Future Plans and Steps Towards Innovation

Andrea Bondavalli, University of Firenze
28th May 2015
• To bring time awareness and evolution into the design of System-of-Systems (SoS),
  • to establish a sound conceptual model,
  • a generic architectural framework and
  • a design methodology, supported by some prototype tools, for the modeling, development and evolution of time-sensitive SoSes with possible emergent behaviors.

• Measures of success
  • proof-of-concept prototype on a smart GRID application,
  • training and background material
AMADEOS current achievements

- Established a solid conceptual model for SoS through viewpoints
- Semi-formalization in SysML
  - AMADEOS profile definition
- Preliminary definition of an architectural framework that captures all the relevant aspects of evolvable SoS
- Identification of a Case Study on Smart Grid
AMADEOS next steps

• Support SoS design(ers)
  • Completion of the AMADEOS SysML profile and its integration in open MDE frameworks

• Enhancement of SoS Architectural Framework
  • Including monitoring, cognitive and predictive features
  • Development of the components of the Architecture such as a Resilient Master Clock

• Development of the Grid Case Study

• Tutorial book and course material
Support SoS design(ers)

- Completion of the AMADEOS SYSML profile for SoS conveying key SoS concepts
  - Time-awareness
  - Evolution
  - Dynamicity
  - Emergent properties
  - Multi-criticality
- Integration in MDE frameworks
  - Adaptation of a user-friendly graphical editor based on the profile able support design, e.g. check the interface compatibility between couples of constituent systems.
  - Providing guidelines to ease the design specification
Architectural Framework

Building blocks

- SoS Management Infrastructure
- The MAPE (monitor analyse plan execute) blocks
- Relied Upon Interfaces
- Time Awareness
- Resilient Master Clock
- Dependability and security aspects
- Evolutionary aspects
Resilient Master Clock

- Development of the Resilient Master Clock
- Let’s put concepts, model and guidelines into practice!
  - Hardware proof-of-concept prototype for future low-cost mass production

Time-awareness, evolution, emergence, dynamicity, security
Tutorial book and course material

• Preparation of teaching material for an SoS Engineering advanced (M.Sc./Ph.D.) course, which includes:
  • AMADEOS SoS concepts
  • SoS model
  • SoS design principles and guidelines
  • SoS SYSML profile
• Realization of a reference tutorial book
Steps towards Innovation

- **Knowledge innovation**
  - SoS concepts and model

- **Process innovation**
  - SoS design guidelines
  - SoS design supporting facilities and tools

- **Proof-of-concept** on key issues (time-awareness, dynamicity and emergence)
  - Prototype development

Product innovation
Steps Towards Innovation

Enhanced SOS Model

Course material and book

AF + components (e.g. the resilient master clock)

Support to SoS design(ers)