Project Profile

Developing interoperability for wireless sensor networks

Speeding the uptake of standardised wireless technologies for systems monitoring and management

The ITEA 2 ISN project creates an interoperability platform for Wireless Sensor Networks (WSNs) tested and validated in a selected set of vertical applications to enable future growth and consolidation. The main benefit of the ISN platform will be to use common and standard communication technologies so to promote interoperability between multi-vendor devices.

Use of wireless technologies for monitoring and management systems is relatively recent. The most important limitation has been the absence of a wireless technology deployed with low-cost and low-consumption devices. However, development of the IEEE 802.15.4 standard and use of open software for its programming have resulted in an important evolution in the potential use of these technologies in different market areas such as industry, domotics and energy-consumption monitoring.

WIDER AND OPEN SOLUTIONS NEEDED
Although WSNs are now becoming well-accepted in different application markets, there are several aspects that must be improved to enable future growth and consolidation.

Standardisation and technologies convergence are needed to offer wider and open solutions. Routing and security standards, energy-efficient communications protocols, integrated data processing and, in general, scalable solutions are absolutely essential for WSN evolution.

ISN therefore seeks to create a WSN-based interoperability platform and to test and validate it in a selected set of vertical applications. The main benefit of the ISN platform will be the use of broadly available and standard communication technologies in order to promote interoperability between multi-vendor devices.

These goals fit not only national and European strategic research agendas but also meet societal needs – the resulting technology will contribute to improving healthcare, energy efficiency in buildings, building automation and safer, more reliable energy production.

FAST DEPLOYMENT OF STANDARD ELEMENTS
Wireless sensor networks consist of tiny nodes with sensing, processing and wireless communications capabilities. These nodes form networks through which sensed data and control commands are transported between nodes and a network manager.

WSNs can enable numerous applications and have an enormous market potential. A basic goal of ISN is to develop tools and technology that create a platform for easy and quick development and deployment of integrated, standards-based, sensor-network applications.

Based on experience developed in the ITEA ESNA project and emerging communications standards, ISN addresses a set of new, relevant technical challenges
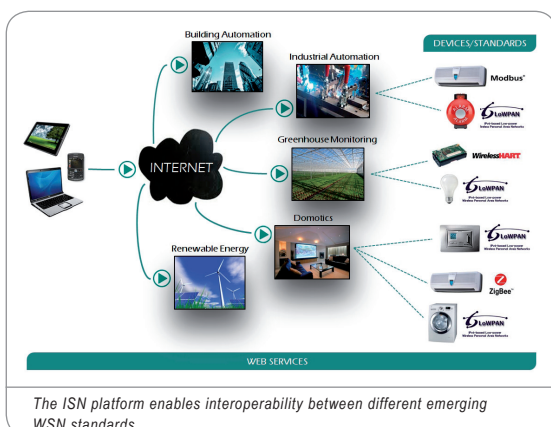
The ISN platform enables interoperability between different emerging WSN standards

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for interoperable sensor network application domains, such as:

- Interoperation with other systems and devices;
- Improved co-existence mechanisms; and
- Management of data within and across networks, and quantitative performance-measurement techniques.

The ISN project is being carried out by a strong international consortium involving high tech industry with strong research support. Its overall objectives are twofold: to create innovative solutions for critical and challenging needs in interoperating sensor-network applications, and to develop the sensor-network technology to enable these applications.

INTEROPERABILITY AND INTEGRATION CRITICAL

Interoperability and integration are becoming critical issues. The multitude of communications protocols creates a challenge for deployment of systems, thus slowing market growth. The success of recent standards such as 6LoWPAN, ZigBee and WirelessHART would make deployment much less challenging and more open for a faster market growth.

These new standards have strong promoting companies which give hope for rapid evolution and wide deployment. The evolution in this field is dependent on technology being able to support and coexist with a number of communications protocols. ISN is therefore focusing on development, use and evaluation of emerging WSN standards.
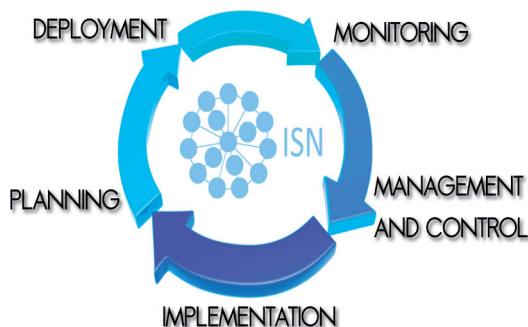
The ISN platform simplifies the 4 main phases of the WSN life cycle: Implementation, Planning, Monitoring and Management & Control

ISN addresses four specific objectives in the lifecycle of a wireless sensor network:

1. Simplifying applications development by refining and developing important building blocks such as communications stacks, operating systems, interoperability testing tools and simulators;
2. Simplifying deployment and integration by implementing emerging WSNstandards, mechanisms for testing network quality, creating integration tools and establishing interoperability with related architectures;
3. Simplifying monitoring and management by developing energy-efficient network-performance monitoring mechanisms, monitoring and management protocols, and network-management tools;
4. Enabling efficient use of data within and outside WSN applications, including management of WSN systems and specific applications needs.

Another goal is to develop, deploy and evaluate pilot installations of sensor-network applications in some high value domains. For example, wireless technology in industrial production environments – challenging scenarios such as large scale condition monitoring and process control with requirements on coexistence with other networks and energy efficiency under varying application requirements.

IMPROVED EFFECTIVENESS AND EFFICIENCY

The results of this project will make it easier and more cost effective to construct standards-based WSN applications in high-value contexts, and thereby contribute to improved effectiveness and efficiency in society at large. Specifically, European industry will gain a competitive edge in the use of WSN technology in critical sectors of industry and society, sectors where global demand has a huge growth potential.

A cross-cutting objective, therefore, is to disseminate results to the rest of the world, to influence both the pace and direction of related technical R&D work outside the project and in standards committees. It is also necessary to influence the user sectors of society and industry, thereby helping speed the uptake of modern technology and methodology as well as wide deployment of WSN in large-scale integrated applications.

- ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services. As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

- ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

- ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.