

The SWIM PMO:

Utilizing Data Today for Better Situational Awareness Tomorrow

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Federal Aviation Administration

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Date: September 20, 2016



Federal Aviation
Administration

SWIM
GET PLUGGED IN...



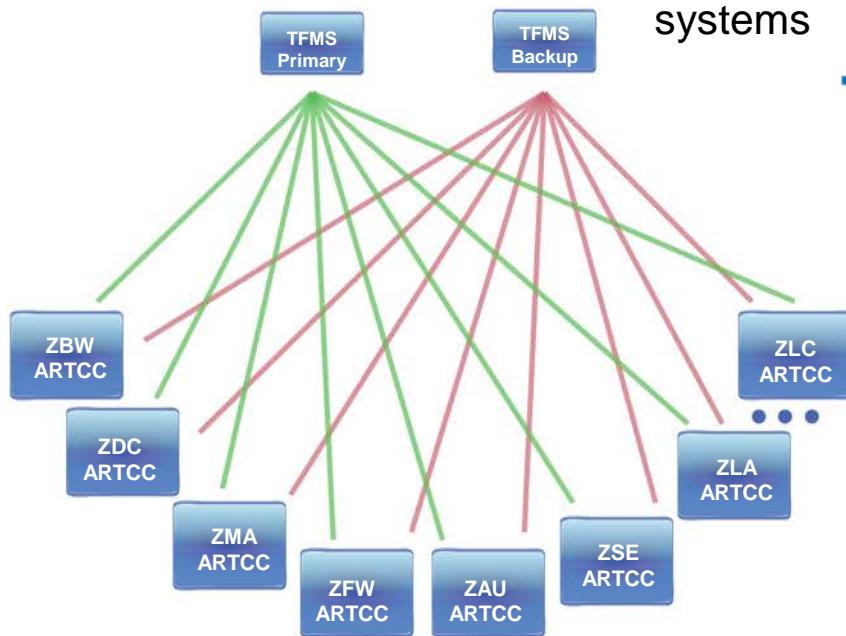
Agenda

- SWIM Background
- SWIM Program Office
- SWIM Evolution
- SWIM Infrastructure: Producers and Consumers
- The Future of SWIM: STDDS, SFDPS, NCR, ESM, IAM
- Applications & Tools Available
 - SWIM Flight Data Publication Service (SFDPS) Viewer
 - SWIM Visual Tool (SVT)
 - National Airspace System Service Registry and Repository (NSRR)
- Upcoming Events
- Closing & Key Resources

What are the Benefits of SWIM?

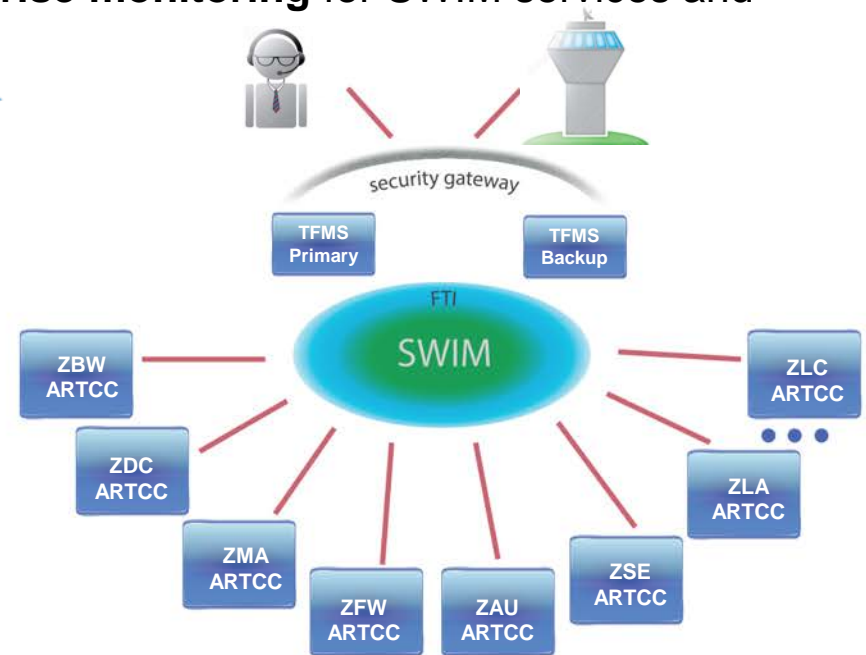
Q:

- Eliminate the **point-to-point connection** requirements
- Replaces **unique interfaces** with modern standards-based data exchange
- Provides users **access to information** without directly connecting to another system
- Provides **enterprise security services** for all producers and consumers and incoming and outgoing data
- Provides **enterprise monitoring** for SWIM services and systems



Before SWIM:

Point-to-point connections



With SWIM:

Data Exchange
(Published once, consumed by many)



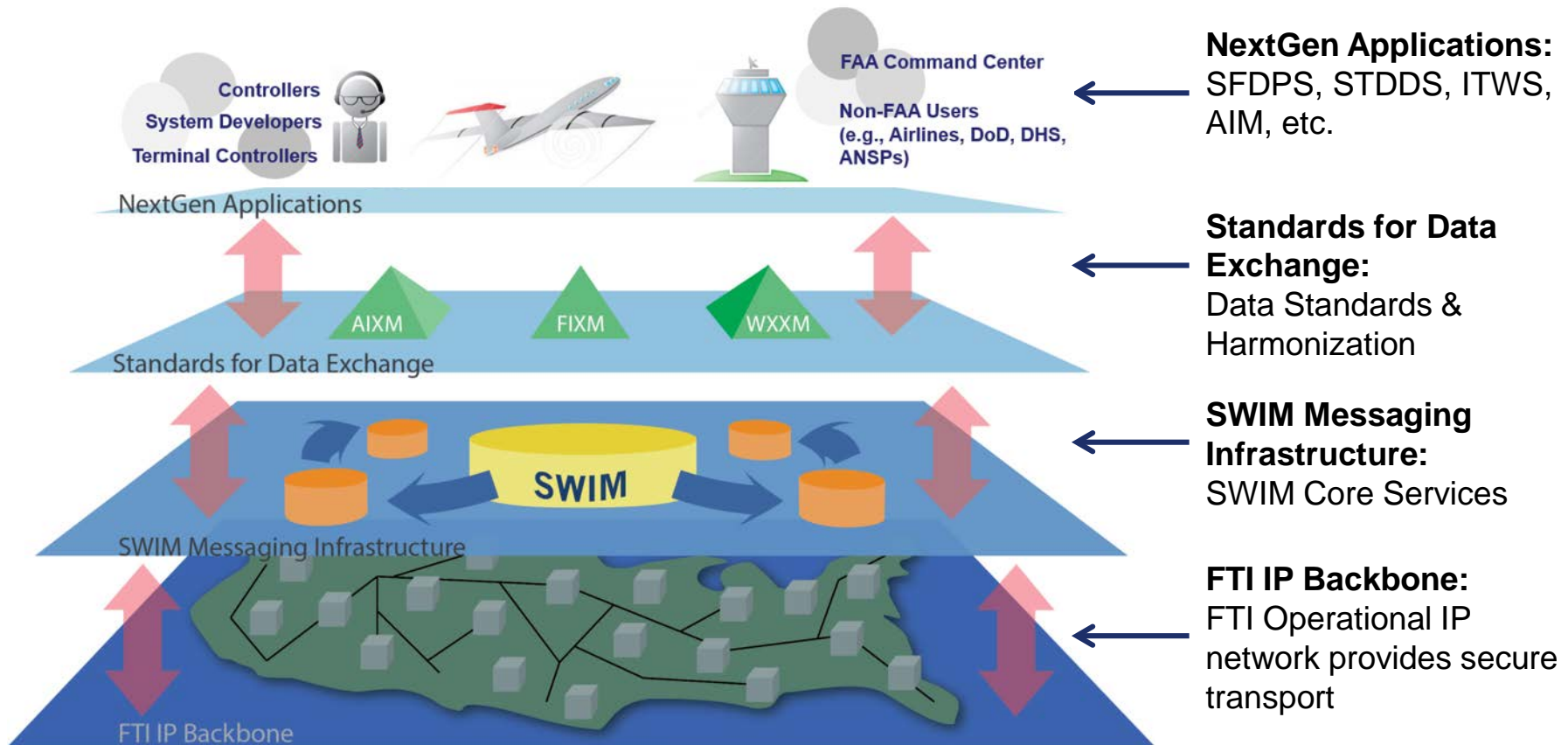
SWIM
get plugged in...



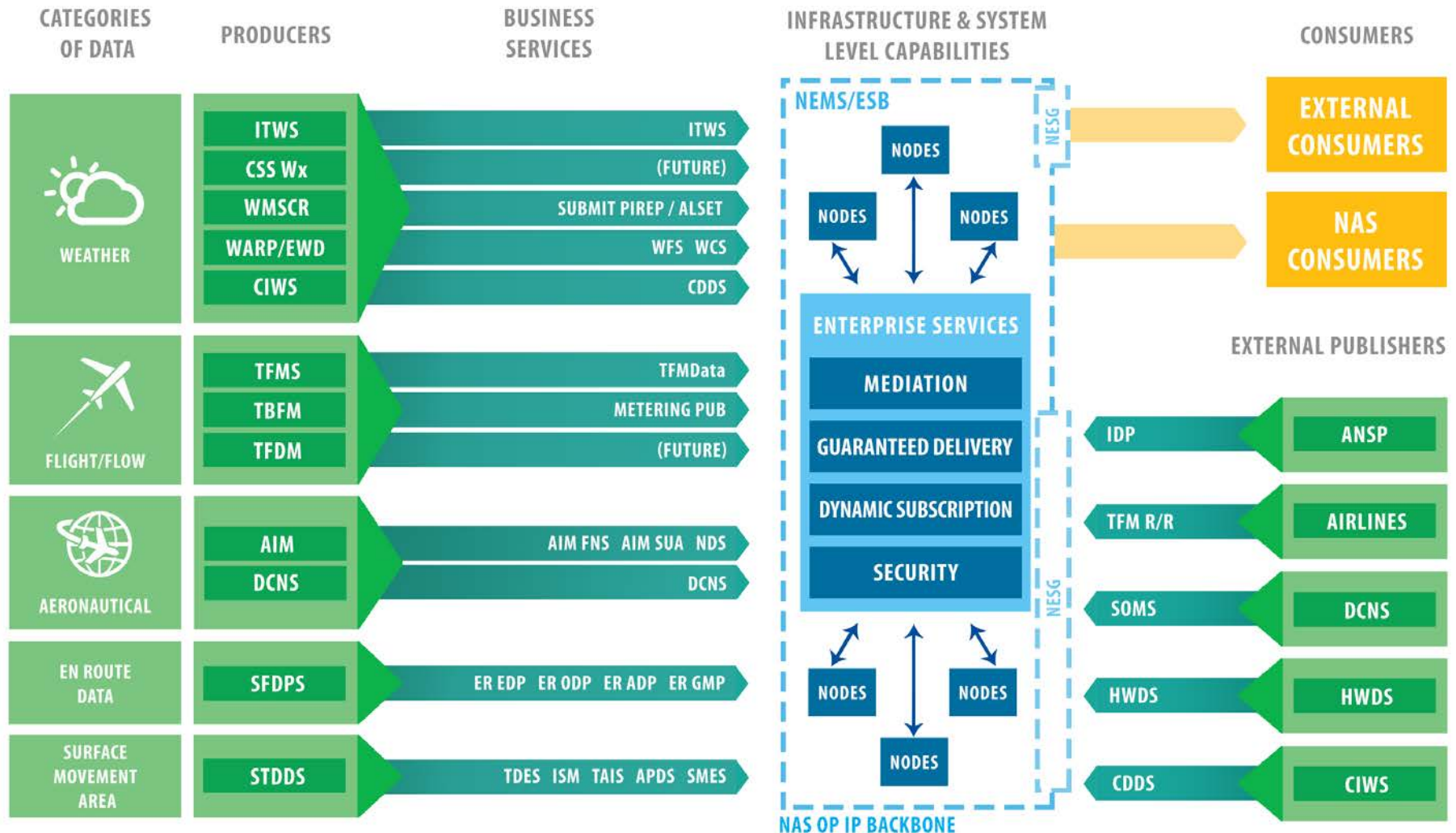
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Q:

How is SWIM Implemented?

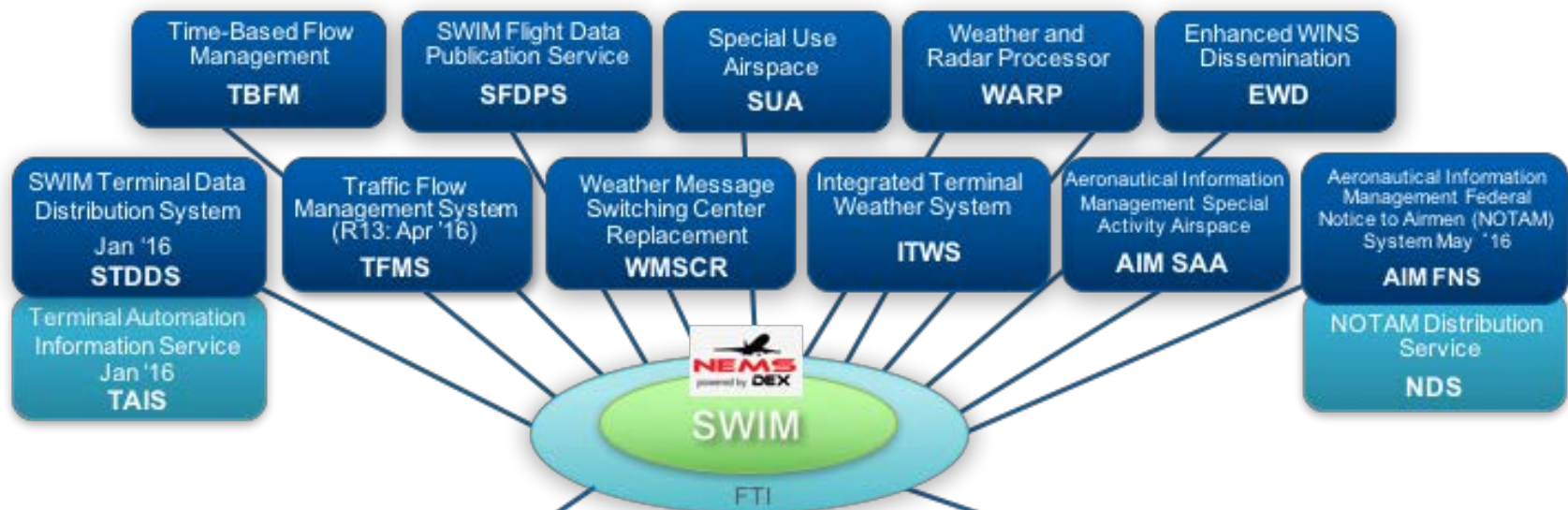


SWIM Structure



FAA NAS Producers/Consumers

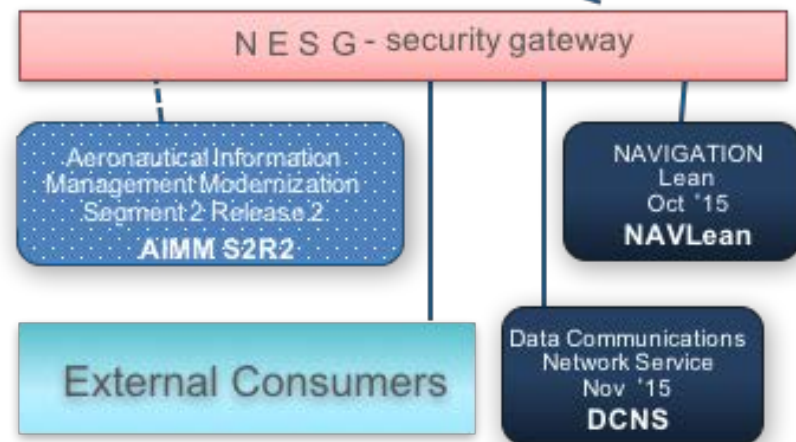
Producers



Internal Consumers



External Consumers



Q:

How does SWIM Engage w/Producers?

Outreach – SWIM PMO Driven

- **SWIM Connect @ ATCA:**
 - Demonstrations of how SWIM is being used
 - SWIM Success Stories as presented by FAA Programs
 - On-ramping process, data availability, and 1:1 conversations with producer representatives
- **Participation at PMO and JRC:** Opportunity to identify future SWIM candidates

Producer Driven / Producer Specific

- **SWIM SMEs:** Each producer is assigned a SWIM SME to assist with on-ramping process which includes
 - Understanding of data availability
 - R&D implementation and testing
 - FNTB implementation and verification
 - OPS implementation, orders, and cutover
 - Hand-off to NEMC for operational support
- **Frequent Interaction with FAA Programs from IARD through Implementation and Operations:**
 - Initial engagement to understand goals of program to perform SWIM suitability assessment (as part of JRC/EIS process)
 - Requirements development through familiarization briefings, SWIM capabilities briefings, Program Level Agreements (PLAs), Memorandum of Agreements(MOAs), Preliminary Design Reviews (PDRs), and Detailed Design Reviews (DDRs)
 - Schedule development w/understanding of capability needs to identify SWIM dependencies
 - Phase 1 NEMS Implementation (R&D on-ramping)
 - Phase 2 NEMS Implementation (only applicable for new capabilities to conduct key site testing)
 - Phase 3 NEMS Implementation (HSV, FNTB Qualification, and OPS Implementation)

NEMS Services

Content On-Ramping Services Producers / Consumers

Basic

- U1: WS-C: Web Service - Consumer
- U2: WS-P: Web Service - Producer
- U3: JMS-C: JMS Subscription - Consumer
- U4: JMS-P: JMS Publishing- Producer

Enhanced

- E1: Mediation
- E2: Performance
- E4: SLAs
- E5: Security
- E7: Reports
- E8: Dynamic Subscriptions
- O1: OPS Publications to R&D, FNTB

System Level Capabilities

Basic

- B1: Run-time Subscription
- B2: Message Reliability QoS
- B3: Mediation
- B4: Availability & Performance
- B5: Security Services
- B6: Web Services
- B12: Dynamic Subscriptions

Enhanced

- B10: Producer/Consumer SLAs
- B13: Global Load Balancer
- B14: Local Load Balancers
- B15: Advanced Mediation

Infrastructure Services

DMN, DAN, DSN, vDEX, NESGs, GLB, LLB

How do I Become a SWIM Consumer?

Q:

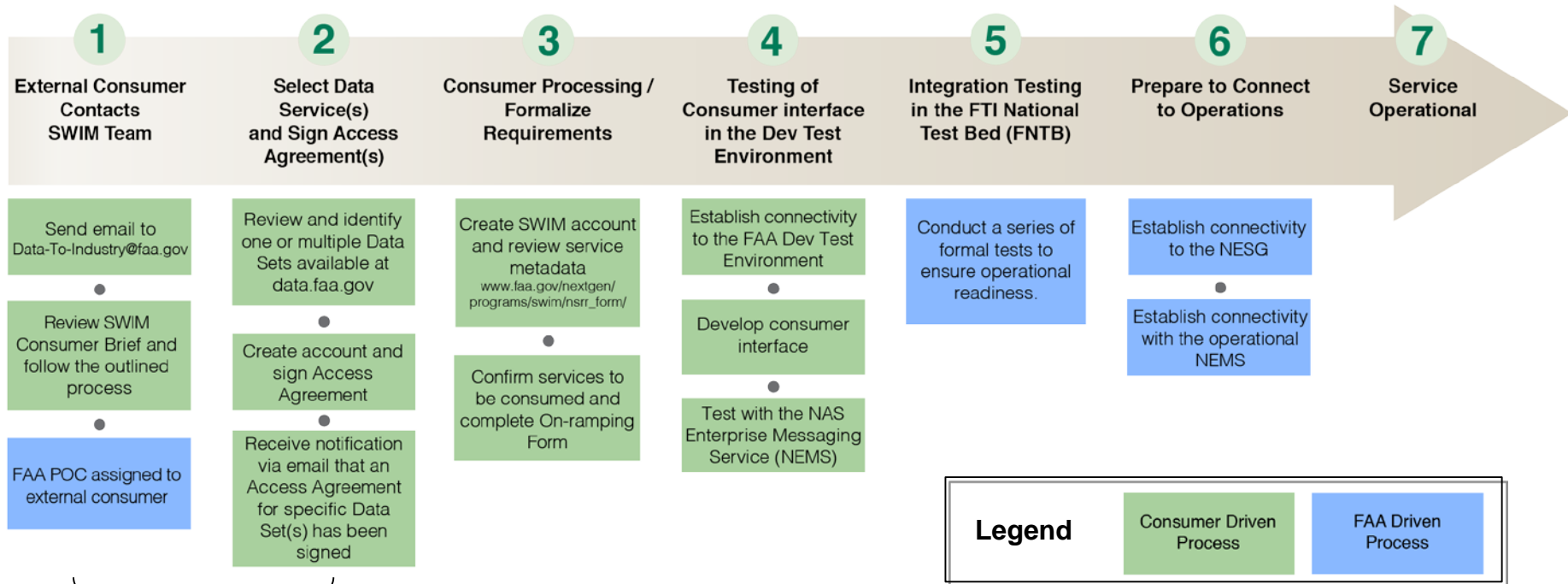
Primarily consumer driven and highly dependent on consumer technical competency and preparedness

Primarily FAA driven for ordering and change management

1-3 weeks

12-16 weeks

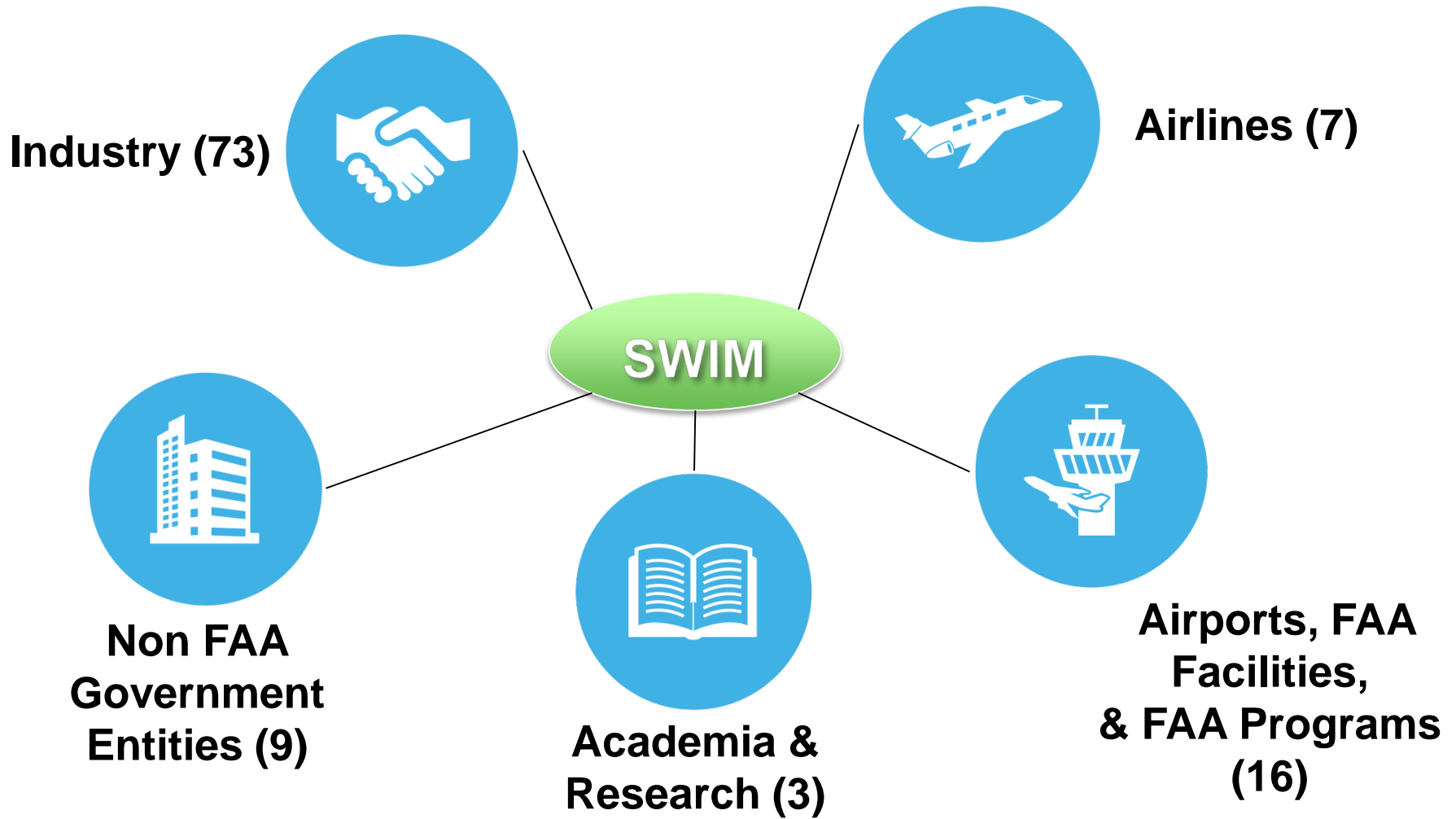
6-9 weeks



Note: Steps are not necessarily serial

*Updated as of August 1, 2016

Q: *Who is Using SWIM today?*



Q:

How does SWIM Engage w/Consumers?

Outreach – SWIM PMO Driven

- **SWIM Connect @ ATCA:**
 - Demonstrations of how SWIM is being used
 - SWIM Success Stories as presented by FAA Programs
 - On-ramping process, data availability, and 1:1 conversations with consumer representatives
- **Quarterly SWIM User Forum:** Provide updates to the broad SWIM User community regarding capabilities
- **Program Specific Outreach Forum:** Program or task specific outreach meetings to communicate drivers, schedules, impacts, and answer consumer questions.
 - 3 ASDI transition User Forums
 - SFDPS 1.29 to 1.30 transition forums
- **Technical Symposiums:**
 - Annual ATCA Tech Symposium
 - FAA Industry Day(s)
- **Developer Forums:** Focused technical sessions to further consumer understanding of SWIM interfaces, data available on SWIM, etc.

Consumer Driven / Consumer Specific

- **SWIM Website:** www.faa.gov/Nextgen/SWIM
- **Data-to-Industry@faa.gov:** Consumers email connection request to common mailbox to enter into the SWIM consumer on-ramping process
 - Assigned a POC
 - Emailed the external consumer on-ramping brief which explains the on-ramping process and contains important links for additional information
- **SWIM POCs:** Each consumer is assigned a POC to assist with on-ramping process which includes
 - Understanding of data availability
 - R&D implementation and testing
 - FNTB implementation and verification
 - OPS implementation, orders, and cutover
 - Hand-off to NEMC for operational support
- **Executive Level Support:** Support CIO in meetings with Partners such as Airlines as it pertains to data available on SWIM and interfacing with SWIM

Q:

What Data are Available?

Flight and Flow Data

- **Traffic Flow Management System (TFMS):** Provides flight data and flow information
- **SWIM Terminal Data Distribution Systems (STDDS):** Collects and publishes data from 150+ airports; Provides Tower Departure, Airport Data, and Surface Movement Events
- **Time Based Flow Management (TBFM):** Aircraft, Airport Configuration and Metering Status
- **SWIM Flight Data Publication Service (SFDPS):** Provides flight plan and track data and updates to clients for filed and active flight plans
- **Terminal Flight Data Management (TFDM):** Decision Support Tools for Airport and Terminal Airspace

Weather Data

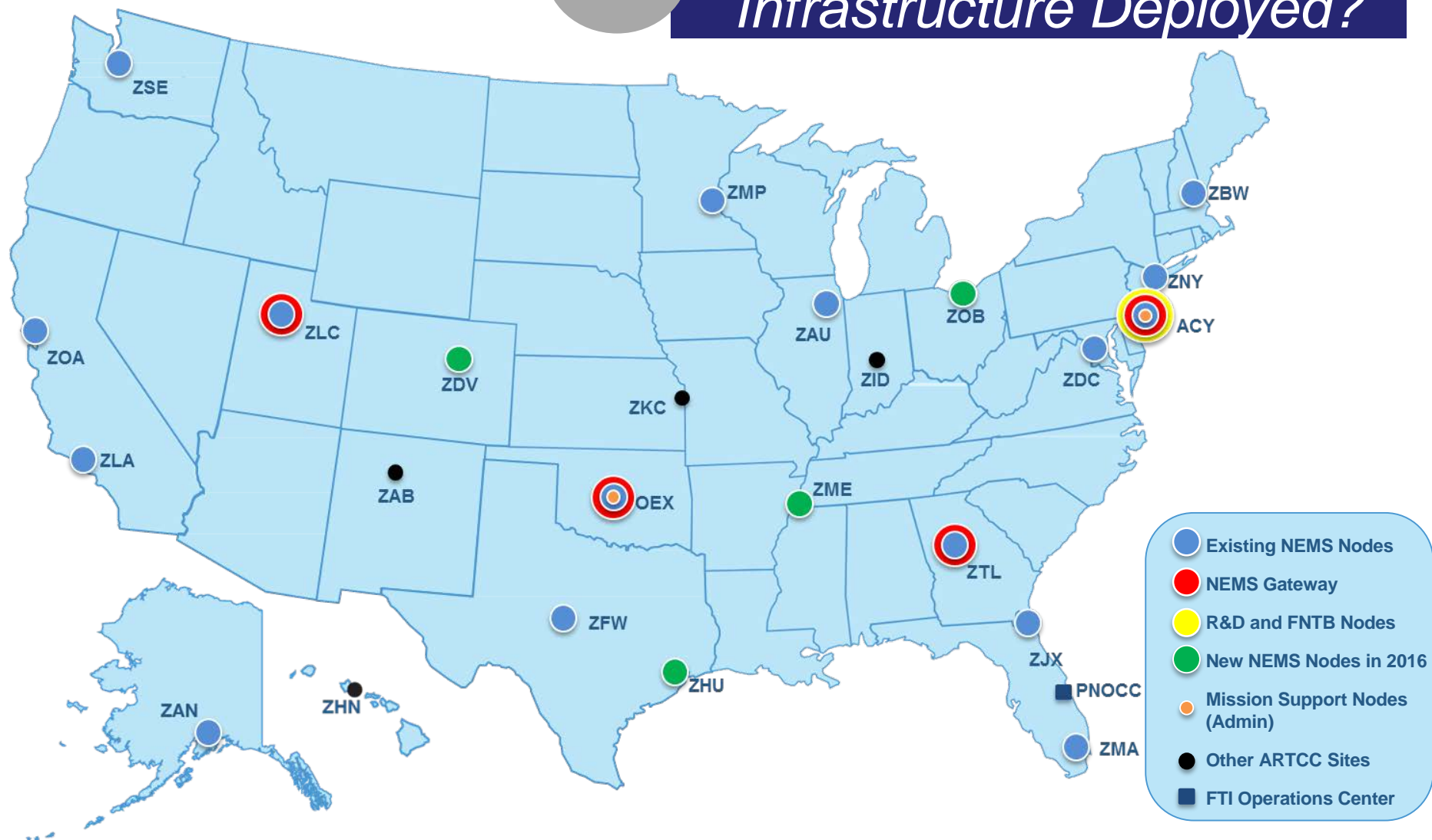
- **Integrated Terminal Weather Service (ITWS)** Provides specialized weather products in the terminal area
- **SWIM Terminal Data Distribution System (STDDS):** Provides flight data and updates to clients for filed and active flight plans (e.g., Runway Visual Data (RVR))
- **Common Support Services- Weather (CSS Wx):** the single provider of weather data, products, and imagery within the National Airspace System (NAS)
- **Weather Message Switching Center Replacement (WMSCR) :** Provides NWS textual aviation weather products

Aeronautical Data

- **Aeronautical Information Management (AIM) Federal NOTAMS Distribution System:** Provides notification and status regarding airspace
- **AIM Special Activity Airspace**
- **AIM Modernization Segment Two:** Modernizes the ingestion, integration, management, maintenance, and distribution of AI by establishing the Aeronautical Common Services (ACS) and a one-stop-shop (OSS) portal.

Q:

How is SWIM Infrastructure Deployed?



Q:

What New Data will Become Available via SWIM?

Program	Discovery	Architecture, Requirements	Qualification (Data Arch, Design, HSV test)	Operations Rollout / Cutover
NAS Information Display System (NIDS) Consumer	In Progress	In Progress	TBD	2016+
Terminal Automation Modernization and Replacement (TAMR)	In Progress	In Progress	TBD	2016+
Aeronautical Information Management (AIM) Segment 2	In Progress	In Progress	TBD	December 2016
Common Support Services – Weather (CSS-Wx)	In Progress	In Progress	TBD	2017-2018
Terminal Flight Data Management (TFDM)	In Progress	In Progress	TBD	2020+

Q:

How does SWIM Benefit FAA and NAS Stakeholders?

- **More data available as we evolve**
- **Easier access to data – “Provide once, consume many”**
 - Eliminates time consuming and costly development of custom interfaces
 - Eliminates need for separate point-to-point connections for individual consumers
 - Provides evolutionary path for NAS services and data
 - Simplifies configuration control
- **Enterprise-level capabilities (e.g., monitoring, security)**
- **Consistency of policy enforcement**
- **Consumer empowered to create value-added products**

Access to the FAA’s enterprise of data through a single connection

Q: *What is in SWIM's Future?*



Add new services



Enhance SWIM capabilities



Access to more data sets



**Upgrade SWIM
Infrastructure**

Q:

What is SWIM Flight Data Publication Service (SFDPS)?

Objective

- SFDPS is a SWIM Flight Data Producer that provides data in SWIM compliant formats (XML messages via NEMS)
 - Flight Messages in Simple XML or FIXM format
 - Airspace messages in Simple XML or AIXM format
 - Operational messages in Simple XML format
 - General Information messages in Simple XML format
- SFDPS provides:
 - Publish/Subscribe data feed
 - Request/Response data access
 - Flight Matching and a unique flight identifier
 - Historical database (15 days)

Benefits

- Publish/Subscribe provides constant timely stream of En Route messages
- Request/Response supports flight query snapshots and reconstitution
- Rich matched data set of available for Big Data Analytics

Status

- Operational since July 2015
- New Release planned for Q2 FY2017



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Q:

What is SWIM Terminal Data Distribution System (STDDS) (Phase 2)?

Objective

- STDDS converts raw radar and surface data from airport terminal areas and publishes it in the form of terminal data and surface events to diverse consumers via the NAS Enterprise Messaging Service (NEMS).

Benefits

- STDDS provides a picture of what is being seen by controllers in the Air Traffic Control Tower (ATCT) to Air Traffic Managers in the corresponding Terminal Radar Approach Control (TRACON) facility as well as other NAS and non-NAS consumers.
- STDDS Phase 2 will provide richer data from a wider range of terminal systems, new message formats (including Request/Response), enhanced filtering for sensitive flights, FIXM compatible message formats, and real time equipment status.

Status

- Release 3.2 which includes Terminal Automation Information Service (TAIS) data is currently being deployed with an anticipated completion date of September 30, 2017.
- Release 3.3 which will include Non-Movement Area Data (Cat 10) is currently undergoing testing. Deployment is scheduled to begin in FY2017

Q:

What is NAS Common Reference (NCR), Enterprise-Level, Information Exchange?

Objective

- Provide consistent spatially and temporally correlated NAS status and constraint information via an enterprise SWIM service

Benefits

- Reduces cost for developing and maintaining capabilities required by NAS systems for requesting, providing, and parsing data to/from sources/clients
- Creates common situational awareness across FAA systems, ANSPs, and NAS users
- Integrates data currently spread across various systems or not available digitally
- Reduces time required for ANSPs to collect data relevant to their decision making, improving efficiency
- Users can quickly integrate new information into their strategic plans as new relevant data is automatically “pushed” to their systems
- Improves usage of resources and bandwidth by (1) reducing a need for point- to- point communications between systems, and (2) sending filtered data (only what is needed, not all data)

Status

- Received JRC approval as part of SWIM Segment 2B
- NCR work to begin Q2 FY2017; planned IOC still targeted for 2020 timeframe

Q:

What is Enterprise Service Monitoring (ESM) Capability?

Objectives

- Provide Operations and Maintenance (O&M) status of NAS infrastructure and the SOA services
- Provide initial assessments to NAS Operations (OPS) for infrastructure and/or service outages

Benefit

- Aggregate, process and share combined enterprise infrastructure and producer/consumer status

Status

- NAS programs collect status (e.g., TFMS, STDDS, RMLS)
- Used for troubleshooting and monitoring of program components
- Program monitors may be FAA operated or vendor controlled
- Tools, protocols and robustness of monitoring varies among programs

Q:

What is Identify Access Management (IAM) Phase 1 (SWIM Segment 2A)?

Objective

- The SWIM IAM service provides secure digital credentials for NAS messaging and web services. In alignment with the National Strategy for Trusted Identities in Cyberspace, IAM provides authentication and authorization services that ensure secure information sharing with FAA partners.

Benefits

- Deploys the infrastructure required to issue, validate, and manage digital certificates and Secure Tokens (STS) in the NAS (including the NESGs) for communication with external partners.
- IAM provides a foundation and starting point for NAS adaption of the *National Identity Ecosystem Strategy* (from the NIST National Strategy for Trusted Identities in Cyberspace (NSTIC)).

Status

- Initial Operating Capability (IOC) - November 2016 at NEMC
- In Service Date (ISD) - July 2016

Q: *What is IAM Phase 2 (SWIM Segment 2B)?*

Objectives

- Provides additional security controls to SWIM: Available for use by any NAS system
- Expands Authentication: Validates identities of interconnected NAS systems
- Introduces Authorization: Fine-grained management of access to enterprise data based on Attributes in Directory

Benefits

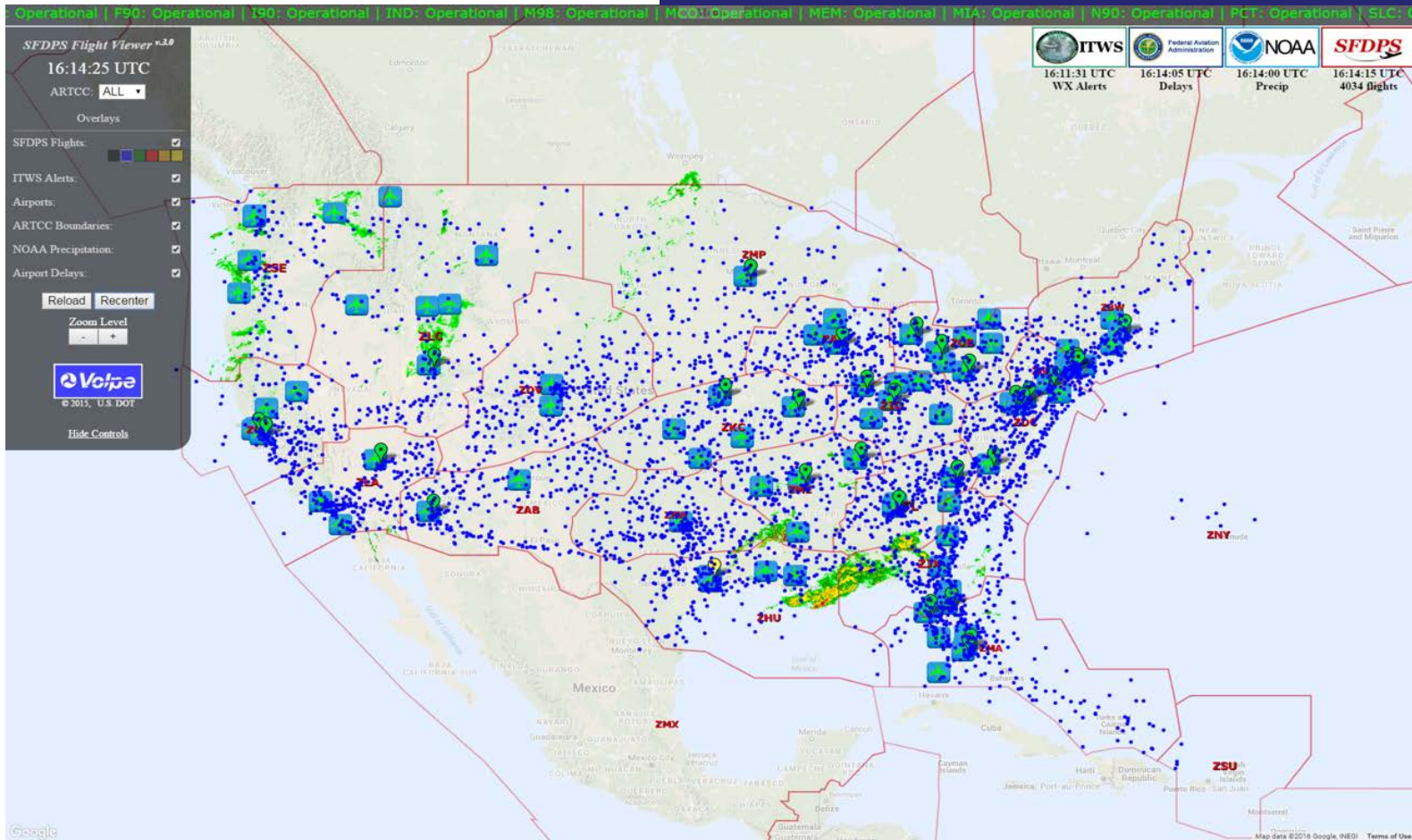
- Expand digital certificate authentication for internal NAS communication; will provide for an Enterprise Authorization capability

Status

- 2016 Start
- 2017 Deliver Authentication Support for Internal NAS Connections (Expands locations for IAM HW/SW to cover all internal systems)
- 2020 Deliver NAS Access Control / Authorization Capability (ISD for New function, new software)

Q:

What does the SFDPS Viewer Look Like?



Q:

SWIM Tools and Applications are Available: What is SVT?

- **What is SVT?**

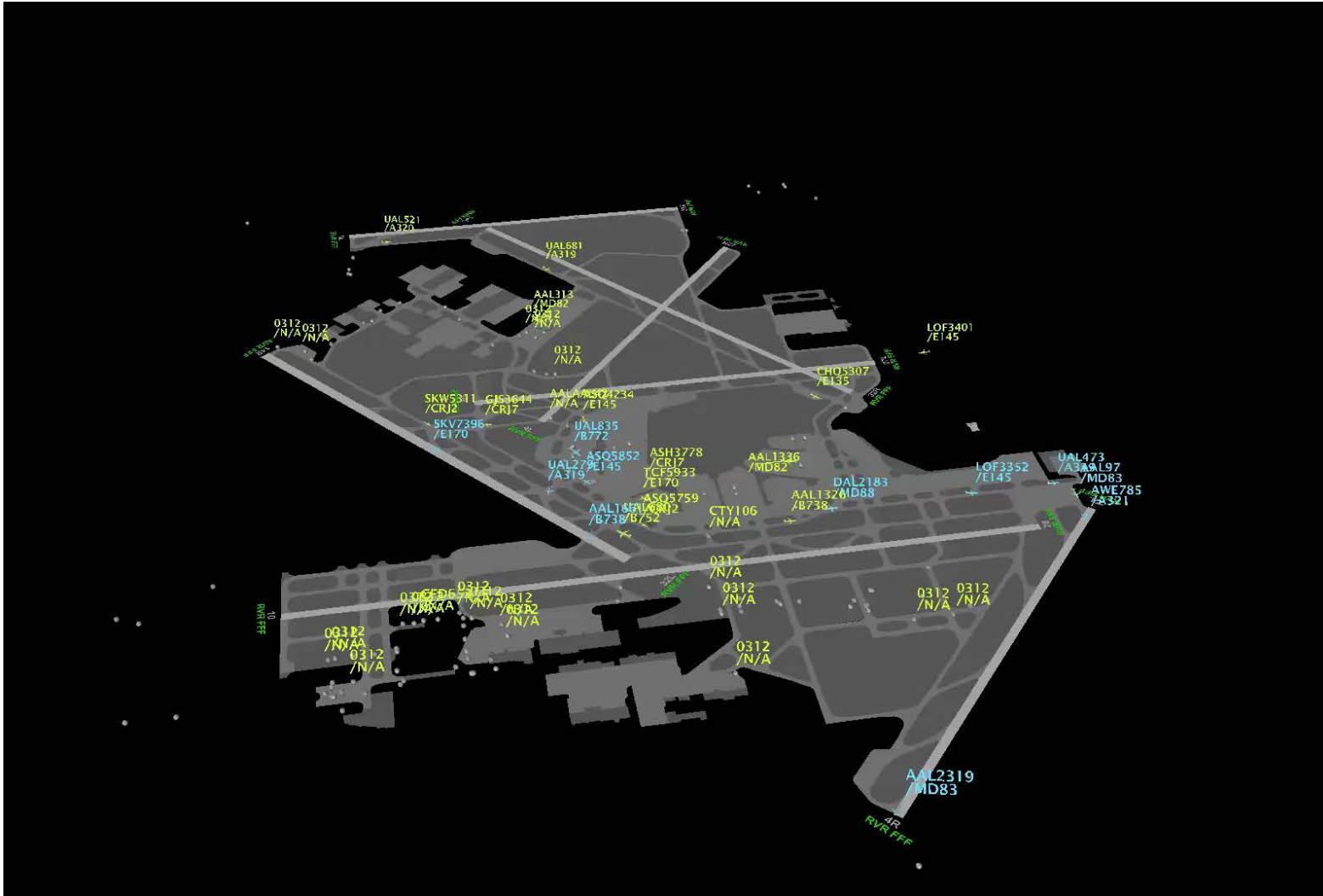
- SWIM Visual Tool (SVT) is a government developed prototype fielded to select TRACONS as part of TFDI Early Implementation. It is a web application tool that provides Surface Situational Awareness utilizing surface data from ASDE-X and ASSC beyond the control tower through STDDs. West Coast SVT TRACONS include the following: Northern California (NCT), Southern California (SCT) and Los Angeles.

- **What does SVT do?**

- Provides the airport layout which includes runways, taxiways, buildings, and other airport features.
- Provide situational awareness for airports with shared departure fixes
- Tracks aircraft positions along with their data blocks which include flight number, aircraft type, etc

Q:

What does the SVT Viewer Look Like?



Q:

SWIM Applications and Tools: How does the NSRR Support Governance?

What's New in NSRR 2.0?

- Improved alignment with the SWIM Governance Policies
- Support for collaborative international efforts
- Enhancements for service publishers and registry users for notifications
- And much more!
- To register:
<https://nsrr.faa.gov/user/register>

NAS Service Registry and Repository
Making Services Visible, Discoverable, and Understandable

Welcome to the NAS Service Registry/Repository (NSRR)

Quick Search
STDDS
Enter the Service Name or a phrase it contains

Service Name	Lifecycle Stage
STDDS Airport Data Service (APDS) STDDS Airport Data (APD). The SWIM Terminal Data Distribution System (STDDS) Airport Data (APD) service publishes Runway Visual Range (RVR) data to SWIM consumers. ... Read More	Proposed
STDDS Infrastructure System Monitor and Control (ISMC)	Proposed

Q:

What is The Interactive Developers Forum?

FAA and the Volpe Center were proud to host the second SWIM Interactive Developer Workshop in June 21-23, 2016. The workshop focused on creating applications that utilize SWIM data to innovate operations in the NAS and solve real world challenges. During the workshop participants were able to:

- Collaborate with subject matter experts to develop new applications
- Attend in-depth workshops on data products, exchange standards and global connectivity
- Refresh your knowledge of SWIM or learn for the first time
- Connect with operators to understand current challenges and opportunities
- Engage in a hands-on challenge session to develop innovative solutions using aviation data



Upcoming SWIM Outreach Activities

Event	Date
SWIM Monthly Brown Bag Series—featuring SWIM Tools and Capabilities	Next one: September 26, 2016
Annual ATCA	October 16-19, 2016
Airline Collaborative Decision Making (CDM) Forums	TBD
Quarterly SWIM User Forums https://www.faa.gov/nextgen/programs/swim/users_forum/	Next one: December 8, 2016

Key Resources

- SWIM website:
<http://www.faa.gov/nextgen/programs/swim/>
- Questions?
 - Jeri Groce Program Manager Jeri.Groce@faa.gov
 - Melissa Matthews, Capabilities Lead
Melissa.Matthews@faa.gov
 - Chris Pressler, System Engineering Lead
Chris.Pressler@faa.gov
- Stay Connected
 - <http://www.faa.gov/nextgen/programs/swim/news/>

Closing Thoughts



Collaboration



Partnership



Data Exchange



Stay Connected

Questions? Comments?



SWIM Related Acronyms

ABRR: Airborne Reroute
ADS-B: Automatic Dependent Surveillance-Broadcast
AFP: Airspace Flow Program
AIM: Aeronautical Information Management
AIRMET: Airmen's Meteorological Information
AIXM: Aeronautical Information Exchange Model
ANSP: Air Navigation Service Provider
AP: Anomalous Propagation
APB: Acquisition Program Baseline
ARTCC: Air Route Traffic Control Centers
ARTS: Automated Radar Terminal System
ASDE-X: Airport Surface Detection Equipment-Model X
ASDI: Aeronautical Situational Display to Industry
ASSC: Airport Surface Surveillance Capability
ATIS: Automatic Terminal Information Service
CCFP: Collaborative Convective Forecast Product
CDDS: CIWS Data Distribution Service
CIP: Current Icing Product
CIWS: Corridor Integrated Weather System
CMS: Common Message Set
CRCT: Collaborative Routing Coordination Tools
CSS-Wx: Common Support Services – Weather
DAN: DEX Access Node
DCNS: Data Comm Network Services

DHS: Department of Homeland Security
DMN: DEX Messaging Node
DoD: Department of Defense
DSN: Document Security Notice
EDDS: En Route Data Distribution Service
EFSTS: Electronic Flight Strip Transfer System
ERAM: En Route Automation Modernization
ESB: Enterprise Service Bus
ESM: Enterprise Service Monitoring
ETAs: Estimated Time of Arrival
EWD: Enhanced WINS Dissemination
EWINS: Enhanced Weather Information Network Server
FCA: Flow Constrained Area
FDB: Full Data Block
FDIO: Flight Data Input / Output
FIXM: Flight Information Exchange Model
FNTB: FAA Telecommunications Infrastructure (FTI) National Test Bed
FTI: FAA Telecommunications Infrastructure
GDP: Ground Delay Program
GLB: Global Load Balancing
GFS: Global Forecast System
GSs: Ground Stops
HADDs: Host ATM (Air Traffic Management) Data Distribution System

SWIM Related Acronyms (cont.)

HP: Hewlett Packard

HWDS: Harris Weather Data Service

IAM: Identity and Access Management

ITWS: Integrated Terminal Weather Service

IP: Internet Protocol

JMS: Java Message Service

JRC: Joint Resources Council

LLB: Local Load Balancing

METAR: Aviation Routine Weather Report

MREs: Meter Reference Elements

NAM: North American Mesoscale

NAS: National Airspace System

NCR: NAS Common Reference

NCWD: National Convective Weather Diagnostic

NCWF: National Convective Weather Forecast

NDS: NOTAM Distribution Service

NEMS: NAS Enterprise Messaging Service

NESG: NAS Enterprise Security Gateway

NEXRAD: Next Generation Weather Radar

NIDS: NAS Information Display System

NOTAMs: Notices to Airmen

NSRR: NAS Service Registry Repository

NVS: NAS Voice System

NWP: NextGen Weather Processor

NWS: National Weather Service

OASIS: Operational and Supportability Implementation System

OGC: Open Geospatial Consortium

OT&E: Operation Test and Evaluation

PDRR: Pre Departure Reroute

PIREP: Pilot report

R&D: Research and Development

RVR: Runway Visual Range

SAA: Special Activities Airspace

SEP: Storm Extrapolated Positions

SFDPS: SWIM Flight Data Publication Service

SIGMET: Significant Meteorological Information

SIP: SWIM Implementing Program

SOA: Service Oriented Architecture

SM: Storm Motion

SME: Surface Movement Events

STAs: Scheduled Time of Arrival

STDDS: SWIM Terminal Data Distribution System

SUA: Special Use Airspace

SVT: SWIM Visualization Tool

SWIM: System Wide Information Management



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SWIM Related Acronyms (cont.)

TAMR: Terminal Automation Modernization and Replacement

TDE: Tower Departure Events

TBFM: Time-Based Flow Management

TDLS: Tower Data Link Services

TFDM: Terminal Flight Data Manager

TFMS: Traffic Flow Management System

TRACON: Terminal Radar Approach Control Facilities

Quarterly SWIM User Forums

vDEX: Virtualized DEX Node

VIL: Vertically Integrated Liquid

WARP: Weather and Radar Processor

WFS: Web Feature Service

WMSCR: Weather Message Switching Center Replacement

WMSS: WARP Maintenance and Sustainment Services

WRF-RR: Weather Research and Forecasting-Rapid Refresh

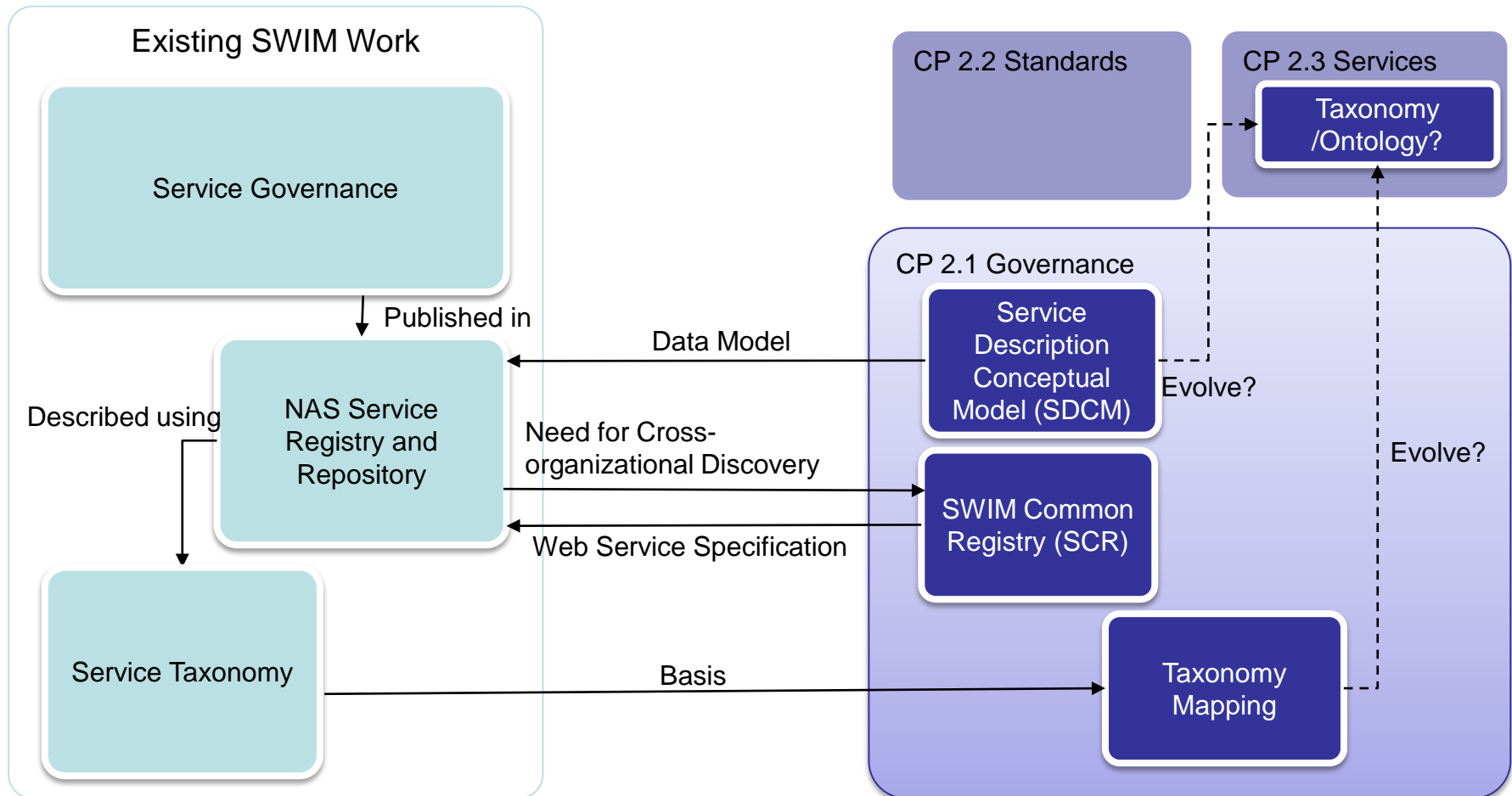
WSR-88D: Weather Surveillance Radar – 1988 Doppler

WXXM: Weather Information Exchange Model

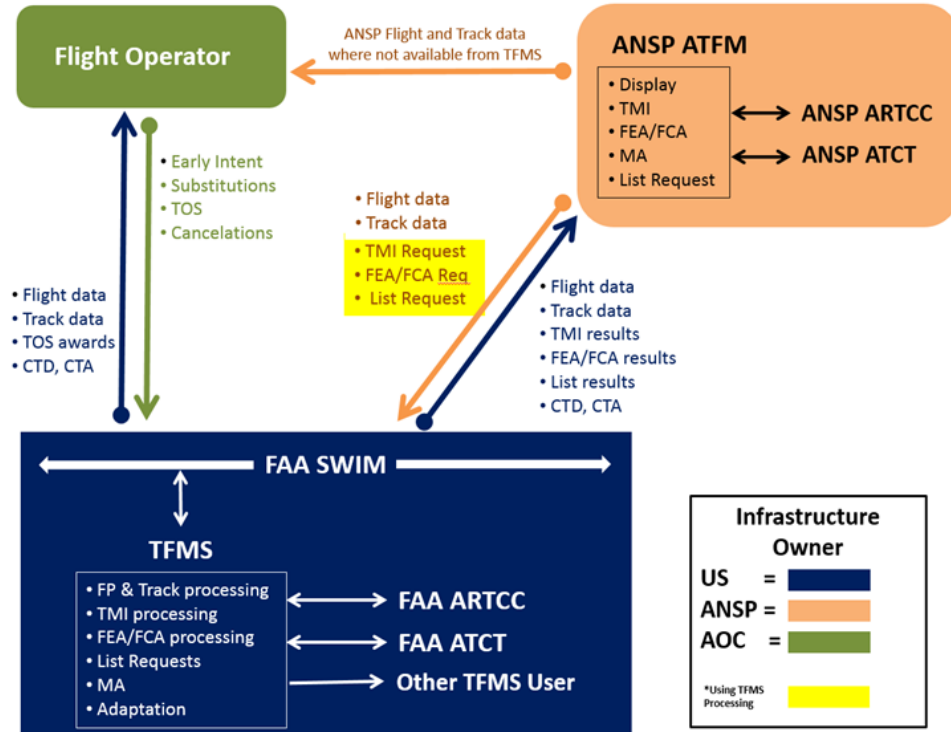
XML: Extensible Markup Language

Extra Slides

International Collaboration: SESAR Interoperability



FAA's Two-Way Data Exchange: Caribbean Initiative



- FAA's ATFM System will feature advanced capabilities to allow two-way flight information exchange supporting cross border ATFM
- The system offers scalable services, beginning with flight and track data for shared situational awareness. More advanced services allow ANSP partners the ability to initiate TMI's

International Data Formats

- NEMS Advanced Transformation and Mediation Services promotes and enables interoperability, governance, and secure information sharing at an enterprise level between producers, consumers, and systems that utilize SWIM content in diverse data formats and protocols.
- Advanced Mediation services provides content interoperability through transformation of content from legacy data formats into compliance with new FAA NextGen adopted data standards for information exchange. Content backward compatibility is another common use case.

Example:

TFMS Release 13 will be mediated into FIXM 4.0 and AIXM 5.1 compliant formats in Dec 2016 timeframe.