



University POLITEHNICA of Bucharest  
Faculty of Automatic Control and Computers



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Professor Monica Drăgoicea  
PhD supervisor, PhD study domain: Systems Engineering

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**Research profile:**

- [1.] Systems Engineering
- [2.] Modelling and simulation based systems engineering
- [3.] Object-oriented design and analysis for real-time and embedded systems
- [4.] Service systems engineering

The proposed research directions approach the domain of systems engineering, from a modelling and simulation perspective. In particular, two special instances of systems are addressed: real time and embedded systems, and service systems.

Systems engineering is a multidisciplinary approach trying to guide solution development of complex engineering problems based on formalized best practices. It relies on processes, tools and methods, expressed as methodologies in order to manage complexity by improving design practices and fostering knowledge coding through model capture in all system design phases.

Modelling and simulation based systems engineering (M&SBSE) supports an effective systems engineering process in which the model is still central, but it reinforces that this model should be executable. Therefore, besides centralising experiences and successful best practices in the systems engineering endeavour, an M&SBSE process should naturally integrate design options to validate design using an executable representation of requirements.

In the Model Driven Development (MDD) perspective, the M&SBSE processes must support a high level visual modelling approach assisted by model execution and simulation tools. From a real-time systems and service systems engineering perspective, the outcomes of this processes are artefacts that automatically support consistency among design steps and effective integration of customer experience and stakeholder requirements through iterative cycles related to systems' design.

Recent literature has proposed the extension of the systems engineering body of knowledge for service systems engineering, in order to develop new processes, methods and tools to design complex service systems of the future. The INCOSE systems engineering vision for 2020 describes the evolution of the systems engineering endeavours in a “model-based” or “model driven” context.

Service Systems Engineering is a commonly used term today to define a specific development approach that accounts for systematically and quantifiable design, development, operation, and maintenance of service systems (a Conceive, Develop, Implement, and Operate - CDIO engineering approach) supporting the development of technology enabled service systems.

The need for such research is thoroughly motivated, considering two important aspects: the evolution of the service sector in the current economical situation, and the complexity in evolving service systems and deploying innovated services.

**PhD supervisor** since 2016

**Research projects (2008 – 2016):**

- 2006–2008: Grant director, research grant title "Automatic Generation and Broadcasting of Macroseismic Intensity Maps using Informational Networks", partnership with the National Institute for Earth Physics (<http://www.infp.ro/en/>)

**Proposed PhD research topics:**

- [1.] Service systems modelling
- [2.] Resource allocation in service delivery
- [3.] Information-based smart transport services