



WORLD AUTOMATION CONGRESS

WAC 2018

13th Bi-annual Congress

**Lifetime Achievement Keynote
No. TUE-AM3**

**Dan DeLaurentis
Purdue University, USA**

Time: 11:20-12:20
Tuesday, June 5, 2018
Chair: Mo Jamshidi, USA
Venue: Stevenson Ballroom A



From air transportation to space exploration: Progress in modeling and analytics in a “Systems-of-Systems” world

ABSTRACT: The task of engineering design and the larger endeavor of Systems Engineering are challenged by increasingly complex systems interactions and network topology evolution, independence of stakeholders, heterogeneity of participating systems, and all together producing emergent behavior. These are typical features of Systems-of-Systems, and their study requires different approach and methodologies than those established in systems engineering. This talk will highlight interesting points along our group’s journey in this “world” over the last few years.

The first part of this talk will introduce a framework for System-of-Systems engineering, which includes a three-phase Process Model: the phases of definition, abstraction, and implementation support informed decision making, providing insights into relative structure and performance of various combinations of technical, operational, policy, and economic design decisions. The US National Air Transportation System will be used as an example, with reference to research milestones for sponsors and key publications).

The second part of the talk will focus on the System-of-Systems Analytic Work Bench developed in our group. The Analytic Work Bench includes methods and tools for reasoning about System-of-Systems architecture, explicitly addressing the features mentioned above. Two methods for modeling and analysis of operational and developmental dependencies will be described in detail, and space applications will provide exemplary use of the methodologies in the Analytic Work Bench.

Bio: Dr. Daniel DeLaurentis is Professor in Purdue's School of Aeronautics & Astronautics (Engineering). He also serves as Director of Purdue's Institute for Global Security and Defense Innovation (i-GSDI) in the University's Discovery Park. i-GSDI's mission is to converge Purdue's interdisciplinary resources to bring timely, responsive and transformative solutions to the most pressing security and defense challenges facing the nation and the world.

Dr. DeLaurentis' primary research interests are in the areas of problem formulation, modeling and simulation, and robust system design and control methods for aerospace systems, transportation architectures, and systems-of-systems (SoS), conducted under grants and contracts from private industry, NASA, FAA, Navy, the DoD Systems Engineering Research Center (SERC) UARC, and the Missile Defense Agency. Within the SERC he is co-lead of the Enterprises as Systems and System of Systems Thrust Area and a member of the SERC's Research Council.

Dr. DeLaurentis is an Associate Fellow of the American Institute of Aeronautics and Astronautics and served as Chairman of the AIAA's Air Transportation Systems (ATS) Technical Committee from 2008-2010. He is also AIAA's Deputy Director for Aircraft and Atmospheric Systems Group since 2014. Dr. DeLaurentis is also a senior member of the IEEE and member of INCOSE and active in "systems circles" of those societies. He was the Co-Chair of the System of Systems Technical Committee in the IEEE System, Man, and Cybernetics Community (2009-2014) and is Associate Editor for the Transactions of the IEEE Systems, Man, & Cybernetics: Systems. He is Faculty Fellow of CERIAS (Purdue's Center for Education and Research in Information Assurance and Security).