



10th Annual Verification and Validation Summit

Event Record

The 10th Annual Verification & Validation (V&V) Summit was held at the Resorts Hotel in Atlantic City NJ on September 23-24, 2015. Over 170 participants attended the annual summit. There were 19 speakers from FAA, NASA, Department of Defense (DOD), International Air Navigation Service Provider, Academia, and Industry who addressed and promoted this year's theme: "*V&V of Enterprise Capabilities*".

To provide additional perspectives on how to address Enterprise Capability V&V challenges, the following three videos were presented: "*Got a wicked problem, first let me tell you how to make toast*"; "*Robot's that fly... and cooperate*"; and "*Introduction to Complex Systems: Patterns in Nature*".

The V&V Summit was planned and conducted by the V&V Strategies and Practices Branch, under the direction of the Branch Manager, John Frederick. The V&V Summit coordinator was Test Standards Board member, Joseph Burns. John Frederick, Manager, V&V Strategies and Practices Branch, Federal Aviation Administration (FAA), facilitated the event. The 19 expert speakers at the summit addressed the following topics:

- **Dennis L. Filler** – Director, FAA WJHTC Technical Center: Discussed that when V&V is conducted early and often in a systems/service lifecycle, that the outcome of the operational assessment of the system should be a certainty. He identified some key enablers to achieve a successful outcome that included people, processes and tools.
- **Dave Ingram** – Director, FAA Acquisition Policy and Oversight: Introduced and discussed the FAA Acquisition Management System (AMS). He identified the major phases and decision points associated with the lifecycle of an acquisition. Mr. Ingram discussed the value of "right sizing" the policy for the complexity of the acquisition and encouraged the "do the right thing" philosophy for FAA programs. He mentioned several recent updates to AMS as well as several projects that intend to feed future AMS enhancements. He closed with a discussion of updates to Acquisition Workforce development and certification requirements.
- **Melvin Davis** – National NextGen Representative, National Air Traffic Controllers Association (NATCA): Presented NATCA's perspective on independent operational assessment of current and future FAA programs. He acknowledged the importance of early V&V and keeping concept of operations up to date and relevant. He identified shrinking and unstable budgets as a risk to obtaining NextGen capabilities.
- **Kevin Knudsen** – Enterprise Systems Test Capability Leader, Boeing Co.: Discussed the challenges V&V faces given the increasing complexity of systems and system of systems. A key element of his discussion is to find and fix problems early to retire risk early while focusing on the mission. He discussed distributed testing as a "real world" way to incorporate V&V into organizational operations.
- **Mark Flanigan/Simon Daykin** – NATS UK GM Customer Solutions/Chief Architect: Presented an overview of the UK's air traffic operations and challenges faced in implementing Europe's NextGen equivalent SESAR (Single European Sky ATM Research). Simon described the concept of a service stack and stressed the value of a service oriented Vee model. They proposed the idea that visualization of new concepts can accelerate validation of new concepts resulting in smoother change, greater acceptance and faster benefits.

- **Monica Farah-Stapleton** – PM DMIX Interoperability, Naval Post-Graduate School: Discussed the difficulty in assessing the unintended or unexpected behaviors of a new system or capability. Introduced the idea of behavior models as an approach to assessing design decisions and identifying resulting impacts as a way to promote a V&V culture. She addressed V&V from a sociotechnical domain approach. A prototyping tool named ‘Monterey Phoenix’ was identified as serving the presenter in this role.
- **William D. Miller** – Stevens Institute of Technology/INCOSE INSIGHT (Chief Editor): Discussed several V&V concepts associated with resilient systems, systems engineering interactions with test practitioners, and model-based systems engineering. He cautioned that models can be wrong (“Models Behaving Badly”) and discussed the presence of emergent behaviors in socio-cyber-physical systems.
- **Donald Firesmith** – Principal Engineer, Software Engineering Institute (SEI), Carnegie-Mellon University: Discussed a taxonomy of system and software testing types to answer the 5W (What, When, Where, Who, and Why) and 2H (How and How well) questions. The taxonomy has multiple uses that includes identifying that the test strategy is sufficiently complete, organizes test types to make them and their relationships understandable, augments test training materials, and helps with understanding test tools limitations. He described the complete taxonomy and defined rarely heard terms for testing like “the monkey test”, “galumphing”, and “the shoe test”.
- **Harry Bilicki** – Electrical Engineer, FAA V&V Strategies and Practices Branch Test Standards Board: Provided an overview of the storyboard project. Discussed the five steps in the storyboard process: identify how it works, layout of the storyboard, establish the sequence of events, build the animation, and conduct independent V&V. Both benefits and future enhancements were described. A demonstration of select program storyboards was given.
- **Jeri Groce** – FAA Program Manager, SWIM/STDDS: Kicked off her presentation with a video lead-in titled “What is SWIM?” produced by ANG-E5A. The presentation provided an overview of what SWIM is doing for the FAA and aviation community. Identified both the SWIM data product portfolio and current product consumers. Described the SWIM process for on-ramping new SWIM consumers. Summarized the Segment one test efforts to date.
- **Tom Zaccheo / Michael Lyman** - Senior Air Traffic Control Specialists, FAA Terminal Automation Branch: Discussed V&V from an end users perspective. Emphasized that bringing the end users in early in the lifecycle of a project has a number of potential benefits. These include providing crucial operational information and developing a mutual understanding between end user and developer. Several video clips from the motion picture “Pushing Tin” were used to underscore their message of mutual cooperation. Tom and Mike ended with a quote from the movie that applies to handling complex challenges like NextGen: “to gain control, you have to lose control”.
- **Edward L. Bolton Jr.** – Assistant Administrator for NextGen: Discussed delivery of the major investments that form NextGen. Provided progress to date on NextGen priorities. He emphasized that in order to measure the benefits, metrics and lessons learned must be collected by both the FAA and industry, this work has recently begun. Mr. Bolton stressed his vision for an agile and resilient NAS. He reviewed the progression of NextGen and touched on the future visions for the NAS.
- **Dr. C. David Brown** – Deputy Asst Secretary of Defense DT&E/Director of Test Resource Management Center: Discussed the four “V”s of T&E: validate requirements, verify the design, verify specs and validate performance. Getting the first three right enables a “shift left” to occur. He emphasized the importance of test and engineering collaboration. He closed with a video of DoD’s major T&E resources.
- **Sherri Magyarits** – Engineering Research Psychologist, FAA NextGen Advanced Concepts Branch, ATO/ANG UAS Concept Maturation Team: Provided background of the FAA concept

development and maturation efforts to date supporting UAS integration into the NAS. Discussed the approach and processes used in identifying concept maturation/validation needs. Explained the team diversity within the project and highlighted plans for moving forward.

- **Matt McKnight** – VP Solutions Development and Technology Insertion, Noblis NSP: Presented an overview of Agile development and the challenges when used on complex enterprise systems. He discussed a new kind of team that is cross functional to bridge the challenges the Agile paradigm presents. He believed that automation is the key to dealing with complexity and scale and identified several tools for this purpose.
- **James N. Elele, PhD** –M&S VVA Lead, US Dept. of the Navy: Discussed the processes that provide decision makers a way to judge and establish M&S credibility. The process optimizes resource investment based on the risk associated with the decision the M&S results support.
- **Guillaume Brat, PhD** - RSE Acting Area Lead, Intelligence Sys Div, NASA Ames Research Center: Discussed the challenges associated with the V&V of complex systems. Models allow V&V to be performed earlier and continuously. He introduced the SMART NAS Test Bed, identified several use cases for the test bed, outlined the test beds 5 year program, and identified several potential contributors for the test bed.

This V&V Summit explored how V&V can be innovated to address the FAA’s current and future challenges. It focused on fostering commitments to embracing V&V methods and capabilities into FAA common practices to help bring concepts to life and more importantly support the operational implementation of needed FAA capabilities. A common message at this summit was to use V&V practices on complex system-of-systems to “shift left” and find defects early. The speakers presented many perspectives and methods to help understand and better perceive the complexities of today’s technologies and enterprise level challenges.

All FAA participants at this year’s V&V Summit received 14 hours of FAA eLearning Management System (eLMS) credits (course # FAA3002000). V&V Summit feedback forms were collected at the end of each day and will be assessed to improve future summits. The 10th Annual V&V Summit presentations, final agenda, video links, and pictures can be found on the internet at:

http://www.faa.gov/about/office_org/headquarters_offices/ang/offices/tc/library/v&vsummit/v&vsummits.html