



Final Review
Brussels, December 12th, 2008

Achievements and Perspectives :

Execution Platforms

Cluster leader : Jan Madsen

Technical University of Denmark



Partners of the Cluster

- Core partners
 - DTU (Jan Madsen)
 - University of Bologna (Luca Benini)
 - ETH Zurich (Lothar Thiele)
 - University of Braunschweig (Rolf Ernst)
 - Linkoping University (Petru Eles)
 - Eindhoven University (Jeroen Voeten)
- Affiliated partners
 - KTH (Axel Jantsch)
 - EPFL (Giovanni DeMicheli)
 - Politecnico Di Milano (Donatella Sciuto)
 - University of Leiden (Ed Depretter)
 - Universidad de Cantabria (Eugenio Villar)
 - University of Erlangen-Nuremberg (Juergen Teich)
 - Politechnico di Turino (Luciano Lavagno)

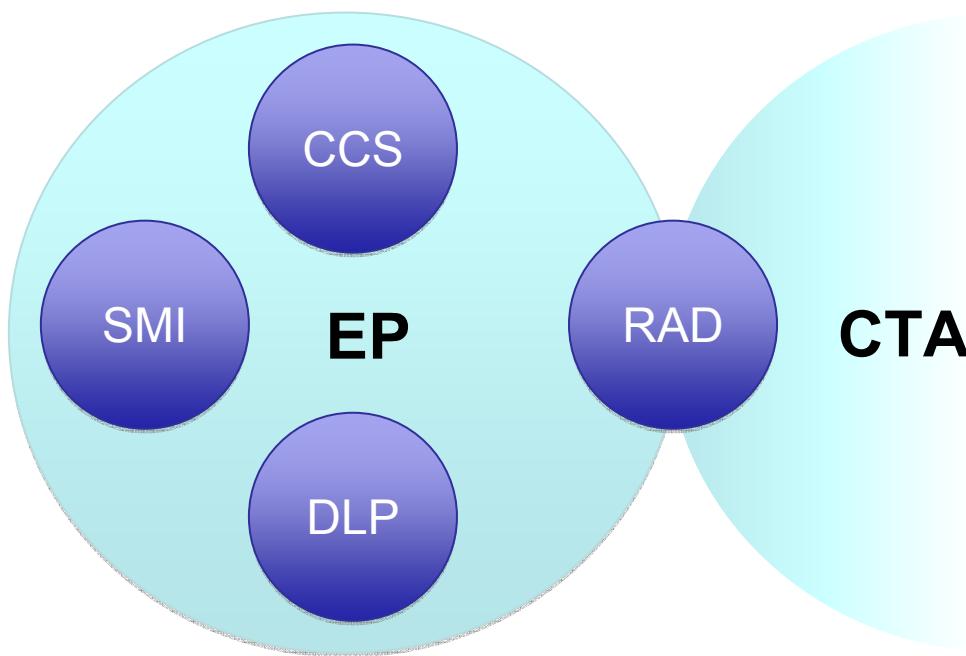
Partners of the Cluster

- Affiliated industrial partners
 - Volvo (Magnus Hellring)
 - STM (Roperto Zafalon)
 - Volkswagen (Fabian Wolf)
 - SymtaVision (Kai Richter)
 - Bosch (Dirk Ziegenbein)
 - Nokia Denmark (Peter Mårtensson)
 - Intel Germany (Matthias Gries)
 - Prevas (Rune Domsten)
 - Bang & Olufsen ICEpower (Bjørn Sand Jensen)

High-Level Objectives

- Investigate the *hardware* architecture and *software* components in their *interaction*,
- Investigate *models and methods* for accurate *estimation* of important properties (energy, timing),
- Provide the designer with adequate support for *design space exploration* and *optimisation*.
- *Fault tolerance* as an important property

High-Level Objectives

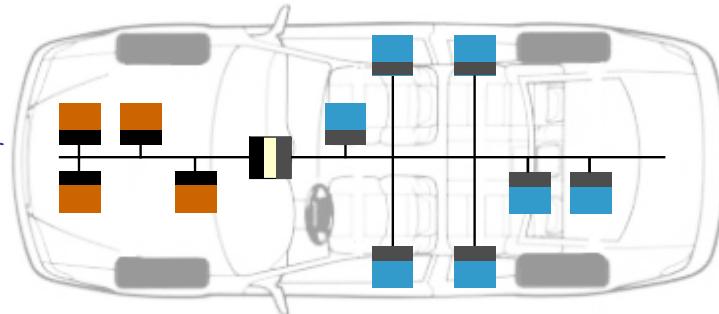


State of the Integration in Europe

- Industrial Sectors:

- Automotive

increasingly distributed
complex integration



- Mechatronics

increasingly networked
predictability



State of the Integration in Europe

- Industrial Sectors:

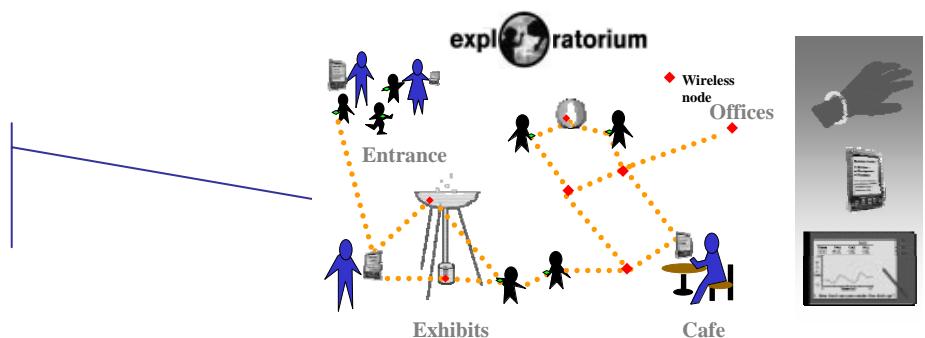
- Multimedia

high performance
increasingly multi-core



- IT Industry

resource awareness
short product cycles
distributed operation



Building Excellence

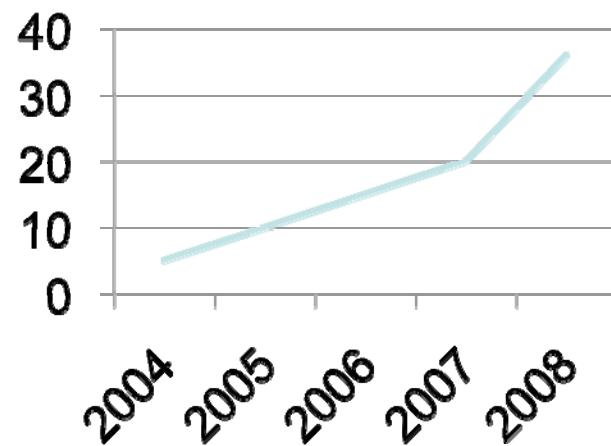
- Year 4
 - 36 joint publications
 - 5 workshops organized
 - 2 summer schools
 - 1 PhD courses
 - 1 conference tutorials

Building Excellence

- ARTIST2

- 84 joint publications
- 15 workshops organized
- 6 summer schools
- 3 PhD courses
- 9 conference tutorials
- 7 special conference sessions organized
- 2 special journal issues organized

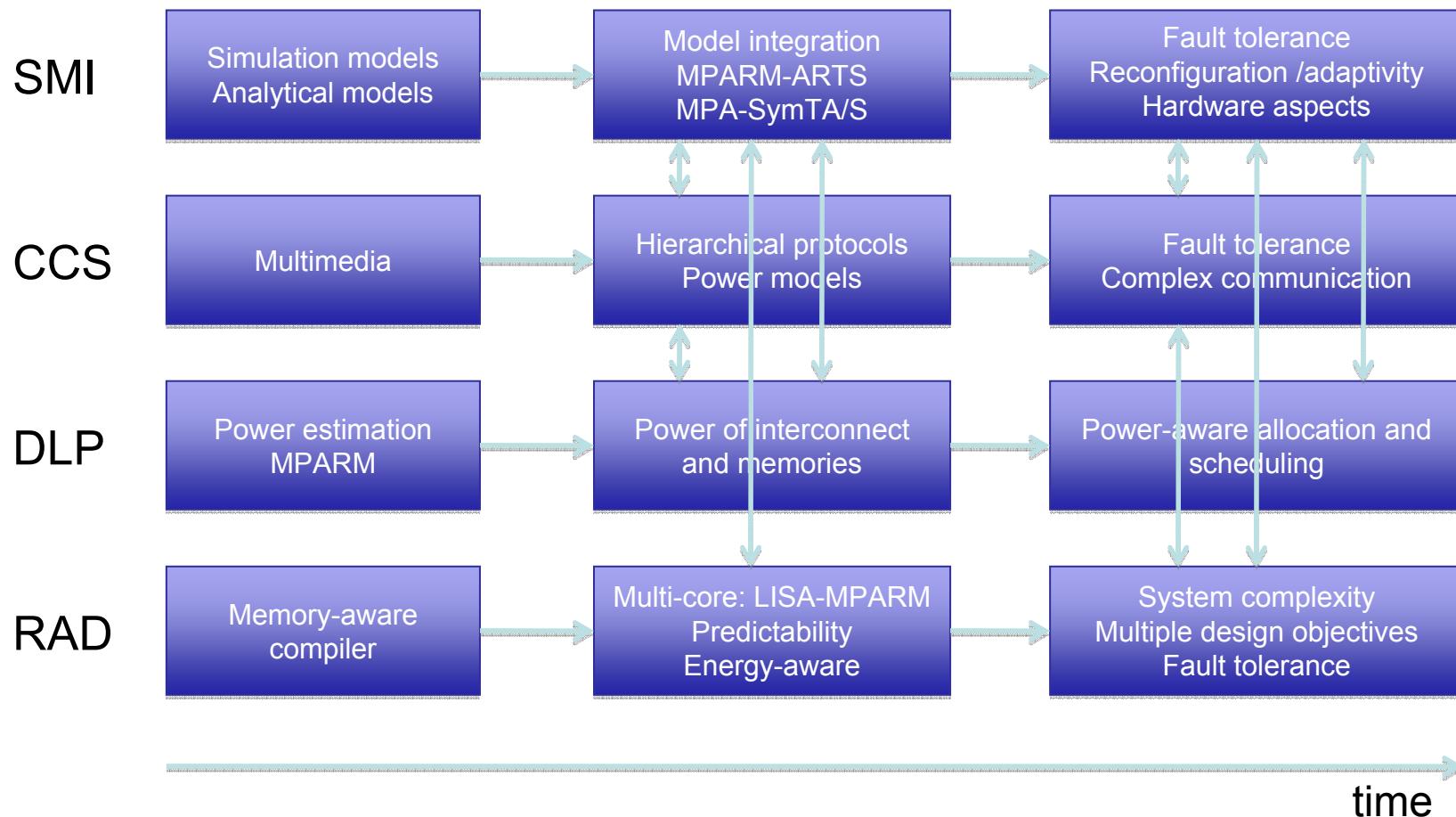
joint publications



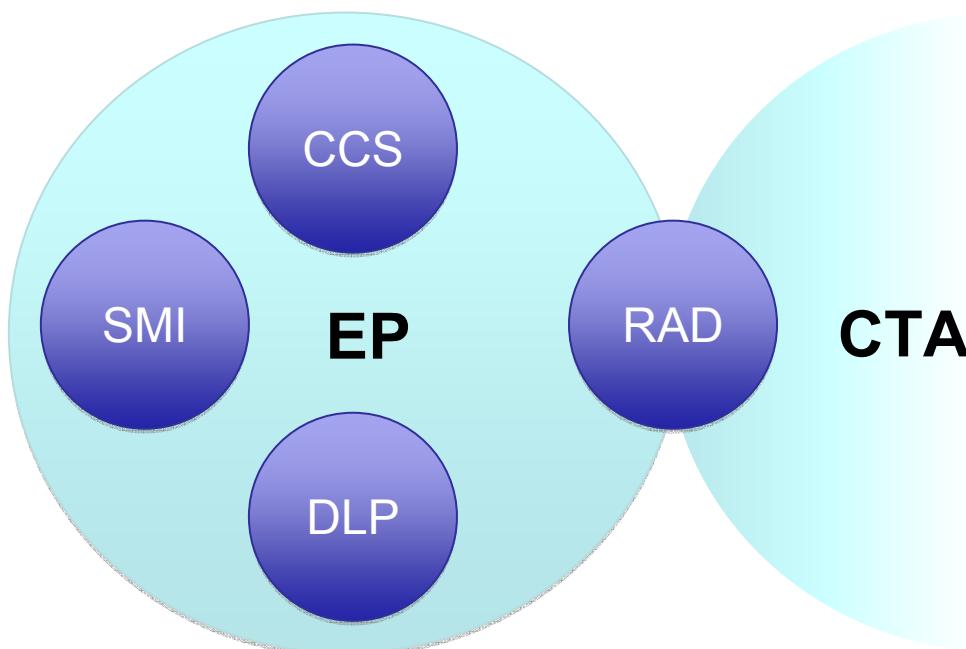
Building Excellence

- Joint projects
 - PREDATOR, COMBEST, SHAPES, MNEMEE, DaNES, SYSMODEL, ...
- Industry co-operations
 - STM, Intel, Bosch, Volkswagen, Volvo, IBM, B&O, Prevas, ...
- DATE conference more embedded systems
 - Book: “The most influential papers of 10 years of DATE”
- ARTEMIS JU / ARTEMISIA
- Hipeac2
 - Multi-core architectures, programming models

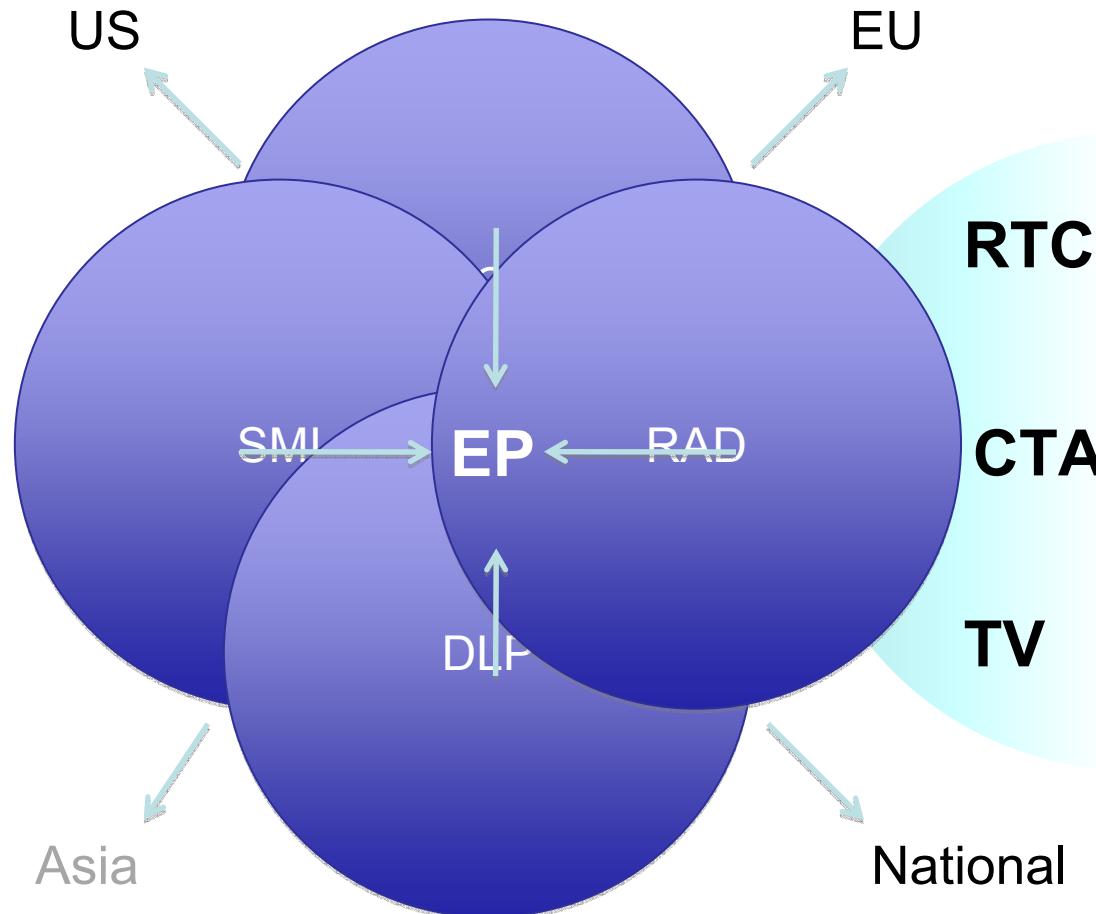
Overall Assessment at the end of the NoE



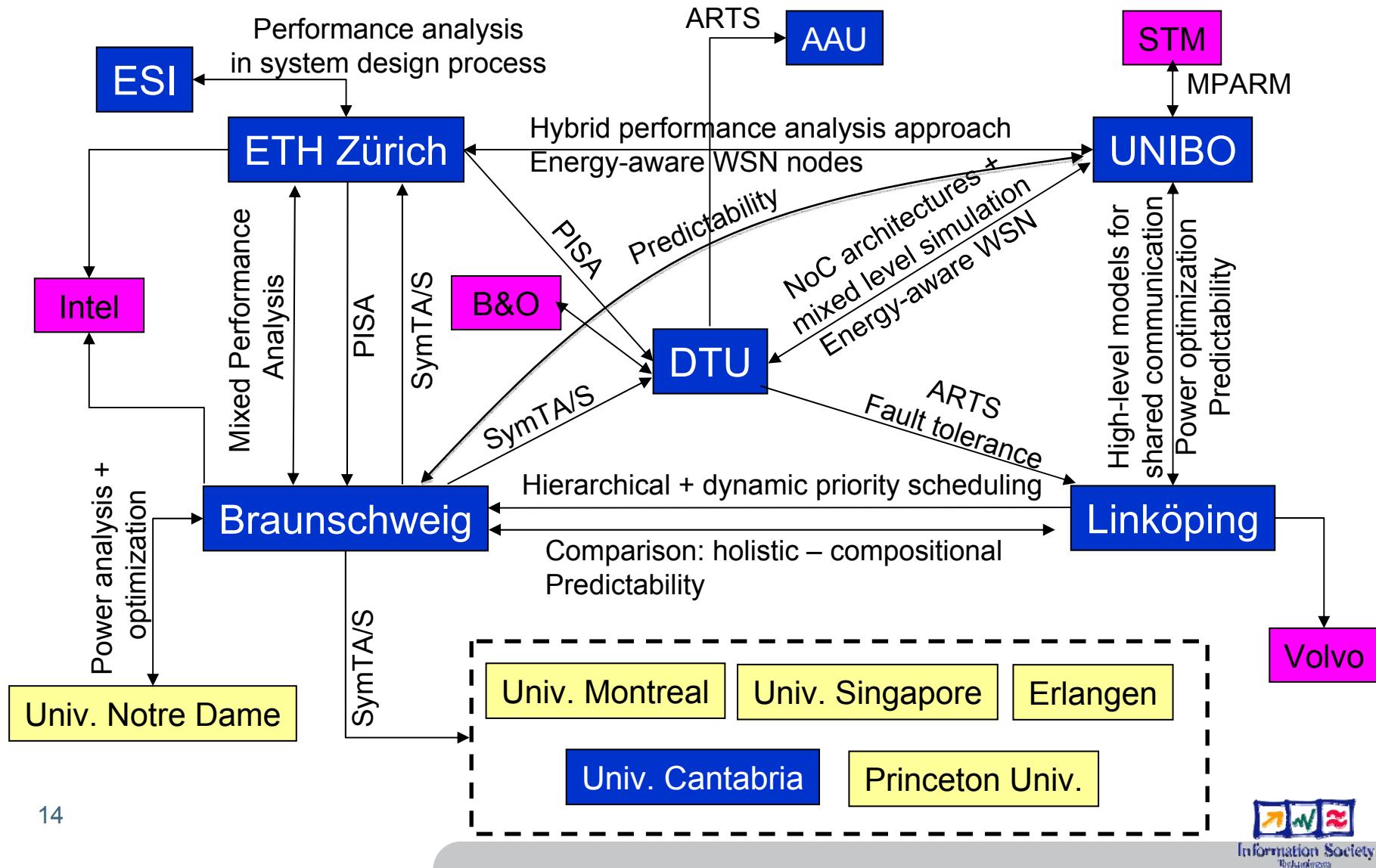
Overall Assessment at the end of the NoE



Overall Assessment at the end of the NoE



Cluster Integration

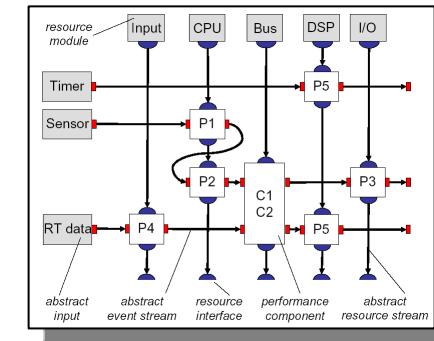
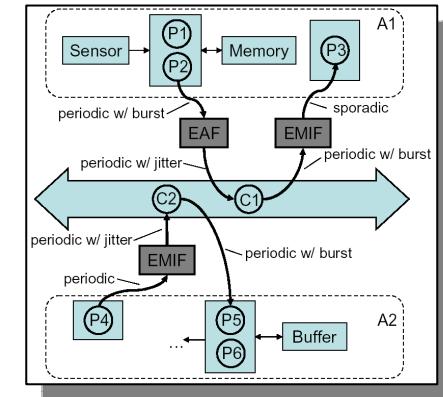


Future

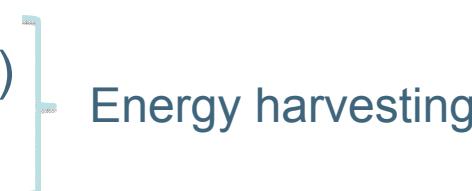
- ArtistDesign
 - Hardware Platforms and MPSoC Design
 - Activity on Analysis and Design
 - Participation in transversal activities
- Other Projects
 - EU and national
- Lasting impact:
 - Succeeded in creating a *community* on Embedded Systems
 - Embedded Systems Design as a *discipline*
 - Embedded Systems *education*
 - National *awareness* of importance of Embedded Systems

Scientific Highlights

- Performance Analysis Frameworks
 - Analytical: MPA, SymTA/S (SymtaVision), Holistic
 - Integration: MPA-SymTA/S, ARTS-UPPAAL
- Design process
 - Simulation -> Analytical
 - Analytical -> Simulation (validate bounds)
 - MPSoC Design
 - MPSoC simulation: MPARM, ARTS, MPARM-ARTS
 - analysis and optimization
 - Power, memory, predictability
 - NoC and Task mapping

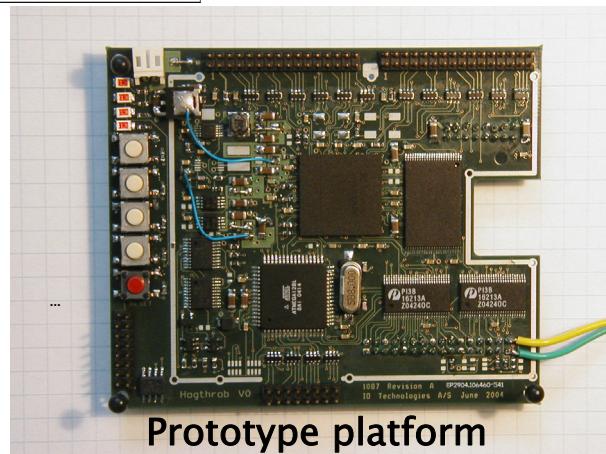
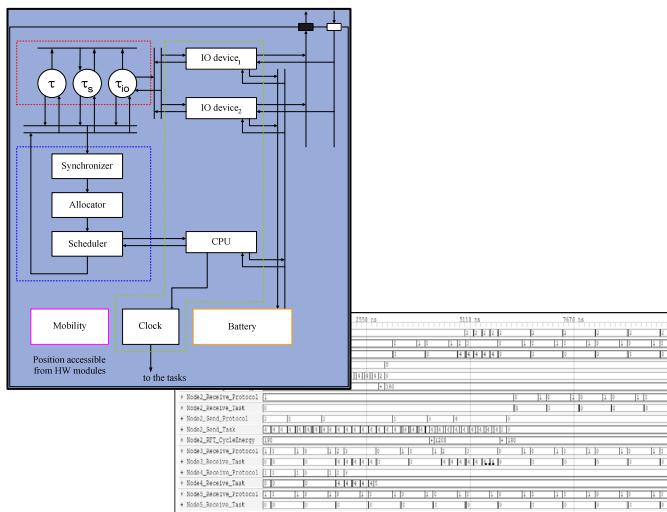


Scientific Highlights

- Distributed Embedded Systems
 - SymTA/S commercialized by SymtaVision. Link to aiT WCET
 - Fault tolerance: analysis and optimization of timing in presence of faults (FlexRay analysis).
 - Sensitivity analysis and robustness optimization
 - Networked Embedded Systems
 - Energy-aware node scheduling (lazy scheduler)
 - Energy-aware routing (dynamic adaptation)
- 
- Energy harvesting

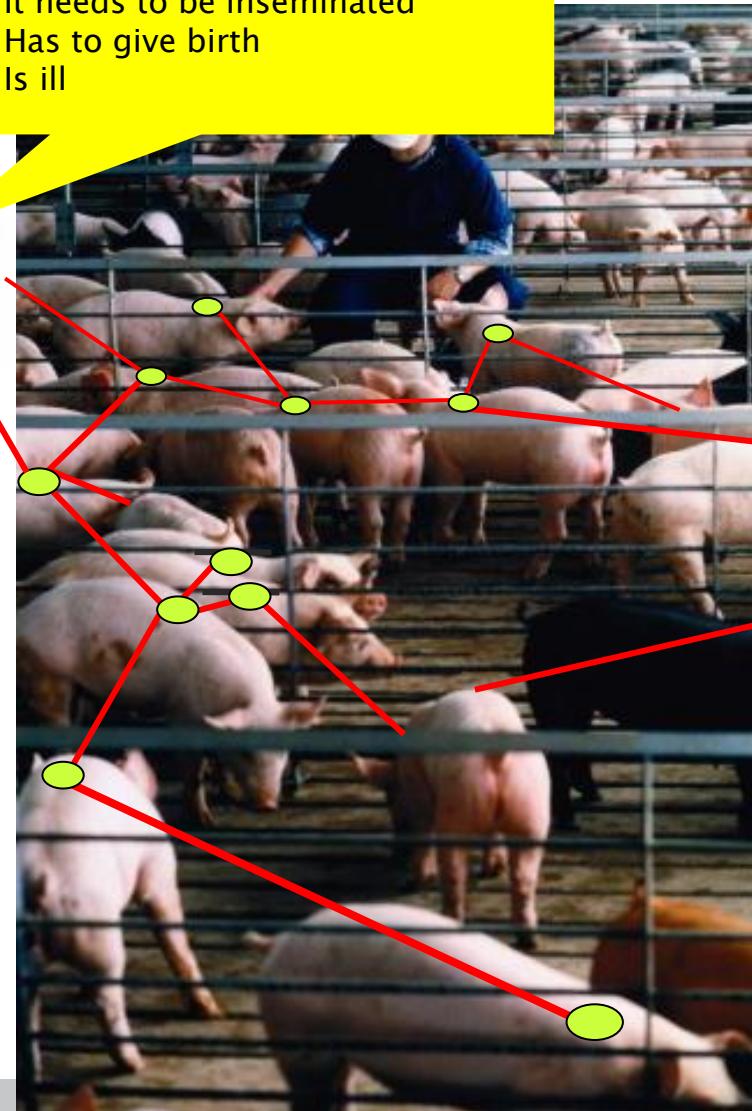
Example: Wireless Sensor Networks

System-level modelling, analysis
and optimization

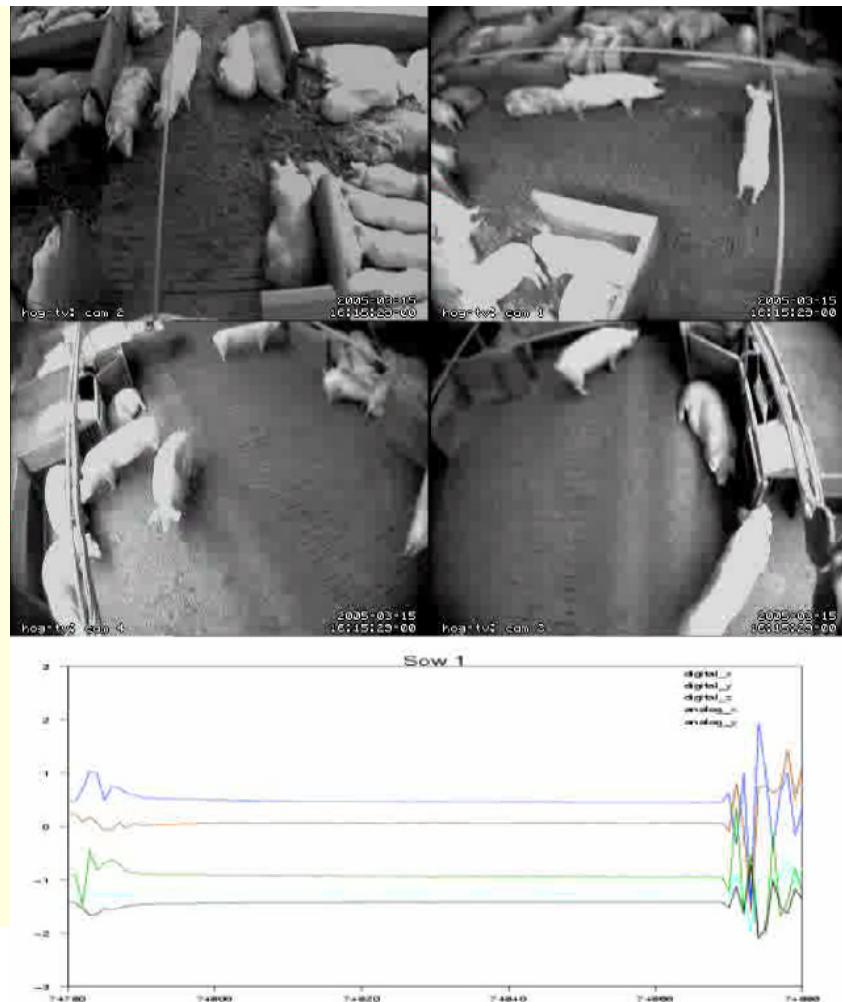
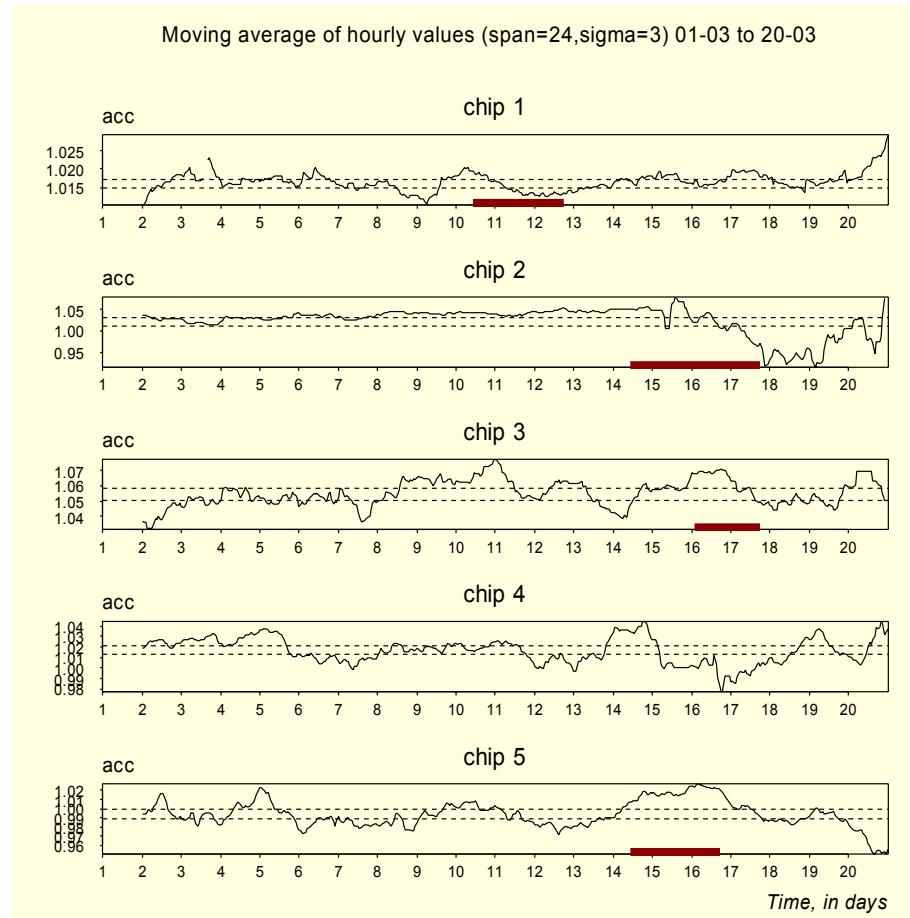


Let the sow phone the farmer when:

- It needs to be inseminated
- Has to give birth
- Is ill



Example: Wireless Sensor Networks





THANK YOU!