

# **Evolving The NAS Laboratories**

**at the FAA William J. Hughes Technical Center**

**Presented by Michael Konyak**  
**Laboratory Integration**



| **NextGEN**

# My Briefing Summary

- **The Laboratories**
- **Meeting the V&V Needs of NextGen**
- **The Challenge**
  - The gap (and obstacles) between where we are and where we need to be
- **The Approach**
  - Communications Infrastructure
  - NextGen Systems and Prototyping Emulations
  - Computational Agents



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# Purpose of the Laboratories

- Support FAA goals and objectives
- Maintain field equipment for Second-Level Maintenance
- Provide for an evolving aviation industry
- Provide for NAS upgrades, improvements, and operational sustainment

## Mission Statement

*To provide a set of world class laboratories for research, engineering development, test, evaluation, and maintenance of air navigation, air traffic management, and future transportation system capabilities.*



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# Meeting NextGen V&V Needs

While keeping consistent with our Mission

- NextGen V&V is part of the NSIP, NAS Conops
- Capital Investment Funds are provided for Laboratory NAS Modernization
- Systems approach
  - Integration of NextGen Programs
- Collaboration within and without



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## The Labs

- **The NAS Systems Laboratories**
  - ATOP, ERAM, STARS
  - Weather and Voice Systems
- **The Advanced ATC Research Laboratories**
  - NIEC, FTB, RDHFL, AFTIL, IIF
  - SWIM, DataComm, UAS



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## External Facilities



Cockpit  
Simulators

- LaRC  
- Ames



- *Florida TB*  
- NASA NTX  
- Research  
Partners



DREN

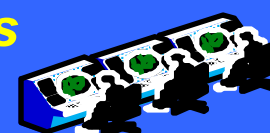
## High Fidelity NAS Labs



ERAM



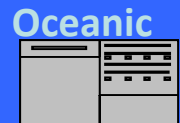
STARS



Common  
ARTS



Voice  
Comm



Oceanic

## NIEC Display Lab



UAS Simulation



Cockpit Simulator



Tower Simulator

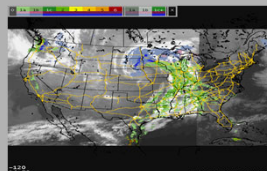
NextGen  
Prototyping  
Network



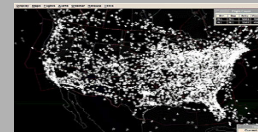
Simulated RADAR(s)  
**Target Generation Facility  
(Aircraft Simulation)**



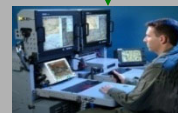
ATC Simulation



Weather Displays



TMU Displays



TMU Work  
Stations



AOC  
Dispatch  
Position

NextGen  
Surveillance  
(Live ADS-B Data)



360° Tower Simulator

Weather

## Specialty Labs

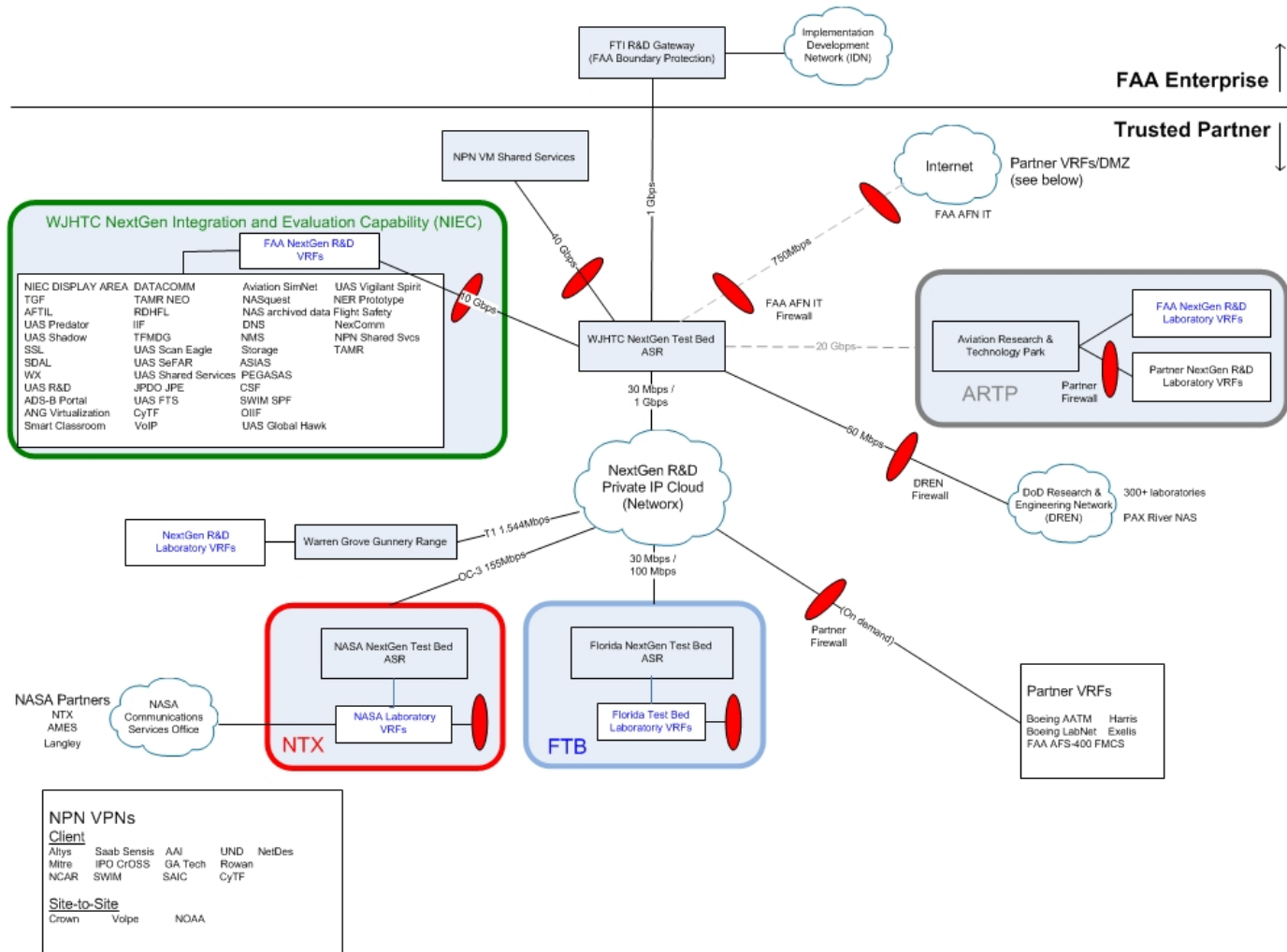


Data  
Comm

SWIM

Traffic Flow  
Mgmt

# FAA NEXTGEN PROTOTYPING NETWORK (NPN)



# Meeting the Needs of the NextGen Transformational Programs

- **ADS-B**
  - GPS surveillance, traffic, weather, and aero data via radio broadcast
- **CSS-Wx**
  - Networked, standardized access to weather data
- **SWIM**
  - Right data, right place, right time
- **CATM-T**
  - Collaborative traffic management tools and procedures
- **NVS**
  - Replace legacy voice systems with digital voice comm that is capable of dynamic re-sectorization, re-allocation, and remote service
- **AIRE**
  - Reductions in noise and emissions
- **DataComm**
  - Digital controller-pilot communications



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## Re: NextGen Maturation

- **How does NextGen define program interconnectivity?**
  - And how does NextGen avoid program interdependency?
- **How is NextGen program data presented on the glass?**
- **How flexible is NextGen collaboration?**
- **How will NextGen communications and collaboration mature?**
- **How does program data come together to allow the controller to solve problems?**



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## Lab Challenges

- **Understand the NextGen Concept**
  - NAS EA
  - NSIP
  - Maintain contact with NextGen architects
- **Remain flexible to technology evolution**
- **Continue to justify funding**
- **Infrastructure/Interconnectivity**
- **Integrate NextGen tools and develop emulations**
  - Are actual systems necessary for lab testing (DT&E) or are prototype systems suitable?
- **Develop cost-effective methods for NAS-Wide NextGen sims**
- **Remain responsive to customer requirements**



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# Our Approach

- **Communications Infrastructure**
  - Datacomm, ACARS, ADS-B, IP Datalink
  - NextGen Prototyping Network
  - Cybersecurity
- **NAS Modeling**
  - Ground automation, airborne automation, TMU, AOC
- **NextGen Systems, Hardware, and Prototyping Emulations**
  - NVS, SWIM, Wx, Automation, decision support tools
- **Computational Agents**
  - Agent-Based modeling of NAS systems to permit recursive emulations for realistic NAS-Wide simulation



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# NAS Laboratories POC

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