



ENVIROFI

THE FUTURE INTERNET ENABLEMENT OF THE ENVIRONMENT INFORMATION SPACE

ISESS 2013
Neusiedl, 10/10/2013

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Three phases of the Future Internet Programme (FI-PPP)

Phase 2: Apr 2013 - Mar 2015

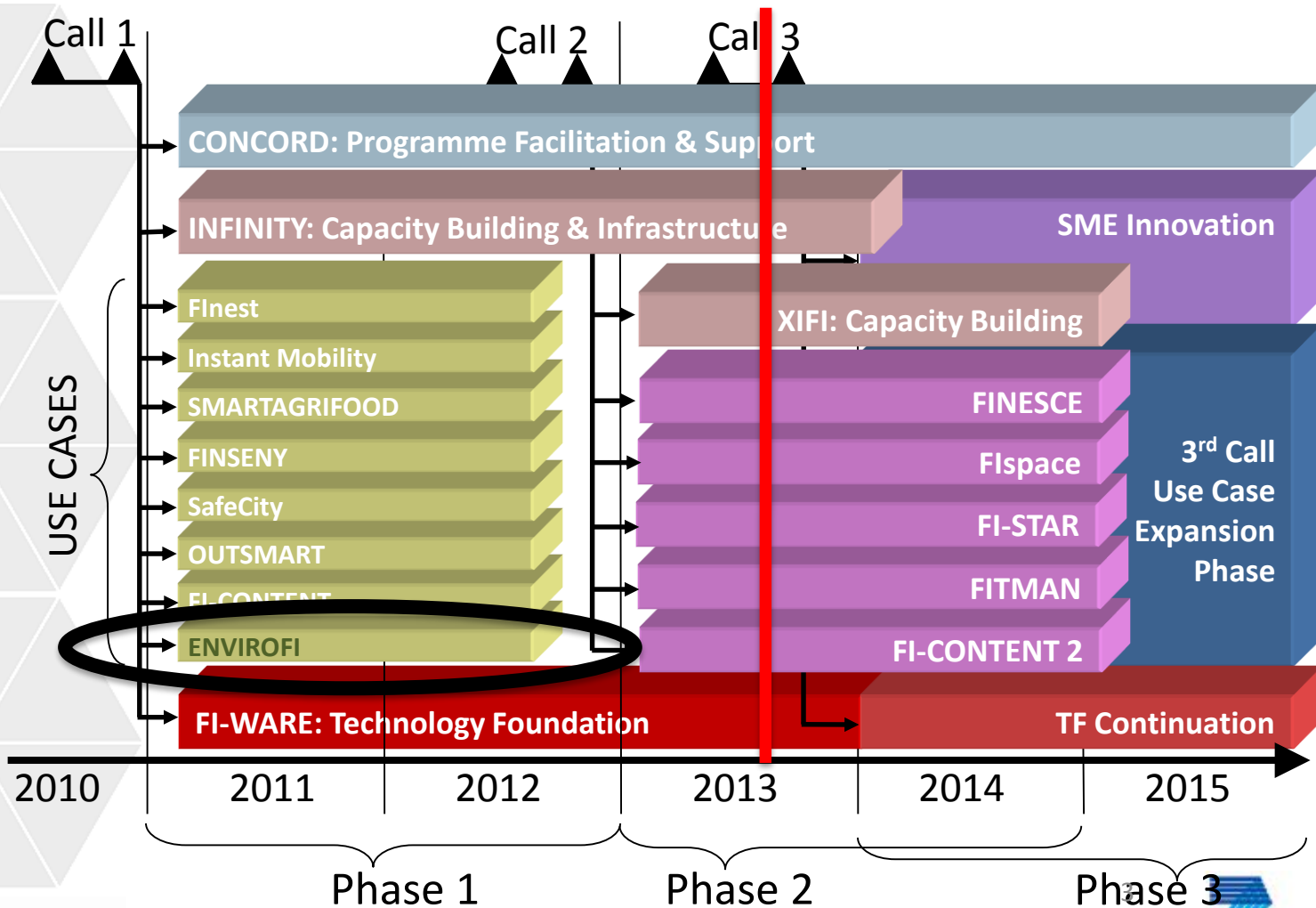
- Prepare for early trials
- Develop core platform and use case specific functionalities
- Run early trials

Phase 3: May 2014 - Oct 2015

- Provide stable infrastructure for large-scale trials
- Prove viability of concept through large-scale trials including innovative SMEs

Phase 1: Apr 2011 - Mar 2013

- Usage area requirements
- Development of architecture and generic and specific enablers
- Evaluation of test infrastructures



Scenarios



1. Bringing Biodiversity into the Future Internet

- Enabled biodiversity surveys with advanced ontologies
- Analysis, quality assurance and dissemination of biodiversity data



2. Personal Information System for Air Pollutants, allergens and meteorological conditions

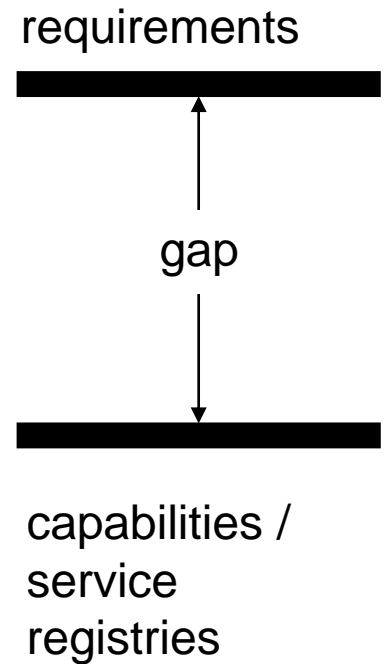
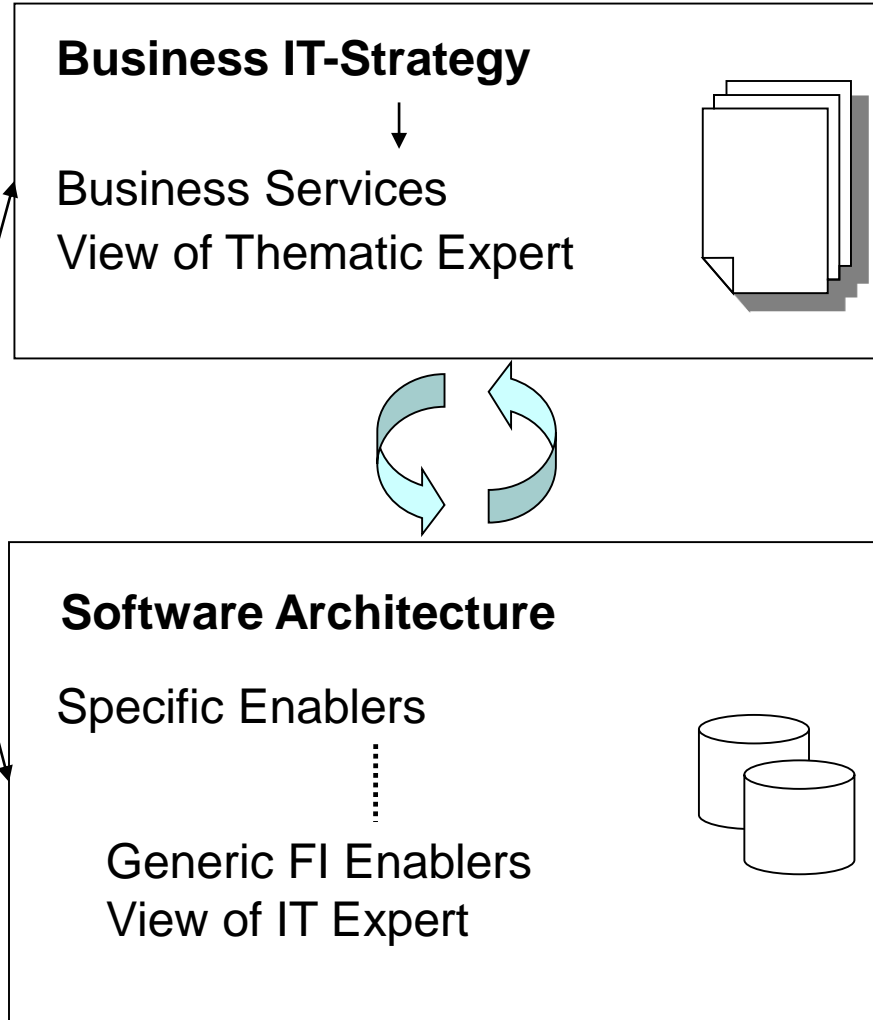
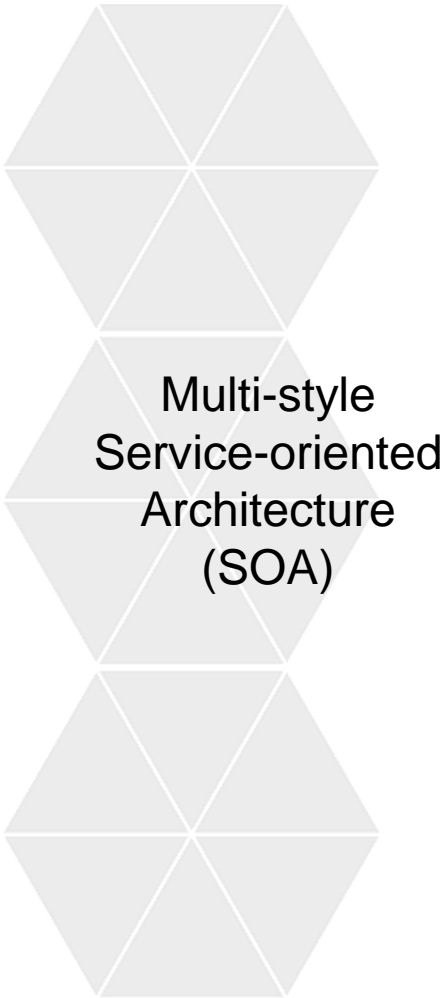
- Enhance human to environment interaction
- Atmospheric conditions and pollution in “the palm of your hand”



3. Collaborative Usage of Marine Data Assets

- Assess needs of key marine user communities
- Selection of representative marine use cases for further trial: leisure and tourism, ocean energy devices, aquaculture, oil spill alert

Service-oriented Analysis and Design



“ENVIROfying” the Future Internet: Requirements vs. Capabilities

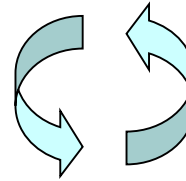
Biodiversity

Air Quality

Maritime
Risks

Compliance with
standards !

requirements



capabilities



Environmental Enablers

Future Internet
Core Platform (Generic Enablers)

Compliance with Standards ?



TC/211
19119 NWIP



Air

Biodiv

SensorWeb
Ref.arch



Various Standardization activities



MetOcean

TC/287

SoaML



European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung



Reference Architecture Baseline

OGC 07-097
Best Practices
paper

OGC 09-132r1
Discussion
paper

OGC 13-015
Best Practices
paper

ISO 19119
revision

ISO Reference Model for Open Distributed Processing (RM-ODP)

RM-OA

SensorSA

SWE Best Practices

Environmental
Risk Management

Environmental
Monitoring

Environmental
and Health Risks

Biodiversity, Air
quality and
Maritime Risks



Geospatial SOA

Sensor Web

Spatial Information
Infrastructure

2006

2007

2008

2009

2010

2011

2012

2013

t
and Media

ISO 19119 rev: Change areas

- Focus on normative parts (requirements) (Configuration management and backward compatibility)
- Service taxonomy (multiple, including “life cycle”)
 - Revise/enhance the services taxonomy – with specification of both architectural based and life cycle based taxonomy and their relationships
- Service modeling (examples of Service models)
 - Relationship with OWS Common (OGC)
- Abstract test suite – test all the requirements
- Missing modularisation recommendation, PMG comments
- Relationship to Enterprise architecture, and enterprise viewpoint i.e. TOGAF
- Relationship to ISO 19101 reference model, classify concepts etc., matrix ref. service
- OSE relationship – previous ISO standard (withdrawn)
- References to other documents – TR 15449, projects etc. ..ENVIROFI etc.
- Clarify/ relationship/references to CEN/TC289 TR 15449-4 and input references

Reference Architecture Baseline

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SWE Best Practices

Biodiversity, Air
quality and
Maritime Risks

Environmental
Risk Management

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Environmental
and Health Risks



Geospatial SOA

Sensor Web

Spatial Information
Infrastructure

FI-WARE
core platform

2006

2007

2008

2009

2010

2011

2012

2013

Allocation of Virtual Machines (VMs)

Allocation of Object Storage

Creation of Cloud Proxies

**Cloud
Inter-
face**

Data
Proces-
sing

Data
Analy-
tics

App
Services

IoT

Secu-
rity

FI-WARE

**Generic
Enablers**

- Complex Event Processing (CEP)
- Publish/Subscribe Broker
- Big Data Analysis
- Video Analysis
- Query broker
- Location Service
- Semantic Application (Support)

Cloud
Inter-
face

Data
Proces-
sing

Data
Analy-
tics

App
Services

IoT

Secu-
rity

FI-WARE

**Generic
Enablers**

FI-WARE Core Platform Architecture (3)

Service Description Repository

Marketplace

Light Semantic Composition Editor

Mashup Factory

WireCloud

Mediator



The diagram shows a horizontal bar with six rounded rectangular boxes. From left to right, the boxes are: 'Cloud Interface', 'Data Processing', 'Data Analytics', 'App Services', 'IoT', and 'Security'. The 'App Services' box is highlighted in a darker blue color, while the others are a lighter beige color. The entire bar is enclosed in a blue border.

Cloud
Inter-
face

Data
Proces-
sing

Data
Analy-
tics

App
Services

IoT

Secu-
rity

FI-WARE

**Generic
Enablers**

Things Management
Device Management
Advanced Connectivity Management
Data Handling
Protocol Adapter

Cloud
Inter-
face

Data
Proces-
sing

Data
Analy-
tics

App
Services

IoT

Secu-
rity

FI-WARE

**Generic
Enablers**

FI-WARE Core Platform Architecture (5)

Security Monitoring

Identity Management

Data handling

DB Anonymizer

Context-based Security & Compliance

Secure Storage



Cloud
Inter-
face

Data
Proces-
sing

Data
Analy-
tics

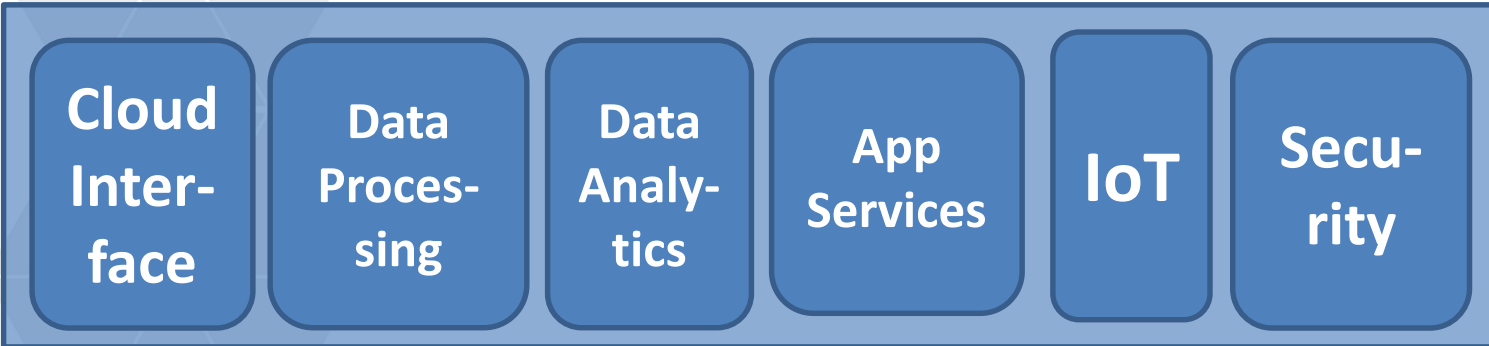
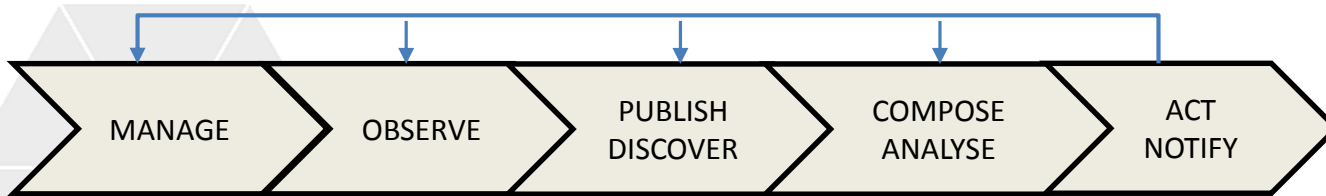
App
Services

IoT

Secu-
rity

FI-WARE

**Generic
Enablers**



Environmental Monitoring and Decision Support Lifecycle

Environmental Specific Enablers

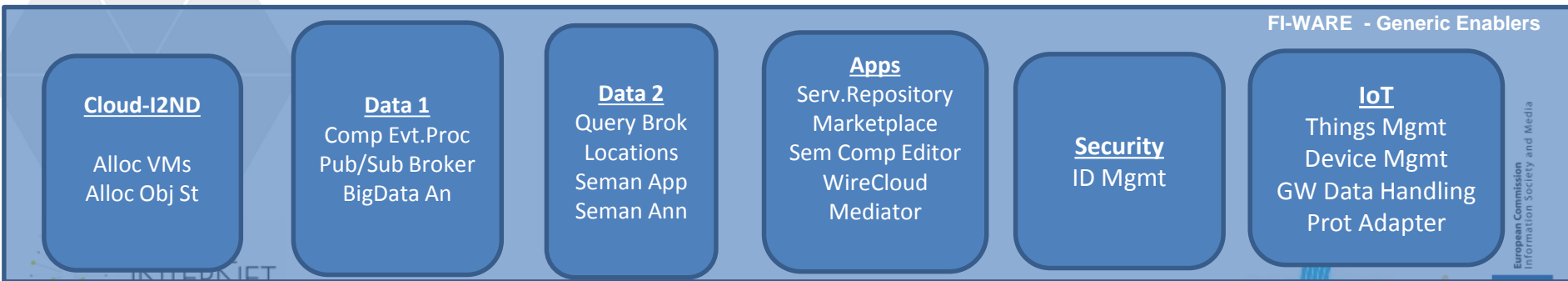
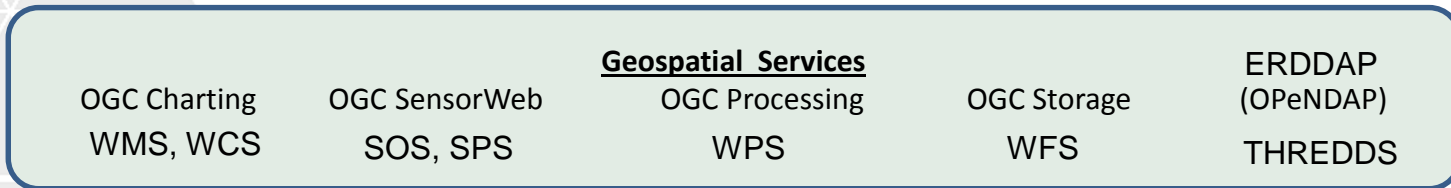
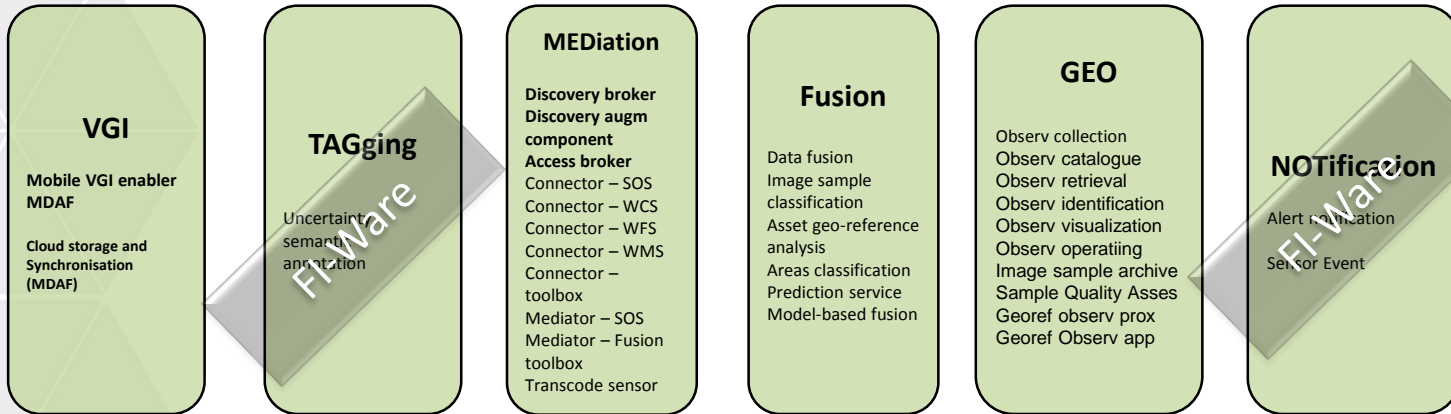
Geospatial Specific Enablers

FI-WARE

Generic Enablers



Environmental (Biodiversity, Atmospheric and Marine) Applications

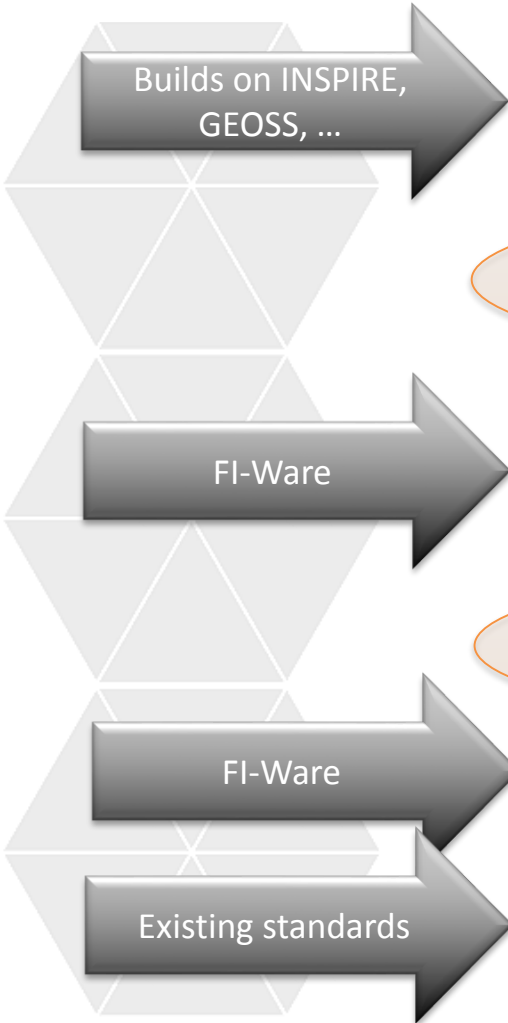


...worthwhile to compare with ORCHESTRA services of 2007

Service Type Name	Service Category	ISO 19119 Service Taxonomy
Authentication Service	OA Info-Structure	GeoModel/InfoManagement
Authorisation Service	OA Info-Structure	GeoModel/InfoManagement
Catalogue Service	OA Info-Structure	GeoModel/InfoManagement
Document Access Service	OA Info-Structure	GeoModel/InfoManagement
Feature Access Service	OA Info-Structure	GeoModel/InfoManagement
Map and Diagram Service	OA Info-Structure	GeoModel/InfoManagement
Name Service	OA Info-Structure	GeoModel/InfoManagement
Sensor Access Service	OA Info-Structure	GeoModel/InfoManagement
Service Monitoring Service	OA Info-Structure	GeoModel/InfoManagement
User Management Service	OA Info-Structure	GeoModel/InfoManagement
Annotation Service	OA Support	GeoModel/InfoManagement
Coordinate Operation Service	OA Support	Geographic Processing Services
Format Conversion Service	OA Support	GeoModel/InfoManagement
Gazetteer Service	OA Support	GeoModel/InfoManagement
Ontology Access Service	OA Support	GeoModel/InfoManagement
Schema Mapping Service	OA Support	GeoModel/InfoManagement
Service Chain Access Service	OA Support	Workflow/Task Management Services
Thesaurus Access Service	OA Support	GeoModel/InfoManagement

Table 2: List of OA Services

Mapping of Environmental Enablers

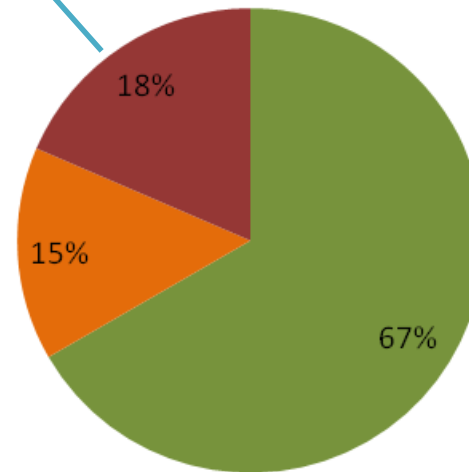


- **Harvesters, connectors and mediators (MED):** facilitate easier interoperability between other backend services and data sources
- **Geo-referenced data collection applications (GEO):** provide ways to record and archive geo-tagged measurements and designed to support mobile crowd-sourcing and crowd-tasking
- **Semantic tagging tools (TAG):** support for semantic enrichment of environmental data
- **Fusion tools for heterogeneous data sources (FUSION):** preparing and aggregating environmental data into formats suitable for use
- **Event detection and notification services (NOT)**
- **Geospatial data provisioning and storage (OGC):** relate to the provisioning and storage of environmental observations and measurements

- (Open) Environmental Architectures heavily **rely upon geospatial data models and services** (standards)
- These standards need to be realized on top of, or better, need to be integrated **into the core platform (FI-WARE)**
- generic **Environmental Monitoring and Decision Lifecycle** as a framework for use case generalization
- **Contributions to standardization**
 - CEN /TC289 TR 15449 on Spatial Data Infrastructure in Europe
 - ISO/TC211 19119 Geospatial Service Architecture
 - OGC Topic 12 on Service Architecture

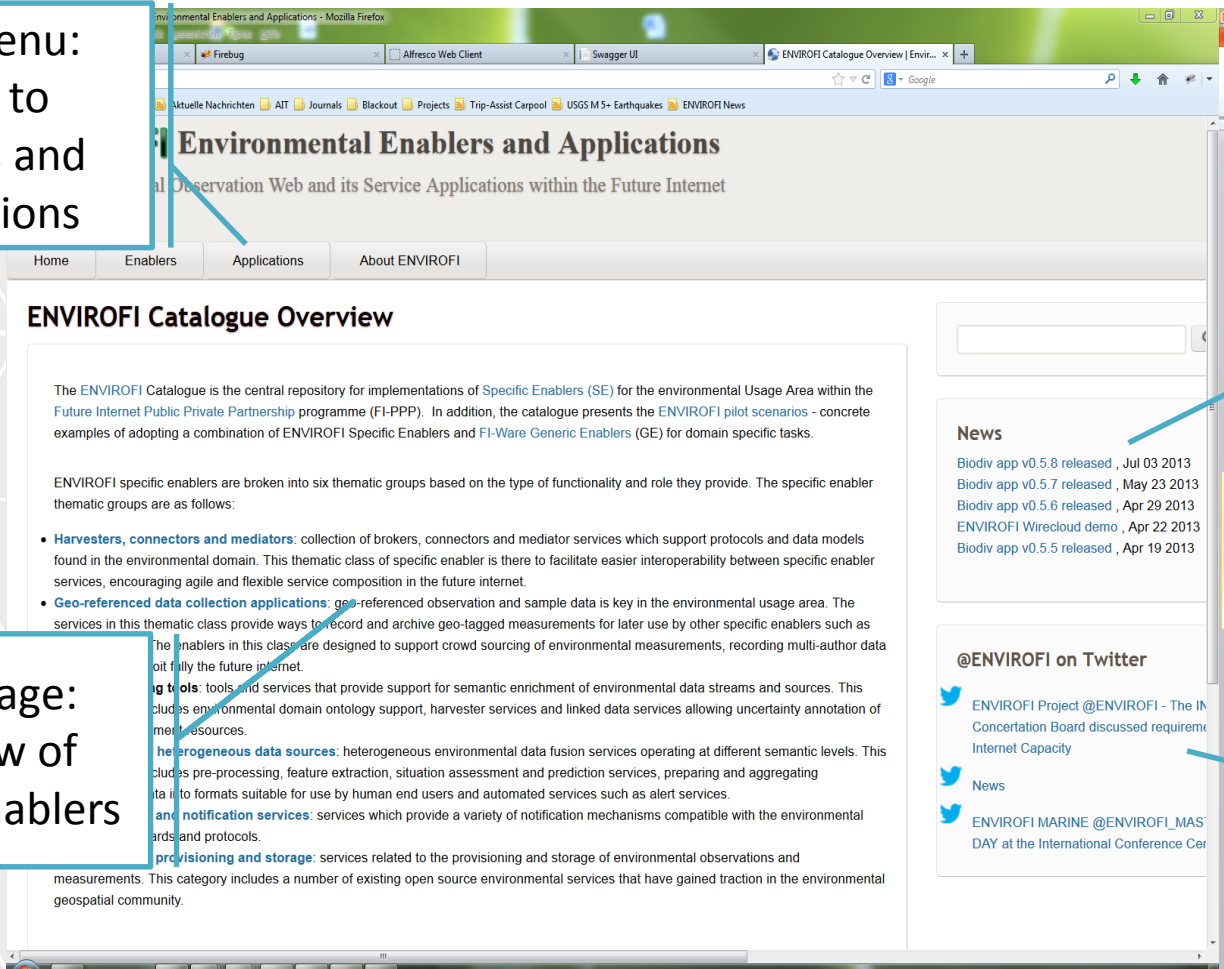
Not limited to the environmental usage area.
=> Delegated to Generic Enablers of the FI-WARE core platform

Requirements - Enablers matching



- Requirements fulfilled
- Requirements partially fulfilled
- Requirements not fulfilled

Main Menu:
access to
Enablers and
Applications



Recent
developments

Home page:
Overview of
specific enablers

ENVIROFI
Tweets

Thank you for your attention

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