


AIAA GREATER HUNTSVILLE SECTION PRESENTS A WORKSHOP ON: **The Role of Analytics and Uncertainty Quantification in the Digital Twin / Digital Engineering**



Join us on Feb. 15, 2019 from 12:00 to 4:00 PM at
Kord Technologies, 635 Discovery Dr. NW, Huntsville, AL

The digital revolution has forever changed the way analytics is conducted. It has modernized the field of metrology with responsive digital measurement devices, yielding a “data rich” environment. Moreover, advancements in simulation software coupled with high-performance computing provide a venue for analyzing complex multi-physics systems never thought possible a decade ago. Evidence of this evolution is the emergence of the Digital Thread/Digital Tapestry/Digital Twin methodologies which bring together multidiscipline simulations and physical data into a functional group for conducting analytics.

The workshop will first discuss Digital Engineering initiatives started by the Department of Defense and other governing bodies. Then the workshop will introduce Uncertainty Quantification (UQ) methods that utilize digital technologies to provide value-based solutions to engineering issues. A SmartUQ software demonstration will highlight how these methods can be applied to industrial challenges and the value that they bring. Then the workshop will present the role UQ and other analytics play in building and running an efficient and accurate Digital Twin. These analytical solutions are then broadened to the Digital Engineering Ecosystem, which consists of the Digital Twin, the Digital Thread, and the Digital Tapestry. The workshop will conclude with a panel discussion about industry challenges of developing and applying Digital Twin and Digital Engineering to their engineering system.

Key Learning Objectives:

There are no prerequisites for this workshop. At the completion of this workshop attendees will:

- Gain an introductory understanding of the framework which merges digital technologies to transform high velocity, high volume, noisy data into authoritative, decision quality knowledge.
- Learn that analytics and UQ methods are the key enablers to acquiring viable solutions in the digital engineering ecosystem.
- Understand the tremendous value that comes from analytics and UQ in having real time analysis of product performance, control, and sustainment which closes the gap between collecting data and generating business value.

Workshop Audience:

The audience for this workshop includes engineers, managers, and data scientists in both industrial and defense sectors who are involved in simulation, experimental testing, design, and analyses and have interest in learning more about using analytics for the Digital Twin / Digital Engineering.

**To register, go to <https://engage.aiaa.org/greaterhuntsville/home> and click on Events -> Upcoming Events.
For questions, email distribution@hsv-aiaa.org. Snacks and drinks will be provided.**

Workshop Speakers:



DR. ED KRAFT, SMARTUQ TECHNICAL ADVISER

Dr. Ed M. Kraft is the Associate Executive Director for Research at the University of Tennessee Space Institute and a Technical Advisor to SMARTUQ. He has over 48 years' experience in testing and evaluation in industry and the government. He recently retired as a Senior Leader in the Air Force as the Technical Advisor for ground testing in the AF Test Center where he was the top technical expert in the testing of hardware in aerodynamic, propulsion and space ground test facilities that simulate flight conditions. He is a leader in the innovative integration of high-performance computing with ground and flight testing to improve defense acquisition and one of the early advocates for the CREATE high-fidelity physics-based modeling program. He is one of the initiators and principal architects for the Air Force's Digital Thread/Digital Twin initiative and a strong advocate for the application of Uncertainty Quantification in developing the digital authoritative truth source in support of decision making. He is a distinguished alumnus of both the University of Cincinnati and the University of Tennessee Space Institute, where he received his degrees in aerospace engineering. He is a fellow of the American Institute of Aeronautics and Astronautics (AIAA) and an Arnold Engineering Development Complex fellow.



DR. MARK ANDREWS, SMARTUQ UQ TECHNOLOGY STEWARD

Dr. Mark J. Andrews is SmartUQ's UQ Technology Steward where he is responsible for advising SmartUQ on the industry's uncertainty quantification needs and challenges. He is SmartUQ's principal investigator for the Probabilistic Secondary Flow and Heat Transfer Model project as part of the Probabilistic Analysis Consortium for Engines (PACE). Prior to working at SmartUQ, Dr. Andrews spent 15 years at Caterpillar where he worked as a Senior Research Engineer, Engineering Specialist in Corporate Reliability, and Senior Engineering Specialist in Virtual Product Development. While at Caterpillar, Dr. Andrews presented tutorials internally about new subject matter such as uncertainty quantification and produced over 20 Caterpillar internal publications. In 2018, he received the award for "Best Tutorial" at NAFEMS Conference on Advancing Analytics & Simulation in Engineering (CAASE). He has been a member of ASME for over 20 years and is currently a member of the Probabilistic Methods, a subcommittee of Structures & Dynamics committee for ASME Turbo. He is also a long-standing member of SAE and American Ceramic Society (ACERS).



ZACK GRAVES, SMARTUQ SENIOR APPLICATION ENGINEER

Zack Graves, SmartUQ Application Engineer, is responsible for performing simulation and statistical work for clients in aerospace, defense, automotive, gas turbine, and other industries. He is also a key contributor in SmartUQ's Digital Twin/Digital Thread initiative. Mr. Graves received a B.S. in Mechanical Engineering and Astronautics from the University of Wisconsin-Madison.

To register, go to <https://engage.aiaa.org/greaterhuntsville/home> and click on Events -> Upcoming Events. For questions, email distribution@hsv-aiaa.org. Snacks and drinks will be provided.