

eDIANA - Embedded Systems for Energy Efficient Buildings



Rafael Socorro, Project Leader, ACCIONA Infraestructuras S.A.

5th June, Copenhagen, Denmark

Advanced Research & Technology for Embedded Intelligence and Systems

Project profile



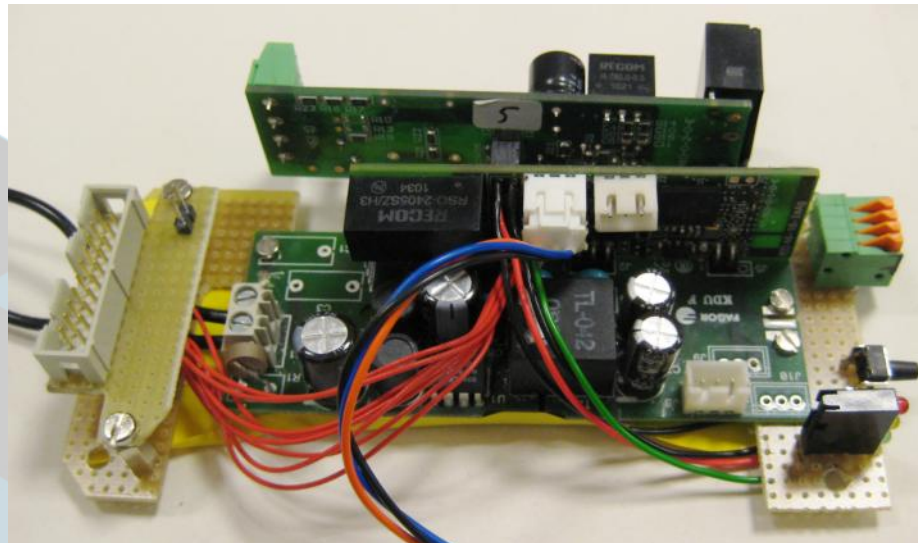
- **Start:** February 2009 **Duration:** 3 Years **Total cost:** 17.5 M€
- **National Contribution:** 4.5 M€ **JU Contribution:** 2.9 M€



eDIANA - Embedded Systems for Energy Efficient Buildings



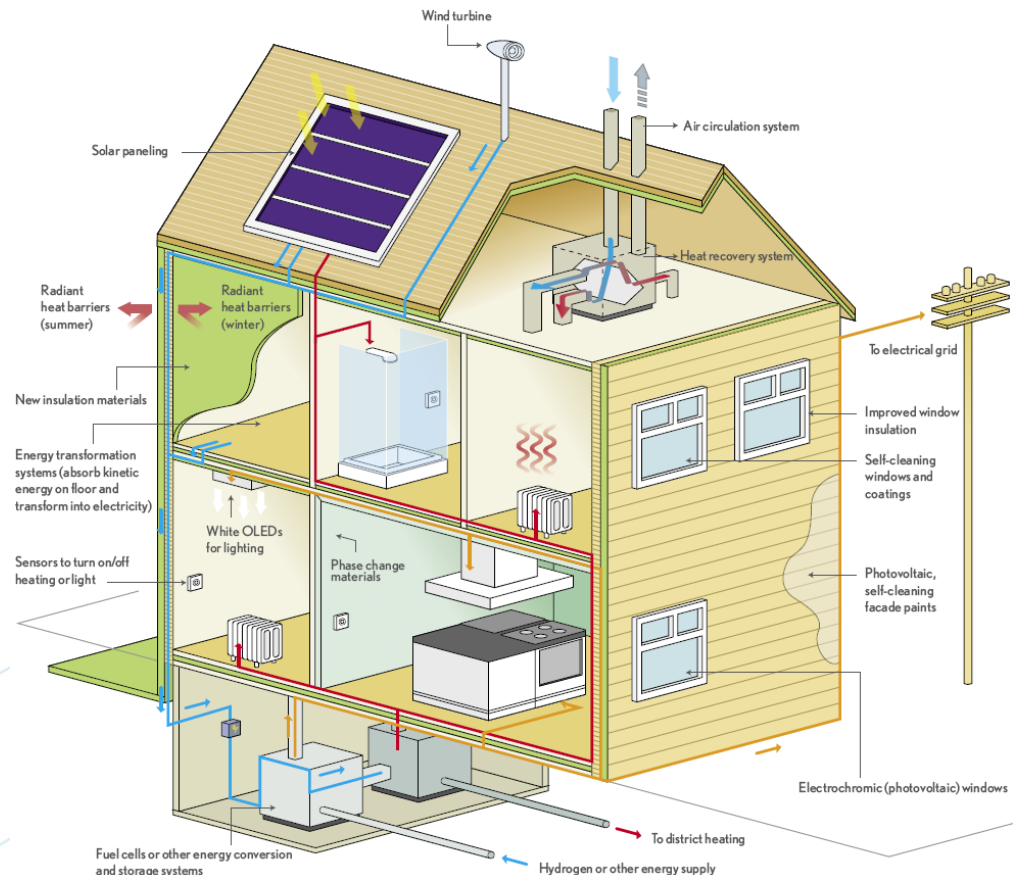
- **Embedded systems** has been identified as a powerful mean to design, optimize, regulate and control energy use within **existing** and future (smart) buildings.



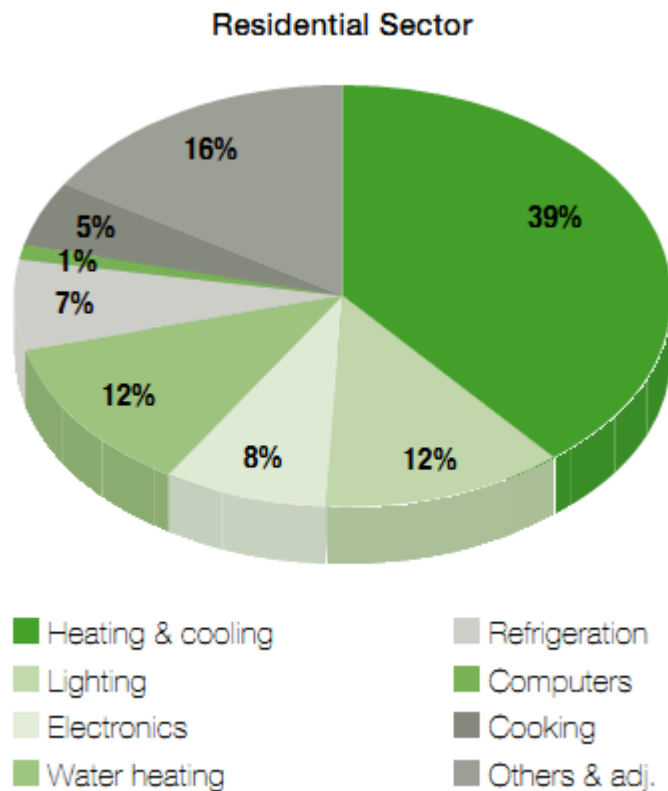
eDIANA - Embedded Systems for Energy Efficient Buildings



- Address energy consumption of buildings
- Improve energy efficiency
- Better resource management
- Consumption awareness



eDIANA - Embedded Systems for Energy Efficient Buildings



- ▶ Primary energy use in buildings → ~40% of total EU energy consumption.
- ▶ ~175 M of buildings in EU.
- ▶ Energy wasted:
 - ▷ Residential → 30-50%
 - ▷ Commercial → 80%!!!

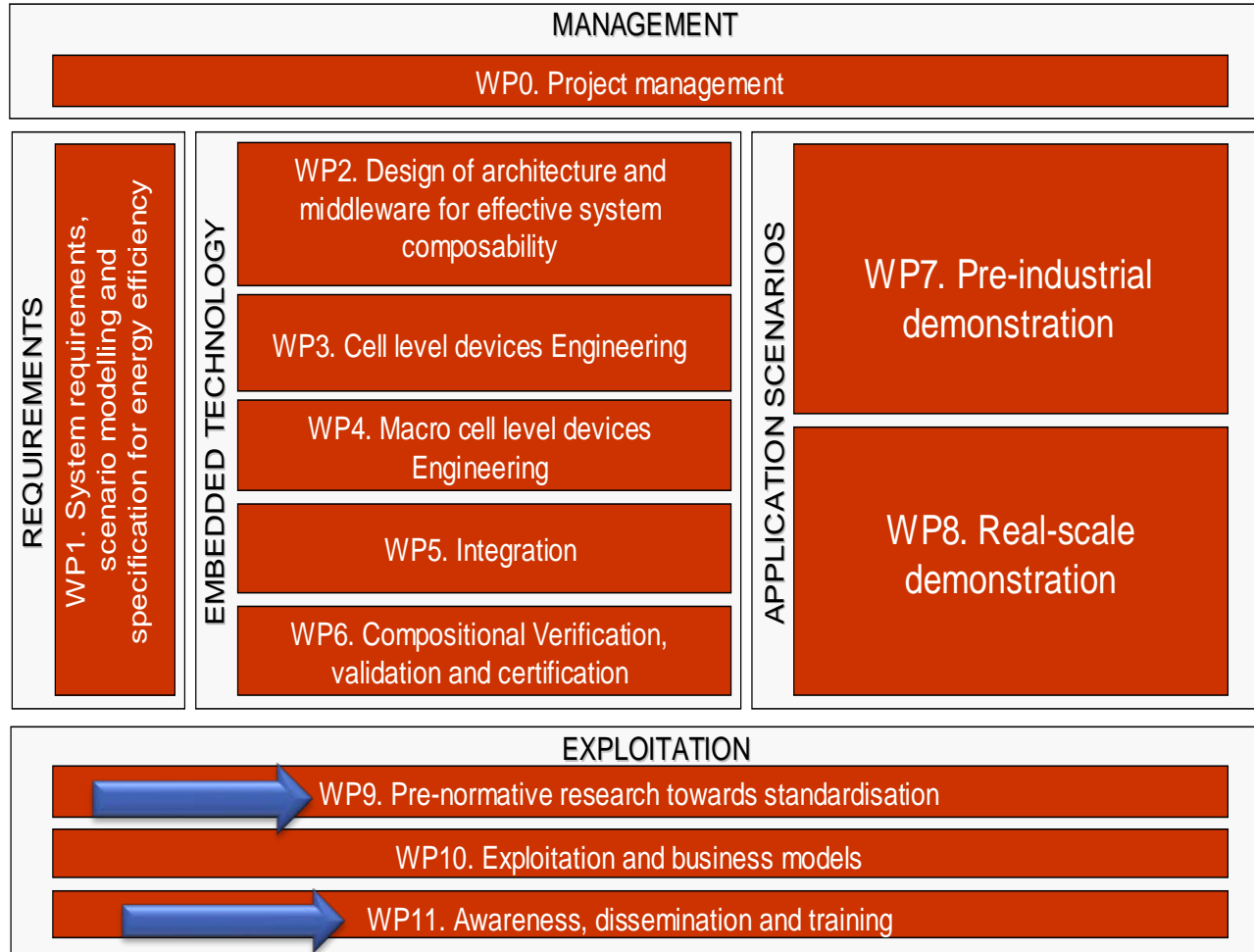
Technological Innovation



- ▶ Interoperability at two different levels
- ▶ **eDIANA Platform**
- ▶ Reference model-based architecture
- ▶ Open middleware



Standardisation and CoIE activities



Pre-normative research and implementation towards standardisation



Objectives

The work package aimed at providing the necessary basis for the introduction of eDIANA energy efficiency system in terms of tests, standards and norms for these technologies which were developed in the project.

Tasks

- **T9.1** Inventory of relevant standards and identification of white spots, opportunities and possible barriers
- **T9.2** Priorities and actions
- **T9.3** Inputs and recommendations towards standardization bodies, international fora and platforms

Inventory of existing norms and standards



- ▶ SDO/SIG activities in context of eDIANA (a few examples)
 - ▷ 3GPP, ETSI TC M2M, ISO, CEN/ CENELEC, IEC, ITU, ANSI, ESMIG
 - ▷ NIST (SG Interoperability Standards Project), BIM (Building Information Model) datasets, UPnP Low Power, IEEE 802.15.4 (ZigBee), KNX, OSGi
 - ▷ ProSE, REEB, ICT4E2B

- ▶ Standardization bodies investigated in context of eDIANA WPs
 - ▷ CEN/CENELEC, ETSI, ISO, IEC and ITU
 - ▷ SPEM 2.0, BPMN 2.0, WfMC, XPD L 2.1, OASIS and BPEL
 - ▷ IEC 61508 “Functional safety of electrical, electronic and programmable electronic safety related systems”
 - ▷ Tooling and in particular web services standardization activities were additionally taken into account.

Analysis and prioritization of white spots, opportunities and barriers towards norms and standards



eDIANA fails without the Norm / Standards

- Zigbee - 4 partners
- CE-HTML - 3 partners
- Ethernet, SQL, Linux/X11, Windows, XML, SOAP - 2 partners
- Data Link, DOM, WSDL - 1 partner
- X-HTML (user interface on mobile devices) - 1 partner

eDIANA is / could be blocked because of the Norm / Standards

- Service provider specific dependencies GSM/ GPRS/ EDGE/ HSDPA/ UMTS/ LTE
- Radio in white space, digital dividend (not standardised yet)
- Uncertainty regarding QT because of change of policy at Nokia: UDP/IP
- IEC 61968/61970, OpenHAN

eDIANA identified white spots

- Zigbee: Support for CO2 sensors

Pre-normative research and implementation activity plan



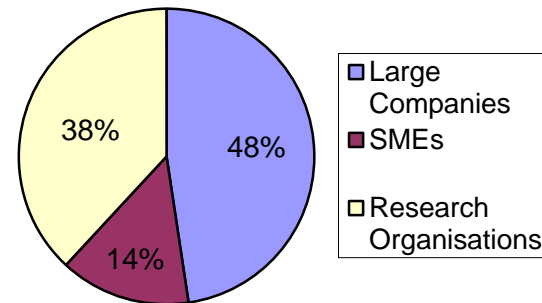
- ▶ CEN/CENELEC/ETSI SG-CG
 - ▷ Endorsed use of existing standards which are already globally recognized
 - ▷ Pushed that standards must be generic and open to be agnostic for future technological developments and market requirements
 - ▷ Supported to develop the report further in issues such as security

- ▶ ETSI TC M2M
 - ▷ Endorsed ETSI M2M service capabilities application for EC M/441 reference architecture
 - ▷ Collaborations with CENELEC TC 13, CEN TC294 and CENELEC TC 205
 - ▷ Supported DLMS/COSEM object model and application layer use
 - ▷ Proposed IP protocol use
 - ▷ Reinforced deployment of interoperable test systems
 - ▷ Supported proposal to make data concentrator interoperable by DLMS/COSEM
 - ▷ Endorsed security not only on transport level, but also on the application level

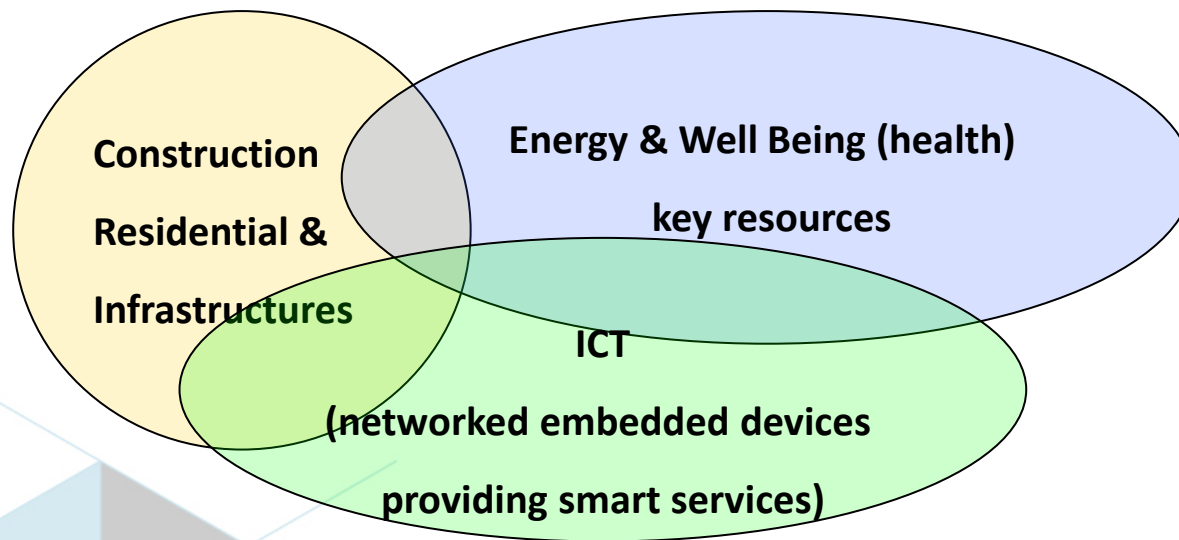
ES4IB - Embedded Systems for Intelligent Buildings - CoIE



- ▶ One of the goals of the eDIANA project:
 - ▷ Set up a Center of Excellence (CoIE), labeled by ARTEMISIA.
- ▶ Domain: Embedded systems for Buildings.



ES4IB - Embedded Systems for Intelligent Buildings - CoIE



► Research & Innovation strength and possible synergies.

ES4IB - Embedded Systems for Intelligent Buildings - CoE



► **END-USERS** involved in the CoE

- ▷ European **Living Lab** strategy followed.
- ▷ Living Lab → a real-life test and experimentation environment where users and producers co-create innovations.
- Building a future economy in which real-life user-centric research and innovation will be the normal co-creation technique for new products, services and societal infrastructures.

**European
Network of
Living Labs**

ES4IB - Embedded Systems for Intelligent Buildings - CoIE



- ▶ ARTEMIS Label to be obtained in November'11 (applied in July'11).
- ▶ Implementing Action Plan for the next 3 years.
 - ▷ Website
 - ▷ Clustering activities
 - ▷ Publications





Thank you for your attention!

Rafael Socorro

rafaelclaret.socorro.hernandez@acciona.com

Advanced Research & Technology for Embedded Intelligence and Systems