System Wide Information Management (SWIM)

Presented to: **Japanese Civil Aviation Bureau**

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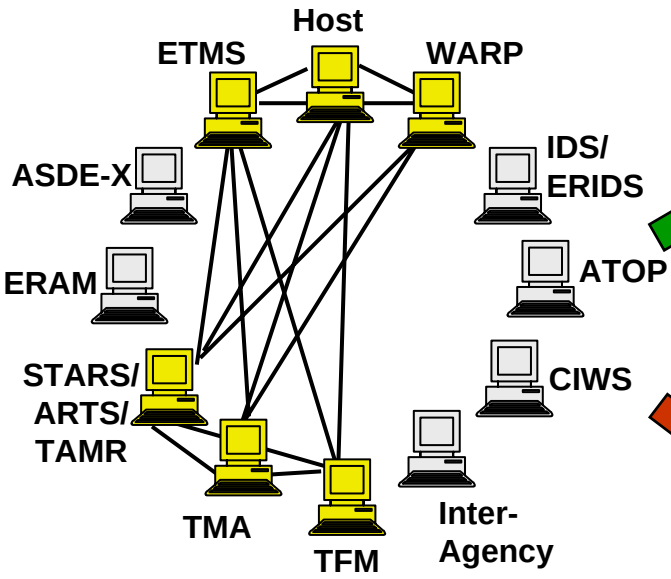
Federal Aviation Administration

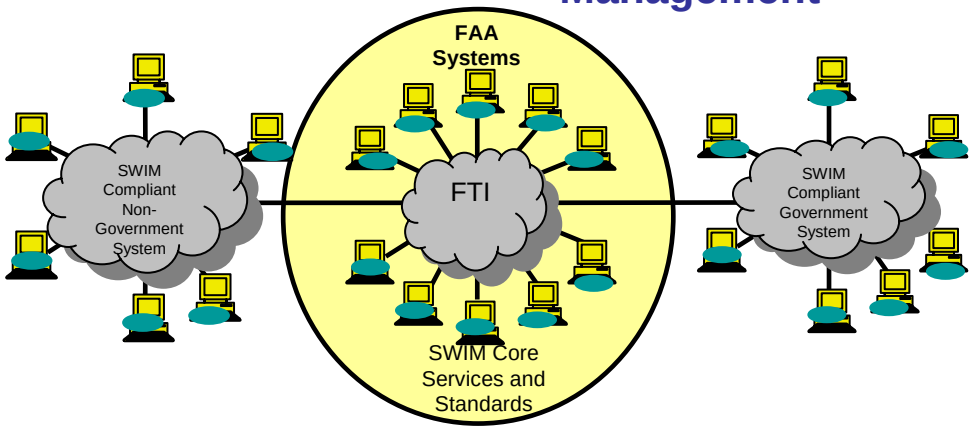
The Challenge

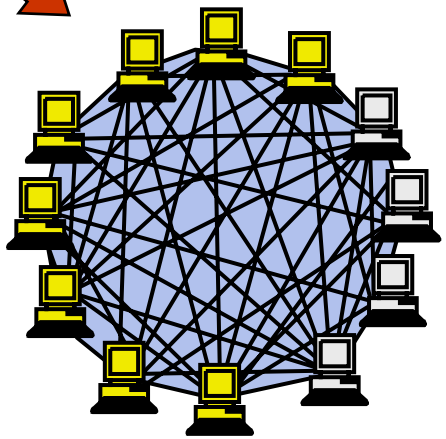
Today



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

Enterprise Management





Business as Usual

(NextGen without SWIM)

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

SWIM

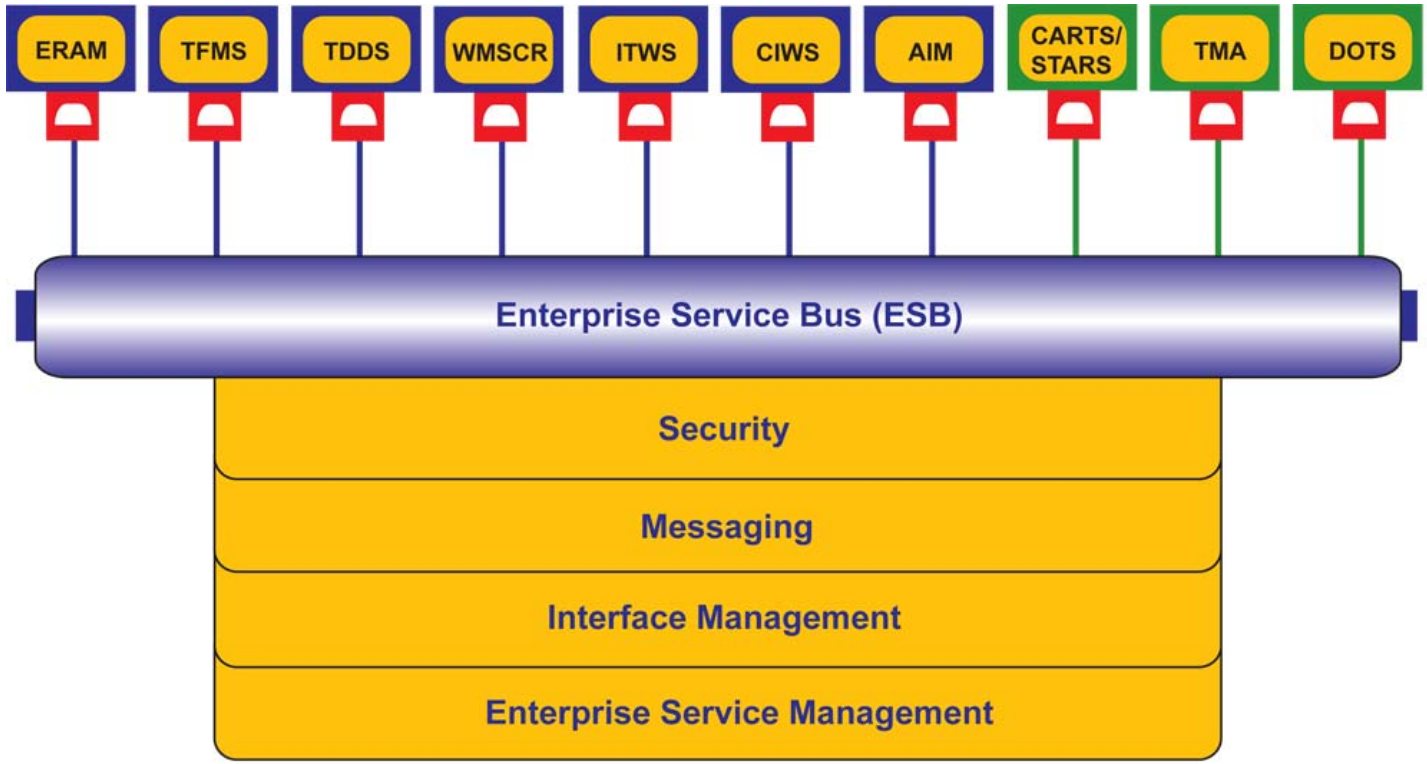
Program Concept

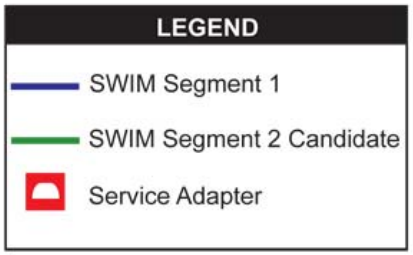
SWIM is an IT infrastructure program that will operate in the background to provide data to authorized users

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**

The Plan


ERAM
TFMS
TDDS
WMSCR
ITWS
CIWS
AIM
CARTS/ STARS
TMA
DOTS
Enterprise Service Bus (ESB)
Security
Messaging
Interface Management
Enterprise Service Management

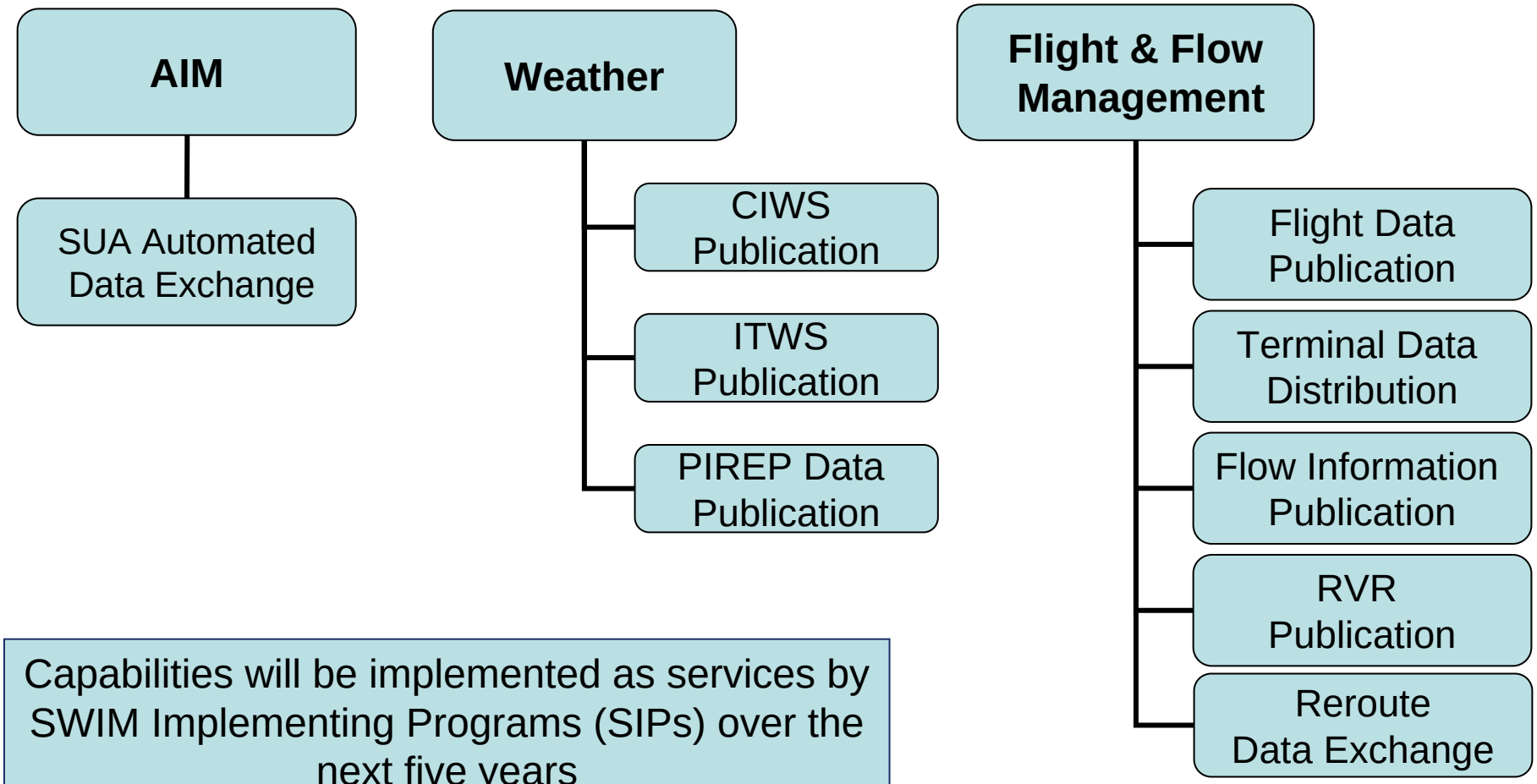

LEGEND
SWIM Segment 1
SWIM Segment 2 Candidate
Service Adapter

Segment 1 Overview

- Nine Segment 1 capabilities were derived from three Communities of Interest:
  - Aeronautical Information Management (AIM)
  - Flight & Flow Management (F&FM)
  - Weather
- SWIM will not implement a separate infrastructure for Segment 1
  - SWIM will leverage existing infrastructures, processes, resources, and logistics chains that are part of the program offices implementing the nine SWIM capabilities
  - SWIM Governance will ensure use of common protocols and interfaces, assisted by use of commercial software for some Core Services

SWIM

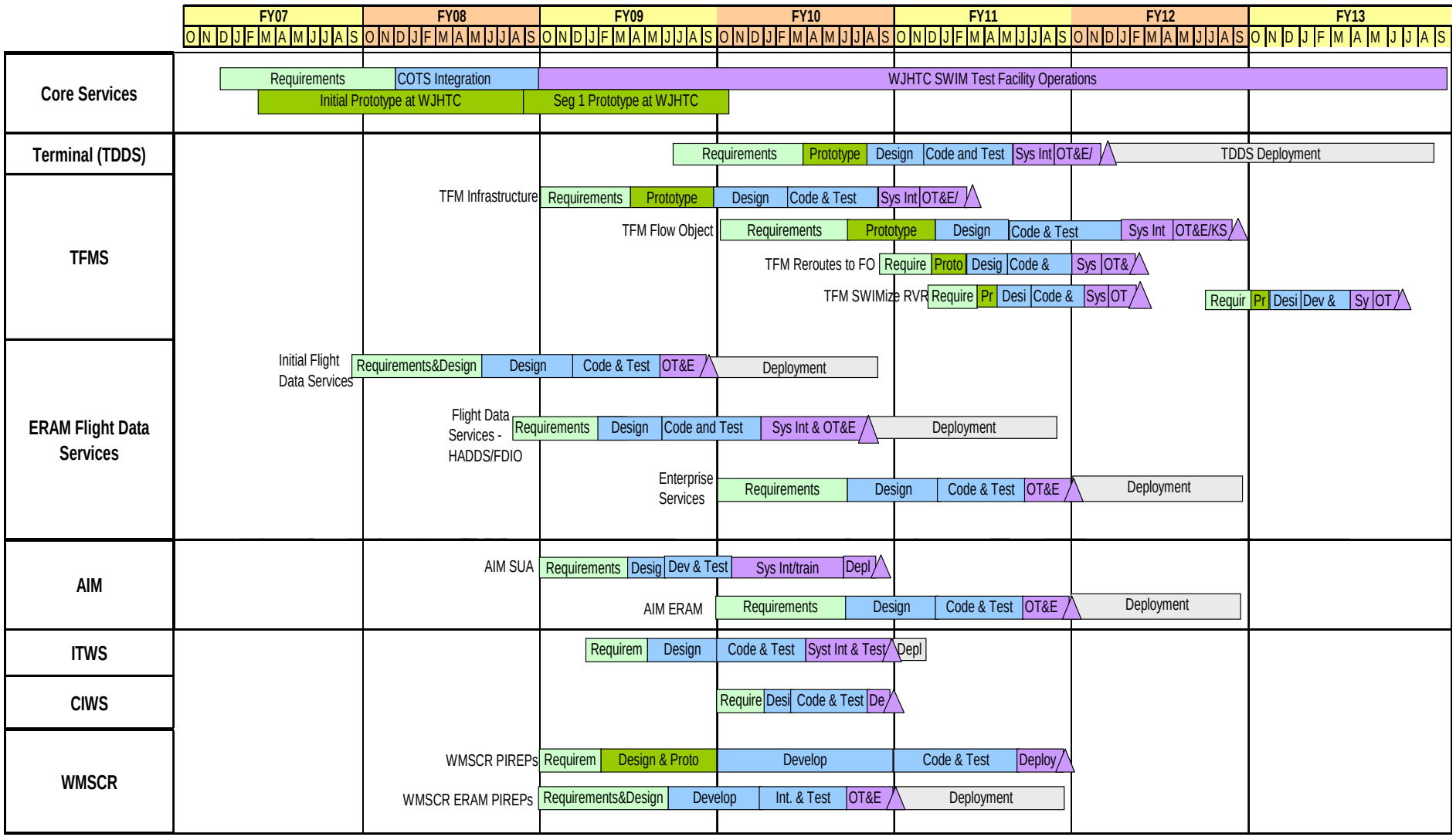
Segment 1 Capabilities



Capabilities will be implemented as services by SWIM Implementing Programs (SIPs) over the next five years

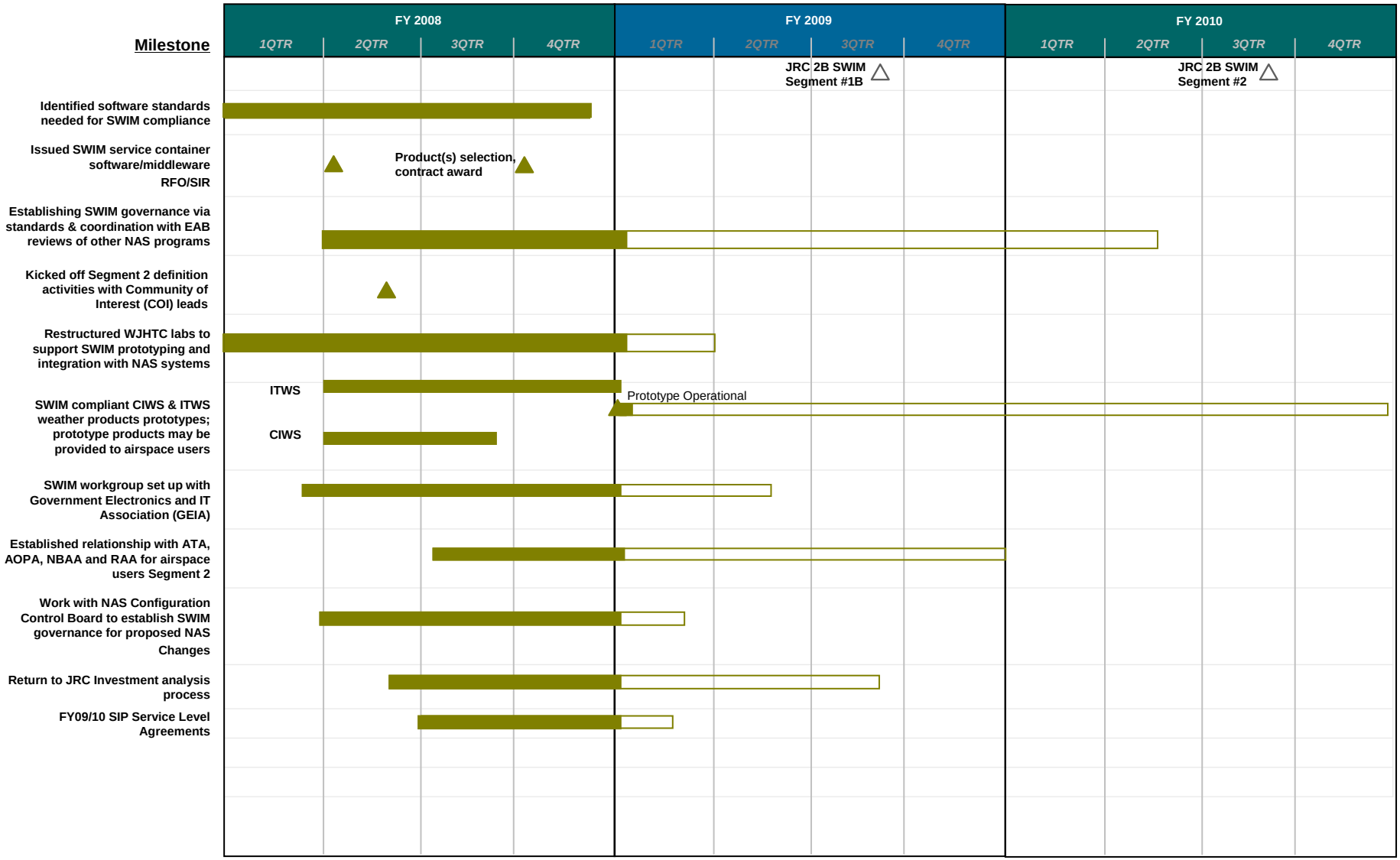
SWIM

High-Level Schedule



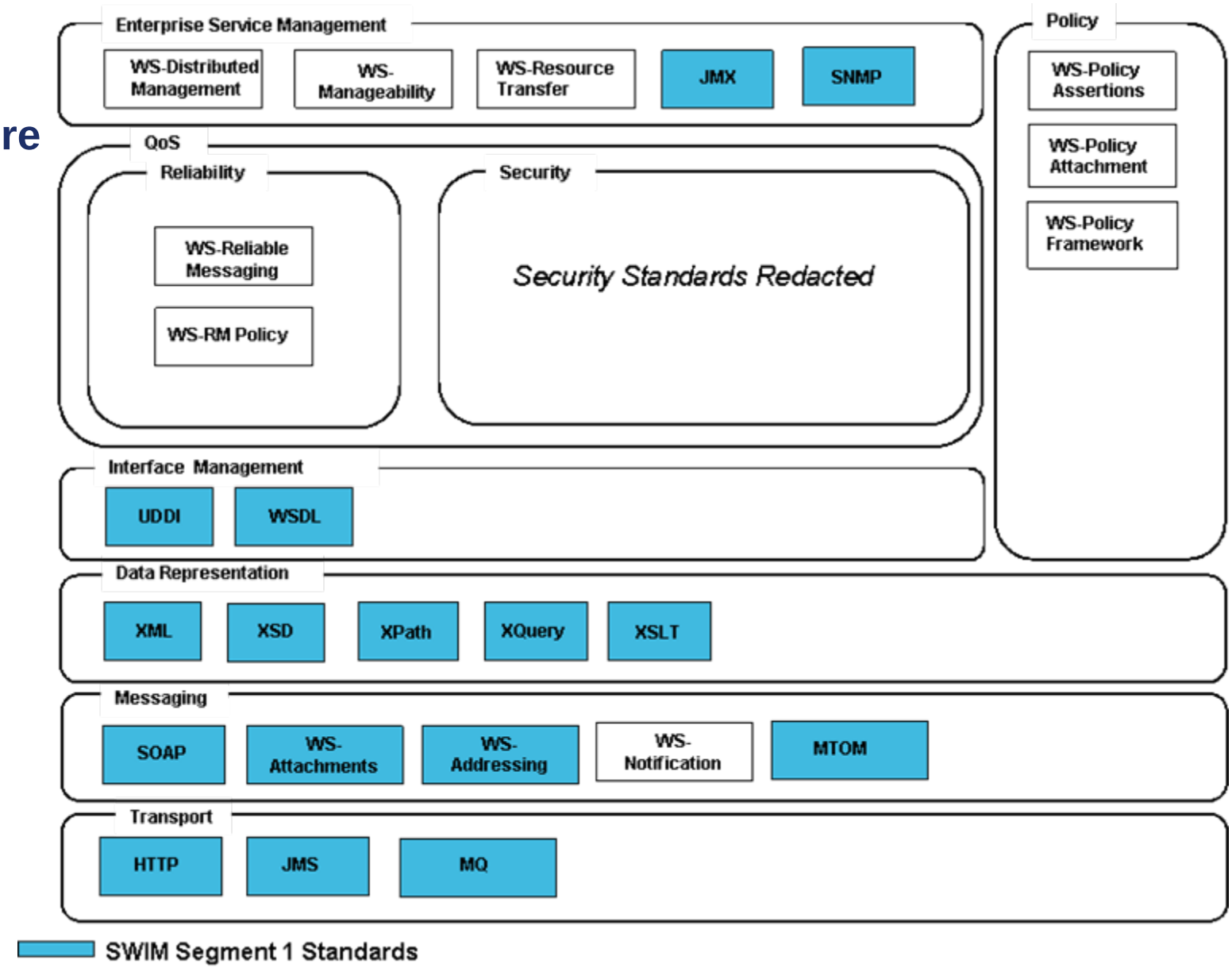
SWIM

FY2008 – FY2010 Activities / Progress



Technical Overview

SWIM
Technical Architecture



Current Standards

Standard Designation	Standard Title
JMX V1.4	Java Management Extensions
SNMP v3	RFC 2573 SNMP Applications
HTTP v1.1	Hypertext Transfer Protocol (RFC 2616)
JMS v1.1	Java Message Service
Websphere MQ	
SOAP v1.2	Simple Object Access Protocol
WS-Addressing v1.0	Web Services Addressing Core
WS-Attachments	
MTOM	SOAP Message Transmission Optimization Mechanism
XML v1.0 & v1.1	Extensible Markup Language (XML)
XSD (working draft) v1.1	XML Schema Definition Language
Xpath v1.0	XML Path Language
Xquery	Xquery Version 1.0
XSLT v1.0	XSL Transformations
UDDI 3.0.2	Universal Description Discovery & Integration (UDDI)
WSDL v2.0	Web Services Description Language
X.509 Certificates	Internet X.509 Public Key Infrastructure Certificate and CRL Profile (RFC 2459)
WS-Security v1.1	Web Services Security Policy
TLS	Transport Layer Protocol (RFC 2246)
SSL	Secure Socket Layer v3.0 (Internet Draft)

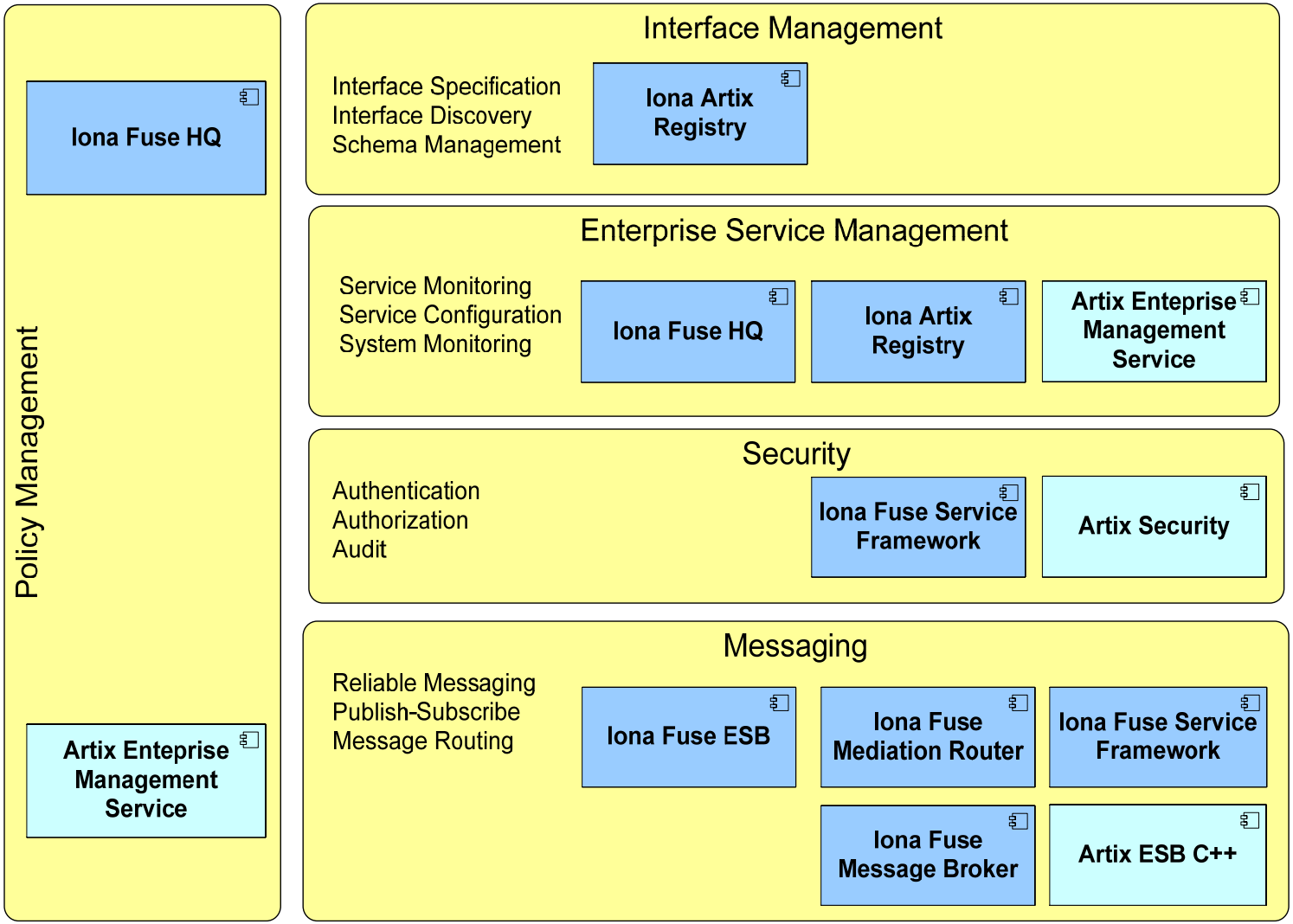
Service Container Contract

- **Contract award to Iona Technologies on August 18, 2008**
- **Contract options:**
  - Software
  - Documentation
  - Support Licenses
  - Training
  - Consulting Services
- **Indefinite Delivery Indefinite Quantity**
- **Base year + 12 option years**
- **Iona was purchased by Progress Software on September 12, 2008**
  - Fuse will remain and continue to evolve
  - Artix will be combined with Progress SOA portfolio
  - Artix already interoperates with the Progress Sonic ESB
  - Product integration between Artix and Actional for run-time visibility and governance is already underway as part of an existing partnership between IONA and Progress

Available Products on Contract

- **Products Available:**
  - FUSE Suite
    - FUSE ESB
    - FUSE Services Framework
    - FUSE HQ
    - FUSE Mediation Router
    - FUSE Message Broker
  - Artix Data Services
  - Artix Registry/Repository
  - Artix ESB C++
  - Artix Connect for WCF
  - Artix Security
  - Artix Enterprise Management Service Plug-in
- **Artix Orchestration (meets desirable requirement for BPEL) available at extra cost**
- **Fuse is not currently supported on AIX but will be by mid November 2008.**

Use of Iona Software for Core Services



Prototype: Goals

- **Prior to Service Container Contract award to IONA Technologies, Two prototypes were developed to evaluate service containers**
  - ITWS-SWIM Prototype using a service container product provided by IONA Fuse
  - CIWS-SWIM Prototype using a service container product provided by Mule
- **CIWS-SWIM Prototype was completed and was not made available to users once the IONA Service Container Product was selected.**
- **ITWS-SWIM prototype was extended to be able to provide service to interested non-FAA consumers to evaluate web services and XML formats, and overall products' usability**
  - Publishing four ITWS weather products
    - Microbursts; Gust Fronts; Configured Alerts; Terminal Text
- **ITWS-SWIM Prototype became operational on October 6, 2008 and will operate until ITWS-SWIM Segment One capability is deployed in December 2010**

Prototype: FY08 ITWS-SWIM Prototype Accomplishments

- **Initial end-to-end testing and stress testing successful, August 2008**
- **Conducted successful tests with the FTI National Test Bed (FNTB) and the ED-8 Gateway**
- **Three airlines selected as initial participants**
  - JetBlue, UPS, NWA
  - UPS operational today
- **SCAP update effort successful to date – with late September Certification and Authorization target**
- **FTI connectivity between Volpe and the WJHTC in place**
  - Backbone will support ITWS SWIM Prototype subscriber traffic
- **UPS connectivity to FTI ED-8 Gateway occurred the week of September 23**
- **Successfully explored "don't code, configure" principles. Results to date with Iona Fuse have been very promising**
  - Produced a proof-of-concept configuration enabling WS-Security functions in ITWS SWIM Prototype System through configuration only (no coding required)

Prototype: FY09 Plans

- **Agreement reached and documented with ITWS to maintain the Prototype through FY10**
  - No enhancements after initial deployment are currently funded or planned
- **Volpe will provide client software and a user guide to additional service consumers**
- **More service consumers may be added until the current allocated bandwidth limit for the prototype is reached**

FY09 Work

- **Service Registry/Repository**
  - Initial RegistryRepository stood up at WJHTC
  - Evaluation based on Requirements to be conducted this year
- **XML Gateway**
  - Qualified Vendor List in process
- **Policy Server**
  - Requirements in Development
  - Evaluation to be conducted early next year
- **SWIM Resource Kit**
  - Assist the SIP developers in learning and utilizing the SWIM Core Services
  - Assist the SIP developers in debugging COTS and related third party products
  - Assist the SIP developers in obtaining and managing the resources required for development.
  - Assist the SIP developers in identifying the SWIM Service Container components required to implement their Service.
  - Assist the SIP developers in sharing knowledge.
  - Provide tools to assist the SIP developers with testing.

SWIM Resource Kit

- **Guidance Documentation**
  - Maven Guidance
  - Developers Guide for Fuse ESB
    - Procedures for installing Eclipse, Fuse tools for Eclipse and Maven plug-in
    - Build procedures
    - Debugging procedures
    - Examples
- **COTS Repository**
  - Fuse ESB, Fuse Mediation Router, Fuse Message Broker, Fuse HQ, Fuse Service Framework, Spring, Eclipse, Maven, Ant
- **SWIM Reference Model**
  - Description of Service Container components and interfaces
  - Maps Service Container components to Core Services
  - Decision Tree for identifying which Service Container components and architecture are required to achieve particular operational needs
    - i.e., guaranteed messaging
- **Governance and Policy Guidance**
- **Standards**

SWIM Resource Kit (Continued)

- **Tools**
  - WS-I Testing Tools
  - iTKO LISA – SOA Test Tool and Virtual Service Emulation (VSE)
- **XML Gateway Qualified Vendor List**
- **SWIM Wiki**
- **Third Party References and Training Information**
- **Available on the SWIM Wiki as Resource Kit items are completed (NLT 1/1/09)**
- **Resource Kit is dynamic**
  - New items will be added as required

Future Plans for Segment 2

- **Determine operational requirements for information that must be met in FY12-16 (Segment 2)**
  - Input from JPDO, Roadmaps, Operational Improvements
- **Determine technical requirements needed to meet Segment 2 operational requirements**
- **Determine how the Segment 1 architecture must evolve to meet Segment 2 requirements**
  - Ex. Segment 1 federated approach vs. possible future centralized approach
- **JRC for Segment 2 currently planned for June 2010**

SWIM
Web Site

www.swim.gov