



Mobesens

MOBESENS: monitoring water quality at large and in the long term

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Sensing A Changing World workshop

Wageningen, 20 November 2008

- EC Water Directive Framework (-> 2015)
 - Objective: Good qualitative and quantitative status of all water bodies
 - ✓ Ecological status (structure, ecosystems, etc.)
 - ✓ Chemical status
- INSPIRE geo-info availability Directive (April 2009)
 - Towards a European spatial information infrastructure that delivers to the users integrated spatial information services (« geographical information »)
 - Objective: identify, access and consolidate geographical information from a wide range of sources, from the local level to the global level, in an inter-operable way for a variety of uses
 - Who: policy-makers, public and para-public bodies at European, national and local level
- MOBESENS: Mobile water quality sensor system
 - is an FP7 EC funded project
 - June 2008 – may 2011

Scenario examples



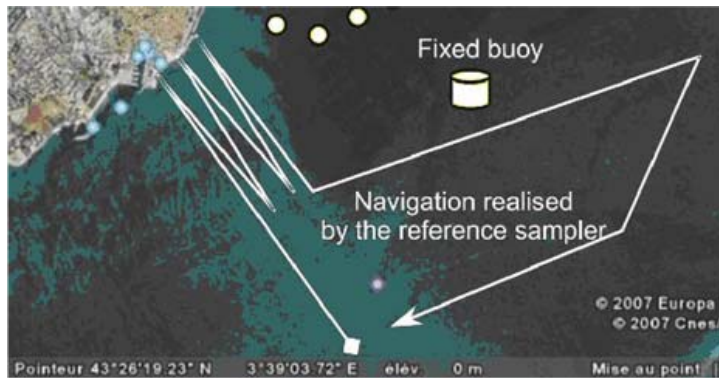
Sub-surface quality measurement and monitoring



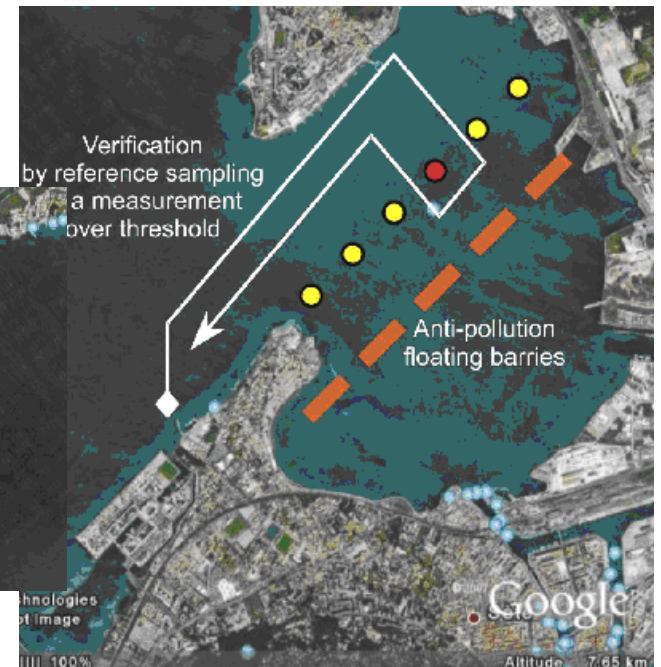
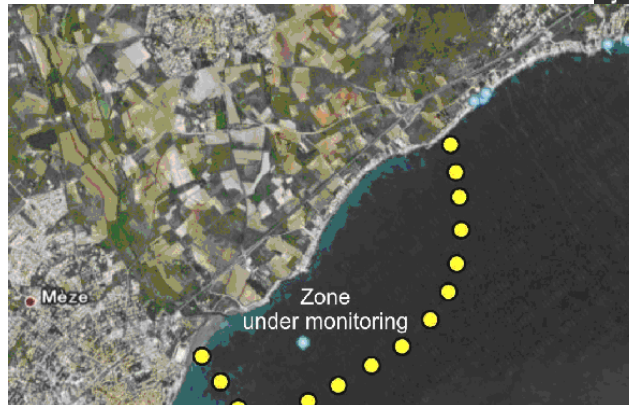
River monitoring

Lagoon, estuarine and coastal monitoring

Control and containment



Reference sampling on the monitored area (MOBESENS return to port)



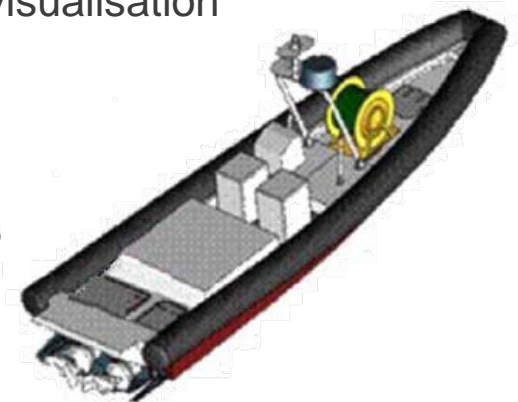
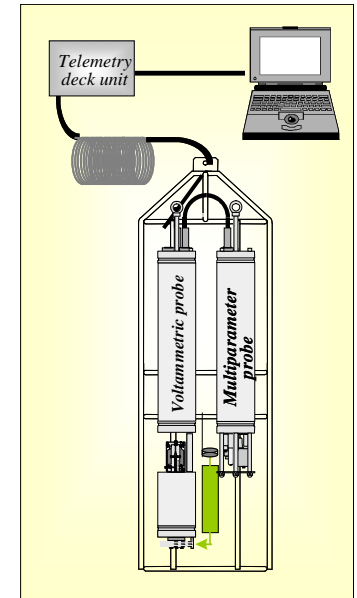
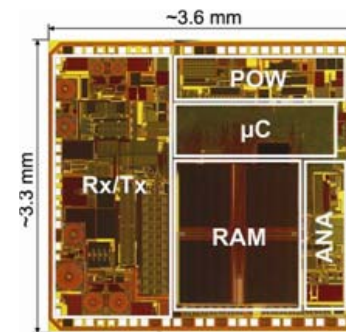
MOBESENS at a glance



- Objectives:
 - Modular, flexible and scalable network solution for water quality monitoring
 - ✓ Networked system for gathering water quality information
 - ✓ and for reporting back to water quality management information systems (the « Grid »)
 - Sensing (2D, 3D)
 - ✓ Parameters \in {physicochemical, organic, inorganic, metals, biological, temperature, salinity, turbidity, nutrients, pH, Redox, oxygen, fluorescence, conductivity, velocity, ...}
 - (Self-)reconfigurable wireless networking
 - Mobile system: fixed, drifting and controlled nodes
 - Autonomous: low-power (but the sensors), energy scavenging
 - Identified and interoperable standardised data (« durable »)

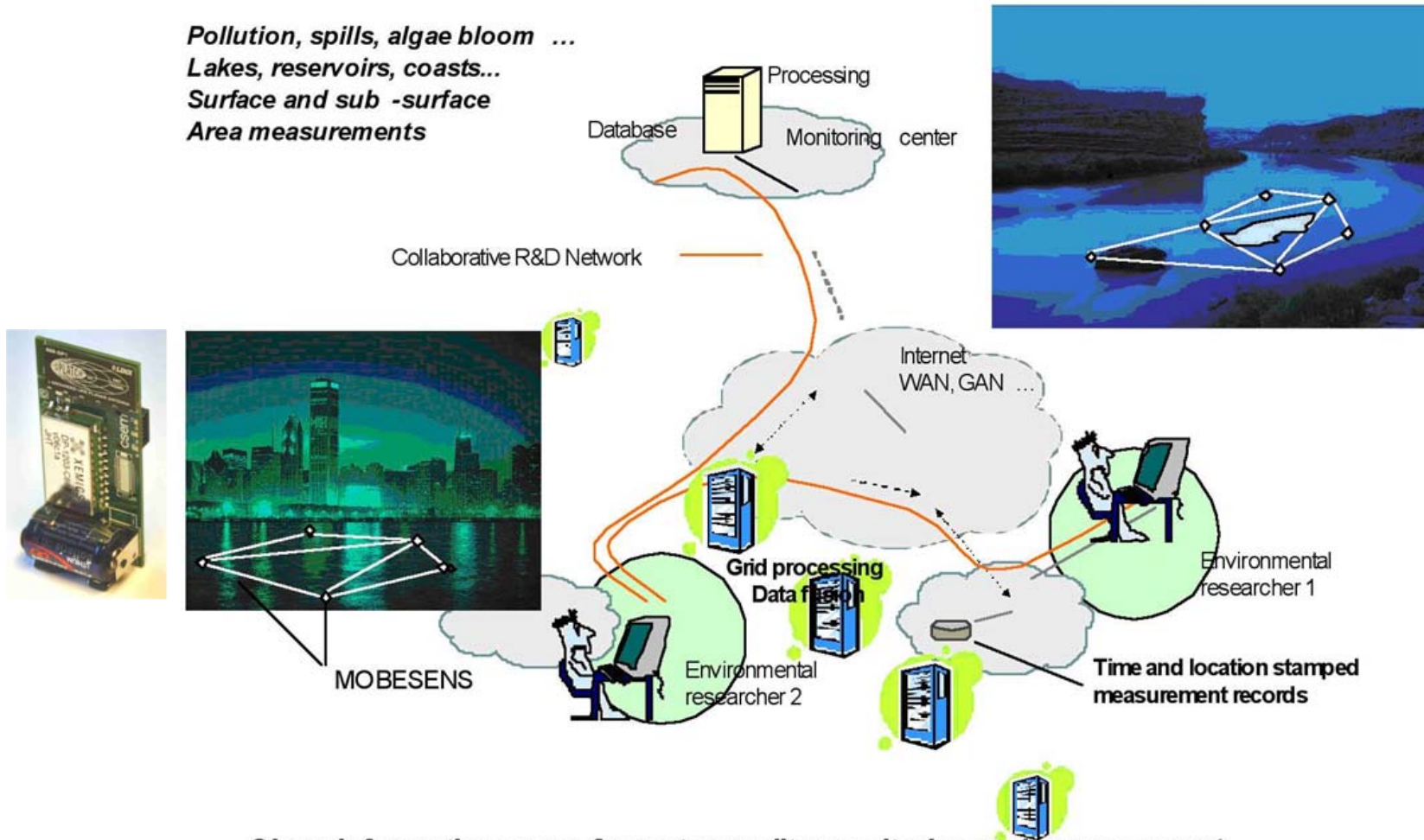
MOBESENS components

- Water quality sensors and sensing materials
 - Voltametric micro-sensors and submersible probe for in situ trace metal monitoring
 - Miniature Electrochemical Sensors and Interfaces
 - Micro-acoustic sensors
- Autonomous, low power, mobile WSN with relative positioning
 - mobility models in wireless communication networks
 - support in communication layers
 - Low-power, radio-based localisation of nodes
- Power management and energy scavenging
 - Solar power, micro-turbine, inertial devices, buoyancy...
- Collaborative systems, Grid computing and data dissemination and visualisation
 - Data fusion & correlation and grid processing
 - Networking and data dissemination (sensor and samples metadata)
 - Visualisation system
- Propulsion, control and guidance of mobile nodes
 - Supports opportunistic data gathering



MOBESENS system overview

*Pollution, spills, algae bloom ...
Lakes, reservoirs, coasts...
Surface and sub -surface
Area measurements*



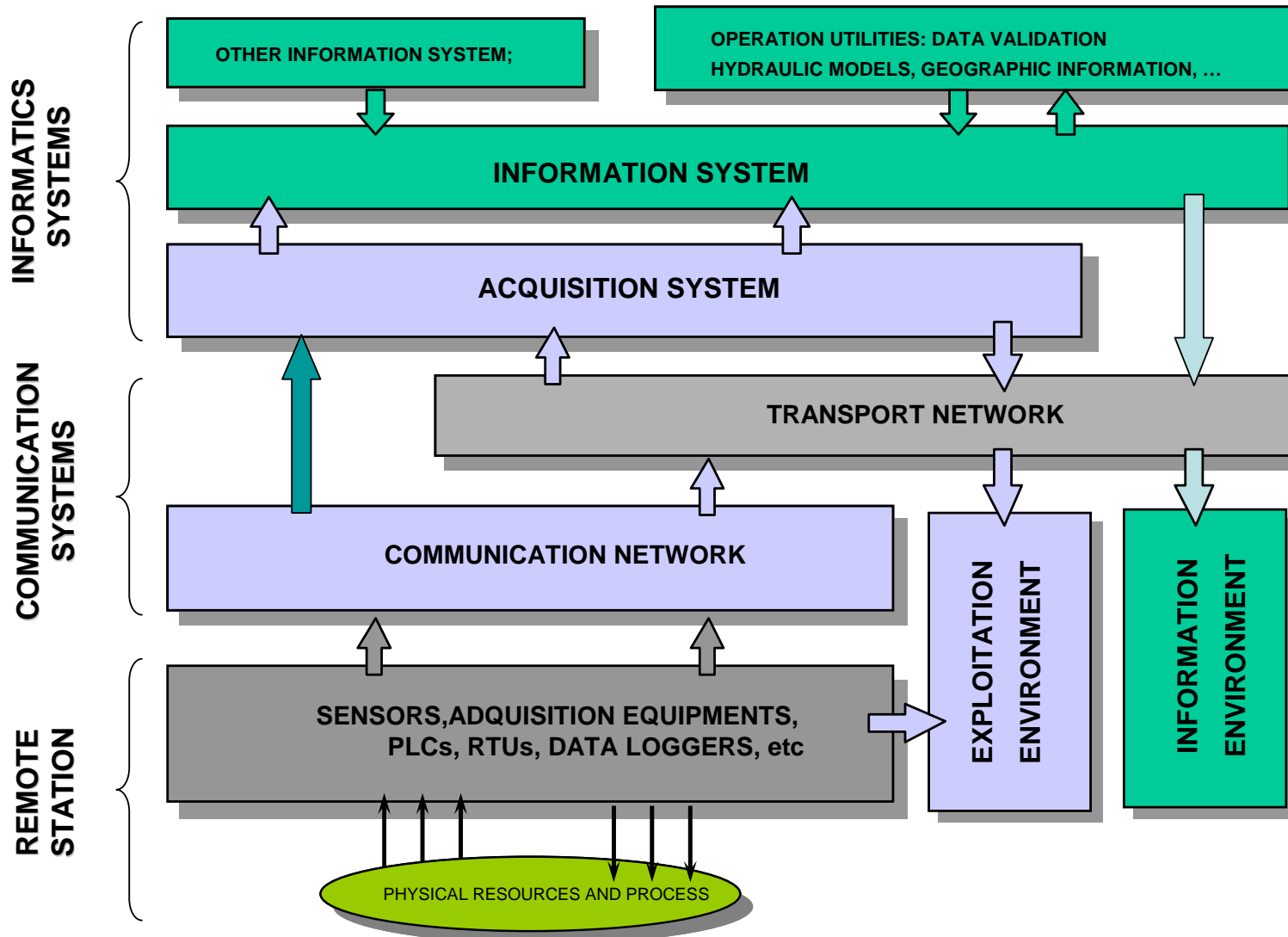
Single information space for water quality monitoring and management
Single information space for the environment

MOBESENS use cases

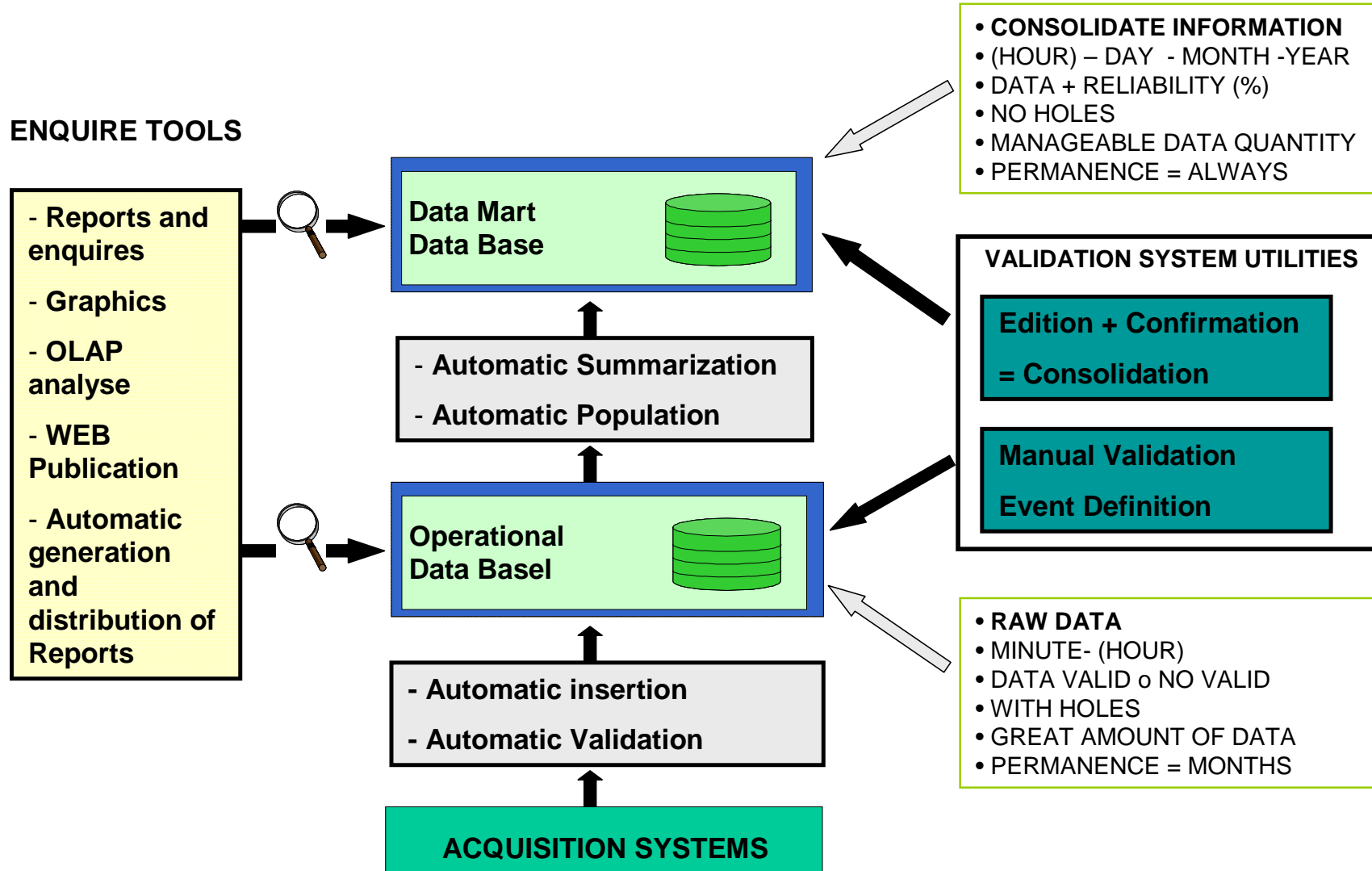


Use Case	Identification	Qualification / objective	Monitoring parameters
1	Surface water quality measurement and monitoring	Water quality monitoring Accidental spills – surface water quality Identification and relative localisation of spills Surface mobility Adaptation of the monitoring system	Metal ions Hydrocarbons – pesticides – HAPs – nutrients – pH - oxygen – turbidity
2	Sub-surface water quality measurement and monitoring	Accidental spills - sub-surface water quality Identification and relative localisation of spills Diving and sub-surface samplings Good or bad weather	Temperature, pressure, conductivity, oxygen, turbidity
3	Lagoon, estuarine and coastal monitoring	Wide area coverage. 3D profiles. Wide area relay Salt water operation	Temperature, conductivity, oxygen, nutrients, fluorescence (Chlorophyll A), turbidity
4	Reference sampling on the monitored area	In response to an alert by the MOBESENS monitoring network, launching of a small vessel able to sample a volume of water or perform passive sampling on the threatening zone. Returning to port with samples.	HAPs – pesticides metal ions – pH – temperature – fluorescence (Chlorophyll A or hydrocarbon)
5	Extension of a fixed buoy monitoring capacities with MOBESENS network	Opportunistic access to WAN and relay of data Extended range and shorter update intervals. Link between the reference sampling mobiles distributed network of miniature sensors and a fixed buoy.	Temperature, conductivity, oxygen, nutrients, fluorescence (Chlorophyll A)
6	Single information space	Distributed computing and processing of data from multiple sources over wide areas Fusion of data from multiple sources and sensors Analysis and collaborative research Trends, alerts and alarms	Tailored for 30 parameters
7	Control and containment or protection devices efficiency on a water area	Floating barriers such as oil spill containment booms are often deployed to protect a living area, an environment protected area or a water resource inlet. MOBESENS monitoring networks will be positioned upflow, down flow or attached to the boom in order to alert in case of trespassing of the spill..	HAPs – pesticides – pH – temperature – fluorescence (Chlorophyll A or hydrocarbon) - turbidity

MOBESENS data management



Information system: the « Grid »



Summary

- The MOBESENS project contributes to monitoring water quality
- At large
 - Large population of sensors, possibly numerous networks
 - Mobile nodes headed towards significant zones
 - Deals with river, lakes and sea
 - ✓ Towards compliance to the Water Quality directive
- In the long term
 - Raw or fused data is kept in the data management system
 - Time-stamped & geo-tagged data
 - Consolidated, stored and made available in a standard form by the « Grid »
 - ✓ Towards compliance to the INSPIRE directive