



Università degli Studi dell'Aquila

Center of Excellence DEWS

*Design methodologies for **E**Embedded controllers,
Wireless interconnect and **S**ystem-on-chip*

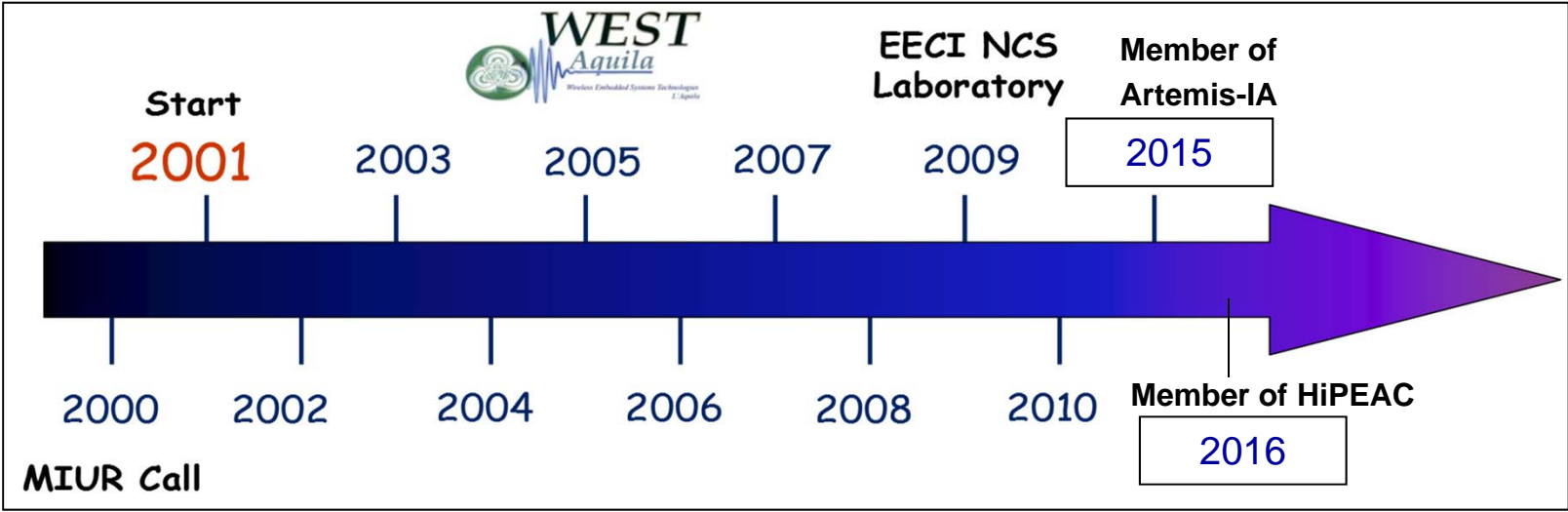
Overview

- **Introduction**
- **Main Research Topics**
- **Main Research Projects**
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Introduction

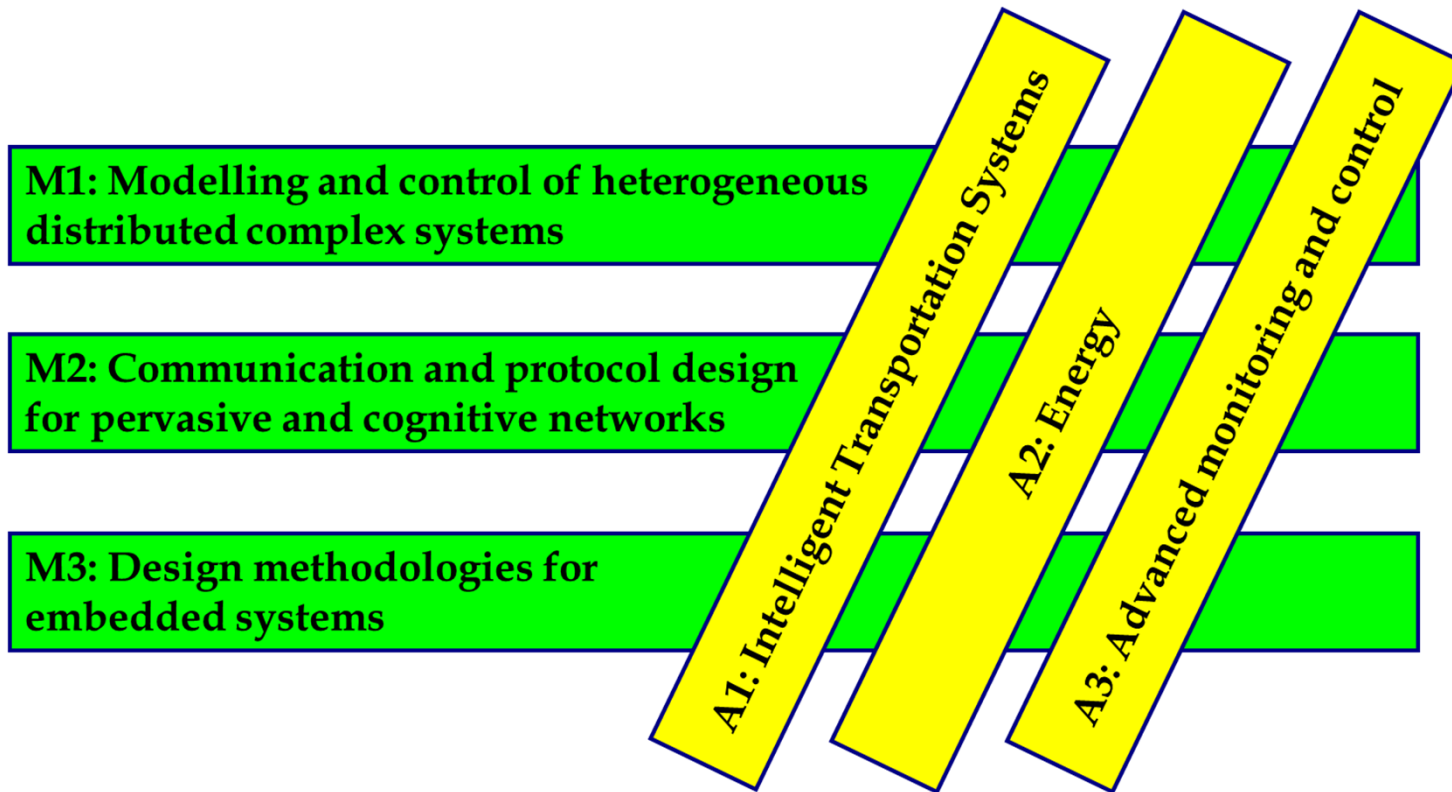
Introduction

- **Center of Excellence DEWS**
 - Design methodologies for Embedded controllers
 - Wireless interconnect and System-on-chip



Introduction

- Center of Excellence DEWS
 - Research Lines



Main Research Topics (M3)

Main Research Topics (M3)

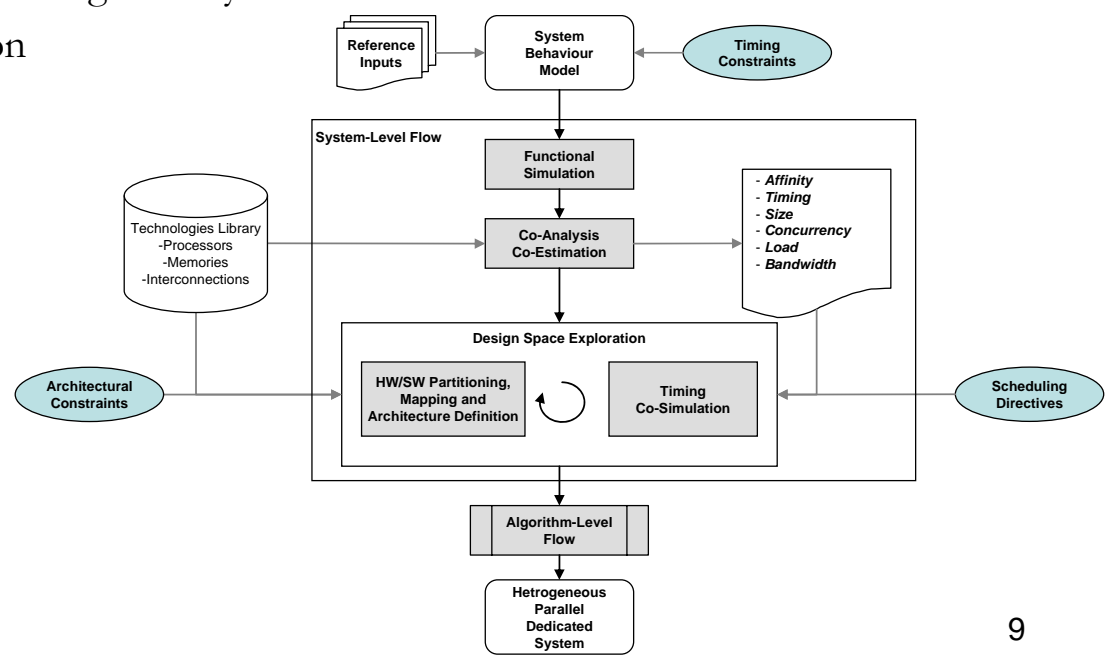
- **Electronic System-Level HW/SW Co-Design**
- **HW Profilers for Parallel Architectures on FPGA**
- **Mixed-Criticality Systems**
- **Wireless Sensor Networks**

Main Research Topics (M3)

Electronic System-Level HW/SW Co-Design

Main Research Topics (M3)

- **Electronic System-Level HW/SW Co-Design**
 - **HEPSYCODE**
HW/SW Co-Design of Heterogeneous Parallel Dedicated/Embedded Systems
 - System-Level Synthesis: Design Space Exploration
 - Concurrent Error Detection
 - Real-Time Constraints/Mixed-Criticality
 - Monitorability/Reconfigurability
 - Formal Verification



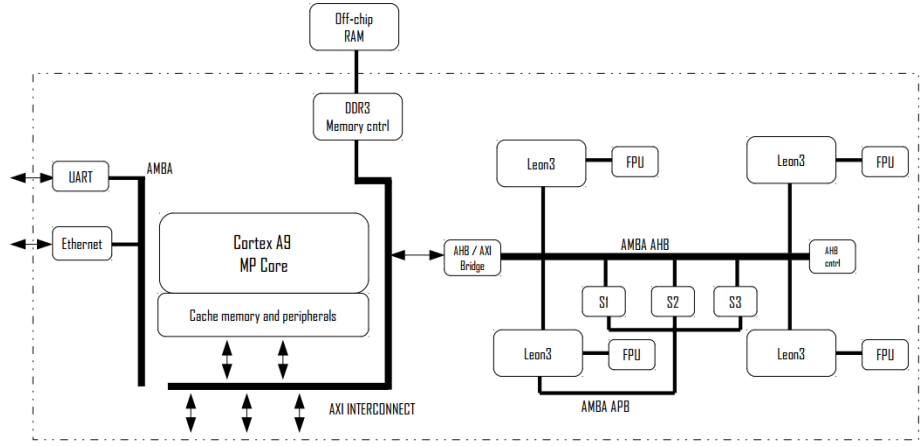
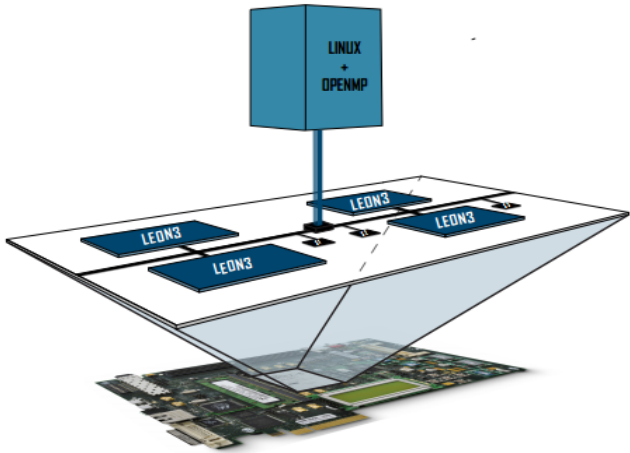
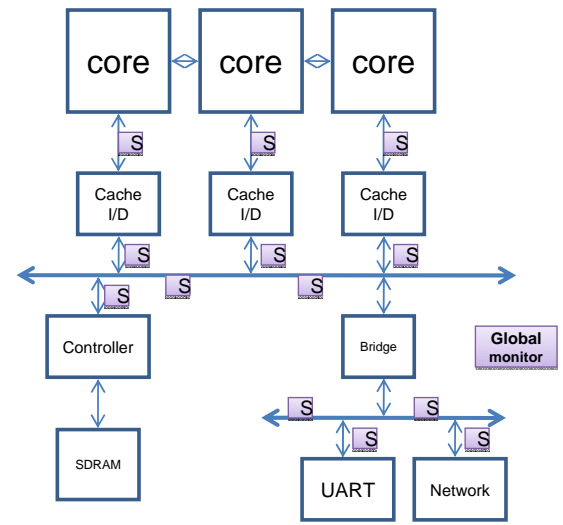
Main Research Topics (M3)

HW Profilers for Parallel Architectures on FPGA

Main Research Topics (M3)

- **HW Profilers for Parallel Architectures on FPGA**

- Distributed HW Profiling System
 - Support for offline/online monitoring and reconfigurability
- Platforms
 - *4-LOOP, A-LOOP*
 - *ARM, MicroBlaze, NIOS-II, LEON3*

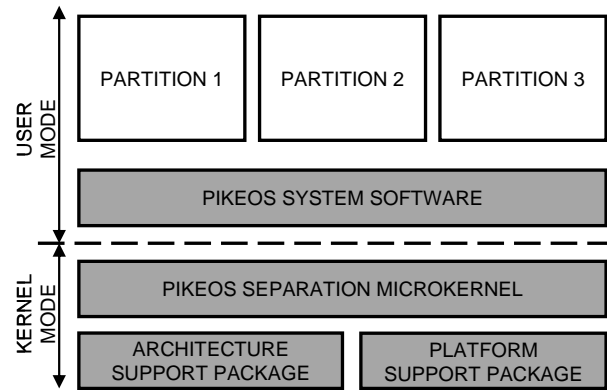
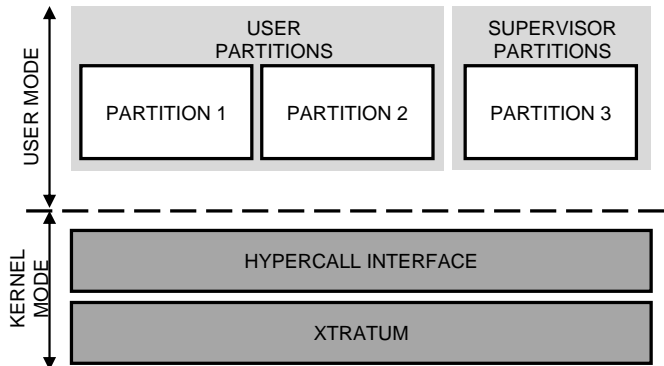


Main Research Topics (M3)

Mixed-Criticality Systems

Main Research Topics (M3)

- **Mixed-Criticality Systems**
 - Hypervisor technologies for mixed-criticality multi-core platforms
 - *PikeOS, Xtratum*
 - *ARM, LEON3, LEON4*
 - Mixed-criticality Network-On-Chip
 - Ad-hoc HW mechanisms to support isolation

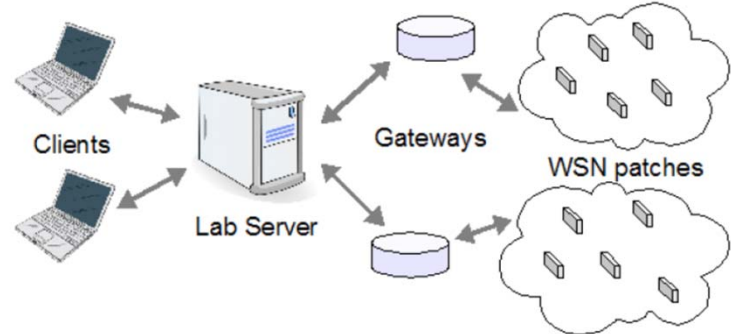


Main Research Topics (M3)

Wireless Sensor Networks

Main Research Topics (M3)

- **Wireless Sensor Networks**
 - Basic technologies
 - HW
 - *CrossBow/Memsic, Advanticsys, Texas Instruments, Atmel*
 - SW
 - *C/HAL, TinyOS, FreeRTOS, Contiki*
 - Communication protocols
 - *IEEE 802.15.4 (802.15.4e), OpenZB, TinyAODV*
 - Remote Lab and Testbed (*LabSMILING*)
 - Up to 100 nodes remotely programmable and monitorable
 - WSN data collection and analysis
 - Communication protocols assessment



Main Research Topics (M3)

- **Wireless Sensor Networks**
 - Middlewares for WSN
 - Heterogeneous HW/SW/radio platforms
 - Mobile-agents based Virtual Machines
 - Support to IOT application development and deployment
 - Services
 - Indoor Localization
 - *TinyGIS*
 - Security
 - Cryptography
 - Intrusion Detection System
 - Technologies
 - *TinyOS Agilla/ Agilla2*
 - *IBM MoteRunner*
 - DEWS MW (WIP)

Main Research Projects (M3)

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- **VISION** (ERC-2009-StG 240555) [CLOSED]
 - *Video-oriented UWB-based Intelligent Ubiquitous Sensing*
- **SMILING** (RIDITT 2009, national project) [CLOSED]
 - *SMart In home LiviNG*
- **PRESTO** (Artemis-JU ASP 2010-269362) [CLOSED]
 - *ImProvements of industrial Real Time Embedded SysTems develOpment process*
- **CRAFTERS** (Artemis-JU ASP 2011-295371) [CLOSED]
 - *ConstRaint and Application-driven Framework for Tailoring Embedded Real-time Systems*
- **EMC²** (Artemis-JU AIPP 2013-621429) [CLOSED]
 - *Embedded Multi-Core systems for Mixed Criticality applications in dynamic and changeable real-time environments*

Main Research Projects (M3)

- **CASPER** (H2020-MSCA-RISE-2014) [RUNNING]
 - *User-centric MW Architecture for Advanced Service Provisioning in Future Networks*

- **SAFECOP** (ECSEL-JU RIA-2015) [RUNNING]
 - *Safe Cooperating Cyber-Physical Systems using Wireless Communication*

- **MEGAM@RT²** (ECSEL-JU RIA-2016) [RUNNING]
 - *MegaModelling at Runtime - scalable model-based framework for continuous development and runtime validation of complex systems*

- **AQUAS** (ECSEL-JU RIA-2016) [RUNNING]
 - *Aggregated Quality Assurance for Systems*

Main Research Projects (M3)

- **FITOPTIVIS** (ECSEL-JU RIA-2017) [NEGOTIATION]
 - *From the cloud to the edge - smart IntegraTion and OPTimization Technologies for highly efficient Image and VIdéo processing Systems*
- **AFARCLOUD** (ECSEL-JU RIA-2017) [NEGOTIATION]
 - *Aggregate Farming in the Cloud*

Memberships (M3)

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- **Artemis Industry Association (Artemis-IA)**
 - *Advanced Research & Technology for EMbedded Intelligent Systems*
 - <https://artemis-ia.eu/>
- **HSA Foundation**
 - *Heterogeneous System Architecture*
 - <http://www.hsafoundation.com/>
- **HiPEAC**
 - *European Network on High Performance and Embedded Architecture and Compilation*
 - <https://www.hipeac.net/>
- **TULIPP Advisory Board**
 - *Towards Ubiquitous Low-Power Image Processing Platforms*
 - <http://tulipp.eu/>

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