System Wide Information Management (SWIM)

2nd Annual SWIMposium - An Informational Panel on the SWIM Program

Presented to: FAA Staff

By: SWIM Program

Date: September 29, 2010

Federal Aviation Administration

Agenda

- Introduction
- Overview of the SWIM Program
- A Scenario: What does SWIM mean for your program?
- FuseSource
- How to Learn More
- Q&A

Program Concept

SWIM is an IT infrastructure program that will operate in the background to provide data to authorized users

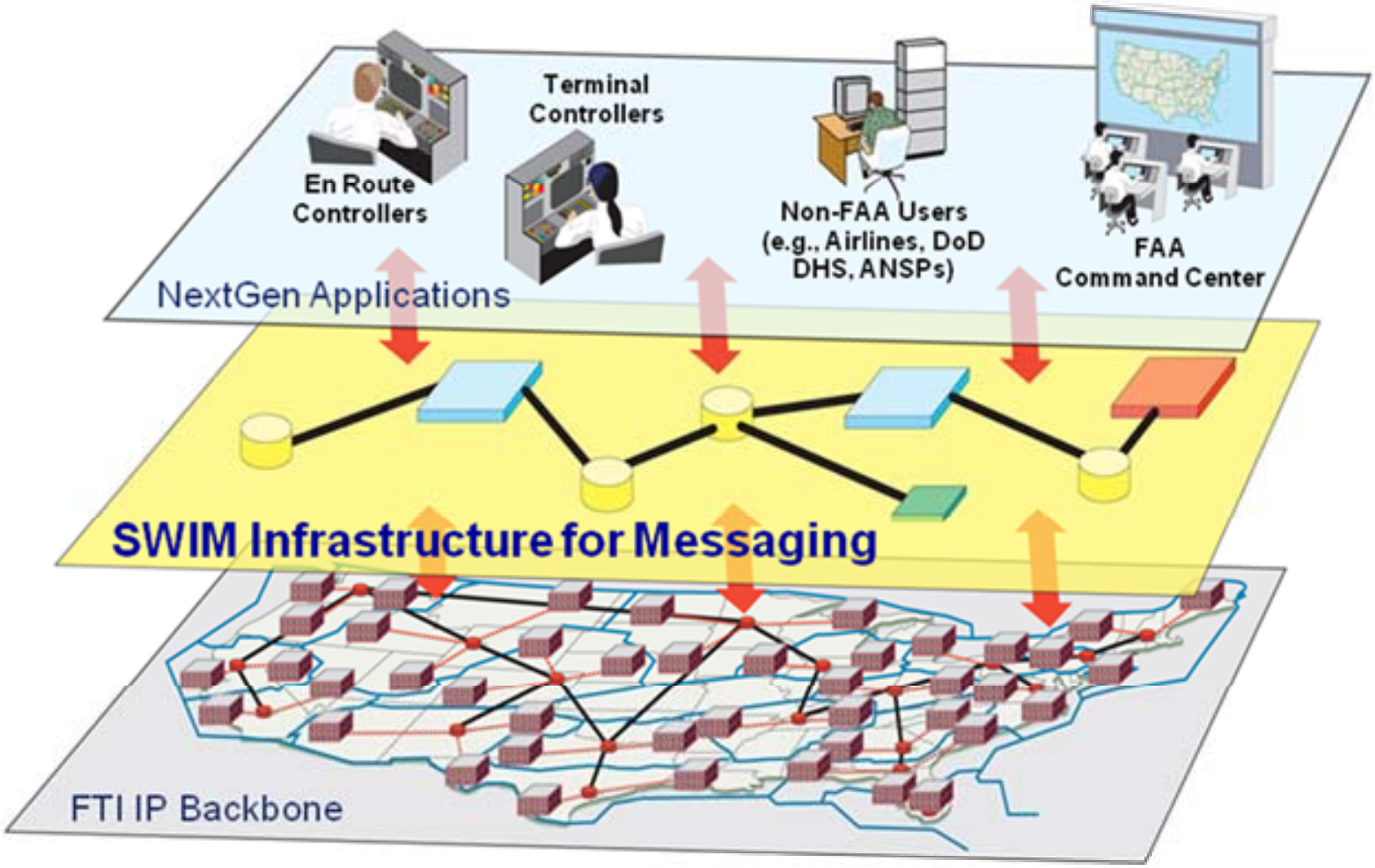
SWIM will:

- Implement a Service-Oriented Architecture (SOA) in the NAS
- Lower information costs
- Increase speed to establish new interfaces
- Increase common situational awareness
- Increase NAS agility

SWIM Concept

- **Migrate the National Airspace System (NAS) to a Service Oriented Architecture**
  - Facilitate ease of establishing interfaces between computing and information systems
- **Get the "right information to the right place at the right time": Net Centricity**
  - Facilitate Shared Situational Awareness
  - Facilitate Collaborative Decision Making
- **Establish governance over information management**
- **Represents significant cultural change**

SWIM Overview (OV-1)



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SWIM and the Evolution of Air Transportation

SWIM supports FAA's long-term goals for the Next Generation Air Transportation System to:

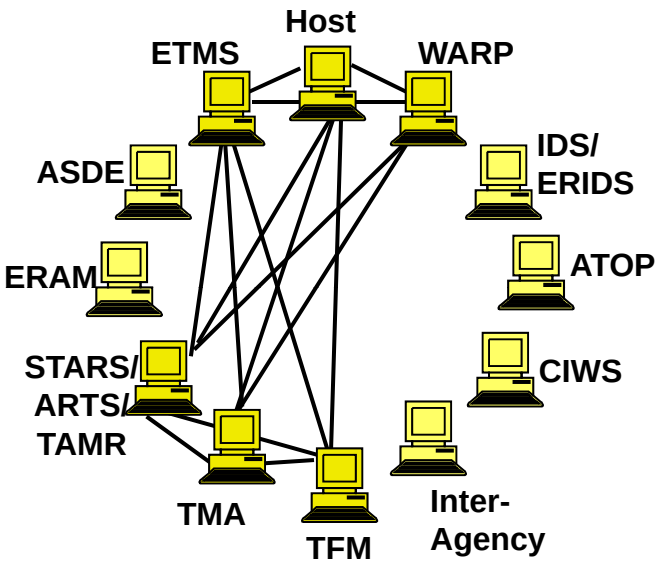
- Allow more aircraft to fly more closely together on more direct routes
- Reduce delays and congestion
- Provide benefits for the environment and the economy through reductions in carbon emissions, fuel consumption, and noise

Specifically, SWIM will support these goals by:

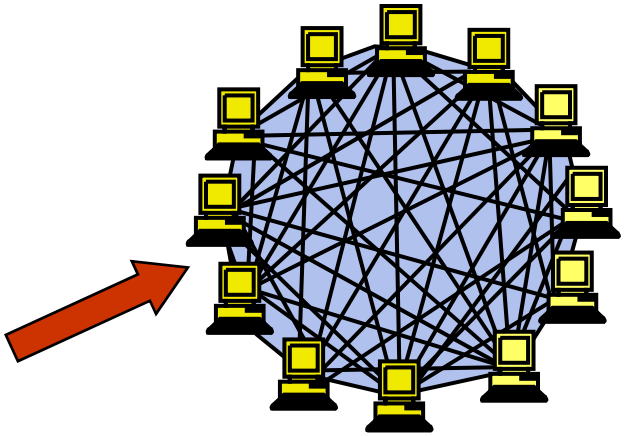
- Providing data and services to support better real-time planning
- Streamlining communications
- Connecting more FAA systems to more customers

State of the System

Today



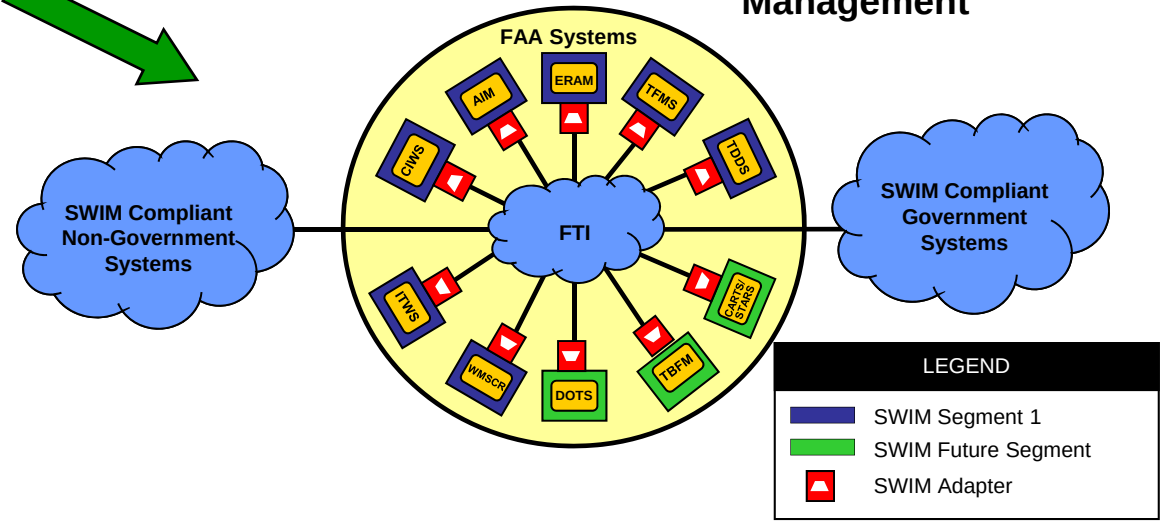
- Existing point-to-point hardwired NAS
- Unique interfaces, custom designs



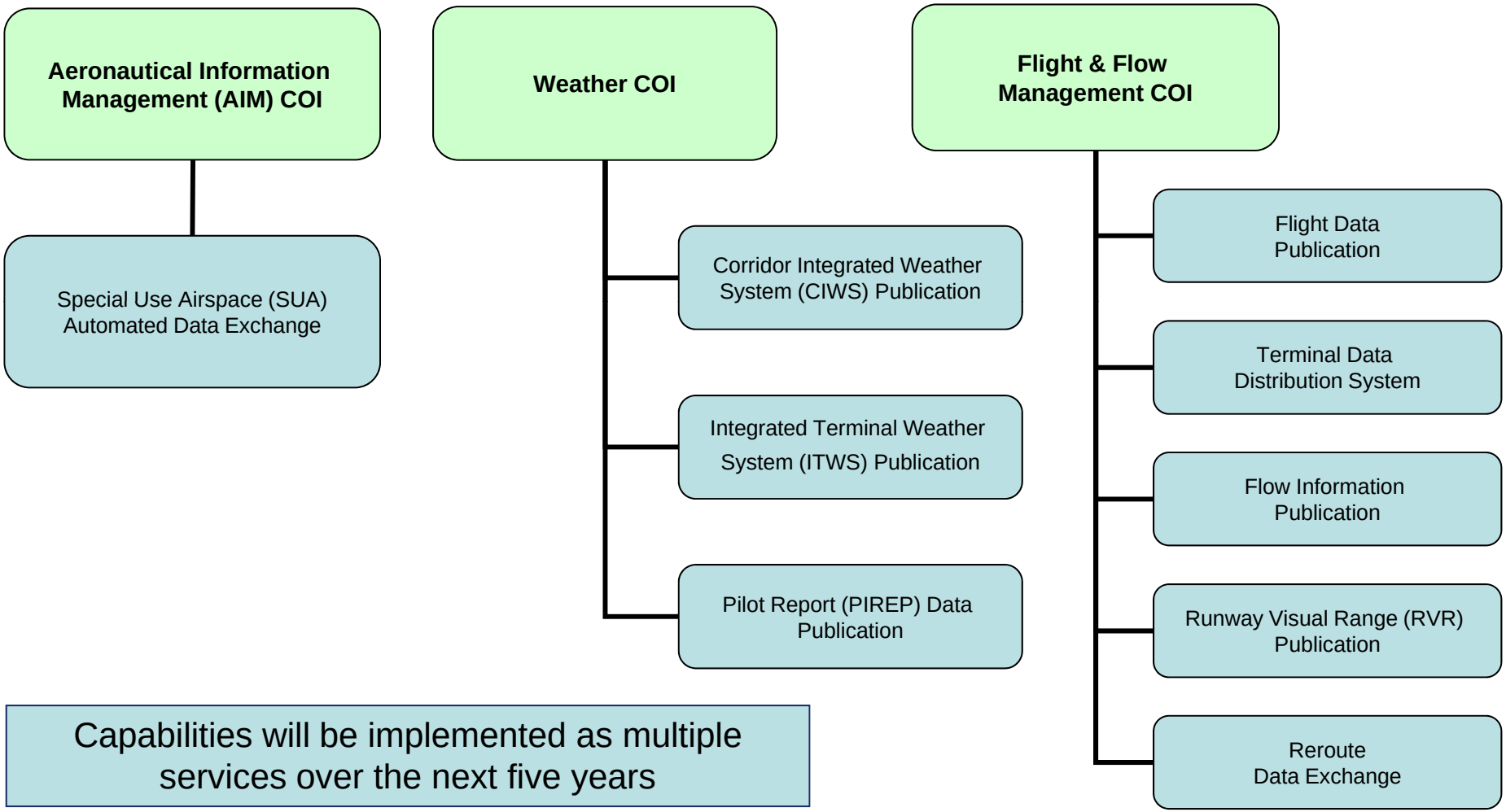
Business as Usual

- More point-to-point unique interfaces
- Costly development, test, maintenance, CM
- New decisions linked to old data constructs
- Cumbersome data access outside the NAS

Enterprise Management

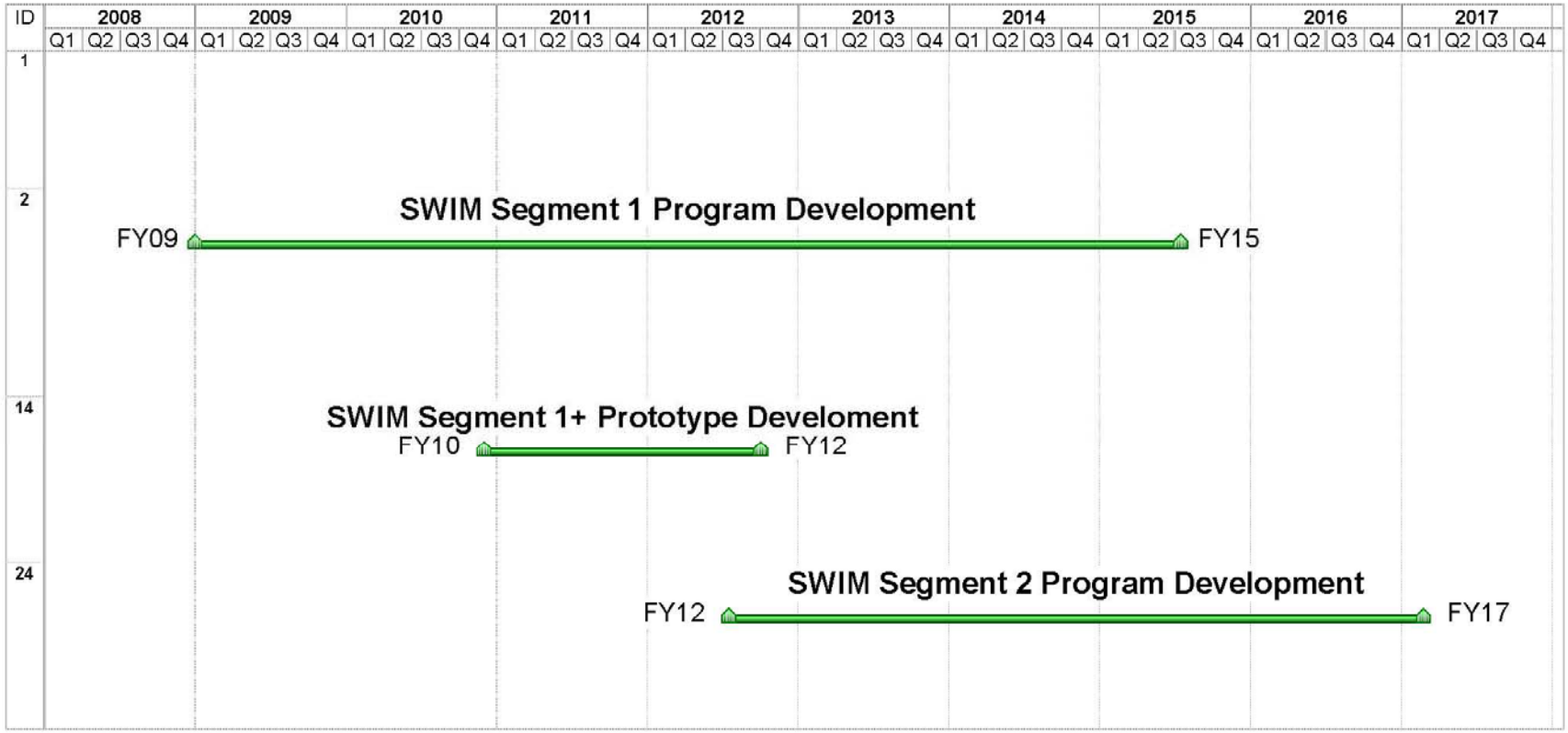


Current SWIM Capabilities



Capabilities will be implemented as multiple services over the next five years

SWIM Schedule



FY09-10 Accomplishments

- Integrated Terminal Weather System (ITWS) Publication prototype service subscribed to by UPS, Harris, DoD, and FedEx
- Trained developers from SWIM Implementing Programs (SIPs) on FuseSource Middleware. SIPs have started systems engineering and design
- Conducting Service Oriented Architecture (SOA) suitability assessments of other FAA programs
- Finishing development of the Airspace Information Management (AIM) portion of the Special Use Airspace (SUA) Automated Data Exchange
- Developing Corridor Integrated Weather System (CIWS) Publication prototype service. Selected participants from industry to receive the Corridor Integrated Weather System (CIWS) Weather data

FY09-10 Accomplishments (Continued)

- NAS Service Registry/Repository (NSRR) operational
- SWIM Commercial off-the-shelf (COTS) Repository operational
- Released the SWIM Segment 2 Technical Overview and draft Final Program Requirements (FPR)
- Met with Single European ATM Research (SESAR) Joint Undertaking (JU) to discuss commonality and interoperability between future SWIM environments
- SWIM is now on the Joint Resources Council (JRC) Checklist
  - Investment Analysis Readiness Decision (IARD)
  - Initial Investment Decision (IID)
  - Final Investment Decision (FID)

Planned FY 11 Activities

- **Segment 1 capability deployments:**
  - ITWS Publication
  - CIWS Publication
  - AIM SUA Automated Data Exchange
  - Reroute Data Exchange
  - PIREP Data Publication
- **Segment 2 Acquisition Activities:**
  - Segment 2 FPR
  - Segment 2 System Specification Document
  - Segment 2 Acquisition Strategy

Segment 2 Acquisition Strategy

- Published Segment 2 Request for Information on August 20 on the FAA Contract Opportunities website
  - Focused on technical and acquisition strategy questions for industry review and feedback
  - Included a Draft of Segment 2 FPR for comment
- Industry events, such as meetings and other industry exchanges, will be scheduled for later this year, as appropriate
- Segment 2 Contract Award expected in FY2012
  - Contract Type and number of contracts is still TBD

SWIM Program Management - Points of Contact

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  - (202) 493-5944
- **Ahmad Usmani, SWIM Program Manager**
  - Ahmad.Usmani@faa.gov
  - (202) 267-3391

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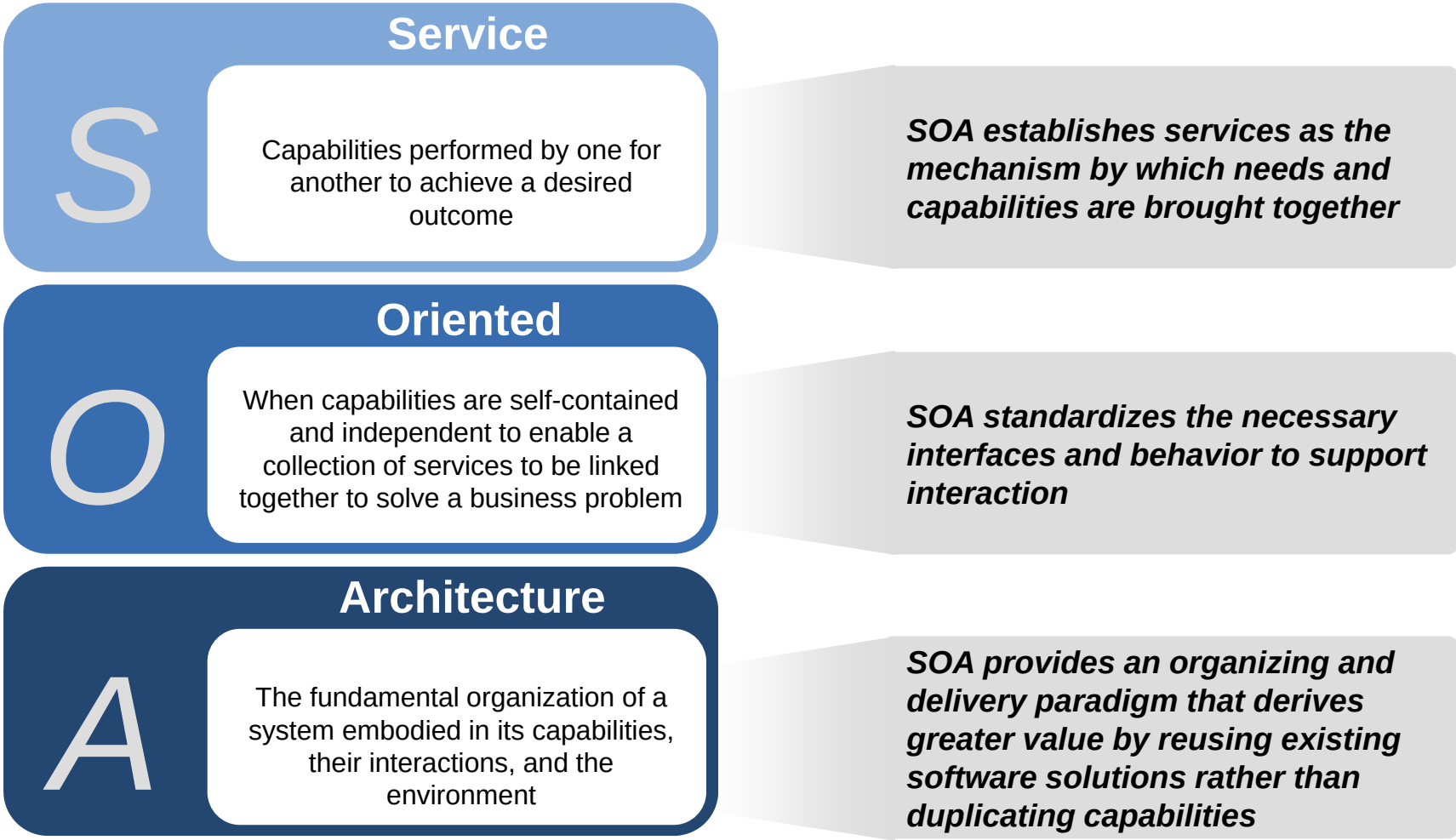
A program hears that SWIM is a SOA implementation at the FAA…

SOA? What's that?

SOA organizes technical capabilities in a standard way to allow flexible accomplishment of constantly changing demands



Benefits of SWIM

What kind of benefits would the FAA see from implementing a SOA?

Benefits of SWIM

- **Business and IT Alignment**
  - Systems design is driven by a market forces model (supply and demand)
  - Systems are grown to evolve with the environment rather than designed and built as a fixed structure (a city vs. a building)
- **Adaptability**
  - Agility: allow for rapid enhancement of services capability
  - Flexibility: enable on-demand composition and restructuring of services to meet business needs
- **Interoperability**
  - Priority on exposing capability for rapid consumption
  - Create ability for unanticipated utilization (emergent behaviors)
- **Reuse**
  - Maximize utility of the services provided
  - Maximize utilization of existing services (eliminate/reduce development)
- **Scalability**
  - Distribution of effort: widely distribute the development of capability
  - Distribution of value: enable wide access to capability

SOA Suitability Checklist

How do I know if my program should be SWIM-compliant?

The SOA Suitability checklist is designed to assess whether programs should be SWIM-compliant

		New Data Req'd	Data Refresh	
	SWIM Suitability Checklist	**Investment Analysis Readiness Decision**	**Initial Investment Decision**	**Final Investment Decision**
	Description of New Service or Mod	X	X	X
1	SOA service availability verification	X	X	X
2	Intended Audience/User Community (FAA)	X	X	X
3	Intended Audience/User Community (Non FAA)	X	X	X
4	Type of user information	X	X	X
5	Frequency of Data Usage (FAA)	X	X	X
6	Frequency of Data Usage (Non FAA)	X	X	X
7	Role in NextGen strategic plan	X	X	X
8	Durability of proposed process	X	X	X
9	Granularity of service(s)	X	X	X
10	Reusability of service(s)	X	X	X
11	Degree of use of SOA infrastructure		X	X
12	Impact on FAA Users		X	X
13	Impact on non-FAA Users (DOD, NASA, Airlines, etc)		X	X
14	# Interfaces Required to Existing Systems	X	X	X
15	Technical Complexity of Pt-Pt		X	X
16	Technical Complexity of SOA		X	X
17	Ability to use SWIM common components		X	X
18	IT Security (Pt-Pt vs. SOA)		X	X
19	Greenfield vs Mod to Existing		X	X
20	Technological Maturity of non-SOA solution	X	X	X
21	Technical risk of SOA approach		X	X
22	Safety		X	X
23	Human Factors/Impact to Workforce		X	X
24	Operational Cost Efficiencies		X	X
25	Maintainability		X	X
26	Risk of SOA approach		X	X
27	Executability		X	X
28	Known dependencies for SOA solution		X	X

Gate #1 to Stage 2 - Suitability Scorecard

28 total items

Step #1

	INSERT PROGRAM NAME HERE		Only select one category (Low, Medium, High) per criteria; Input 1,2 or 3 into applicable cell					
	SWIM Suitability Checklist	N/A	LOW	Yes-1	MEDIUM	Yes-2	HIGH	Yes-3
1	SOA service availability verification		No comparable service exists		Partially compliant service exists that would require moderate development		Compliant service exists that would need minimal development	
2	Intended Audience/User Community (FAA)		Single primary user; limited audience (1-10)		Multiple primary users; moderate audience (11-20)		Multiple primary users; large audience (21-40)	
3	Intended Audience/User Community (Non FAA)		Single secondary user; limited audience (1-10)		Multiple secondary users; moderate audience (11-20)		Multiple secondary users; large audience (21-40)	
4	Type of user information		Minimal value to user(s) primary role/function		Moderate value to user(s) primary role/function		High value to user(s) primary role/function	
5	Frequency of Data Usage (FAA)		Infrequent use of data by primary users (1-2 x per month)		Periodic use of data by primary users (1-2 x per week)		Frequent use of data by primary users (1-2 x per day)	
6	Frequency of Data Usage (Non FAA)		Infrequent use of data by secondary users (1-2 x per month)		Periodic use of data by secondary users (1-2 x per week)		Frequent use of data by secondary users (1-2 x per day)	
7	Role in NextGen strategic plan		Information has minimal role in NextGen strategic plan		Information has moderate role in NextGen strategic plan		Information has critical role in NextGen strategic plan	
8	Durability of proposed process		Service/info will only be required for a short period of time (months)		Service/info will only be required for a moderate period of time (quarters)		Service/info will only be required for a significant period of time (years)	

Summary of scoring

Step #2

	N/A	LOW	MEDIUM	HIGH	Total Score
Evaluation Criteria	0	0	0	0	0

Step #3

	Range	
Low value in SOA-based solution	0	28
Moderate value in SOA-based solution	29	56
High value in SOA-based solution	57	84

Value range

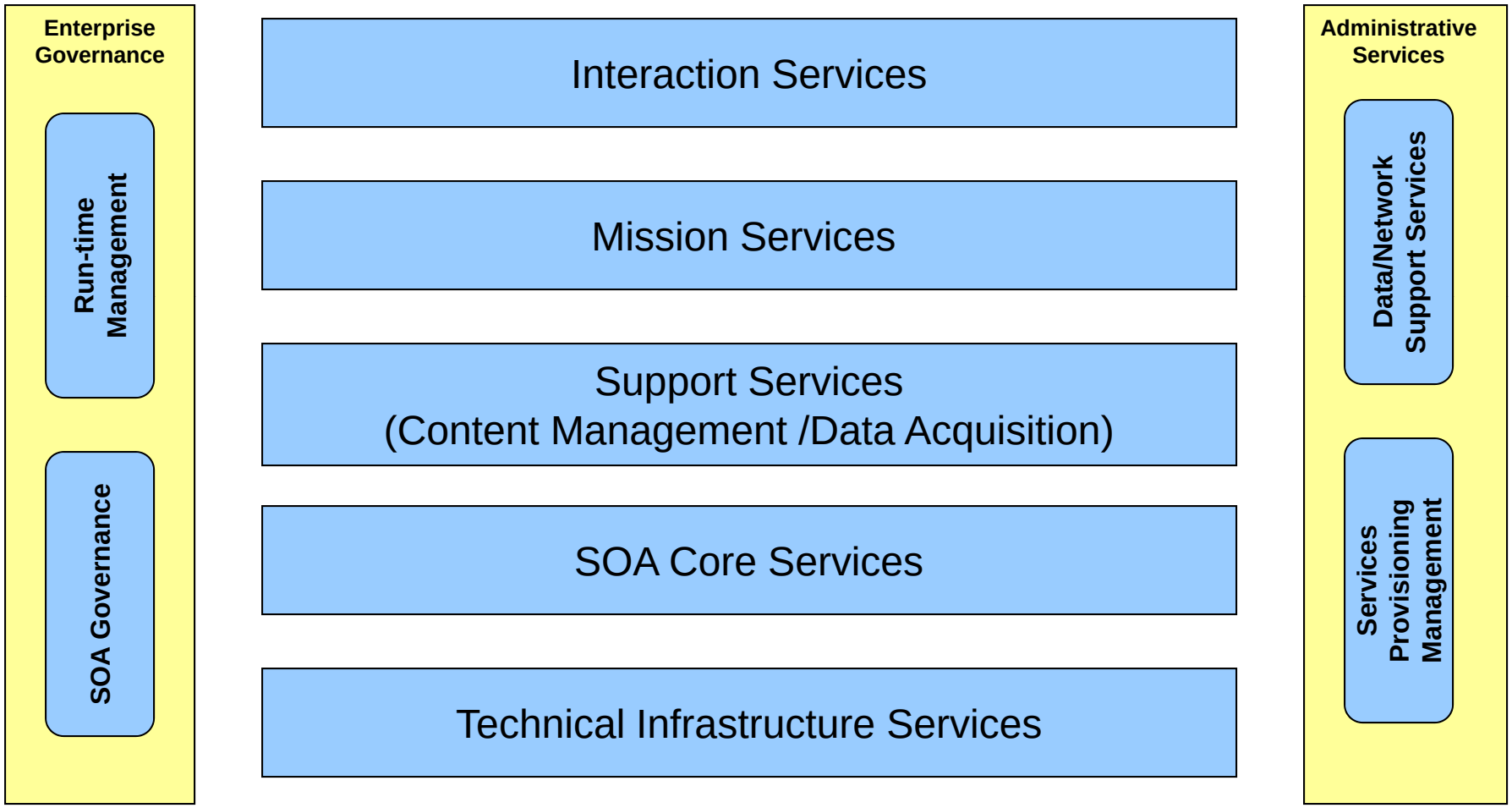
Segment 2 Overview

Hmmm…What is Segment 2? How is that different than Segment 1?

Segment 2 Overview

- Support data exchange needs of NextGen
- Build on Segment 1 Governance, for all NAS programs that score high on the SOA Suitability Checklist
- Expand SWIM infrastructure to include additional Enterprise Service Management, Security, other SOA infrastructure services, and Core services that were delegated to the SIPs in Segment 1

Simplified NextGen NAS SV-4 Framework



Core Services Components

What are the Core Service components?

Core Services Components

- **Core Services SWIM supports include:**
  - Interface Management
  - Messaging
  - Security
  - Enterprise Service Management

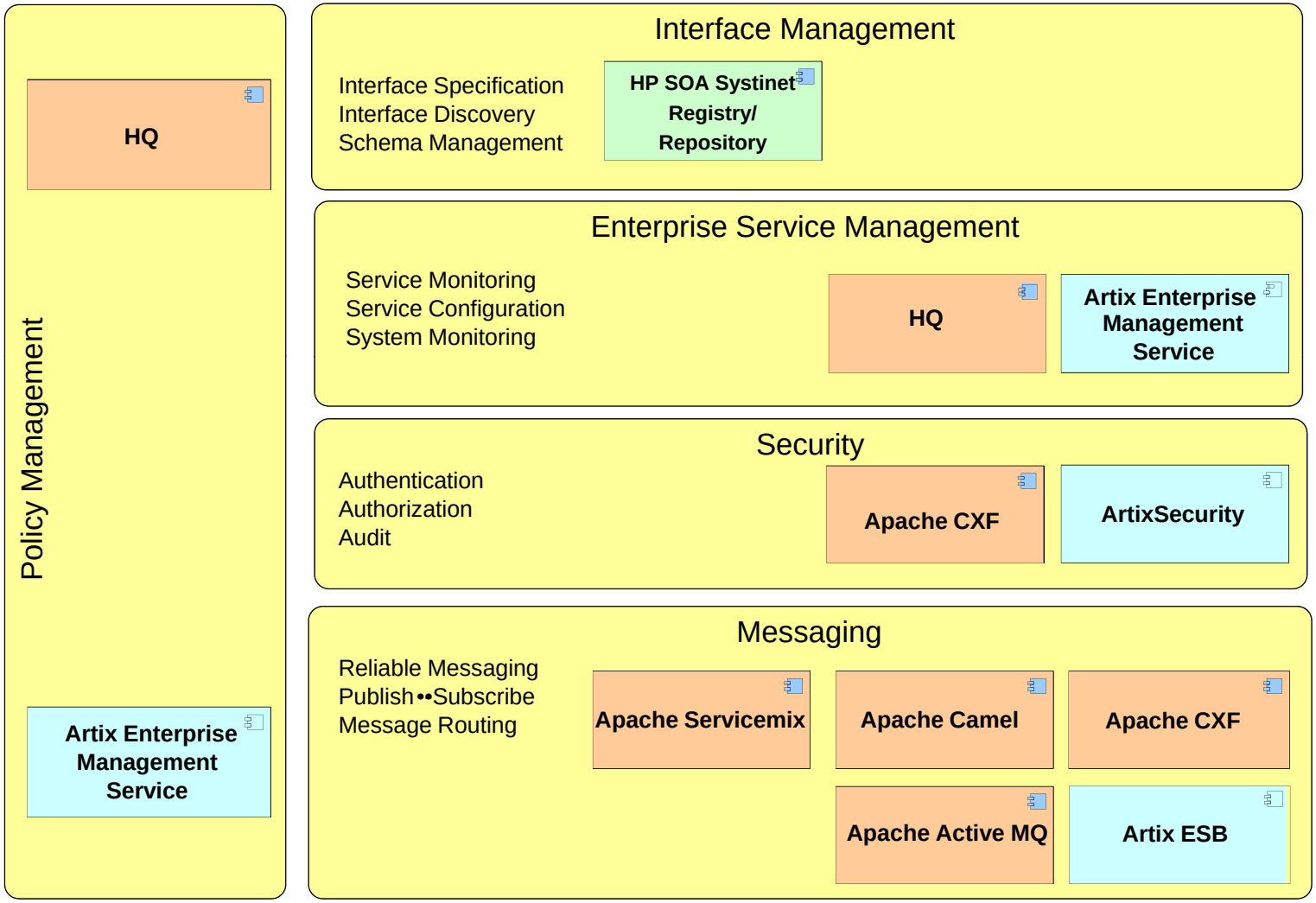
SWIM Software

Is SWIM using a COTS product?

FuseSource Software for SWIM

- FUSE Suite
  - Apache Servicemix/FUSE ESB 3.4.x and 4.2.x
  - Apache CXF/FUSE Services Framework 2.2.x
  - Apache Active MQ/FUSE Message Broker 5.3.x
  - Apache Camel/FUSE Mediation Router 2.2.x
  - FUSE HQ 4.2.x
- Artix Suite
  - Artix Registry/Repository (Depot) v1.5
  - Artix ESB v5.5
  - Artix Connect for WCF v1.0.1
  - Artix Security Advanced v5.5
  - Artix Enterprise Management Service Plug-in
- DataXtend Semantic Integrator (DXSI) v8.4.1
- Progress Actional Team Server v8.1

SWIM Core Services Product Stack

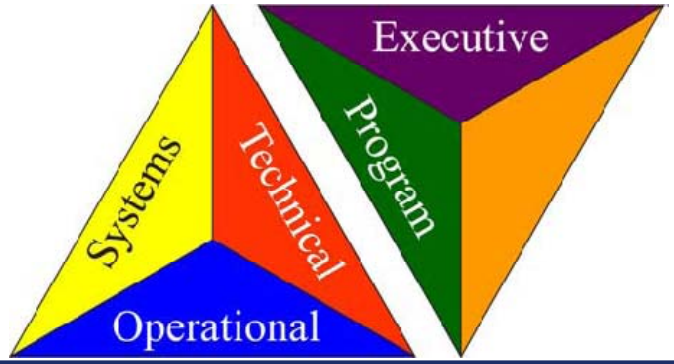


Requirements for SWIM Compliance

What are the technical requirements for SWIM-compliance?

National Airspace System Enterprise Architecture Framework (NASEA) Technical Standards Profile (TV-1)

- Information Process Standards
- Information Transfer Standards
  - Web Services
- Information Modeling, Meta Data and Information Exchange Standards
- Human Factors Standards
- Information Security Standards
- Aviation Related Standards



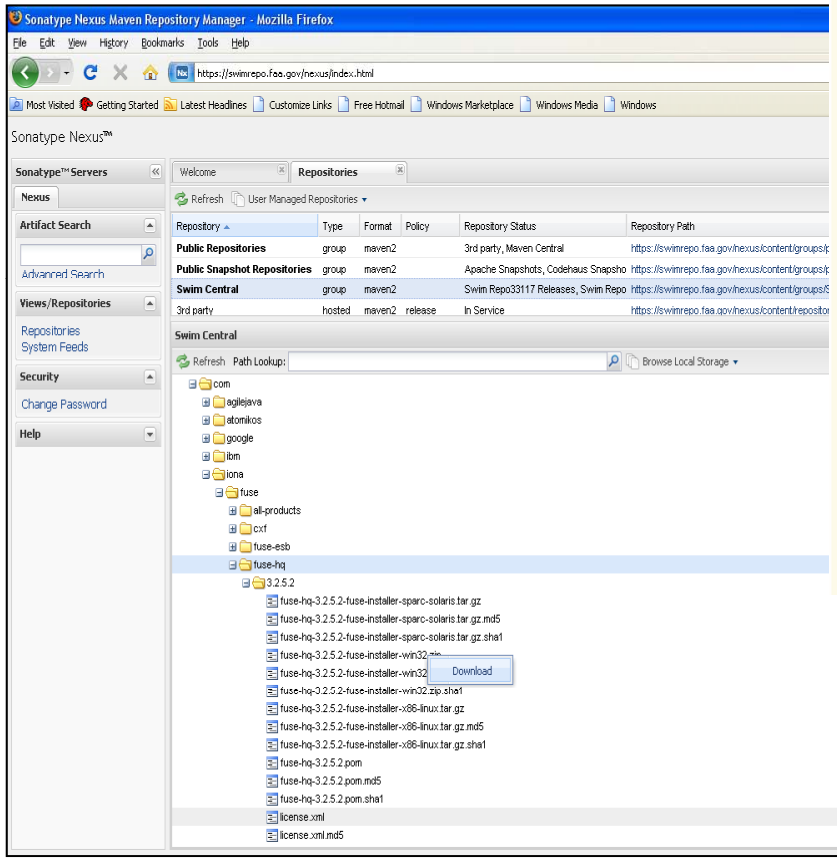
FAA Standards for Services

- **FAA-STD-063** ***XML Namespaces***
  - Requirements for namespaces in XML documents
- **FAA-STD-064** ***Web Service Registration***
  - Requirements for registering services
- **FAA-STD-065** ***Web Service Description Documents***
  - Minimum content for documenting properties and capabilities of web services
- **FAA-STD-066** ***Web Service Taxonomies***
  - Minimum set of taxonomies to categorize service metadata

COTS Repository

What will the COTS Repository be used for?

COTS Repository



FAA SWIM COTS PRODUCTS REQUEST FORM

Please save and E-MAIL this form to jeffery.hobbs@faa.gov for authorization

ATTN: Jeffery Hobbs Phone: (202) 267-9772

SWIM COTS PRODUCTS REPOSITORY Account Request

Current Date

Requester Name:

Company/ORG info:

FAA Authorizing Organization Mgr/Supervisor/ POC / COTR

E-mail:

Phone:

Program:

Role:

Describe the request in detail: (Justification)

Form Instructions:

Please fill out the form **save the PDF file and e-mail it** to jeffery.hobbs@faa.gov.

If you have any question please contact Dominic Timoteo

E-mail: dominic.timoteo@faa.gov

Phone: 609-485-4055

Internal Use Only

Click button below to approve this request

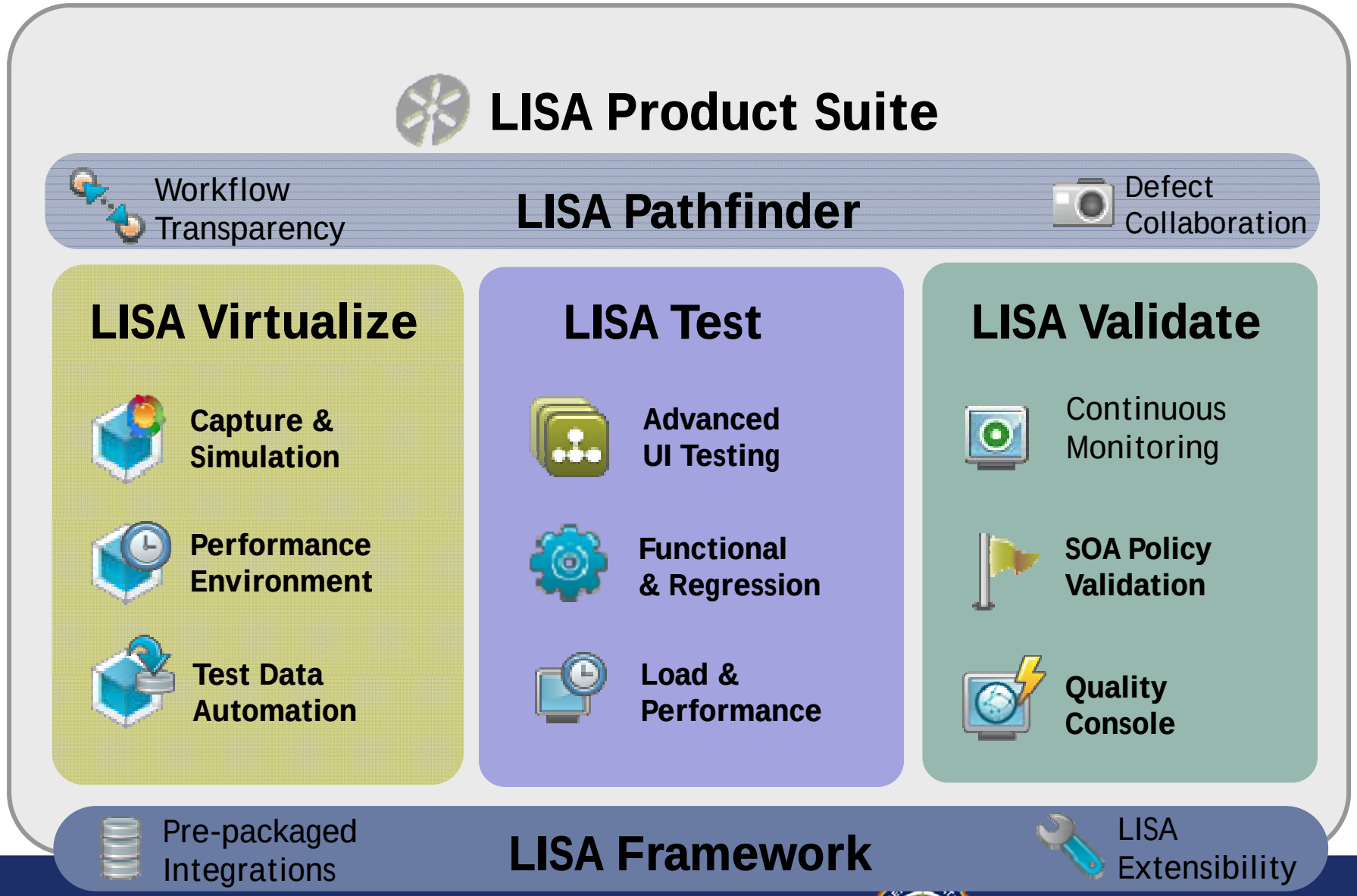
Jeffery Hobbs approval

Handled By	Date	Time

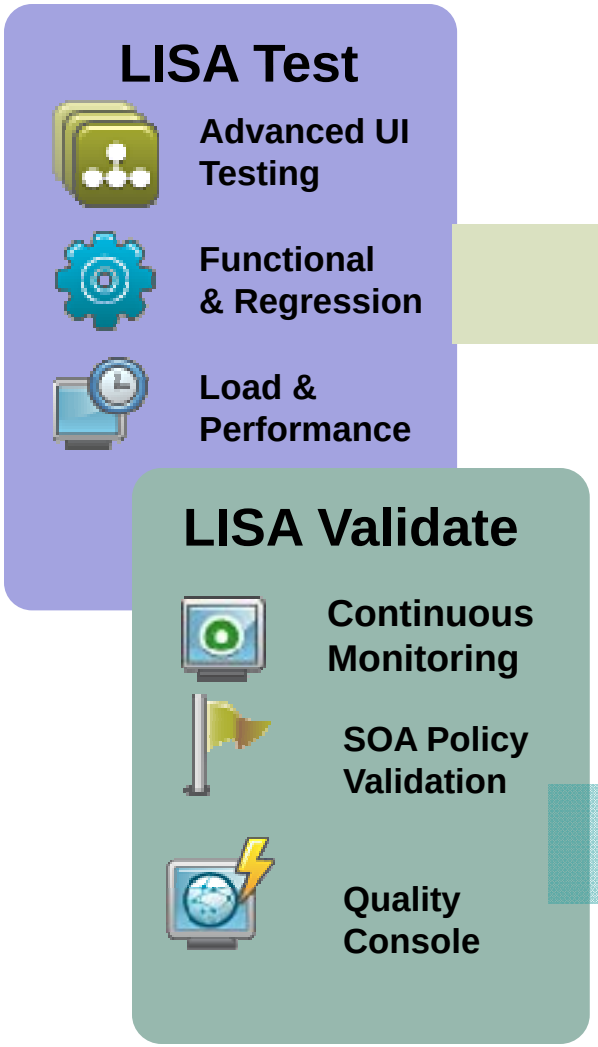
LISA

What is LISA?

iTKO's LISA 5: *A Complete, Integrated Solution*



End-to-End Validation & Testing with LISA



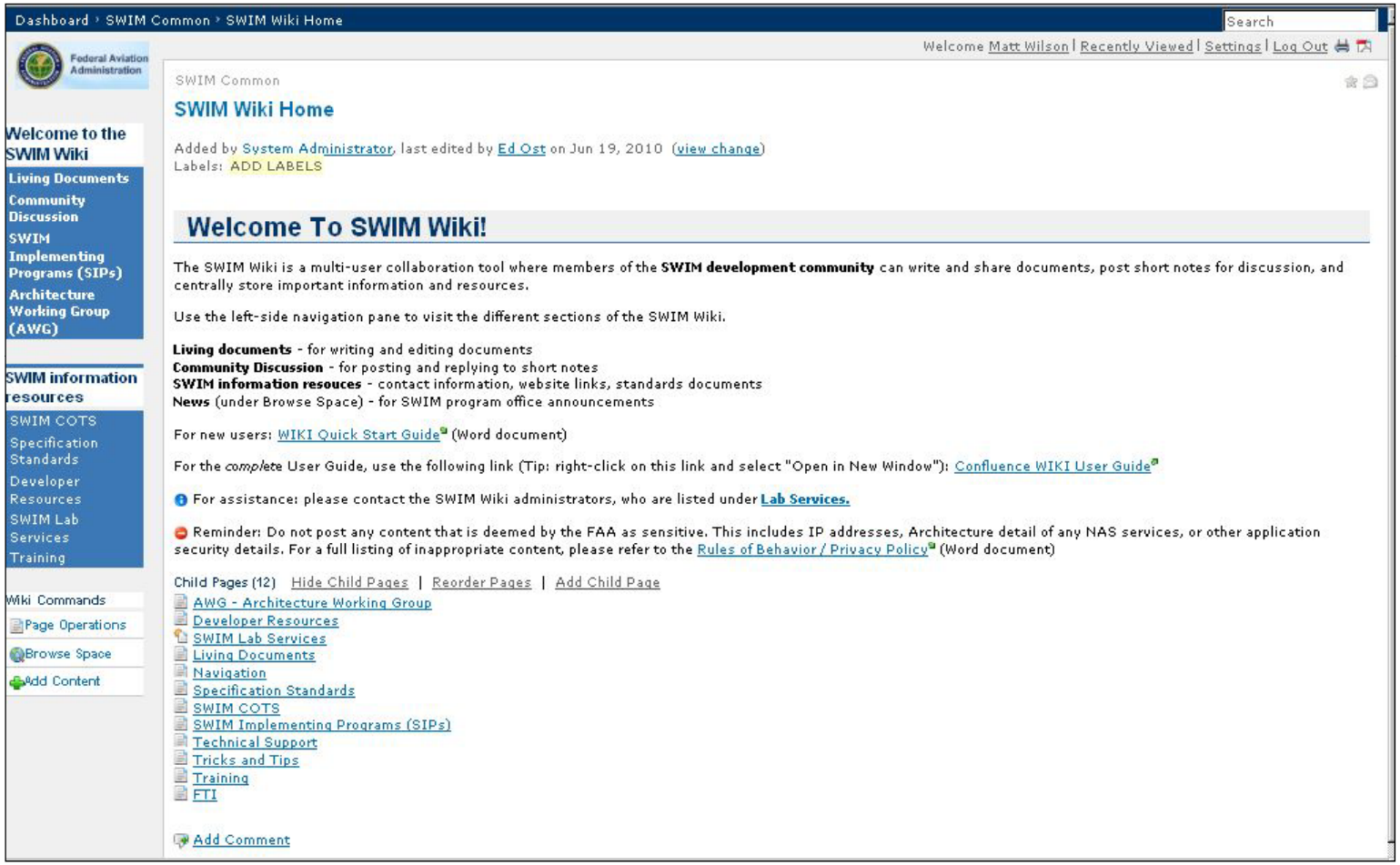
- No-Code Test Automation at Every App Layer
- Next Generation UI Testing Capabilities
- Advanced Reporting
- Industry-Leading Support Across Platforms

- Continuous Validation at Design, Build and Runtime
- Works with Leading Quality and ALM Tools
- Metrics and Alerts

SWIM Wiki

What is the SWIM Wiki and how can it help me?

SWIM Wiki


Dashboard › SWIM Common › SWIM Wiki Home
Search
Welcome Matt Wilson | Recently Viewed | Settings | Log Out
Federal Aviation Administration
SWIM Common
SWIM Wiki Home
Added by System Administrator, last edited by Ed Ost on Jun 19, 2010 (view change)
Labels: ADD LABELS
Welcome to the SWIM Wiki
Living Documents
Community Discussion
SWIM Implementing Programs (SIPs)
Architecture Working Group (AWG)
SWIM information resources
SWIM COTS
Specification Standards
Developer Resources
SWIM Lab Services
Training
Wiki Commands
Page Operations
Browse Space
Add Content
Welcome To SWIM Wiki!
The SWIM Wiki is a multi-user collaboration tool where members of the SWIM development community can write and share documents, post short notes for discussion, and centrally store important information and resources.
Use the left-side navigation pane to visit the different sections of the SWIM Wiki.
Living documents - for writing and editing documents
Community Discussion - for posting and replying to short notes
SWIM information resouces - contact information, website links, standards documents
News (under Browse Space) - for SWIM program office announcements
For new users: WIKI Quick Start Guide (Word document)
For the complete User Guide, use the following link (Tip: right-click on this link and select "Open in New Window"): Confluence WIKI User Guide
For assistance: please contact the SWIM Wiki administrators, who are listed under Lab Services.
Reminder: Do not post any content that is deemed by the FAA as sensitive. This includes IP addresses, Architecture detail of any NAS services, or other application security details. For a full listing of inappropriate content, please refer to the Rules of Behavior / Privacy Policy (Word document)
Child Pages (12) Hide Child Pages | Reorder Pages | Add Child Page
AWG - Architecture Working Group
Developer Resources
SWIM Lab Services
Living Documents
Navigation
Specification Standards
SWIM COTS
SWIM Implementing Programs (SIPs)
Technical Support
Tricks and Tips
Training
FTI
Add Comment

NAS Service Registry/Repository (NSRR)

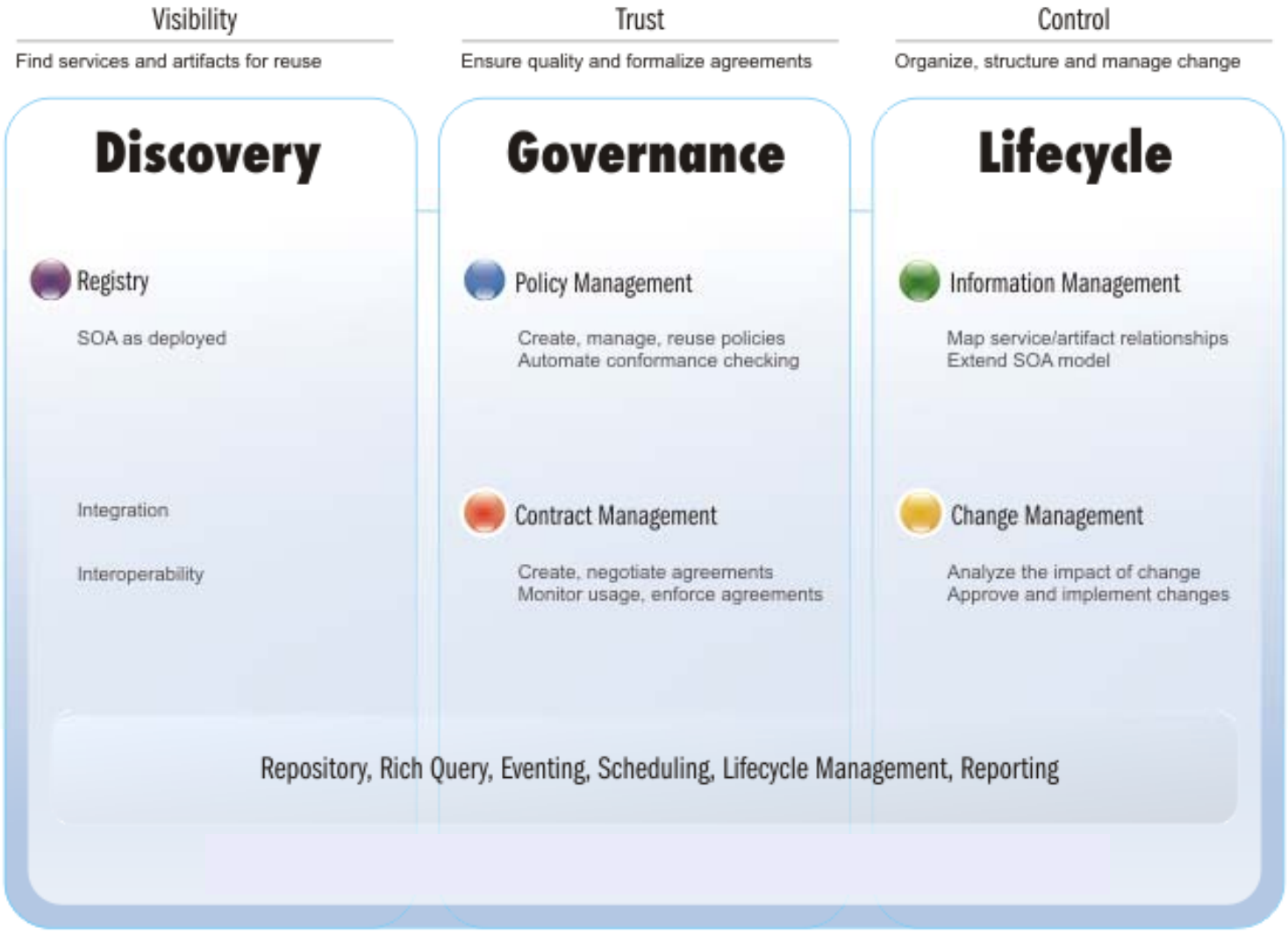
How will potential clients learn about my new service?

NAS Service Registry/Repository

- The SWIM Program has stood-up a National Airspace System (NAS) Service Registry/Repository
- This creates a central repository to help users discover, use and, whenever possible, reuse Web services

- The Hewlett Packard Systinet V3.2. product is being used to implement the NAS SWIM Service Registry/Repository (available as of July 1, 2010)
- The NSRR is available at https://swimrep.faa.gov/soa/web/login

Key Features of NSRR



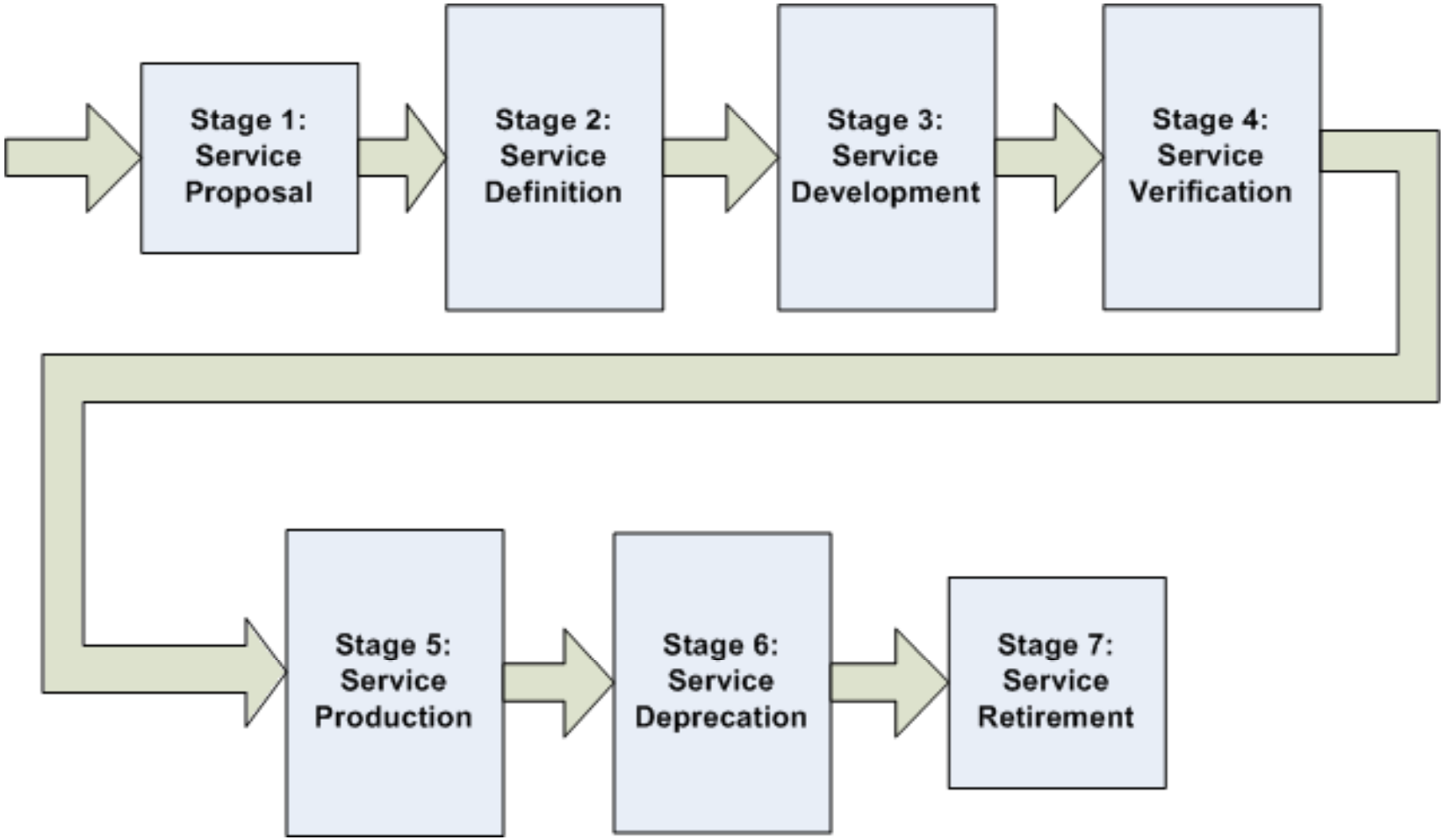
IT Governance & Service Lifecycle Management

What is IT Governance and Service Lifecycle Management?

Service Lifecycle Governance

- SWIM has developed Policies to govern the design and deployment of Services in the NAS
  - Strategic Policies
  - Design-time Policies
  - Run-time Policies
- SWIM has also developed Processes to guide the lifecycle of Services
- NSRR is the primary tool to manage the Service Lifecycle

Service Lifecycle



Service Lifecycle Stages

- **Proposed**
  - Advertise the capability as early as possible
- **Definition**
  - SWIM Policy advocates “Contract-first” development
- **Development**
  - Implement the defined capability
- **Verification**
  - Does it do what was promised?

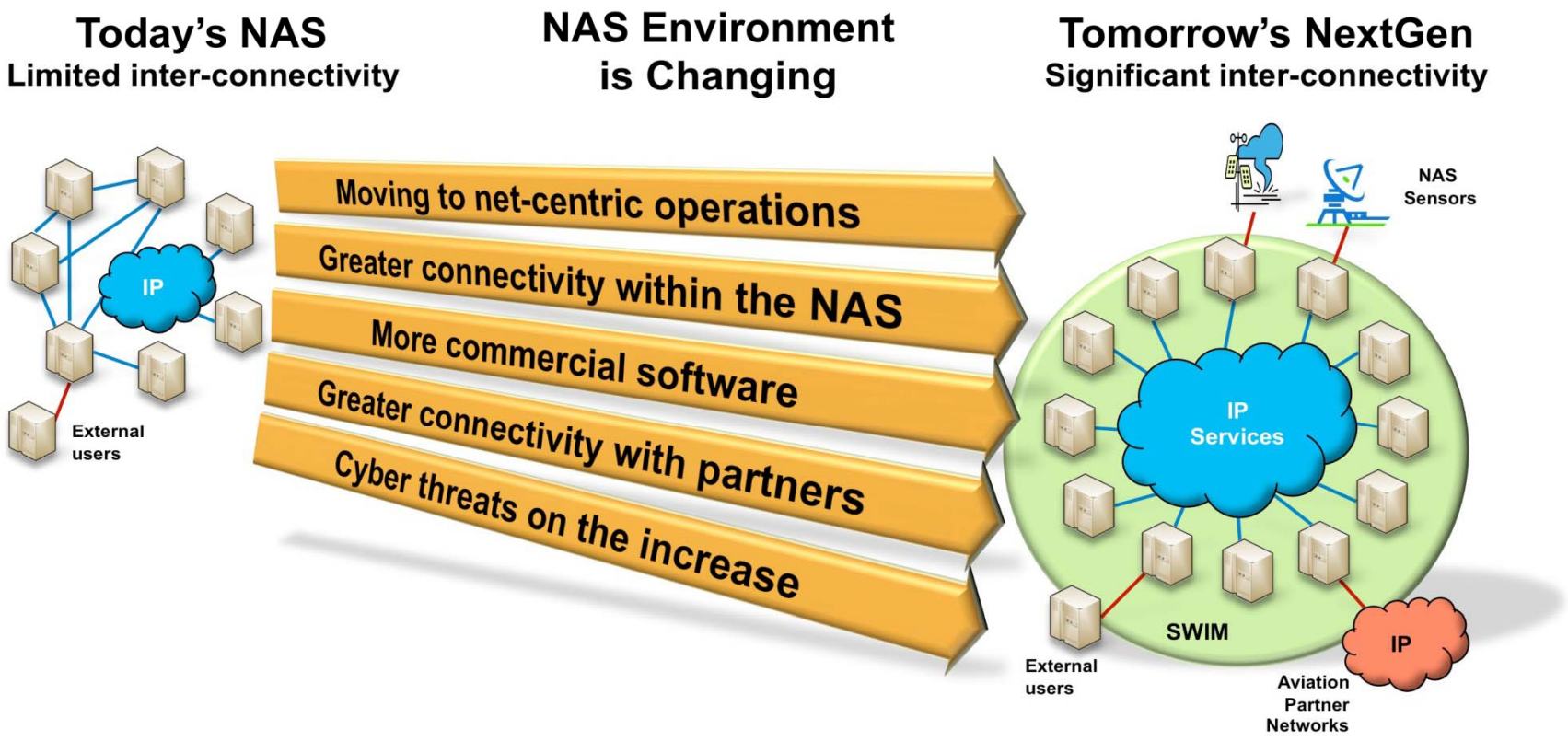
Service Lifecycle Stages

- **Production**
  - Available for consumers to use
- **Deprecated**
  - Still available, BUT will be retired
    - New version available
    - Obsolete
  - NO new consumers
- **Retired**
  - No longer available

Security and Segment 2

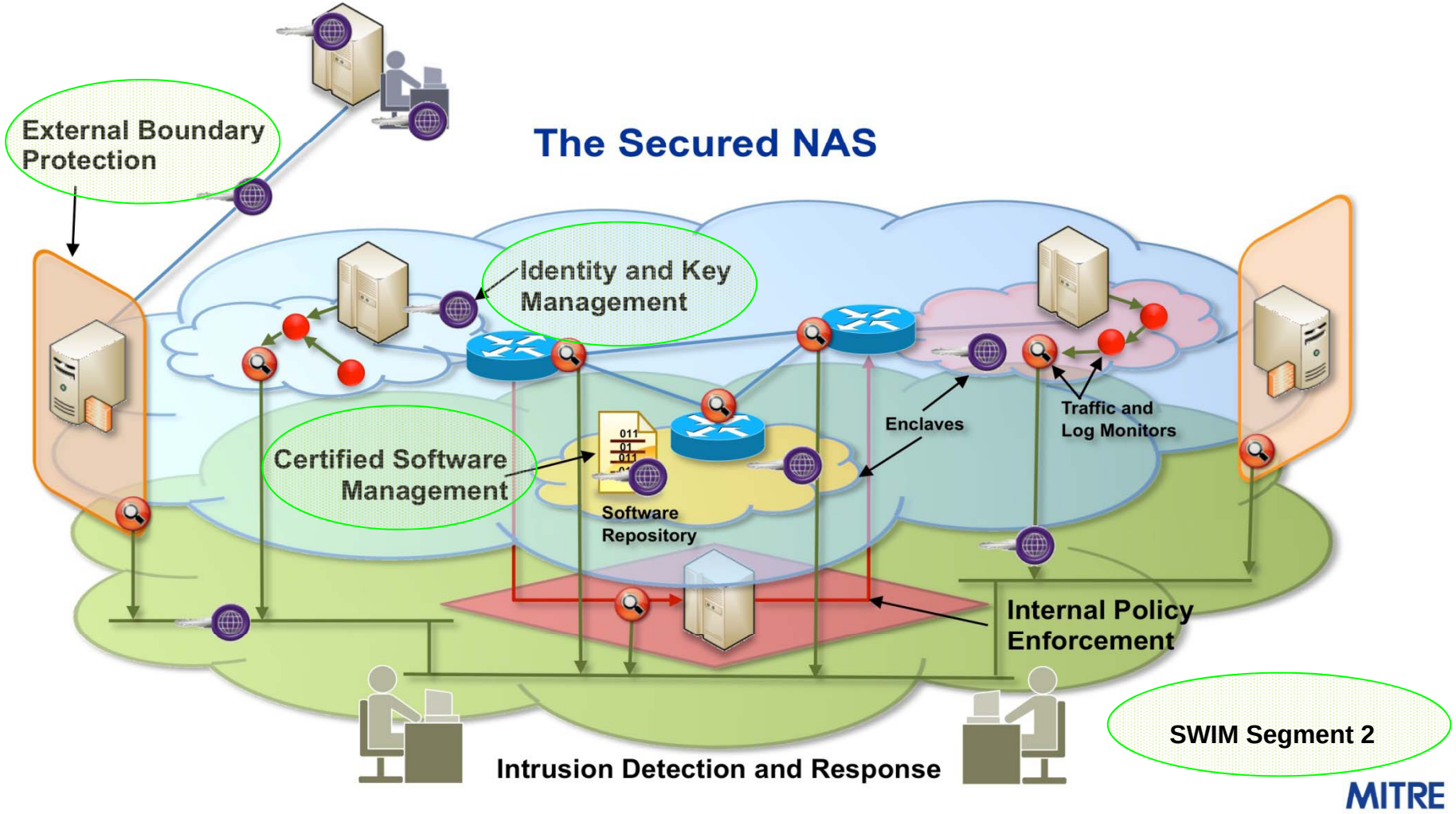
Is there a vision for NAS Cyber Security, and how does SWIM fit into that vision?

SWIM Segment 2 and a changing NAS environment requires an additional cyber security perspective



MITRE

National Airspace System (NAS)
Enterprise Information System Security (NEISS)

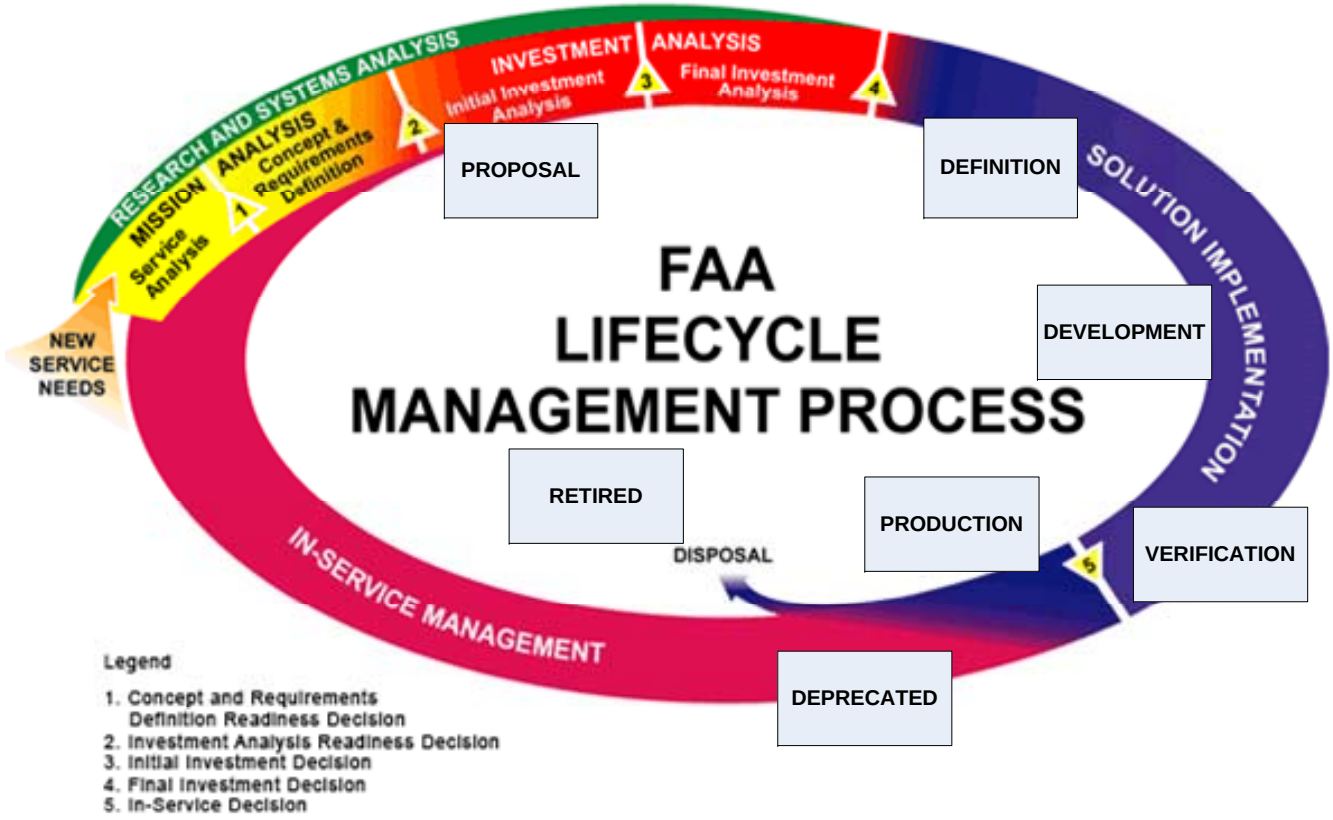


SWIM and Your JRC Package

When and how do I get engaged with SWIM? What is the process?

SWIM and Your JRC Package

- Acquisition Management System (AMS) and SWIM Service Lifecycle



SWIM is now part of the Investment Decision Analysis Checklist. For example, at Final Investment Decision:

Final Investment Decision Checklist Items	Who Confirms Completion
FAA Acquisition Executive (FAE) has reviewed and agreed upon an approach for tailoring the AMS process (if requested)	**JRC Secretariat**
Exhibit 300 Program Baseline Attachment 1: Final Program Requirements has been completed	• **Service organization** • **ATO-P Operation Analysis representative**
Requirements in the Safety Risk Management Guidance for Acquisitions have been met	**ATO-S Safety Engineering representative**
Enterprise architecture products and amendments have been developed	FAA Enterprise Architecture representative
Business Case Analysis (BCA) has been completed	**Service organization**
Independent Evaluation Review (IER) has been completed	**ATO-F Business Case Analysis representative**
Capital Investment Team (CIT) has performed the F&E and OPS budget impact assessment and Vice President ATO-F briefing has been scheduled	**ATO-F Business Case Analysis representative**
Exhibit 300 Program Baseline Attachment 2: Implementation Strategy and Planning has been completed	**Service organization**
Strategy for the Post Implementation Review (PIR) / operational assessments has been incorporate in the Implementation Strategy and Planning (ISP)	**ATO-A PIR Quality Officer**
Method for applying EVM has been incorporated in the ISP	**ATO-A EVM Focal Point**
Telecommunications requirements for the program have been identified and coordinated	**ATO-W Telecommunication Engineering representative**
Exhibit 300 Program Baseline has been reviewed and feedback has been incorporated	**AIO Value Management Office representative**
Service Organization has a recommendation for the In-Service Decision (ISD) authority	**Service organization**
The strategy and requirements for ensuring information interoperability using SWIM have been incorporated into the program requirements and the Implementation, Strategy and Planning Document	**SWIM**
In-Service Requirements (ISR) Checklist Template has been appropriately tailored	**In-Service Decision Secretariat**

These requirements are not necessarily the same for every program. Please see fast.faa.gov for most current requirements list

Engage with SWIM during AMS Process

- Mission Analysis
  - Suitability Analysis
- Investment Analysis
  - Update Suitability Analysis
  - Register Proposed Service in NSRR
  - Document SWIM Interaction in Investment Strategy and Planning Document (ISPD)
  - Document Infrastructure Requirements in SWIM Program Implementation Plan (SPIP)
    - Template and assistance provided by SWIM

SWIM and Cost

Who is going to pay for SWIM?

Role of the SWIM Program Office

- The SWIM program will work with you to determine the cost of SWIM-compliance
- As part of SWIM Segment 2 planning, estimated costs for SWIM-compliant interface development for capabilities in Enterprise Architecture Roadmaps provided to JRC
- SWIM will work with you to document required hardware, software, and standards in your SWIM Program Implementation Plan (SPIP)
- SPIP will identify delta between SWIM estimates and present need for JRC decision

SWIM Evolution and Coordination

What is SWIM's long-term vision?

SWIM Evolution and Coordination

- Leadership in Developing Enterprise Service Orientation in the NAS
- Understanding NextGen and NAS Objectives which require SWIM Capabilities
- Identification and Evaluation of Information Management Technologies and Processes for the NAS Enterprise

Net-Centric Demos and Prototype Technical Interchange Meetings

- Held the fifth in a series of Net Centric Demos and Prototypes Technical Interchange Meetings (TIMs) on May 26th
  - Focused on standardizing network centric information exchanges
  - Shared information that enabled some organizations to leverage assets
  - Recognizes the importance of being aware of what other organizations are doing to analyze and develop Network Enabled Operations
- The Next Net Centric Demos and Prototype TIM is tentatively scheduled for November 3rd in Washington, DC

Aircraft Access to SWIM (AAtS)

What is Aircraft Access to SWIM? Are there plans for implementation?

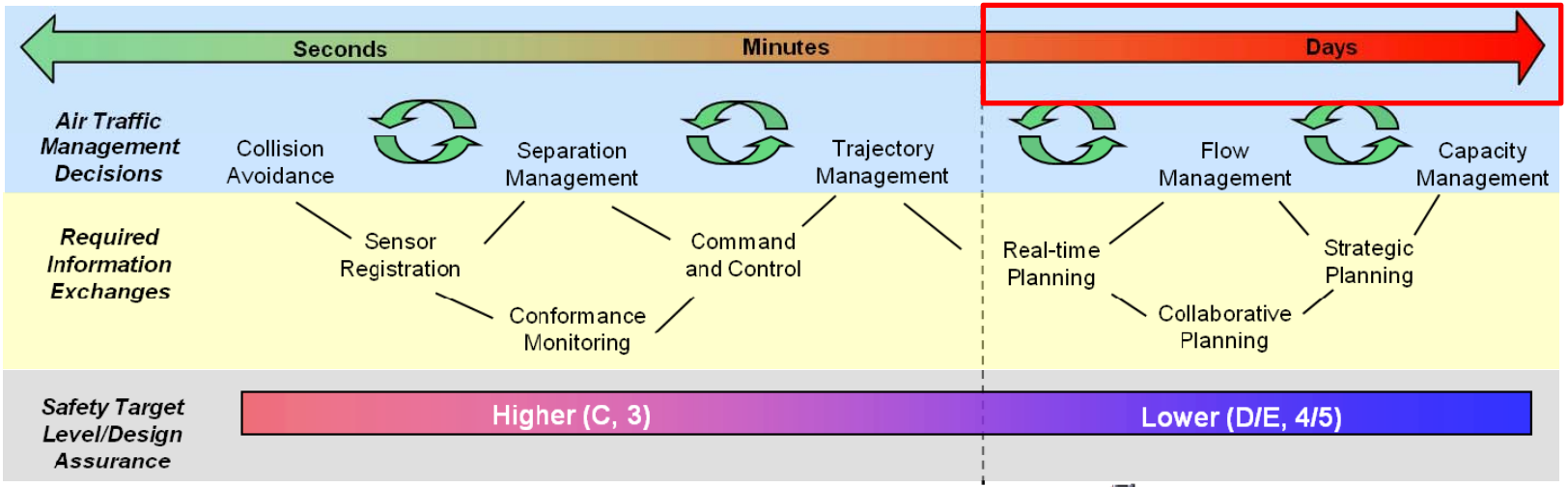
Aircraft Access to SWIM (AAtS)

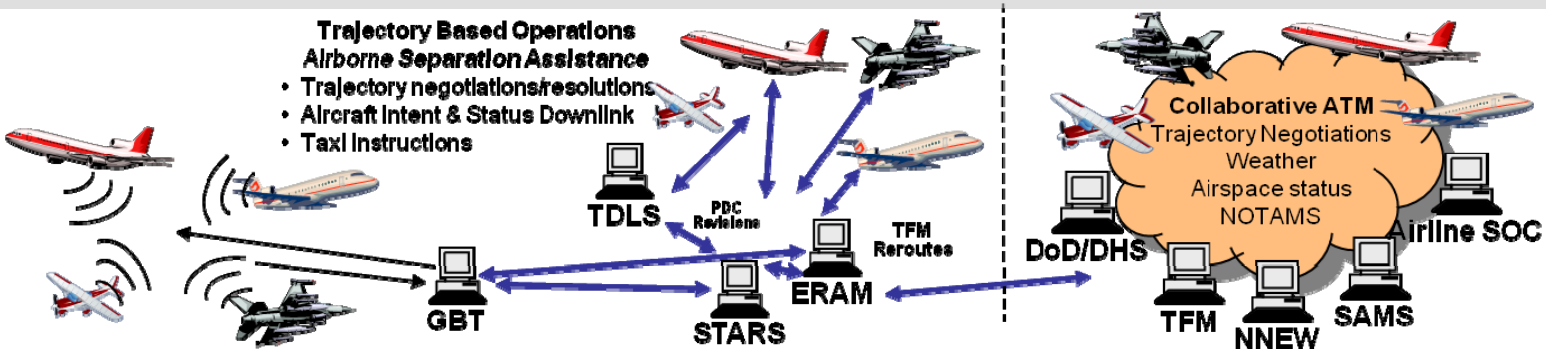
What is it?

- **SWIM – System Wide Information Management – a NAS internet (IP) based data/information sharing system. (Key component of NextGen)**
- **Aircraft Access to SWIM (AAtS) – The aircraft is *Accessing* the SWIM network.**

Why do we want it?

- **So in-flight users have the same information the FAA uses to make its ATM decisions**
- **Scalability is key**
  - New data elements can be added with much greater ease
  - New data is made available to the cockpit by granting it access to the additional data elements in SWIM





ADS-B Characteristics

- Position and intent Broadcasts
- L-Band Protected spectrum
- Safety Assessment Drives :
  - High reliability
  - High safety assurance levels
  - Contention broadcast/receive filtering
  - Low latency
- International usage based on agreements
- Standardized controls and displays
- FMS integration

DataComm Characteristics

- 2 way Command and Control exchanges
- VHF Band Protected spectrum
- Safety Assessment Drives :
  - High reliability
  - High safety assurance levels
  - Guaranteed delivery
  - Low latency
- International usage based on agreements
- Standardized controls and displays
- FMS integration

Airborne SWIM Characteristics

- Commercial spectrum, market driven
- User defined requirements:
  - Authentication
  - Reliability
  - Delivery (e.g. best effort)
  - Latency
  - Controls and displays
  - FMS integration
- International usage based on reach of service provider

Aircraft Access to SWIM (AAtS)

How does it work?

- **Details are still to be determined**
- **Givens**
  - The FAA has no current plans to build a specific supporting infrastructure
  - AAtS is not intended to replace existing or planned systems

Aircraft Access to SWIM (AAtS)

AAtS Working Group meeting

- **Held the second AAtS WG meeting on July 22nd with representatives from:**
  - ATO SysOps
  - SWIM
  - Next Gen I & I
  - AFS
  - AIR
  - WTIC
  - AIM
  - FTI
  - NASA Glenn Research Center
  - European SESAR SJU 09.19 (SWIM Air-Ground Capability)
  - Volpe Transportation Center's Airborne Network Security Simulator
- **Goals include coordination and cross-/inter-agency interoperability**
- **Next WG meeting tentatively scheduled for Wednesday, November 17th**

At Last…

…and the new program becomes SWIM-compliant

Agenda

- Introduction
- Overview of the SWIM Program
- A Scenario: What does SWIM mean for your program?
- FuseSource
- How to Learn More
- Q&A

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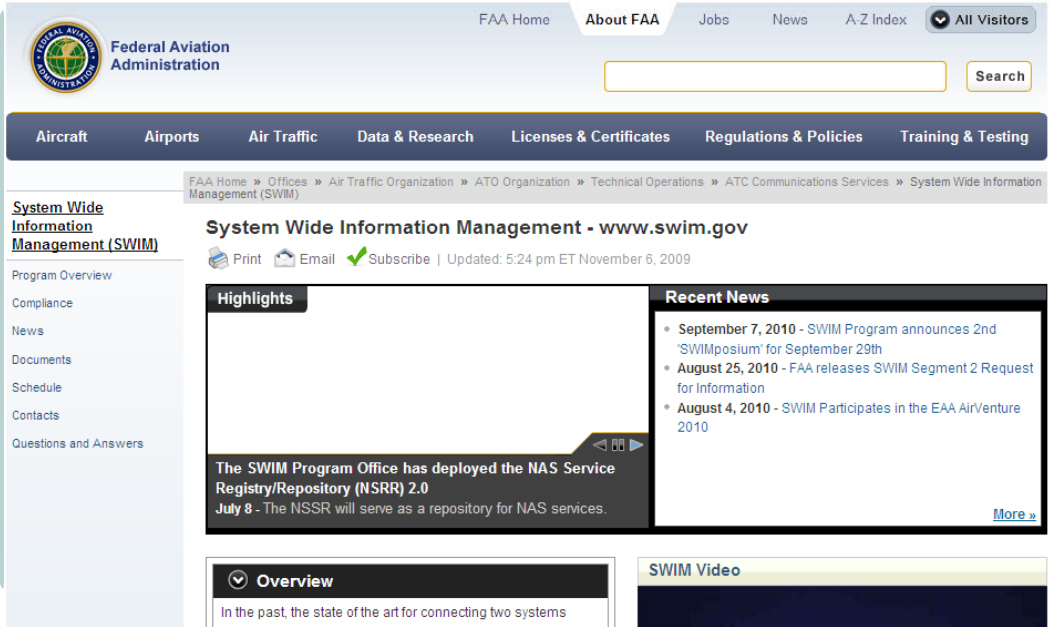
There are several ways to learn more about SWIM…

The SWIM.gov website describes the SWIM program and provides news announcements for current issues

www.swim.gov

1



There are several ways to learn more about SWIM…

Key documentation, including the SWIM Newsletter and the SWIM Q&A, provides an overview of the SWIM program

www.swim.gov

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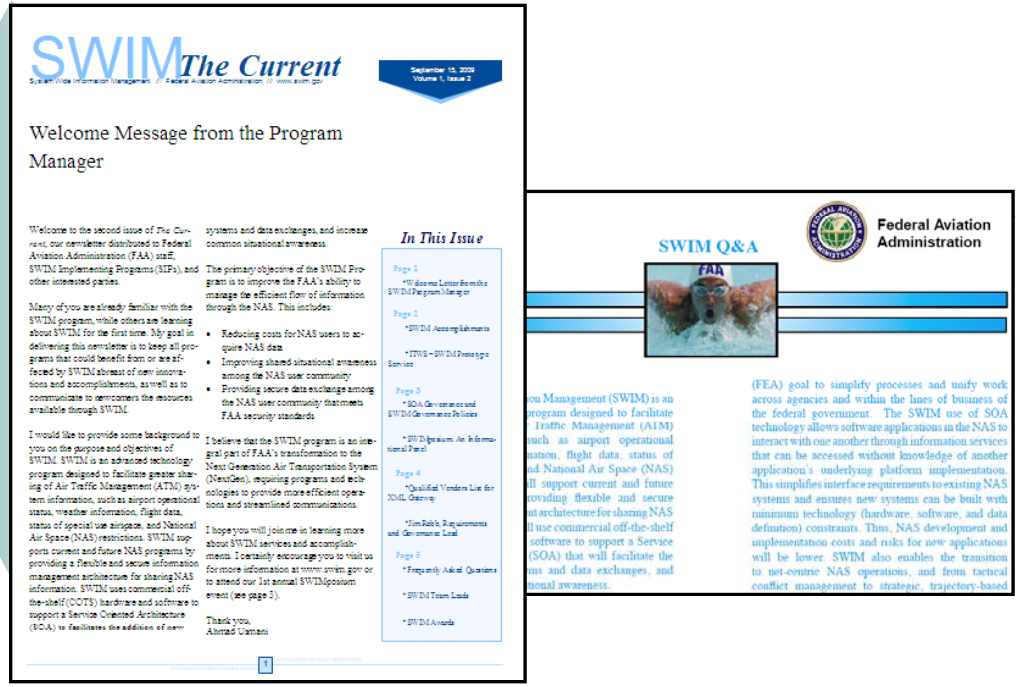

SWIM The Current

Welcome Message from the Program Manager

In This Issue

SWIM Q&A

Federal Aviation Administration

SOA Brown Bag Schedule

Topic	Description	Location	Date/Time
Fundamental SOA	To discuss the fundamental benefits of SOA, including concepts such as: Reusability, Stateless Services, Service Contracts, Service Granularity, Composable Services, the role of a registry, and the role of an ESB	FAA 10A Room 8A/B/C	October 20th from 12-1pm
Enterprise Information Management and its role in SOA	To discuss the Enterprise Information Management and its role in an Service Oriented Enterprise, using concrete examples	FAA 10A Room 5A/B/C	November 17th from 12-1pm
Securing a SOA environment	To discuss different techniques in securing an SOA environment Concepts such as: Security Policies, WS Security, TLS, XML, SAML, PKI	FAA 10A Room 8A/B/C	December 8th from 12-1pm

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Questions and Comments?