

Cyber – Physical Systems in the NextGen Environment

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Air Traffic Management

Next Generation Air Transportation System (NextGen)



Environment

Layered Adaptive Security

Enterprise Services

Safety

Information Technology Mgmt

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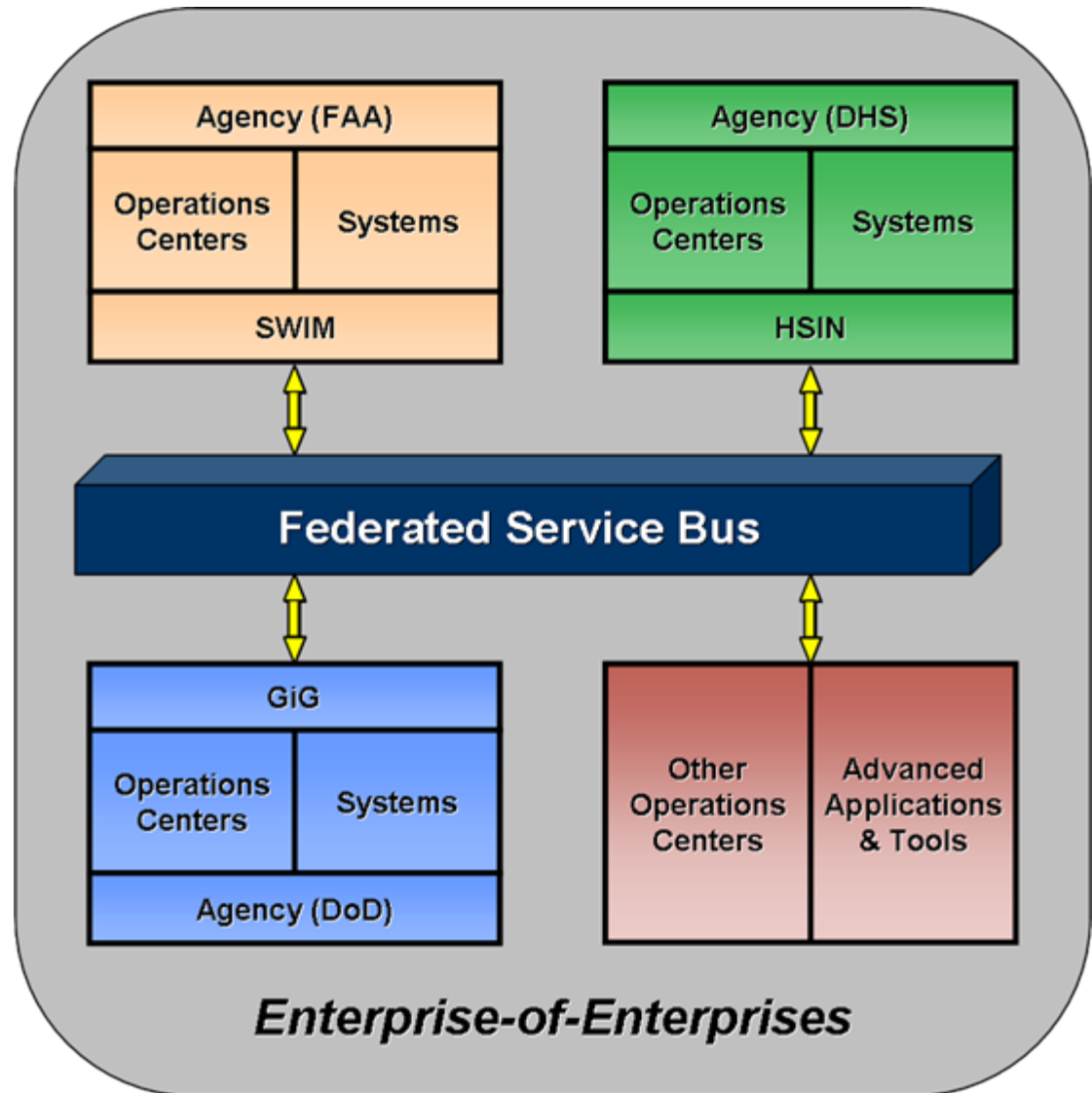
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- **Eight primary focus areas in NextGen**
- **NextGen operational vision calls for information sharing and collaboration across domains**
- **Shared data will include aircraft, airport, airspace, safety, security, and weather**
- **Net-Centric Operations will be the critical foundation for NextGen**



NextGen's Info Sharing Challenge

- **Systems & Network interoperability**
- **Culture change for operational staff**
- **Inter-agency policies are not aligned**
- **International harmonization**



NextGen Capabilities / Concepts

Air Traffic Management

Capability

- Collaborative Capacity Management
- Collaborative Flow Contingency Management
- Efficient Trajectory Management
- Flexible Separation Management
- Effective Information Sharing Environment
- Integrated Regulatory and Risk Management
- Flexible Airport Facility & Surface Operations

Concept

- Balanced Airspace and Airport Demand
- Strategic Flow Management
- 4D Trajectories
- Reduced Separation Standards
- Net-Centric Operations
- Safety, Security, & Environment Performance
- Airside, Landside, Airport Management

NextGen: The future aviation system is viewed as a complex and evolving ecosystem of operators, policies & procedures, and technical enablers.

CPS Challenges in a NextGen Environment

- **Legacy ATC/ATM Automation Systems**
 - Civil, Military
 - Flow, Terminal, EnRoute
- **Future Aircraft & Flight decks**
 - 787 Dreamliner, Very Light Jets, UAVs, Commercial Spacecraft
 - Electronic Flight Bag
 - Health & Safety Management Systems
- **Information, Communications, & Visualization**
 - Surface Management, Cockpit Display Traffic Information
- **Manned vs. Autonomous Vehicles**
 - Sense & Avoid, TCAS

*Evolving micro and macro concepts for day-to-day operations
and for major system perturbations*

- **NextGen is large, complex, evolving ecosystem**
- **Safety, Security, and Reliability will be designed in to the architecture (end-to-end)**
- **Shifting the decision making to a shared Command & Control environment (Air/Ground)**
- **Exploiting cyber-physical systems development will support NextGen goals for the U.S. and globally**