Pilot Prototype Results

Final Review
Feb 2012

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ARTEMIS Call 2009 – SP6100204

Overview - prototypical demonstrations

- FPGA **Power node** prototype
- **Cognitive Radio** prototype
- Middleware prototype for **composability**
- **Rail car monitoring** system
- **Interoperable Rail** Information System
- &
- Lessons-learned on Middleware


ARTEMIS Call 2009 Project

p.S.HI.E.L.D.

pilot embedded Systems arcHItecturE for multi-Layer Dependable solutions

ARTEMIS

EXECUTIVE summary

To help safeguard society, pSHIELD will guarantee the privacy and security of embedded systems by making these built-in features of future designs.

RELEVANCE CALL 2009 objectives

The SHIELD consortium proposes a compact R&D, or pilot, project (pSHIELD) to address the core concepts of SHIELD. The pilot is intended to be a pioneer investigation enhanced with R&D activities that will be proposed in the future ARTEMIS Calls.

MARKET innovation

The project will have a great impact on the SPD market of the ES. By addressing the reusability of previous designed solutions, the interoperability of advanced SPD technologies and the standardised SPD certifiability, it is possible to estimate an overall 30% cost reduction for a full SHIELD oriented design methodology. The composability of the SHIELD architectural framework will have great impact on the system design costs and time to market of new SPD solutions in ES. The integrated use of SPD metrics will have impact on the development because the qualification, (re-)certification and (re-)validation process of a SHIELD framework instance will be faster, easier and widely accepted.

TECHNICAL innovation

pSHIELD will approach SPD at 4 different levels: node, network, middleware and overlay. For each level, the state of the art in SPD of single technologies and solutions will be improved and integrated (hardware and communication technologies, cryptography, middleware, smart SPD applications, etc.). The SPD technologies will be enhanced with composable functionality to incorporate the pSHIELD architectural framework.

The pSHIELD project will be focused on:

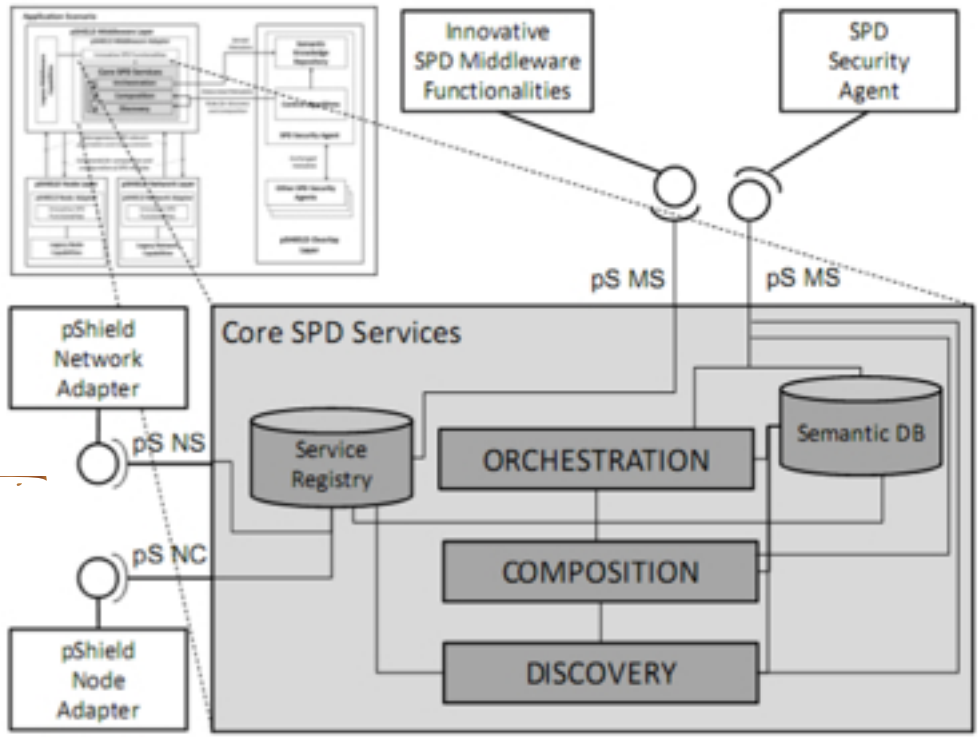
- Demonstrate composability
- New technologies
- Modularity and expandability
- Innovative, modular, composable, expandable and highly dependable architectural framework
- Metrics
- Validation of the SHIELD integrated system in one application scenario.

SHIELD

Advanced Research & Technology for EMbedded Intelligence and Systems

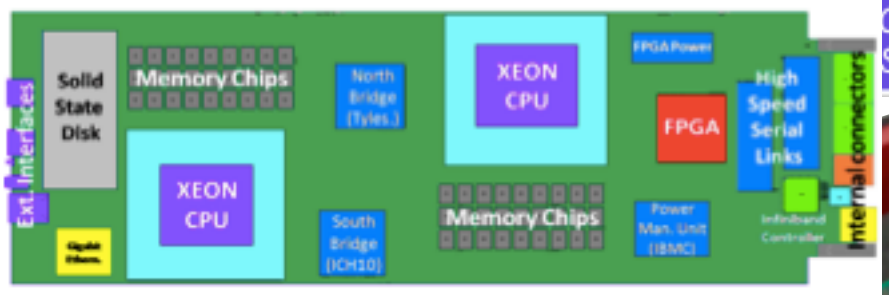
Pilot: Middleware prototype for composability

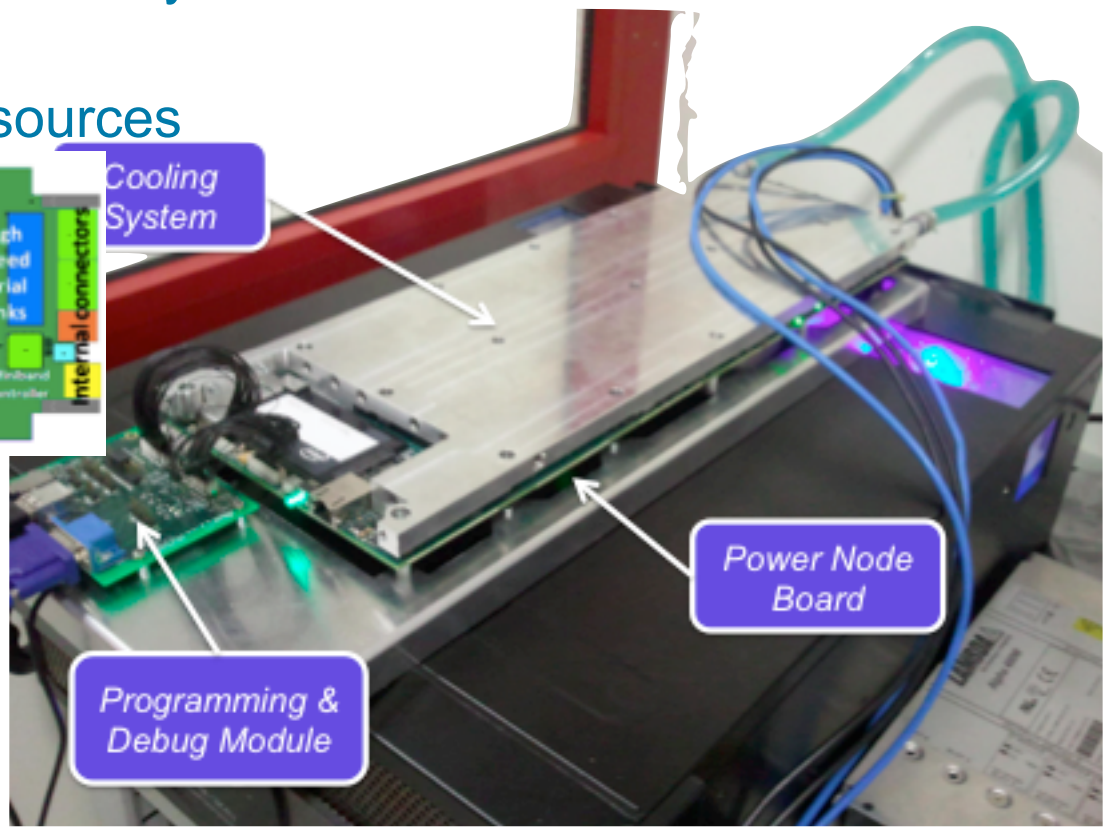
- SPD levels are achieved through specific configurations by the overlay
  - demonstrating the behaviour of the pSHIELD middleware
  - demonstrating SPD-driven composability
  - using metrics-formulation from WP2



Pilot: FPGA Power Node Prototype

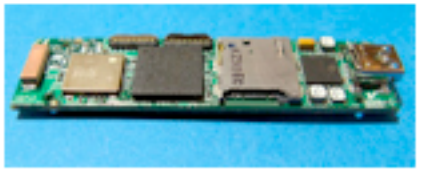
- FPGA Power Node Prototype
  - modular system reconfiguration
  - self-dependability at node layer
  - hardware and software security and privacy service provider
  - management of power sources





Pilot: Cognitive Radio Node Prototype

- Cognitive Radio Node Prototype
  - reconfigurable radio components with waveform Tx parameters
  - Sensing mechanisms to acquire awareness about resources
  - Cognitive algorithms elaborating available resources
  - Embedded platform adaptation for validation of algorithms



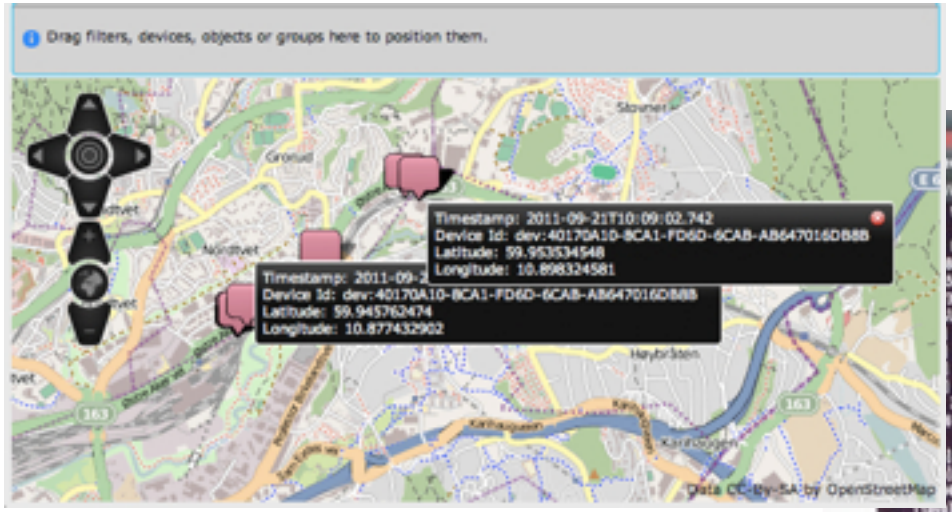
PCB OMBRA-pSHIELD – OMAP uP (18x68 mm)
WCP (1K pieces) =~150 Euro
Computational Power 5X

Pilot: Monitoring trains with WSNs

- Monitoring trains with WSNs
  - identity requirements of real-world applications
  - Identify SPD functions in an integrated embedded sensor testbed
  - opens for SPD metrics based composability

Pilot: Nano-Micro-Personal-M2M platform

- Nano-Micro-Personal-M2M Platform
  - security interworking between embedded sensors and Telecom service platform
  - Identify SPD functions in an integrated embedded sensor testbed
  - opens for SPD metrics based composability



Introduction to specific results

Six prototypes demonstrating various aspects pSHIELD

- FPGA **Power node** prototype (Przemek)
- **Cognitive Radio** prototype (Marco)
- Middleware prototype for **composability** (Vincenzo)
- & Lessons-learned from Middleware development (Andrea)
- **Rail car monitoring** system (Francesco)
- **Interoperable Rail** Information System (Josef)

let us listen to the lessons learned