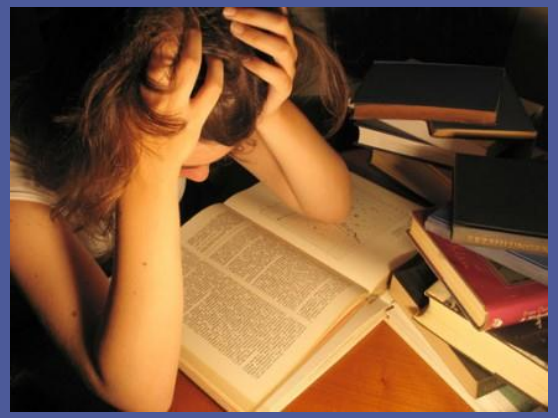
- A service continuity anytime
  - With a huge legacy system
  - Critical safety missions

- Standards yes … but with flexibility to support permanent evolutions :
  - of technology (captors, computers, telecommunications,…)
  - of science
  - Of the users expectations

Crisis in chinese

危机

Wei (danger) *Ji* (opportunity).



Just don’t ignore it *Get prepared*

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