

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)**

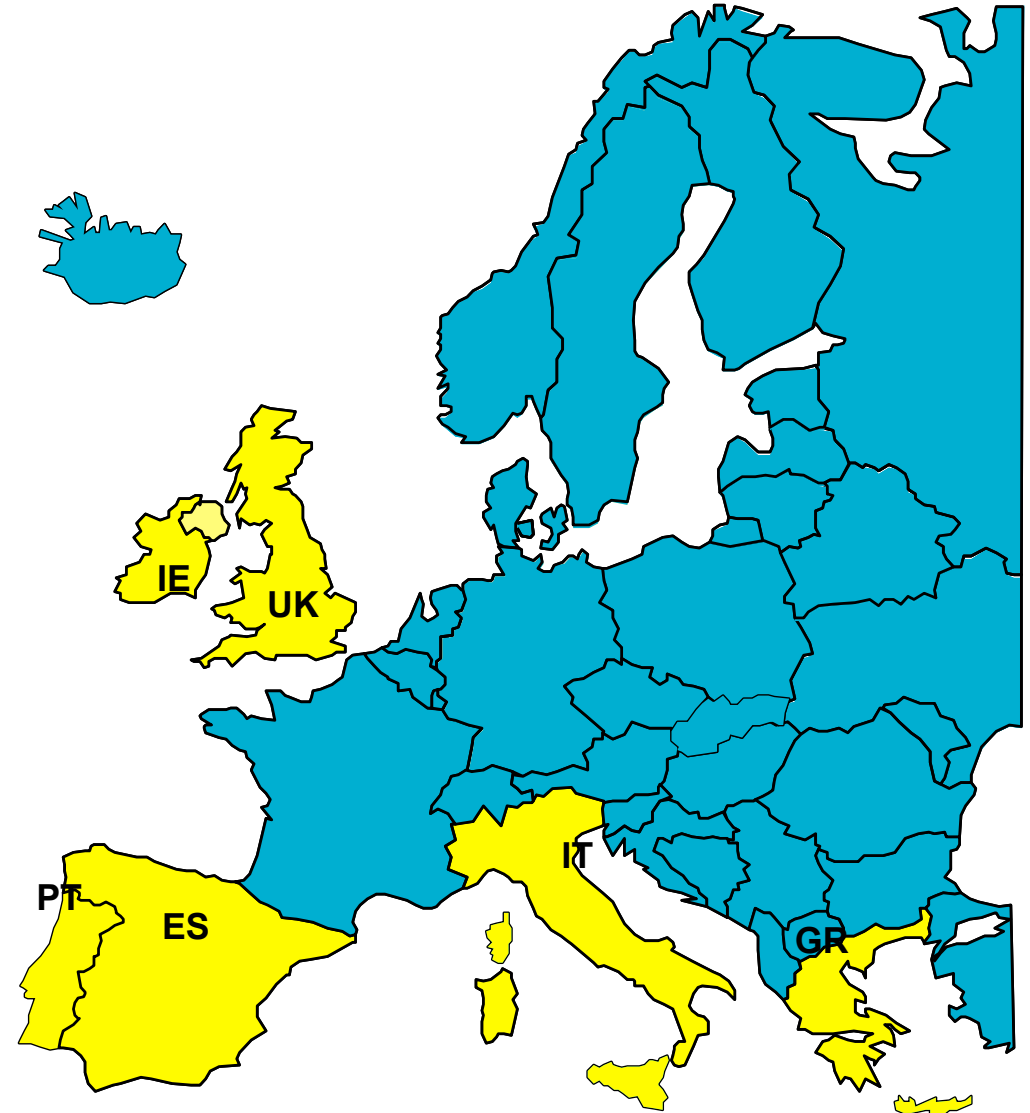
- Critical Software S.A., Intesys Ltd, Critical Software Technologies Ltd, SESM S.c.a.r.l., Akting Ingeniaritza S.L.

- **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

- *“Create an **integrated framework** for **large scale** and **dense** wireless sensor networks that allow effective monitoring for more than **10 000 devices**.”*
 - Solve the scalability problem of WSN
- **Providing:**
 - Large scale continuous environmental monitoring
 - Unprecedented situation analysis to decision makers and authorities
 - Real time (or near) data access and visualization
 - Robust, reliable and scalable network infrastructure
 - Network planning and deployment toolset to assist real deployments
- **Prove by:**
 - Live deployments of more than 400 nodes
 - 10.000 sensors simulation analysis
 - Experimental performance analysis of protocols/middleware within test beds



Project Objectives

- EMMON specific objectives are the following:

Objective	Description
O1	Research, develop and test a functional prototype for large scale and dense WSN deployments in a test bed environment
O2	Instantiate the EMMON WSN system architecture in a real-world application of several hundred nodes (at least 400)
O3	Advance the number of devices by one order of magnitude (10K or above). Prove scalability by: <ul style="list-style-type: none">• Extensive experimental performance analysis in an integrated test bed and real world application• simulation results for 10K 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

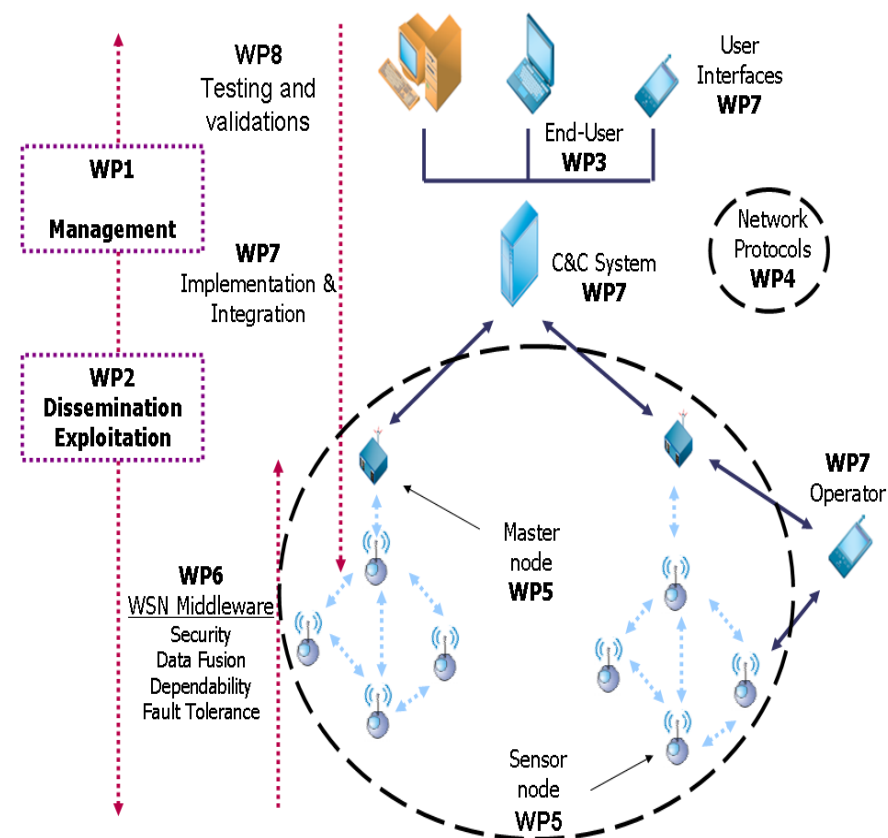


EMMON Motivation

- The vision of smart locations is of significant societal interest today!
- SP3. Smart environments and scalable digital services
 - Smart locations (smart city, smart homes, smart public spaces, ...). 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, better comfort, more flexibility in the provision of resources, energy-efficiency in buildings and better situation awareness for the citizen
- SP4. Efficient manufacturing and logistics

EMMON Main Results

- Deployment of fully-functional system prototype of a real world application (+400 nodes);
- WSN embedded middleware,
- WSN multilevel communication protocols;
- Simulation models for WSN behaviour analysis;
- Network Planning and Deployment tools;
- Centralized C&C centre;
- Portable C&C device;



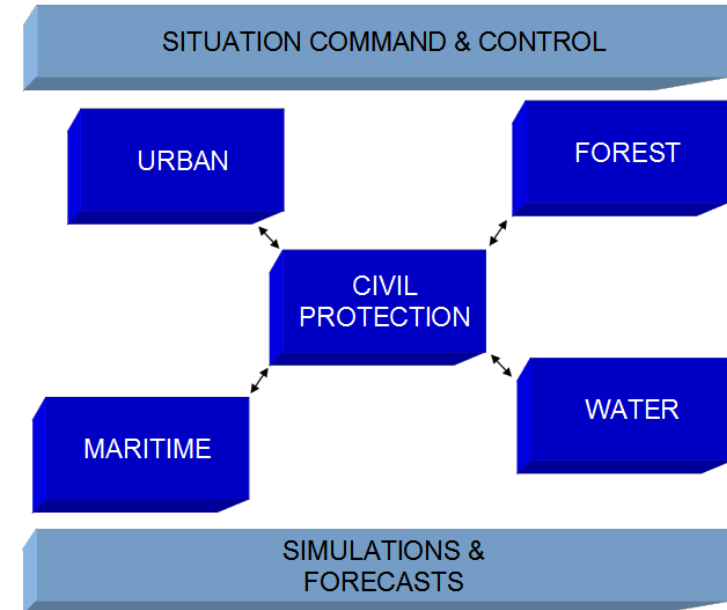


EMMON Areas of Application

■ 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. Changes are reported by triggering of actions (alarms, alerts, actions)



EMMON Expected Impact

- **Impact:** Improve peoples life's:
 - Allow for deployment of large monitoring systems which were not reachable and easily available before
 - Detect environmental and public safety hazards (temperature, gas, noise, pollution, etc)
 - Monitor large and dense geographical areas
 - Provide key data to public authorities, organizations, decision makers
 - Take Better decisions based on “the full picture”!
 - Improve efficiency and reduce costs in existing procedures and maintenance



Technological Innovation

- Develop a WSN system architecture capable of scaling up to 10K nodes (10 times more than today's state of the art)
- Solve the scalability challenge of WSN!
- Horizontal and generic network architecture for multiple applications and scenarios
- New embedded middleware with better overall energy-efficiency, fault-tolerance, and reliability;
- New efficient and low-power communication protocols;
- Develop network planning and deployment tools for LSWSN;
- Provide integrated framework of technologies to enable LSWSN.





Market Innovation – as of TODAY

- Sensor networks widespread barriers:
 - Unreliable communication systems
 - Not easy to use
 - Low battery life / Short lifetime and system lifetime
 - Scalability problems -> Leads to small deployments
 - Available solutions too tailored and specific -> Hard to adapt
 - 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 nodes capability
 - Unprecedented data availability
 - Solve the large scale scalability problem -> Allow Large deployments
 - Facilitate network planning and deployments of such networks
 - Lower cost of deployments

Foundation for widespread emergence of sensor network products

- EMMON collaborates with the End User Committee (10 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
Steering Commission for Regional Development of the North of Portugal	CCDR-N	Portugal	Urban/City



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Thank you for your attention

We value your opinion and questions

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