

ARTEMISIA ASSOCIATION

The association for R&D actors in the field of ARTEMIS



ARTEMIS

Project title: EMMON

EMbedded MONitoring

Advanced Research & Technology for Embedded Intelligence and Systems



Project Overview

- Acronym: EMMON
- Full title: EMbedded MONitoring
- Duration: 01.03.2009–29.02.2012 (36 months)
- Budget: 2.576 M€
- Project Web Site: www.artemis-emmon.eu



- Sponsored by 7th Framework Programme (7FP), ARTEMIS Joint Undertaking initiative:
 - Industrial Priority Seamless connectivity and middleware
 - <https://www.artemis-ju.eu/>
 - <https://www.artemisia-association.org/>



Project Overview

- **Industrial Partners (5)**

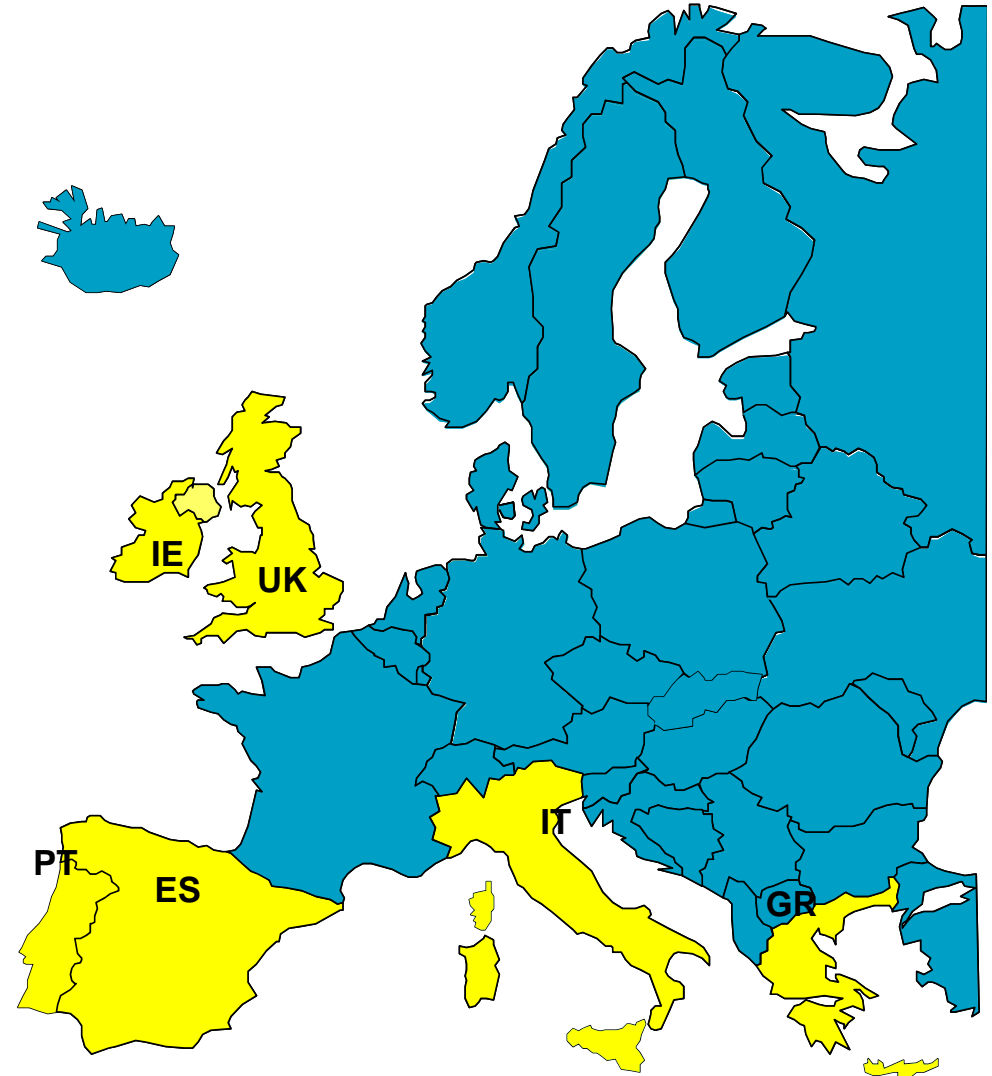
- Critical Software S.A., Intesys Ltd, Critical Software Technologies Ltd, SESM S.c.a.r.l., Akting Ingeniaritza S.L.

- **Research Centres (1)**

- Centro de Estudios e Investigaciones Técnicas de Gipuzkoa

- **Universities (3)**

- Instituto Superior de Engenharia do Porto, Trinity College of Dublin, Aristotle University of Thessaloniki





EMMON Goal

- **Goal:** Research and deploy large scale Wireless Sensor Network
 - 10.000 – 100.000 nodes in real world environment (50 km² area)
 - 100.000 sensors in simulation
 - Large scale continuous environmental monitoring
 - Unprecedented situation analysis
 - Real time (or near) data access and visualization
 - Ability to monitor dynamic, changing environments (sensors per area)
 - Reliable and scalable network infrastructure

- **Facts:**
 - Duration: 36 months (1st March 2009 – 28th February 2012)
 - 9 organizations, 6 countries



Project Objectives

- EMMON main objectives are the following:

Objective	Description
O1	Research, develop and test a functional prototype for large scale WSN deployments
O2	Advance the number of devices by one order of magnitude, by real world validation (10K – 100K nodes)
O3	Advance the number of devices by two orders of magnitude, by simulation (100K – 1M nodes)
O4	Improve reliability and fault tolerance mechanisms in WSN
O5	Identify end-user needs and requirements, as well as operational constraints
O6	Determine a path for exploitation of project results



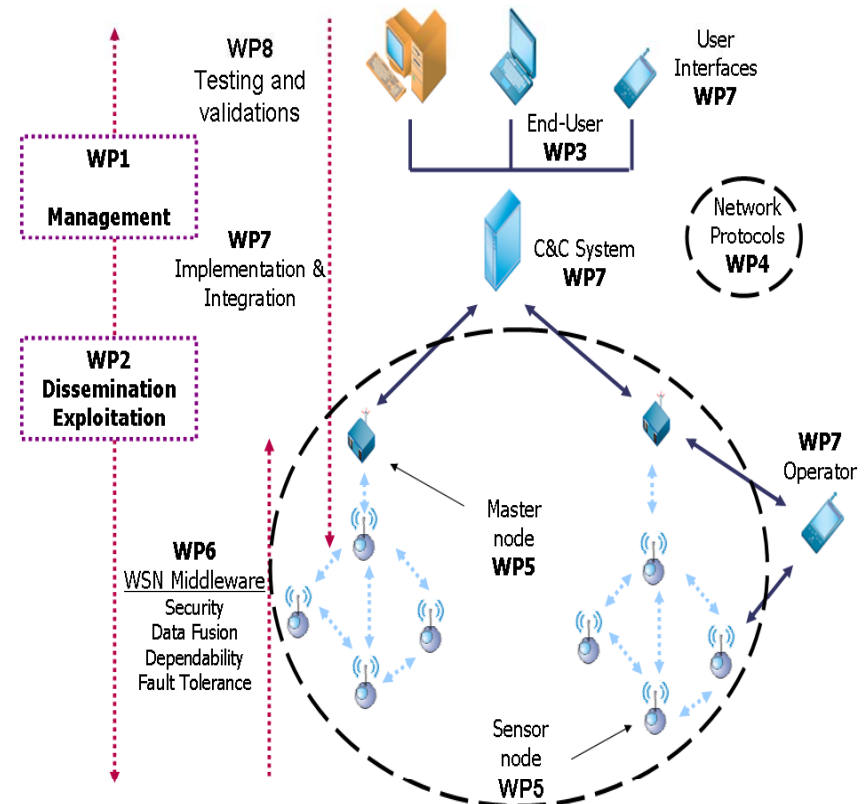
EMMON Motivation

- The vision of smart locations is of significant societal interest today!
- **SP3. Smart environments and scalable digital services**
 - Smart locations (smart city, smart home, smart public space, ...). A smart city can monitor its levels and distribution of air pollution and give recommendations to Civil Protection
 - Monitor large areas detecting abnormal variations and reacting in accordance (water quality in pipelines, pollution and fire hazards in cities and forests)
- **SP7. Embedded technology for sustainable urban life**
 - Achieve greater efficiency in use of resources, more flexibility in the provision of resources and better situation awareness for the citizen
- **SP4. Efficient manufacturing and logistics**



EMMON Main Results

- Large scale deployment of fully-functional system prototype in real world scenario (thousands of nodes);
- WSN embedded middleware,
- WSN multilevel communication protocols;
- Simulation models for WSN behaviour analysis;
- Centralized C&C centre;
- Mobile C&C station or device;



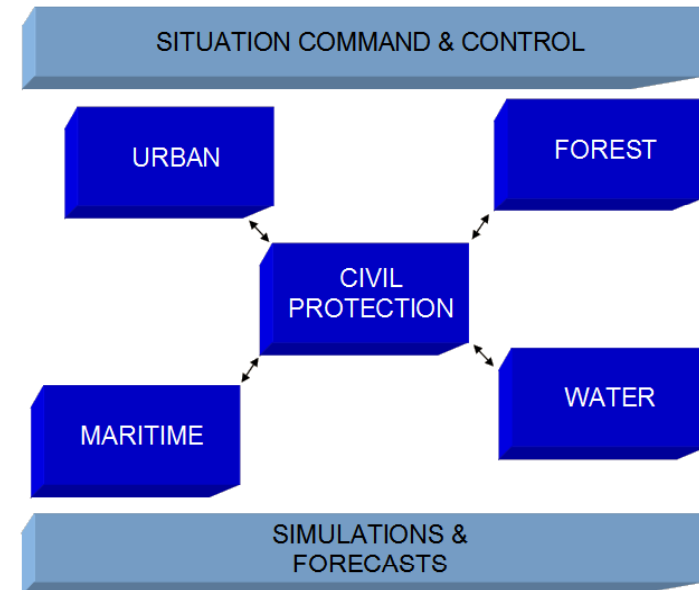


EMMON Areas of Application

■ Areas of Application:

- Regional climate/marine monitoring;
- Water quality monitoring
- Urban quality of life monitoring (pollution, air and noise);
- Forest fire monitoring;
- Fire & pollution propagation;
- Civil Protection
- Natural resources monitoring;

- Precision agriculture;
- Personal health monitoring;
- Industrial plant monitoring.



■ Problem Areas:

- Any problem that requires continuous, periodic, large scale monitoring of the open environment, with variances detection and triggering of actions (alarms, alerts, actions)



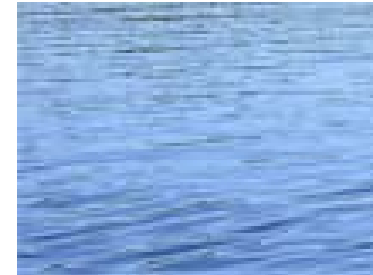
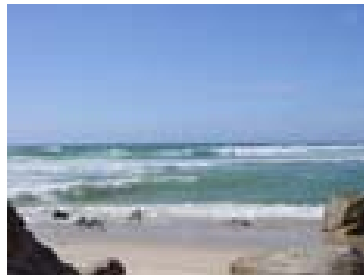
EMMON Expected Impact

- **Impact:** Improve peoples life's:
 - Detect environment and public safety hazards (temperature, gas, noise, pollution, etc)
 - Monitor large geographical areas
 - Provide key data to public authorities, organizations, decision makers
 - Take Better decisions based on “full picture”!
 - Improve efficiency and reduce costs in existing procedures and maintenance



Technological Innovation

- Deploy 10x more sensors than today's existing applications
- Develop common architecture & horizontal interoperable infrastructure for service innovation;
- Identify a set of domain specific services, “vertical cases”, with relevant business models;
- New embedded middleware with better overall energy efficiency, security, and fault-tolerance;
- New efficient and low power communication protocols
- Reliable middleware for large scale monitoring;





Market Innovation – as of TODAY

- Sensor networks widespread barriers:
 - Unreliable communication systems
 - Almost no (or few) technology standards exist!
 - Not easy to use
 - Power consumption -> Low battery life / Short lifetime
 - Scalability problems -> Small deployments
 - Available solutions too tailored and specific
 - Security gaps, limitations (on data and sensors)



Market Innovation – EMMON Future

- EMMON will bring:
 - Technology for robust and reliable environmental monitoring applications
 - Advance from ~1.200 nodes to ~10.000-100.000 nodes capability
 - Unprecedented data availability
 - Solve large scale scalability problem -> Allow Large deployments
 - Lower cost of deployments

Foundation for widespread emergence of sensor network products



End User Involvement

- EMMON collaborates with the End User Committee (9 organizations):

End-User Name	Short Name	Country	Scenario
Marine Hydrophysical Institute	MHI	Ukraine	Marine
National Association for Civil Protection	ANPC	Portugal	Civil Protection
National Directorate for Forest Resources	DGRF / AFN	Portugal	Forest
National Forest Authority (Coimbra)	AFN Coimbra	Portugal	Forest
Ayuntamiento de Irun	AYI	Spain	Urban/City
National Water Agency	ANA	Brazil	River
Laboratory of Forest Management and Remote Sensing	LFMRS	Greece	Forest
Forest Research Institute	FRI	Greece	Forest
InteSys	INT	UK	Simulation

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Thank you for your attention

We value your opinion and questions

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