



CSSEA 2020

conference on systems engineering research

Recent Trends and Advances in Model-Based Systems Engineering

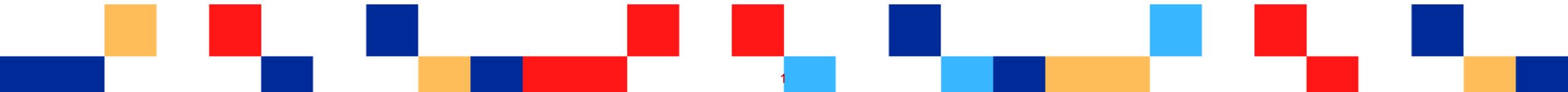
18th Annual Conference on Systems Engineering Research (CSER)

October 08 - 10, 2020

Now Completely Virtual

Technical Program: Thursday, October 08, 2020

Pacific Time (PT)	Tutorials
8:00 - 17:00	Enterprise Modeling using UAF (Mr. Barry Papke, Dassault Systèmes – NoMagic)
8:00 -10:00	Preparing MBSE for Industry 4.0 & IOT– Part 1 (Dr. Dov Dori, Technion - Israel Institute of Technology)
	Parallel Agile - Part 1 (Mr. Doug Rosenberg, University of Southern California)
10:00-10:30	Break
10:30-12:00	Preparing MBSE for Industry 4.0 & IOT– Part 1 (Dr. Dov Dori, Technion - Israel Institute of Technology)
	Parallel Agile – Part 2 (Mr. Doug Rosenberg, University of Southern California)
12:00-13:00	Break
13:00-15:00	MBSE Overview – Part 2 (Dr. Mark L McKelvin Jr., University of Southern California)
	Data Analytics- Part 1 (Dr. Courtney Paulson, Southern Utah University)
15:00-15:30	Break
15:30-17:00	MBSE Overview – Part 2 (Dr. Mark L McKelvin Jr., University of Southern California)
	Data Analytics– Part 2 (Dr. Courtney Paulson, Southern Utah University)



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Full Day Tutorial

Enterprise Modeling using UAF

Mr. Barry Papke,
Dassault Systèmes -
NoMagic

This tutorial describes the role of enterprise architecture in the context of the SE lifecycle and provides an introduction of the modeling concepts and view with the Unified Architecture Framework. It will describe the relationship of UAF to previous frameworks and describe the changes from the previous Unified Profile for DODAF and MODAF (UPDM) modeling language. The majority of the course will introduce attendees to the 11 model kinds and 10 domain perspectives of UAF focusing on key model elements and horizontal relationships within each domain as well as vertical traceability relationships between domains. The course will not include hands on modeling with CAMEO Enterprise Architecture (CEA) with UAF but will include instructor led presentation / demonstration of UAF diagrams and model elements in the tool.

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Morning Half Day Tutorial

Preparing MBSE for Industry 4.0 & IOT

Dr. Dov Dori,
Technion - Israel
Institute of Technology

The emergence of the Internet of Things (IoT) and Industry 4.0 signifies a disruptive departure from traditional systems engineering practices to a collaborative model-based SE environment that enables the concurrent, agile design, modeling, and simulation of systems' and products' hardware and software. The tutorial introduces the state-of-the-art in IoT and Industry 4.0. We discuss what the current rapid transition means to systems engineering professionals and how adopting an agile MBSE approach can prepare them for this era. We then introduce principles and basics of Object-Process Methodology - OPM ISO 19450 as a viable infrastructure for Industry 4.0 and IoT through hands-on experience with OPCloud – a Web-based collaborative conceptual modeling environment that facilitates online and off-line collaboration in developing complex systems, utilizing OPM ISO 19450. We will seamlessly model both conceptual qualitative aspects and quantitative aspects of a couple of systems of interest.

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Morning Half Day Tutorial

Parallel Agile

Mr. Doug Rosenberg,
University of Southern
California

From the beginning of software time, people have wondered why it isn't possible to accelerate software projects by simply adding staff. This is sometimes known as the "nine women can't make a baby in one month" problem. The most famous treatise declaring this to be impossible is Fred Brooks' 1975 book *The Mythical Man-Month*, in which he declares that "adding more programmers to a late software project makes it later," and indeed this has proven largely true over the decades.

Aided by a domain-driven code generator that quickly creates database and API code, Parallel Agile achieves significant schedule compression using parallelism: as many developers as necessary can independently and concurrently develop the scenarios from initial prototype through production code. Projects can scale by elastic staffing, rather than by stretching schedules for larger development efforts. Schedule compression with a large team of developers working in parallel is analogous to hardware acceleration of compute problems using parallel CPUs.

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Afternoon Half Day Tutorial

MBSE Overview

Dr. Mark McKelvin Jr.,
University of Southern
California

Although engineering with models has been part of the systems engineering profession for decades, the increasing scale and complexity of modern systems necessitates rethinking SE processes. Model-Based Systems Engineering (MBSE) provides system engineers with the mean for managing complexity and encouraging collaboration among diverse subject matter experts. In this seminar we begin by discussing the MBSE value proposition and then delve into the details of models, MBSE tools and languages, key terminology and concepts, and usage in the systems engineering process. Practical examples will be provided throughout the course that demonstrate the application of concepts discussed. We emphasize that this is not a SysML training course but rather provides a broader look at the theory and practice of MBSE that is more generally useful for systems engineers and systems thinkers.

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Afternoon Half Day Tutorial

Data Analytics

Dr. Courtney Paulsen,
Southern Utah
University

This data analytics tutorial will take participants through an introduction to the tools and methods available for analyzing big data in a systems context. The course will explore the packages and options available with standard analytics languages such as R and Python, including options such as the Radiant package in R and RStudio Cloud for use of the analytics packages for nontechnical stakeholders. This tutorial will follow through a complete, interactive case study detailing several advanced analytics methods as demonstrated through the tools and options. Though this tutorial focuses on the practical application of analytics methods, resources will also be provided for additional background in methodology and algorithms for participants as well. No programming experience is necessary for this tutorial, but some basic familiarity with programming concepts and syntax may be helpful in understanding some of the demonstration materials. In addition, participants should have an introductory understanding of statistical concepts such as probability and data measures.