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"ENVIROfying" the Future Internet

Sensor Web and the Future Internet

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Brno, Czech Republic
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Overview

- Why all this work?
- SANY and beyond
- Future Internet Public Private Partnership
- ENVIROFI – linking environment and FI

Why all this work?

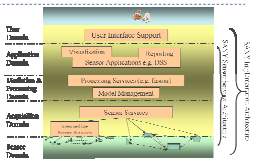
- *An **observation** leads to information;*
- *Information leads to knowledge:*
- *Knowledge leads to understanding;*

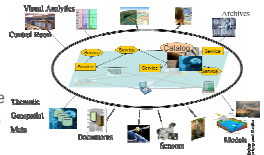
Ultimately, understanding may even lead to the wisdom to act accordingly.(*)

(*) More words of wisdom in the SANY book ☺

SANY (Sep 2006- Dec 2009): Objectives

1. **Standard open architecture** for fixed and moving sensors, sensor networks, and other sensor-like sources of information
2. **Reusable** data fusion and decision support **service building blocks** and a **reference implementation** of the architecture
3. Closely work with end users and international organizations in order to assure that the outcome of SANY contributes to **future standards**
4. Validate the project results, through three innovative risk management applications covering the areas of **air pollution, marine risks and geo hazards**



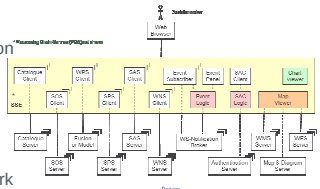


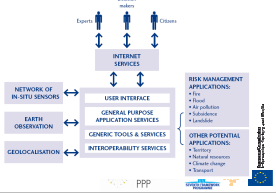
SANY Consortium

Project acronym	**SANY**
Project reference	**IST-2006-033564**
Project type	**Integrated Project**
Start date	**01/09/2006**
Duration	**40 months**
Budget	**11,2 M€**
EC contribution	**7,0 M€**

SANY Results

- Concepts & Software
  - OGC SWE Services
  - Catalogue, Security, Fusion Services, DSS building blocks
  - Data & Meta-information models; uncertainty; INSPIRE
  - TS-Toolbox java framework
- Standardization
  - Sensor Model, SPS 2.0 specifications (contrib.), UncertML (early adopters)
  - SensorSA and Fusion & Modelling discussion papers
- Read the SANY book! ☺





SANY Pilots at a Glance

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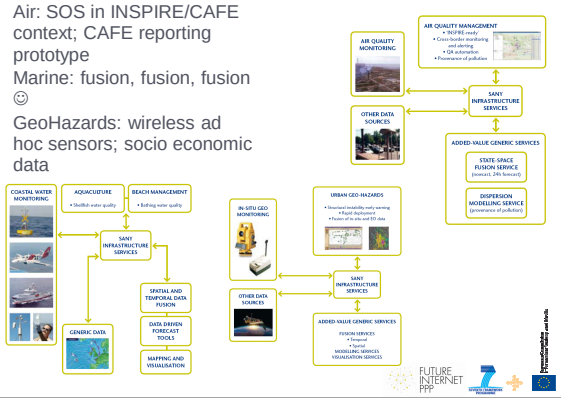
- Air: SOS in INSPIRE/CAFE context; CAFE reporting prototype
- Marine: fusion, fusion, fusion ☺
- GeoHazards: wireless ad hoc sensors; socio economic data



Beyond SANY?

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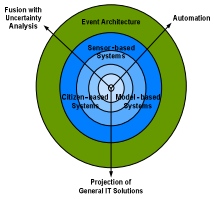
"The Future Sensor Web and its Applications"
- Joint workshop by JRC and EEA in January 2010

Some Identified Issues:
- Heterogeneous information sources
  - Sensors, models, people, cadasters,
- Disparate architectural styles
  - Here to stay – how to integrate?
- Data Fusion & Modelling
  - uncertainty & trust?
- Citizens
  - Education? Participation? Dialogue?



Societal Context

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- International Council for Science (ICSU)
  - **Grand Challenges of Global Sustainable Research**
  - '[…] delivering to society the knowledge and information necessary to assess the risks humanity is facing from global change […]'

- **Europe 2020 Strategy**
  - Smart growth,
  - Sustainable growth, and
  - Inclusive growth
  - **Innovation Union**
  - 'Work with Member States and stakeholders to implement cross-border eEnvironment services, notably advanced sensor networks' (**Digital Agenda**)

Observations from Sensors, Citizens, Models

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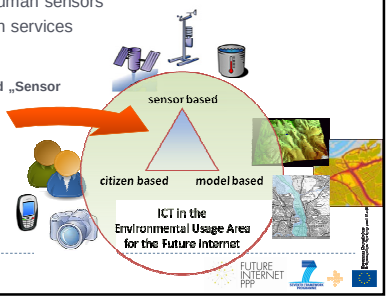
An avalanche of observations sources needs to be Web-enabled
(Observation = Value + Unit/Meaning + Space + Time + other Meta-Information)
- Web-enabled sensors and sensor networks
- Citizen observations/human sensors
- Models and data fusion services

Technical basis: standardized „Sensor Web Enablement" services & data models



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Funding opportunity: FI PPP

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- **Future Internet – Public Private Partnership is a major FP7 Initiative for development of the Future Internet Infrastructure and Applications**
  - Topics of **great economic or societal interest**, such as Traffic, Security, Health, Smart cities, etc.
  - Development of „enablers": web-centric software and hardware infrastructure simplifying the development of FI applications
- **3 FI-PPP Calls in FP7, FP8; Call 1 project started April 1st 2011:**
  - 8 Thematic IPs, each with 2Y duration provide requirements on FI core technology and early prototypes of "specific enablers" for their domains.
  - 1 core IP with 5y duration, develops the core technology ("generic enablers")
  - 2 more projects dedicated to cross-Project coordination

FI PPP Programme: not 'business as usual'

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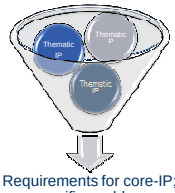
- **FI-PPP is "in-situ experiment" of the EC**
  - „Euro 0.6 billion project"

- **Strong coordination & IPR sharing within the programme**
  - 2x6M€ for Coordination
  - Joint FI-PPP Boards & „Coordination Agreement"
  - Joint review for all projects?
- **„Pathfinder for FP8"**
  - Only 4 months from proposal to project start (!)
  - Industry- and Users- driven.



Requirements for core-IP; specific enablers

This slide is based on FI-PPP presentation by Peter Fatelnig (FI-PPP Task Force Leader)

ENVIROFI Project Vision

We envision…

a system with dynamic understanding of the Earth's atmospheric, marine and terrestrial spheres for the benefit of all European citizens

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Main Scenarios

Bringing Biodiversity into the Future Internet
- Enabled biodiversity surveys with advanced ontologies
- Analysis, quality assurance and dissemination of biodiversity data

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"

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

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Interacting with Mobile Citizens

Automated Quality Assurance
- Spatial/Temporal probability, common miss-identifications, Semantic Check

Subjective "observations"
- Correlation with weather, pollution, allergens

- Improved situation awareness
- Individual alerting

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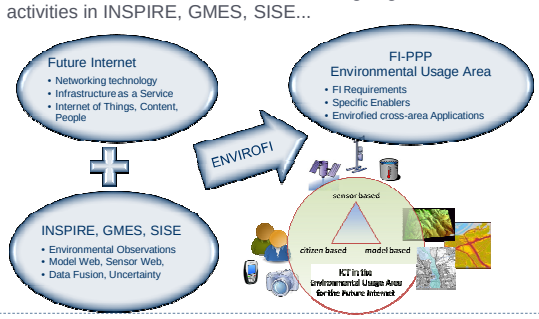
Linking the Communities

ENVIROFI links the Future Internet and on-going activities in INSPIRE, GMES, SISE...



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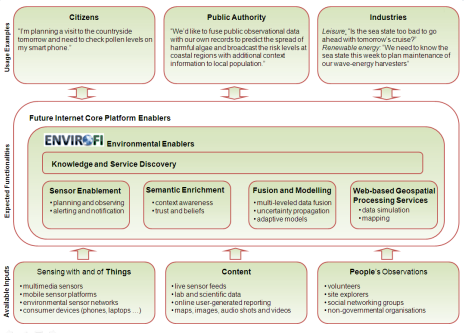


Beyond the Environmental Usage Area…

Observation web

Observations from sensors, models, humans; **Observation** = value + spatial & temporal context, meaning, uncertainty, ...

All data models and services required for observation gathering, processing, visualization, etc.

Environmentally aware internet

Observation Web seamlessly used to improve the decision making in applications from various Usage Areas

Cross-usage area applications are feasible and ENVIROFI will make them easier to develop

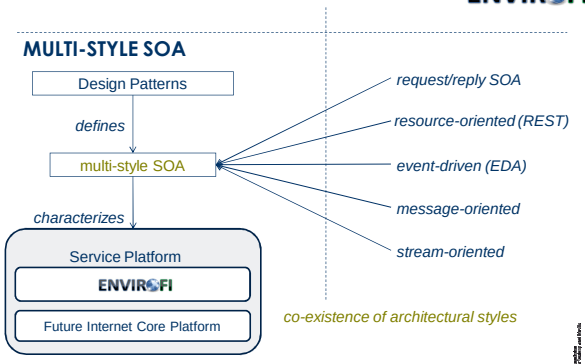
Empowering the Citizens

To Provide additional data, from their own sensors, and personal observations

To Link & Analyze, the observations from various sources

To discuss the state and trends in their own environment with scientists and discussion makers

Beyond Service Oriented Architecture…



Beyond the current technology

Needs	Reasoning/Examples
Reliable Internet Infrastructure	Assured Minimal Quality of Service even in „worst case scenario" is pre-requisite for Envirofied applications in e.g. traffic control, crisis management, etc.
Privacy & Trust by Design	Information solicited by volunteers must be protected from misuse, e.g . by separating "my content" from "my identity" => also assures I can "revoke" my identity from services BUT: service provider has to know who to trust!
Scaling Infrastructure	Affordable and easy to use offerings that assure the service can serve huge peak loads when/if needed (cloud)
Location-Aware "things"	Tiny location-aware things and devices with internet connection; low power consumption (autonomous?); tiny & inexpensive sensors to go along

ENVIROFI & FI-PPP timeline

02.12.2010	ENVIROFI proposal submitted
26.01.2011	Project hearings
03/04.03.2011	Project negotiations (all 11 projects!)
31.03.2011	"From Sensor to Observation Web with Environmental Enablers in the Future Internet"
01.04.2011	Project start (10 projects)
07/08.04.2011	Project kick-off & FI workshop @ EGU2011
03.05.2011	Official launch of the FI PPP (see also next slide)
…	
31.03.2013	End of project

High visibility within FI-PPP

Official launch of the FI PPP in Brussels, 3rd of May 2011

Michael Fassnauer
CEO,
UBIMet GmbH

Javier Ávila Jiménez
Chief Innovation Officer,
Atos Origin

Neelie Kroes
Vice-President of the EC
European Commissioner for the Digital Agenda

People behind the story

1. FI-PPP Team at the EC (left)
2. ENVIROFI core team (below)

Thank you for your attention

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Key Issues

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1. **Heterogeneity** of sources/**large volumes** of data
2. Services interoperability and standards
   - **Multi-Style Service Oriented Architecture**
   - Advance handling of information in Sensor Networks
3. Intelligent **context-aware** information retrieval
4. **Individualized experimentations**
   - Future Internet enabled biodiversity surveys
   - Future Internet atmospheric conditions and pollution
   - Sustainable marine assets in the Future Internet
5. Use of internet of **services**, **things**, **people** and **content**

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Interoperability

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Open Source Software

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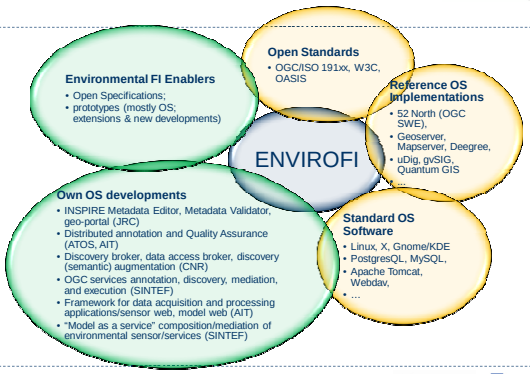

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Project structure & Partners

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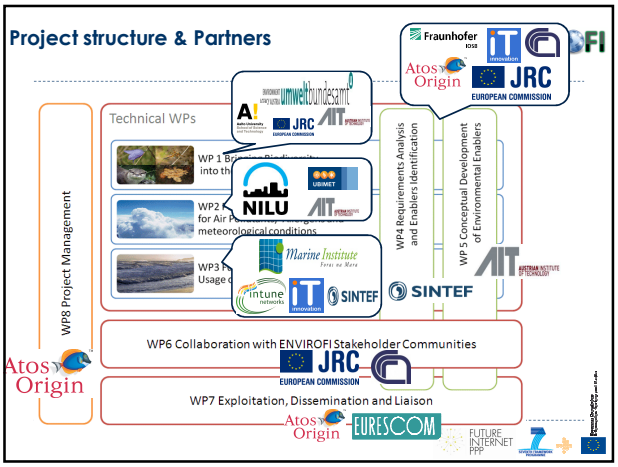

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