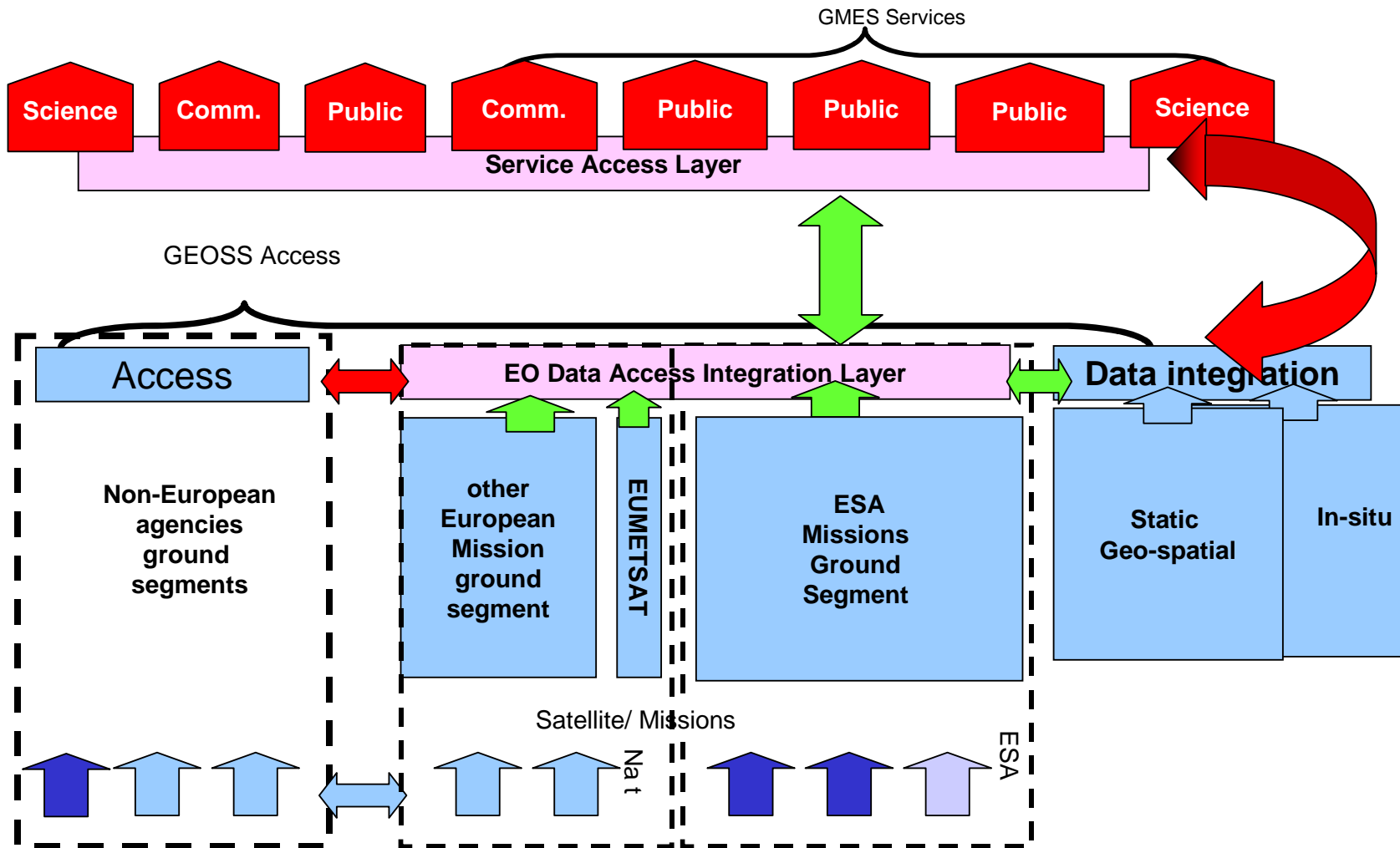


ESA GMES preparatory Activities: Heterogeneous Missions Accessibility

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... The ground segment includes the “necessary interfaces for requesting and accessing data from national and Eumetsat missions forming part of *GMES*” ...

GAC(2004)7_Fin (12.07.04), Reflection Paper: GMES Space Observation Component



- Consolidate scenarios and interoperability requirements
- Define the EO DAIL architecture
- Define and prototype an interoperable protocol for catalogue, order, mission planning,...
- Define approach for User Management
- Define approach for online data access
- Address interoperability requirements arising from:
 - data quality and formats
 - data policy, SLA, etc.
 - security

| <i>Partner</i> | <i>Mission</i> |
|---------------------|----------------------------|
| ASI / Alenia Spazio | Cosmo-Skymed |
| CNES | Pleiades, Spot |
| CSA / MDA | Radarsat |
| DLR | Terrasar, RapidEye |
| EUSC | User |
| ESA | ERS, ENVISAT, Sentinels |

- High level requirement: make easy
 - the search for available products
 - the request for future acquisitions
 - The ordering of the products

- Across multiple missions

- *Independent* missions do not provide any access nor management of any resources to another mission.
- *Federated* missions share access to GS resources, typically catalogue functions.
- *Cooperative* missions allow other missions to place orders, i.e. to access to their space resources.
- *Collaborating* (or loosely coupled) missions may delegate mission planning functions to a partner, e.g. for optimum scheduling of observations over exclusive right zones.
- *Integrated* (or *tightly coupled*) missions are the highest level of interoperation, typically conceived as a single system

➤ External Requirements and Interfaces

- ESA studies (sentinels, service architecture, ...)
- GSE projects
- EC GMES Integrated Projects (e.g. ORCHESTRA, WIN OASIS, GEOLAND, ...)
- INSPIRE
- EUMETSAT

- ESA GMES Preparatory studies (PGS, service architecture, ...)
- ESA established the GMES TCT to coordinate activities
- GSE projects
- Co-location in December 2005
- EC GMES Integrated Projects (e.g. ORCHESTRA, WIN OASIS, GEOLAND, ...)
- Architecture WG established with ORCHESTRA, WIN OASIS
- INSPIRE
- Coordinated approach being set-up, work-plan on catalogue issues established
- EUMETSAT
- Technical co-ordination under definition

- Proposed approach to achieve interoperability:
 - Pull IT standards
 - Push new approach for EO & Geospatial within OGC

- Co-ordination with INSPIRE:
 - Reference document Minimal profile Discussion Paper
 - Catalogue and Discovery Workshop



- four fields in which ESA and the JRC undertake to work together in close cooperation:
- coordinating the use of Earth Observation satellite missions, in which they have a common interest
 - developing services aimed at meeting the specific needs of end users (in particular in EU services)
 - optimising access to support information for EC actions
 - coordinating and providing technical support with regard to Earth observation activities within the European initiative INSPIRE (INfrastructure for SPatial InfoRmation in the European Union), whose objective is harmonising the methods employed by Member States to collect data on the geographical characteristics of their own territories.

- **Heterogeneous Mission Accessibility**
 - EO Data Providers interface standards for catalogue, ordering, mission planning, on-line data access, user management.
 - 2Q2006 – TBC
 - Prototype of the integrated and harmonised access of EO ESA missions, Cosmo, Pleiades, TerraSAR-X, Radarsat-2, SPOT-4/5... using the defined interface standards
 - 1Q2007 - TBC

- **GMES Requirement Definition for Multi-Mission Generic Quality Control Standards (EO products quality certification):**
 - Quality Parameters and Indexes for each instrument domain
 - Quality reporting requirements and acceptable quality threshold values
 - First results: 3Q2006

- **EO products and its format harmonization across heterogeneous EO mission data**
 - Start: 2Q2006, First results: 1Q2007

➤ Protocol/standards taxonomy (arbitrary)

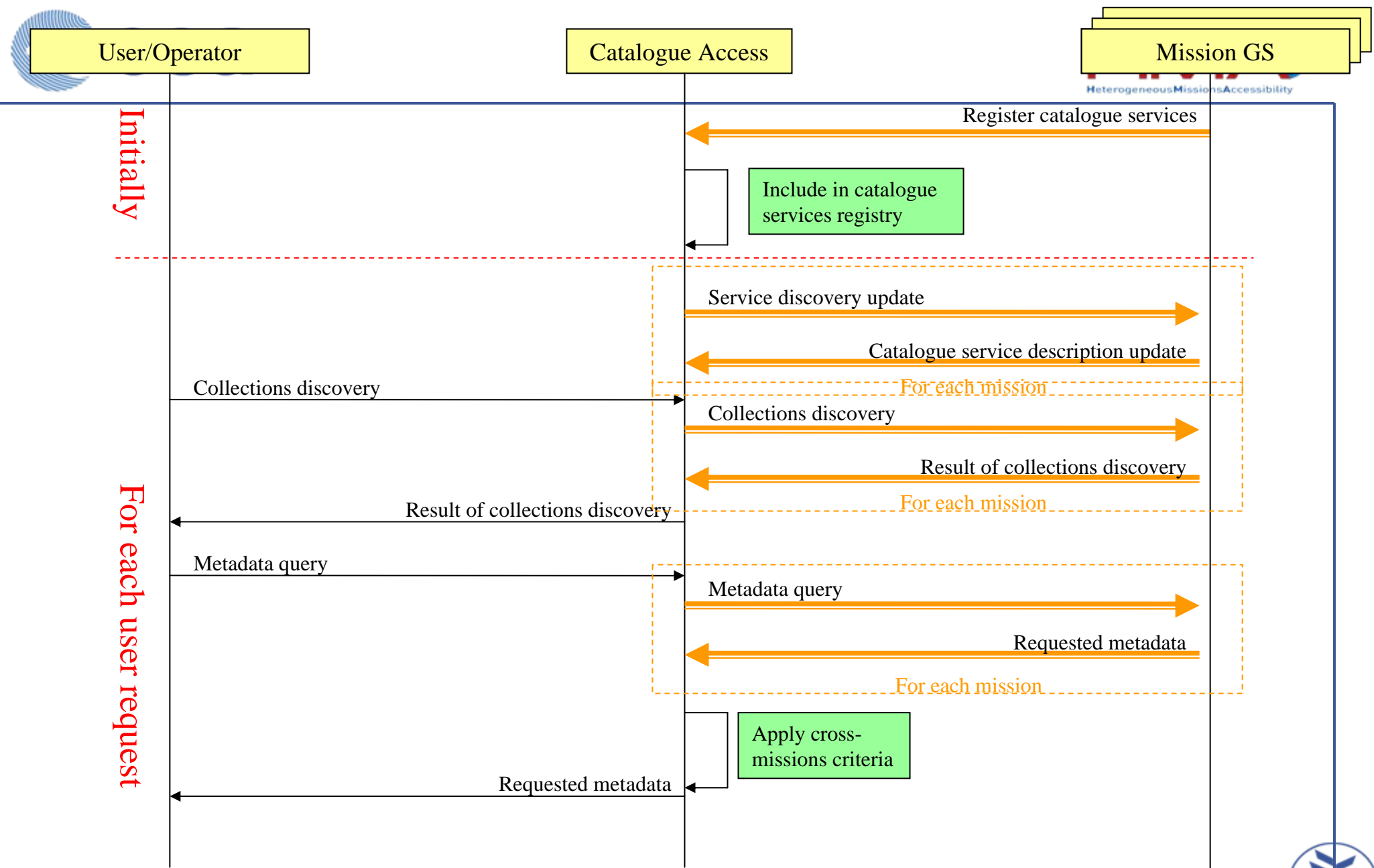
- Information Technology:
 - Service Oriented Architecture, Web Services, WSDL, SOAP
- Geospatial:
 - Web Map Server, Web Coverage Server, Web Feature Server
- Space & EO:
 - Catalogue Interoperability Protocol,
 - HDF, GeoTiff, JPEG2000

➤ Standardisation Bodies taxonomy (arbitrary)

- Information Technology:
 - World Wide Web Consortium W3C, OASIS
- Geospatial:
 - Open Geospatial Consortium, ISO, CEN
- Space & EO:
 - ISO, CEOS, CCSDS

- Select protocols based on current industrial technology standards (W3C/OASIS) e.g. XML/SOAP/WSDL.
- Discussion Paper to OGC for “Minimal Profile for EO products using WSDL and SOAP” of the current OpenGeospatial Catalogue Services CSW2.0
- Seek alignment with INSPIRE (this “catalogue workshop”)
- Propose adoption within the Implementing Rules
- ISO adoption / standardisation of specifications - long term goal

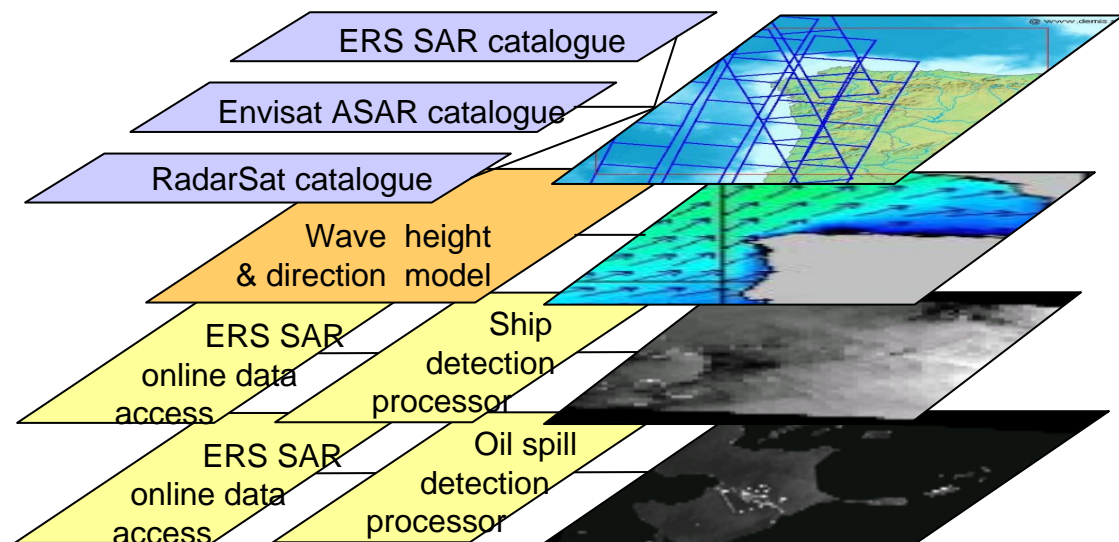
- From W3C and OASIS
- Web services
 - WSDL file describes operation e.g. search, present, order,...
 - XML schema to describe metadata (ISO 19115)
 - document-style SOAP
- ws-addressing (W3C) for asynchronous communication
- UDDI service registry
- BPEL (OASIS) for service orchestration



Scenario US2_3 – Interoperable catalogue interfaces

➤ Online Data access & distribution mechanisms

- FTP/HTTP : URL passed in SOAP message
- WCS - as alternative data distribution mechanism
- WCTS – to perform transformation services
- WFS - to publish service results (vector data)



- Minimal profile for EO Products
- Discovery
- Service registries for SOA select approach
 - Ws-inspection
 - UDDI
 - OGC CSW
 - RSS

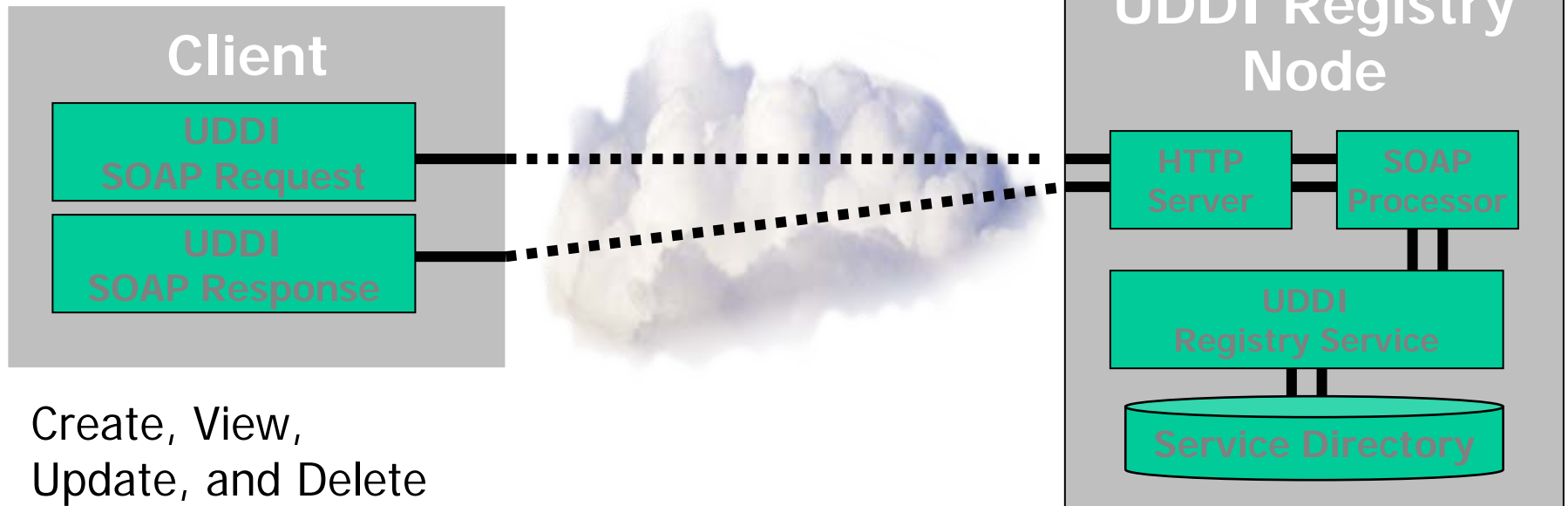
➤ Under test/demo:

- W3C
 - SOAP, WSDL, XML Schema, ws-addressing
- OASIS
 - BPEL
- OGC
 - GML, WMS, WMS-context
 - WCS, WCTS (from BPEL)
- Other
 - Alexandria gazetteer
 - **Ws-inspection**
 - RSS, WSIF
 - WS-I (Basic Profile)

➤ Planned:

- OGC WFS
- OGC CSW (client)
- OGC Gazetteer
- LDAP, SAML
- Ws-security, **UDDI**
- RDF, RDFS, OWL, OWL-S
- Google KML

- Defines protocols for
 - Publishing and searching services registry
 - Controlling access to registry
 - Distributing and delegating to other registries

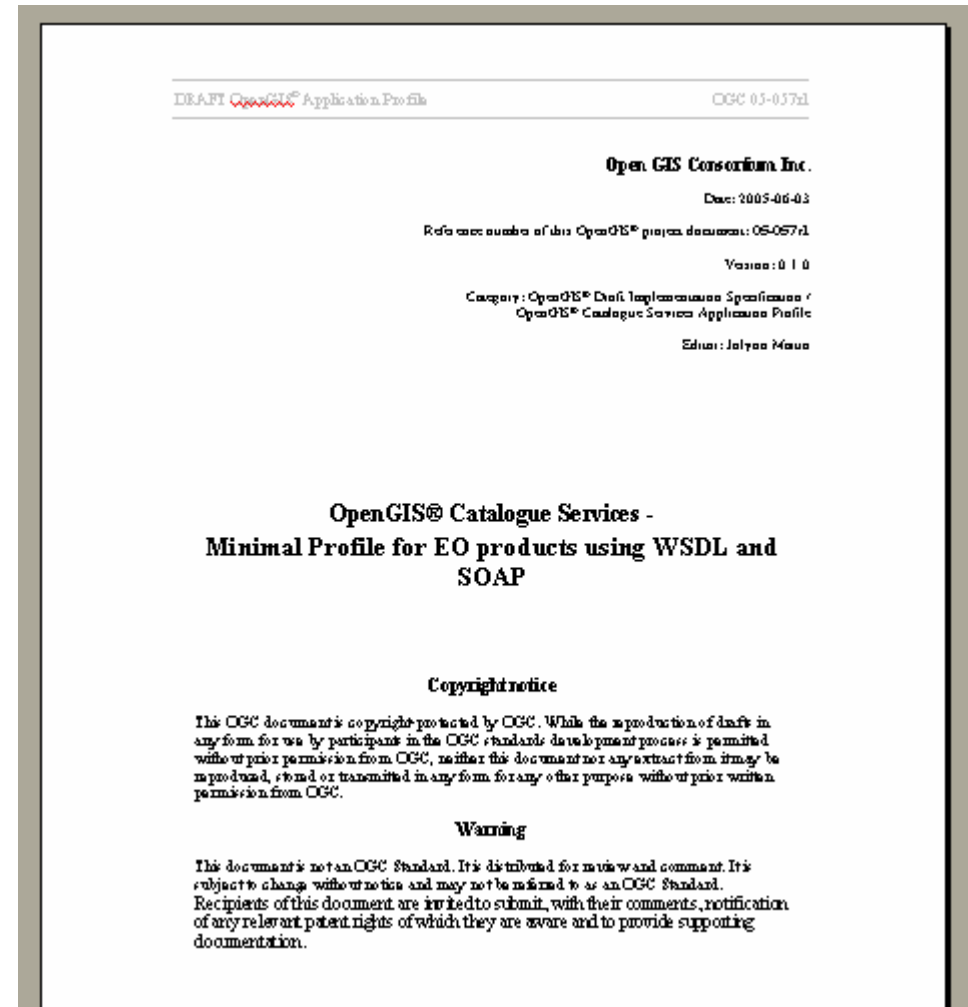


Create, View,
Update, and Delete
registrations

➤ OGC CSW

- Registry for data and services
- Mainly for OGC services, not related to WSDL
- GetCapabilities() allows to discover supported (catalogue) operations
- Calls service.GetCapabilities() to harvest metadata
- Many profiles, bindings reduce interoperability
- Still maturing in OWS-3 experiments (ebRIM)
- Not supported by main Web service and BPM tool vendors

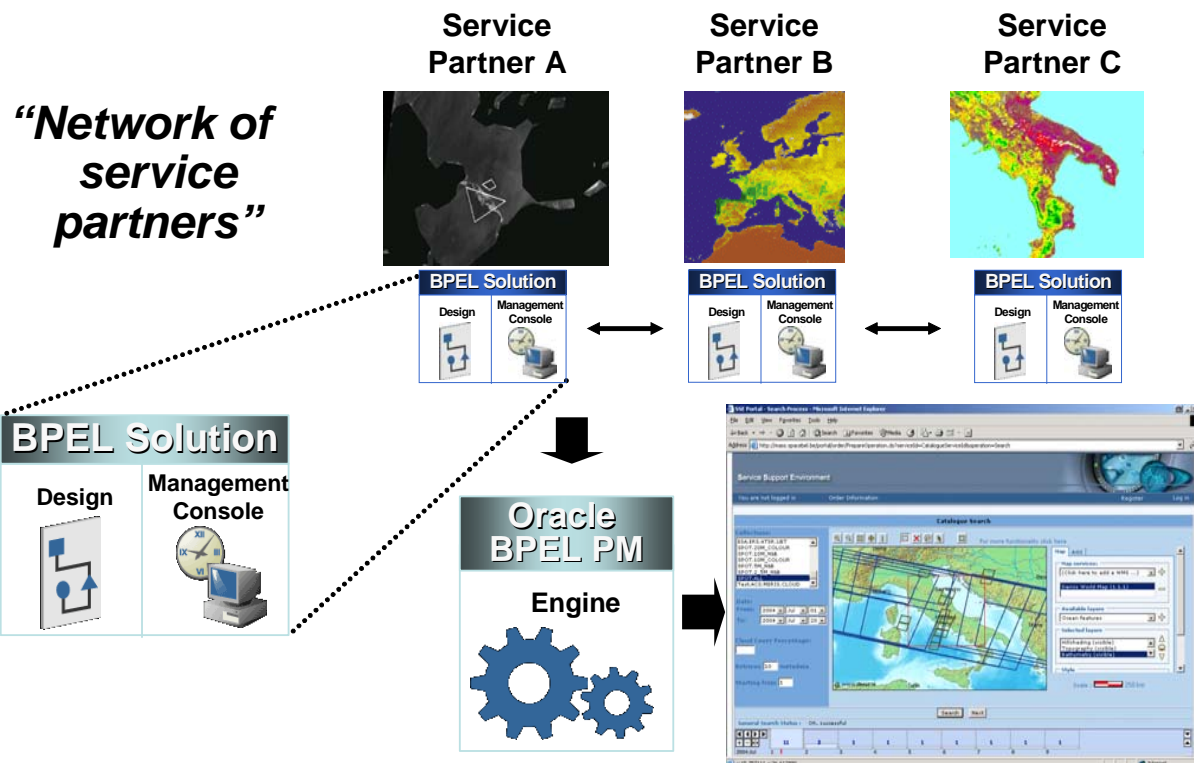
- Not fully compliant with OGC Catalogue Specification v 2.0 – in some ways further advanced, in some ways less: thus raised as discussion paper
- A “readable/digestible” specification (<50 pages)
- Still some issues to be addressed, e.g. security wrt. ordering
- A starting point for HMA for catalogue and order, open for revision within the GMES preparatory activities
- Replacement for CEOS/CIP, but requires some additional work for discovery of collections
- Catalogue WG presentation by: Jolyon Martin ESA



- Which "standards" or "profiles" to be used to be interoperable ?
- Data and services to be dealt with same standard ?
- Service taxonomy interoperability ?

- Selection criteria for "service discovery" spec:
 - In-line with main IT standards for Web services
 - If multiple profiles, bindings or non-compatible versions: a single choice is to be made.
 - Allow use of cheap COTS for development and deployment
 - Should allow non-intrusive addition of identity mgt, Web service management and policy enforcement COTS
 - Should be understood by service chaining COTS

Based on ESA Service Support Environment infrastructure:



- <http://services.eoportal.org>
- Jolyon.Martin@esa.int
- yves.coene@spacebel.be