Challenges in Testing NextGen

Presented to: AIAA CASE

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Topics

- What is NextGen?
- Testing Challenges
The NextGen Air Transportation System
Today’s US Air Transportation System

- Independent Surveillance (RADAR)
- Massive (Expensive) Infrastructure
- Ground Based Navaids (“Highways in the sky”)
- Voice Communications
What is NextGen

- NextGen represents the transformation of our national airspace system, making it flexible and sustainable.

- It is not a single program or procedure but a comprehensive initiative that integrates new and existing technologies, procedures and policies.
Major Features of NextGen

- Required Navigational Performance/Area Navigation
- Dependent Surveillance
- Digital Communications
- Four Dimensional Trajectories
Performance Based Navigation

WAAS LPV Approaches, 2011
Dependent Surveillance: ADS-B

2010

2013
Digital Communications

- Data Communications
- System Wide Information Management (SWIM)
- NextGen Network Enabled Weather (NNEW)
The NextGen Testing Challenge
Challenging Features of NextGen

- New systems have elements which cannot be brought into the lab for testing, e.g.:
  - For the first time, avionics are part of the air traffic control system
  - “Come as you are system” with random participants, some foreign
  - Increased dependence on procedures and airspace as part of the system

24/7/365 Environment
Challenging Features of NextGen, Cont.

- Some elements are acquired as services, or depend on avionics and/or procedures
- The Airspace System is becoming a “Engineered” Complex System

Each of these features demands new approaches to V&V
SOSAP: An Emerging Paradigm

DataComm

How do we test it?
Many airborne platforms (flight decks)
“Too many system states to test them all”*

Solution: an SoS Assessment Platform
Use VLC simulation to explore the corners of the envelope of system states

*Dr. Paul Collopy, UAH!
Integrated Environment Elements

NextGen V&V: Current & Future Capabilities

V&V Effort

NextGen V&V Environment (variable fidelity)

Integrated Laboratories

Stove Pipe Laboratories

One Integrated Toolset

Full Scale Scenarios
Symptomatic Modeling
Thread Testing
Constructive Simulation

Project Toolsets

Models
Scenarios
NAS Data

Integrated Environment Elements

V&V Effort

NextGen V&V Environment (variable fidelity)

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Final Observations

How can we work together better to deliver the systems of the 21st Century?
Questions/Discussion