



SWIM

The Current

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→ www.SWIM.gov

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Welcome Message from the Program Manager

Welcome to the sixth issue of *The Current*, our newsletter distributed to FAA staff, SWIM Implementing Programs (SIPs), and other interested parties.

Since our last newsletter, I am proud to report that the SWIM team has continued to aggressively pursue our agenda for Fiscal Year (FY) 2011. Our accomplishments include installing a SWIM Terminal Data Distribution Service (STDDS) prototype in April; meeting with representatives of the Japan Civil Aviation Bureau (JCAB) to discuss SWIM at the Future Air Transportation System Working Group (FATS WG) meeting in May; holding a FUSE Summit, in which developers working on SWIM capabilities came together to discuss their successes and lessons learned in June; and successful outreach, including briefing SWIM at the Technical Women’s Organization / National Asian Pacific American (TWO/NAPA) Training Conference in June and briefing SWIM to U.S. House of Representatives Appropriations Committee staff in July.

It is an exciting time for the SWIM Program. We are leading the FAA in its efforts to move National Airspace System (NAS) services towards cloud computing and have been collaborating with the Air Traffic Organization (ATO) Chief Information Officer’s Office (AIO) in pursuing this goal. By the time this is published, SWIM will have also held its third annual SWIMposium and hosted a delegation from the Civil Aviation Administration of China’s Air Traffic Management Bureau (CAAC/ATMB). We also look forward to holding SWIM stakeholder meetings to discuss cross-NAS issues in the near future.

I invite you to learn more about SWIM services. We will use this newsletter to keep stakeholders apprised of the current activities and innovations happening on the SWIM Program. It is my sincere hope that, by delivering this newsletter, our team can keep all programs informed about circumstances that could benefit or affect their activities. We also strive to communicate to newcomers the resources available through SWIM.

I encourage you to visit us for more information at www.swim.gov or email us with any questions at 9-ATOW-HQ-SWIM@faa.gov.

Thank you,
Ahmad Usmani



SWIM Accomplishments

The SWIM Program is continually and aggressively pursuing its FY11 scheduled activities. Over the past few months, SWIM has realized a number of achievements, of which the highlights include:

- Completed Weather Message Switching Center Replacement (WMSCR) Pilot Report (PIREP) Publication Service development.
- Installed STDDS prototype at the Yankee (Y90) Terminal Radar Approach Control (TRACON) facility located at Bradley International Airport (BDL) in Windsor Locks, CT in April. Initial Operating Capability (IOC) at Y90 is expected in spring 2012.
- Hosted the FUSE Summit (see image), which brought together developers across the SIPs to discuss FUSE products, software development for SWIM capabilities, lessons learned, and best practices, in May.
- Released the SWIM Segment 2 Technical Overview and draft Final Program Requirements and completed prototyping activities for the SWIM Segment 2 Integration Prototype (SS2IP), SWIM Security Reference Implementation (SSRI), SWIM Compliance Test Kit (CTK), NAS Enterprise Messaging Service (NEMS), and Open Authorization (oAuth).



FUSE Summit

- Registered all current SIP organizational units in the NAS Service Registry/Repository (NSRR). SWIM also performed governance oversight functions on SIPs and other FAA programs to ensure interoperability between systems.
- Continued to provide Service Oriented Architecture (SOA) Suitability Assessments on NAS programs, completed a SOA suitability tracking database, and developed a suitability process review and update. As of August 2011, SWIM had completed SOA Suitability Assessments on almost 40 NAS programs.
- Finalized Aircraft Access to SWIM (AAtS) technical impacts white paper and negotiated with FAA's NextGen & Operations Planning Service Unit (AJP) and Embry-Riddle Aeronautical University for an AAtS demonstration and simulation to be held in the first half of FY2012.
- Completed a second round of SWIM capability demonstrations and evaluations of the Kolona Software Suite with Topia Technology in June. Kolona's capability allows for the delivery of data, services and reporting. A third, web-based demonstration was held in July. The first round, which was held in January 2011, is covered in the March 2011 issue of *The Current*.

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SWIM in the Cloud

Aviation, almost by definition, has involved operating in clouds; now the FAA is moving towards operating in a different sort of cloud, and SWIM is a key part of its effort. In December 2010, the then-Chief Information Officer (CIO) of the United States, Vivek Kundra, published the *25 Point Implementation Plan To Reform Federal Information Technology Management*, which presented a Cloud First policy. Cloud First requires federal agencies to evaluate safe and secure cloud computing investments before making any new Information Technology (IT) investments. Under the policy, each agency will identify 3 “must move” services within 3 months, and move one of those services to the cloud within 12 months and the remaining 2 within 18 months. In 2011, the SWIM

Program started developing a cloud computing strategy for the NAS.

The National Institute of Standards and Technology (NIST) defines cloud computing as: "A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." Cloud technologies enable IT services to efficiently share demand across infrastructure assets, reducing the overall reserve capacity across the enterprise.

In February 2011, Kundra published the *Federal Cloud Computing Strategy*, which details the anti-

pated benefits of cloud computing, reflected in **Table 1**. The benefits come from scalability and elasticity gained by cloud computing. End-users do not need to determine their exact computing resource requirements upfront. Instead, they provision computing resources from their cloud, as required, on-demand.

NIST is the lead technical federal agency for cloud computing. The SWIM Program will leverage the work being done by NIST to implement cloud services in the NAS in the most efficient and cost-effective way possible. Additionally, FAA's ATO IT (non-NAS) is one of the leading offices in deploying cloud technology in the agency and will be used for cloud services whenever possible.

ATO IT is developing a community FAA cloud at the former Air Traffic Control System Command Center (ATCSCC) space in Herndon, VA. The FAA plans to follow the decision framework for cloud migration of “Select”, “Provision”, and “Manage”. Following the establishment of this community cloud, SWIM will work to transition selected NAS Services.

Currently, SWIM is looking at the “Select” phase of the decision framework. The program is developing a Cloud Suitability Assessment that will

Table 1: Cloud benefits: Efficiency, Agility, Innovation

	Cloud Benefits	Current Environment
Efficiency	<ul style="list-style-type: none"> Improved asset utilization (server utilization > 60-70%) Aggregated demand and accelerated system consolidation Improved productivity in application development, application management, network, and end-user 	<ul style="list-style-type: none"> Low asset utilization (server utilization < 30% typical) Fragmented demand and duplicative systems Difficult-to-manage systems
Agility	<ul style="list-style-type: none"> Purchase “as-a-service” from trusted cloud providers Near-instantaneous increases and reductions in capacity More responsive to urgent agency needs 	<ul style="list-style-type: none"> Years required to build data centers for new services Months required to increase capacity of existing services
Innovation	<ul style="list-style-type: none"> Shift focus from asset ownership to service management Tap into private sector innovation Encourages entrepreneurial culture Better linked to emerging technologies (e.g., devices) 	<ul style="list-style-type: none"> Burdened by asset management De-coupled from private sector innovation engines Risk-averse culture

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Table 2: Decision Framework for Cloud Migration

Select	Provision	Manage
<ul style="list-style-type: none"> Identify which IT services to move and when <ul style="list-style-type: none"> Identify sources of value for cloud migrations: efficiency, agility, innovation Determine cloud readiness: security, market availability, government readiness, and technology lifecycle 	<ul style="list-style-type: none"> Aggregate demand at Department level where possible Ensure interoperability and integration with IT portfolio Contract effectively to ensure agency needs are met Realize value by repurposing or decommissioning legacy assets and redeploying freed resources 	<ul style="list-style-type: none"> Shift IT mindset from assets to services Build new skill sets as required Actively monitor SLAs to ensure compliance and continuous improvement Re-evaluate vendor and service models periodically to maximize benefits and minimize risks

be used to identify which services are suitable to move to the cloud. SWIM currently has a SOA Suitability Assessment for NAS programs that determine the readiness of a program to develop SWIM services.

The Cloud Suitability Assessment will be based on best value and readiness for the cloud. Value is determined by the cost, balanced with technical concerns, of moving a service to the cloud. Readiness includes service maturity and other factors, such as the ability to meet FAA security and privacy requirements, as appropriate to the service under consideration. A mature service that is nearing a technology refresh or approaching the end of its maintenance contract also would be considered

a candidate for transition to cloud services. For initial movement to the cloud, SWIM's focus is on administrative data and services, or routine services that do not have any impact on, or connection with, safety-critical services.

The FAA is currently in the early stages of evolution to cloud. To date, the FAA has held formal and informal learning sessions, which included meeting with industry leaders and cloud experts. To better understand the nuances of a cloud environment, the FAA is currently prototyping and will leverage knowledge gained from these activities when implementing the cloud within the agency. As mandated by OMB, the FAA (not NAS/non-NAS specific) will have at least

one service to the cloud by the end of 2011 and two additional services by the end of June 2012.

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Long Distance SWIM

In the last issue, *The Current* gave an account of a visit from representatives from the Japan Civil Aviation Bureau (JCAB) to the United States for a two-day Data Exchange and TBO Workshop with SWIM. Following up on that visit, SWIM Program Manager Ahmad Usmani traveled to San Francisco in May 2011 for a Future Air Transportation System Working Group (FATS WG) meeting with JCAB. Participants updated each other on their respective programs, held a performance assessment workshop, and held a SWIM workshop.

The FATS WG was established by the U.S. and Japanese governments in 2006 to harmonize future air transportation systems and the concepts underlying them. FATS WG meets twice a year to share ideas and coordinate synchronization of future systems development for NextGen and the Collaborative Actions for

Renovation of Air Traffic Systems (CARATS, Japan's functional equivalent of NextGen) in areas such as concept development and validation, simulation and modeling, research and development, technology demonstration, systems architecture, and strategic planning. SWIM has been participating in the FATS WG since 2009.

In the SWIM workshop, Ahmad Usmani updated the FATS WG on the SWIM Program's progress and presented overviews on SOA Governance and SOA Suitability Assessments. SWIM's involvement with cloud computing, and reviewed common terminology. Representatives from JCAB discussed how the SWIM concept fits into its own plans for air traffic modernization, as it will start work on implementing the concept in a few years. JCAB also presented its own terminology for SWIM.

SWIM will be traveling to Tokyo in October 2011 for a FATS Technical Exchange Meeting (TEM). A demonstration of data exchange between the FAA and JCAB is planned for the summer of 2012.

Developing a common terminology, or at least being able to map the difference between how terms are used, is an important step towards international collaboration. The International Civil Aviation Organization (ICAO) is looking to develop a SWIM Concept of Operations (ConOps) to present at its September 2012 Air Navigation Conference in Montréal. Mutual understanding of, and agreement on, the vocabulary used to define the SWIM concept and supporting concepts will smooth information-sharing for international flights.

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SOA Brown Bags

In October 2010, SWIM launched a series of monthly informational meetings, the SWIM SOA Brown Bag Sessions. On the cusp of our one year anniversary, the sessions are still proving to be tremendously successful, with an average of 100 participants attending in person or dialing-in. These events are open to all FAA employees and contractors and feature Subject Matter Experts (SMEs) discussing various SWIM-related topics. The Brown Bags bring a greater awareness and knowledge of the SWIM program to all interested parties within the FAA.

Brown Bags are typically held from 12:00 pm-1:00 pm in the FAA's Orville Wright building (FOB10A). Announcements with details of upcoming Brown Bags as well as previous presentation slides are posted on the SWIM website, www.swim.gov.

In the past year, the sessions have featured such topics as:

Brown Bag #1 (October 2010): Fundamentals of SOA

SWIM's first Brown Bag defined SOA and provided an overview of basic SOA architecture. SOA Concepts – such as definition of a service, the use of Extensible Markup Language (XML), the role of an Enterprise Service Bus (ESB), basic governance, and synchronous versus asynchronous execution – were discussed. SWIM provided insight into the challenges of implementing SOA.

Brown Bag #2 (November 2010): Enterprise Information Management (EIM)

EIM was defined, and its key characteristics examined in SWIM's second Brown Bag. The relationship between EIM, SOA and Service

Oriented Enterprise (SOE) was explored and several key concepts, such as Enterprise Information Models, layered architecture, data virtualization, information understanding, information analytics, dissemination, and information governance were presented. Challenges implementing EIM were discussed.

Brown Bag #3 (January 2011): Governance of SOA

The speaker at SWIM's Brown Bag #3 provided a detailed definition and discussion of the concept of SOA governance. Implementation of SOA governance in terms of SWIM, including policies and processes, was examined. The concept of a SOA Center of Excellence (COE) was discussed.

Brown Bag #4 (February 2011): Business Process Management (BPM)

Business Process Management and its benefits and relationship to SOA were discussed in SWIM's Brown Bag #4. Business Process Modeling Notation (BPMN), Department of

Defense (DoD) Primitives, and Business Process Execution Language (BPEL) and how each relates to BPM was explored.

Brown Bag #5 (March 2011): Registry/Repository in a SOA Environment

In SWIM's Brown Bag #5, a Service Registry/Repository and its functions were defined. The concepts of service discoverability, governance, standards, and taxonomies and artifacts in the context of a Service Registry/Repository were discussed. We examined SWIM's NSRR and its roles, access requirements, standards, and policies.

Brown Bag #6 (April 2011): Enterprise Messaging System

This session provided an overview of SWIM's plan to provide a NAS Enterprise Messaging Service via the FAA Telecommunications Infrastructure (FTI) – referred to as the NEMS – its architecture, messaging patterns, and on-ramping.

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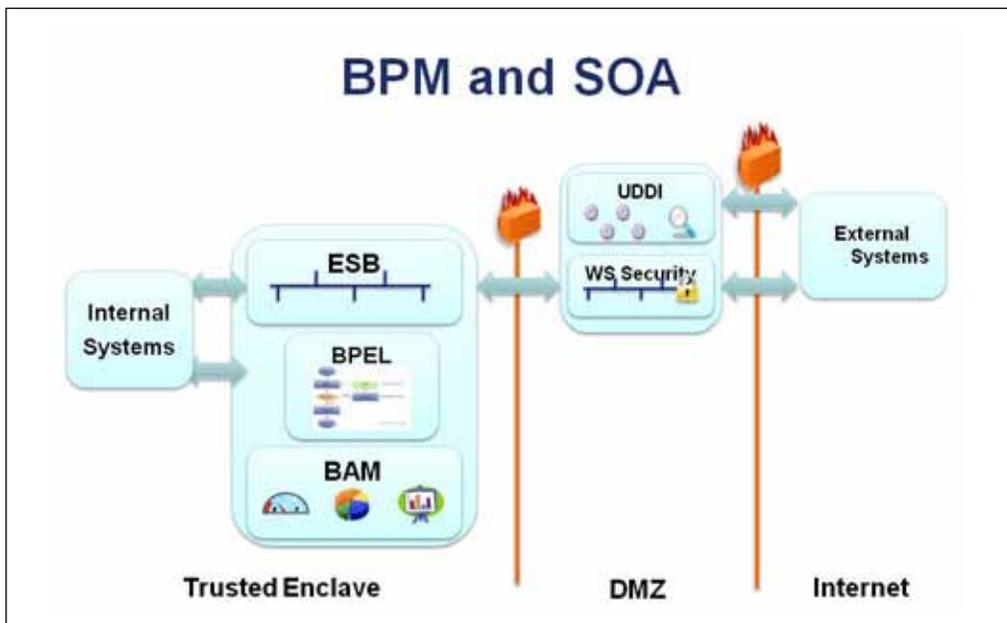


Image from Brown Bag #4

Multi-threading

- Messaging throughput can often be adversely effected by message transfer delay (latency)
- This is especially true for acknowledged messages
- For example, a roundtrip latency of 10 milliseconds (ms) would limit a sequential message transfer using a single thread to no greater than 100 messages per second (mps)

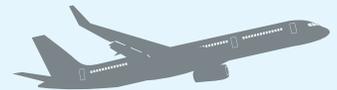


Image from Brown Bag #6

www.SWIM.gov

The SWIM Program invites you to take a look at our website!

If you have a suggestion or information to contribute to our website, please contact the SWIM Communications Team at 9-ATOW-HQ-SWIM@faa.gov.



Brown Bag #7 (May 2011): Complex Event Processing (CEP)

In this Brown Bag, SWIM presented an overview of CEP (processing many events across all layers of an organization, identifying the most meaningful events within an event cloud, analyzing their impact, and taking subsequent action in real time), and provided concrete examples of how it is used. Due to a power outage, this Brown Bag was cut short; however, the presenter returned in July to finish discussing CEP.

SWIM looks forward to another year of Brown Bags. Upcoming topics include SOA Testing and Evaluation, Securing a SOA Environment, Transformation Design Patterns, and Performance and Service Level Agreements (PLAs and SLAs).

SWIM would like to thank the following speakers at our Brown Bag events:

Sam Ceccola, Atif Chaughtai, Paul Jackson, Mark Kaplun, Dov Levy, and Jim Robb.

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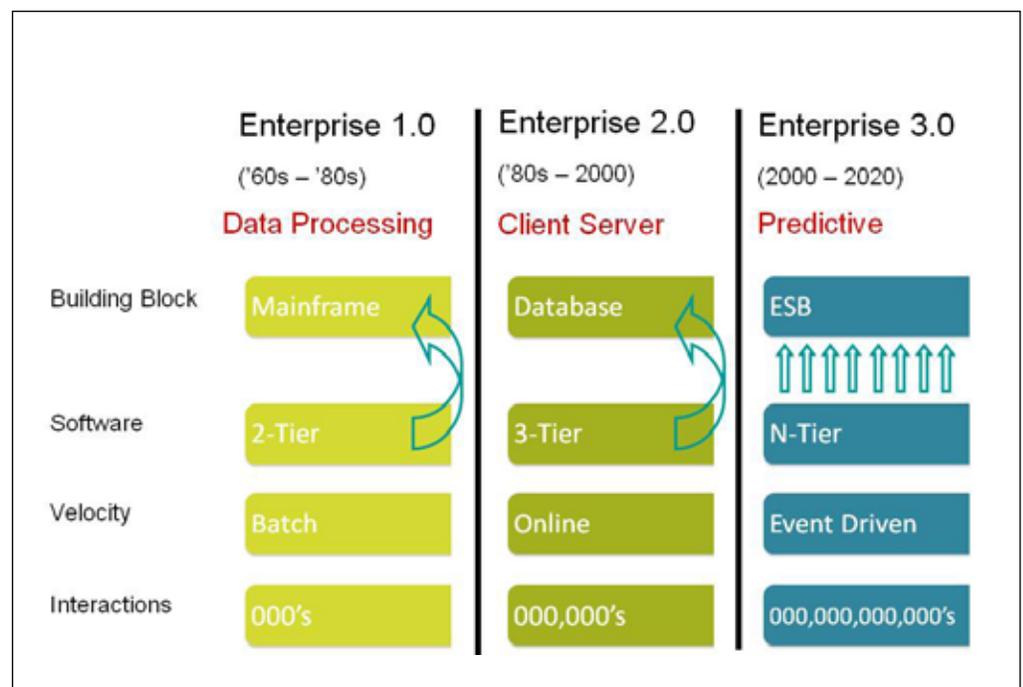
Image from Brown Bag #9

Brown Bag #8 (June 2011): Web Service Description Documents (WSDDs)

A WSDD was defined, and the need for WSDDs and how they are used were discussed in SWIM's Brown Bag #8. The speaker provided an example of a WSDD for a fictitious FAA service and illustrated the steps required to build a WSDD.

Brown Bag #9 (July 2011): CEP pt. II

A continuation of the CEP overview from Brown Bag #7 was provided in this session.



Practitioner Profile: Jeff Hobbs

SWIM Implementation Team Lead Jeffery L. Hobbs is here to help. His role is to work with SIPs to help them develop, publish, and consume SWIM-compliant SOA services. He enjoys his work, especially the variety of topics he encounters, "I work with seven SIPs and each one has its own needs."

October 2011 marks four years with SWIM and a decade with the FAA for Jeff. He joined the FAA after nearly 20 years supporting the Department of Defense (DoD) and FAA as a software developer and engineer. He started in the field after graduating from Purdue with a degree in computer science in 1981. His first job out of college was at the naval facility in Dahlgren, Virginia, conducting diagnostic testing on Marine Air Ground Intelligence System (MAGIS), a mobile combat communications system.

Jeff decided that Dahlgren was ultimately too remote to allow him to work while attending graduate school. He moved to Northern Virginia and



SWIM Implementation Team Lead
Jeffery L. Hobbs

took a job working for a navy communications program, Extremely Low Frequency (ELF), and enrolled in American University. ELF pulses bedrock to send encrypted messages to submerged submarines at sea. He continued contracting in the Washington area while working towards the M.S. degree in Computer Science he earned in 1990. During this time, he

started supporting the FAA on projects that are now part of the agency's En Route and Data Comm programs.

Growing up as a military brat, Jeff never spent much time in one place, living all over the United States and spending six years in Germany. He loves to travel and considers visiting China with SWIM in December 2010 to be one of his most memorable trips, noting that it by far exceeded his expectations. Jeff was part of a delegation from SWIM to meet with counterparts in China, a trip that was covered in the previous issue of *The Current*. He also admits to some disappointments in his travels – Egypt was less like the movie set for Agatha Christie's *Death on the Nile* than he had hoped – and confessed that his second favorite place to be is Paris, where he savors the wonderful delicacies the Parisian restaurants have to offer. Jeff's favorite place is at his beach house on the remote Bald Head Island, North Carolina. Jeff manages to get himself and his two corgis down to the island most weekends to relax, read, and watch the world go by.

In addition to computer science and travel, Jeff enjoys a good meal and subscribes to *Bon Appétit* to ensure he's never far from an innovative recipe. When he isn't cooking, Jeff explores many of the restaurants near his Howard County, Maryland home. He's particularly impressed by a quaint restaurant in South Baltimore, Bluegrass Tavern. Jeff appreciates the Bluegrass Tavern's twenty-something chef who conjures up a variety of unbelievably creative dishes and changes the menu on a weekly basis.

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SWIM Question & Answer (Q&A)

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courtesy of the following:*

**Faiza Shah, John Wendelken,
and the SWIM Team.**

*All documents are available to the
public on the SWIM external website
at www.SWIM.gov.*

A list of Q&As has been posted on www.SWIM.gov. In each edition of *The Current*, the SWIM team highlights a few questions and responses.

What are the benefits of SWIM?

SWIM supports the Office of Management and Budget (OMB) endorsed Federal Enterprise Architecture (FEA) goal to simplify processes and unify work across agencies and within the lines of business of the federal government.

The SWIM use of SOA technology allows software applications in the NAS to interact with one another through information services that can be accessed without knowledge of another application's underlying platform implementation. This simplifies interface requirements to existing NAS systems and ensures new systems can be built with minimum technology (hardware, software, and data definition) constraints. Thus, NAS development and implementation costs and risks for new applications will be lower. SWIM also enables the transition to net-centric NAS operations, and from tactical conflict management to strategic, Trajectory-Based Operations (TBO).

As part of the Next Generation Air Transportation System (NextGen) portfolio of programs, SWIM is critical to ensuring all stakeholders can communicate with each other. For example, SWIM will allow airline operations, air traffic managers and controllers, and the military to share information in near real time. SWIM makes it possible to share this type of information in a more uniform, consistent manner so that as NextGen systems are developed, participation becomes easier for the NAS community.

Why is SWIM important for 21st century aviation?

In the past, connecting two systems required a fixed network connection and custom, point-to-point, application-level data interfaces. Current NAS operations depend upon these legacy information systems. The FAA has identified a need to move away from the proliferation of unique, point-to-point application interfaces. The following five shortfalls capture the key deficiencies in the FAA's current approach to sharing and managing information:

- Costs to develop, test, deploy, and support new interfaces and applications are too high
- The NAS is not an agile air traffic system
- Data sharing in the NAS is labor-intensive
- Timely access to common data is lacking in the NAS
- The underlying tools to support becoming a performance-based organization are currently lacking

The transformation to NextGen requires programs and technologies that provide more efficient operations, including streamlined data communications capabilities. The SWIM program is an integral part of that transformation that will connect FAA systems. The SWIM program also will enable interaction with other members of the decision-making community including other government agencies, air navigation service providers, and airspace users.

