

SWIFT:

SWIM Industry

Collaboration

Workshop #8

**SWIM, Services & SWIFT
(SWIM Industry-FAA Team)**

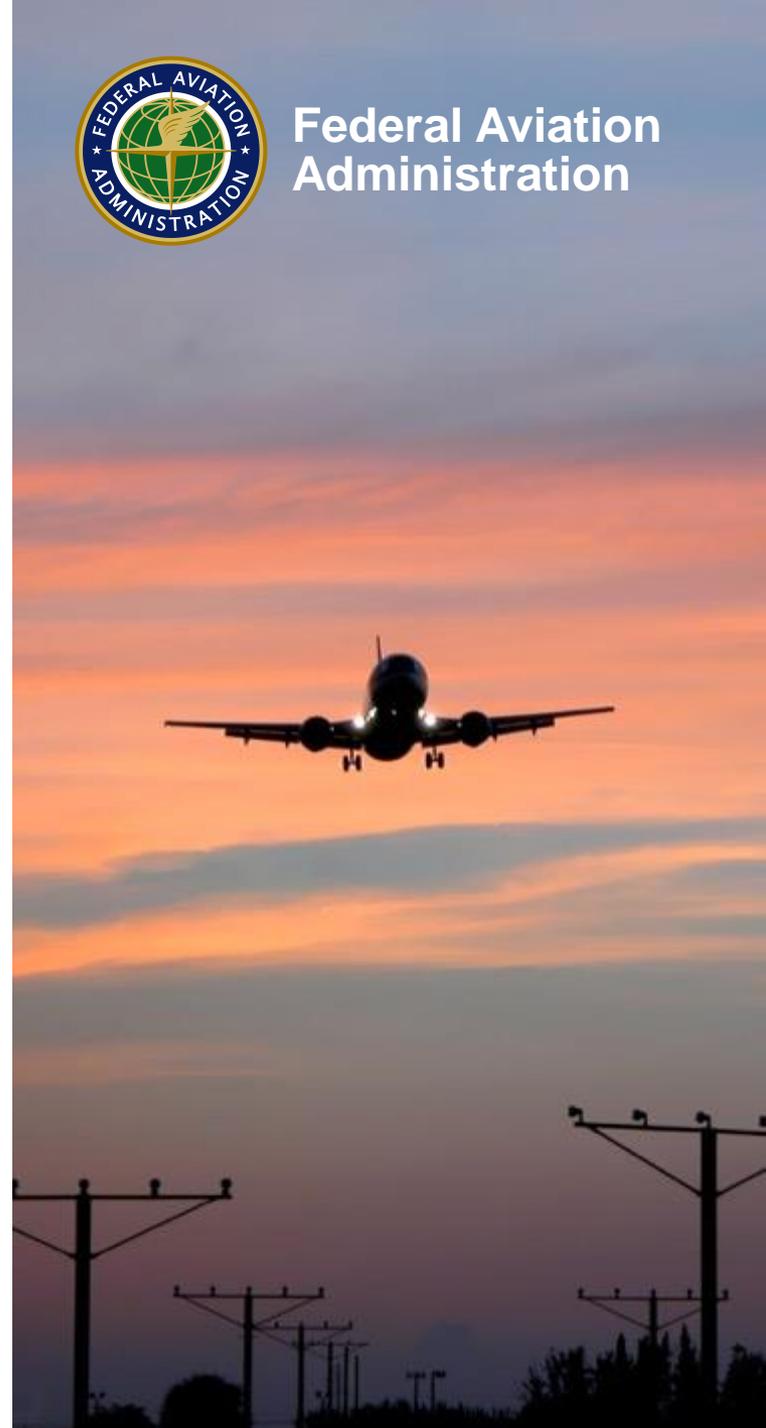
FAA SWIM Program

Communications, Information and Network Programs

November 7, 2019



Federal Aviation
Administration



Welcome to Delta HQ

Welcome and Logistics



SWIFT: From Crawling to Running...



SWIFT Collaborative Workshop #8 Draft Agenda

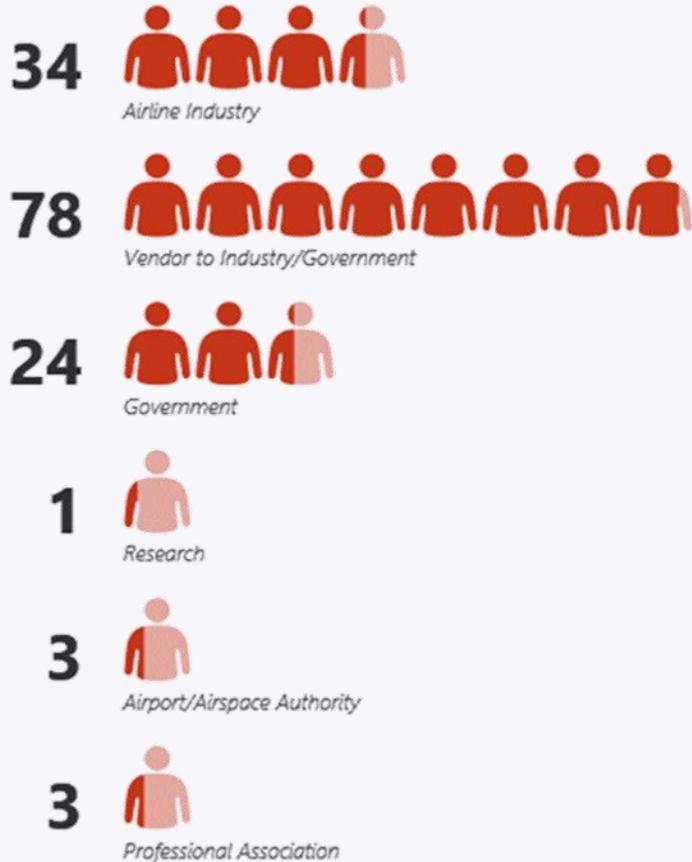
November 7, 2019 – Atlanta, GA

- Start at 8:30: Introductions/Welcome
- What's Next: Look Ahead to 2020
- Special Topic: Delta Airlines SWIM Presentation
- **Break**
- SWIFT Updates/Focus Group Summary
- Producer: TFMS
- Special Topic: Widget Case Study by JetBlue
- **Lunch 12:15-1:30**
- SWIFT Update: ACS
- Special Topic: NBAA Case Study: Review of study/widget
- Special Topic: MITRE ATD2 Phase 3 Briefing
- **Break**
- SWIFT Topic: Introducing new Focus Groups
- SWIM Capability: NCR
- Closing at 4:30



Who is Sitting Next to You at SWIFT #8?

Attendee Organizations



Attended a SWIFT Meeting Before?



143 Attendees
Highest Attendance of any SWIFT!



SWIFT Stakeholders

Airspace Users

American Airlines 

Alaska Airlines  

ATLAS AIR  DELTA 

FedEx  jazz  jetBlue 

ups  spirit airlines  HORIZON AIR 

Southwest 

UNITED 

Professional Associations



Airlines for America®
We Connect the World



Airport/Airspace Authorities

THE PORT AUTHORITY OF NY & NJ 

SFO San Francisco International Airport 

DFW DALLAS FORT WORTH INTERNATIONAL AIRPORT 

NAV CANADA 

Hartsfield-Jackson Atlanta International Airport® 

Standards Bodies

OGC®
Open Geospatial Consortium, Inc.

RTCA 

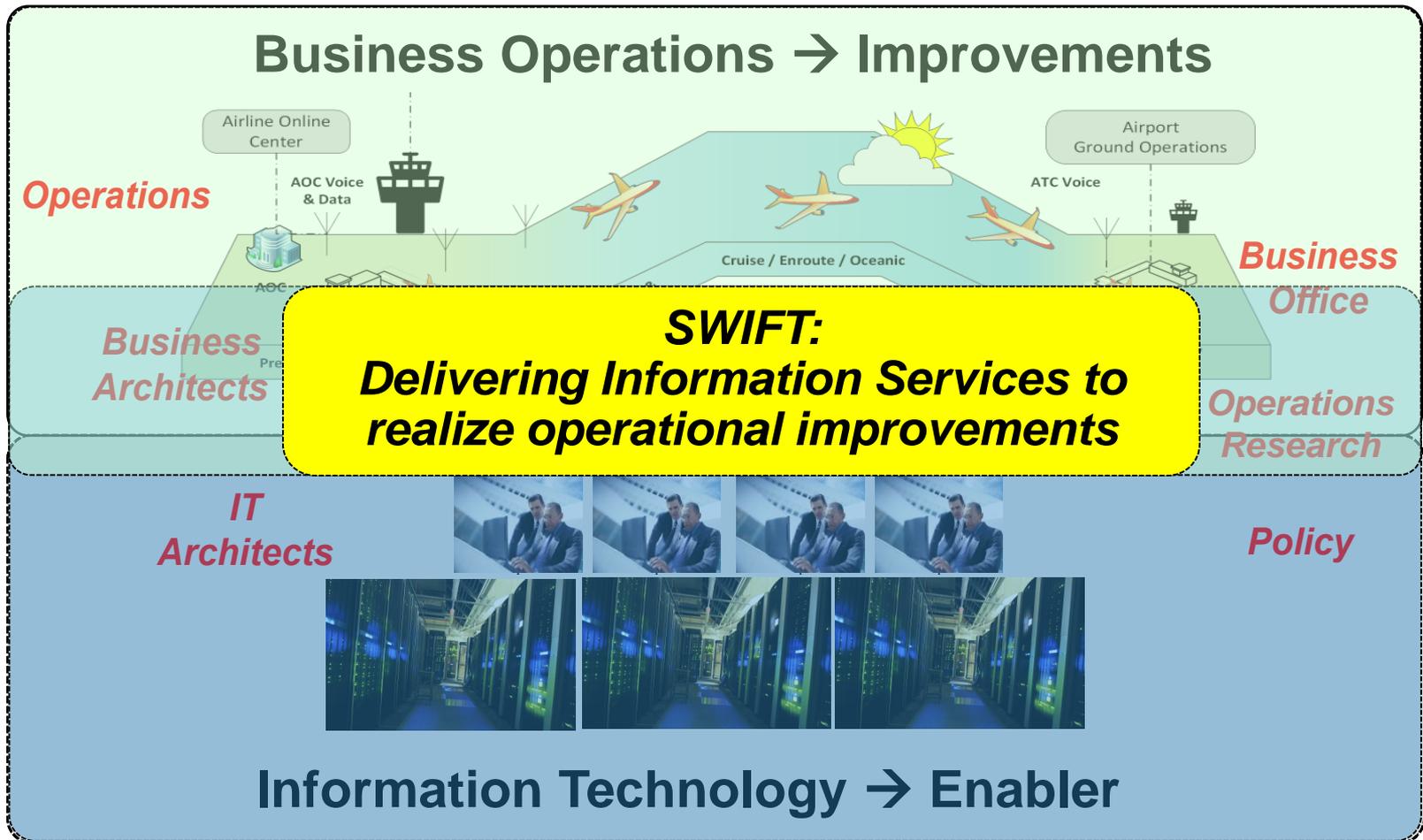


Government

Vendors to Industry/Government

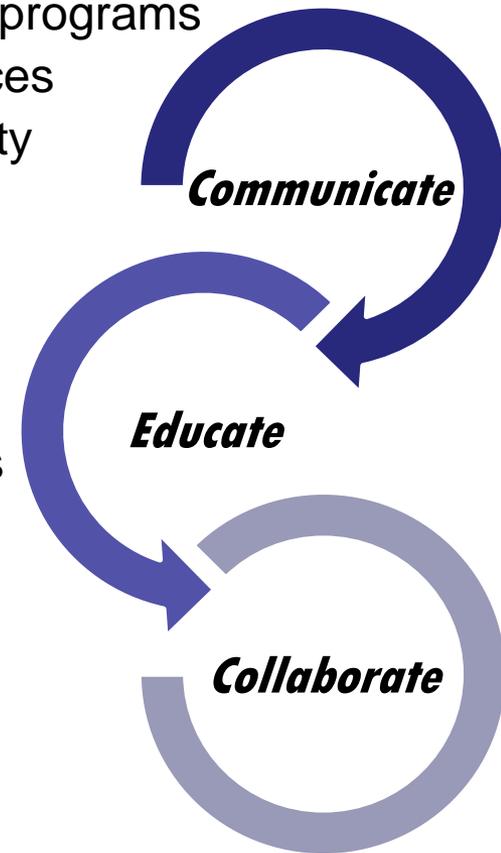



Technology: Enabling Operational Improvements

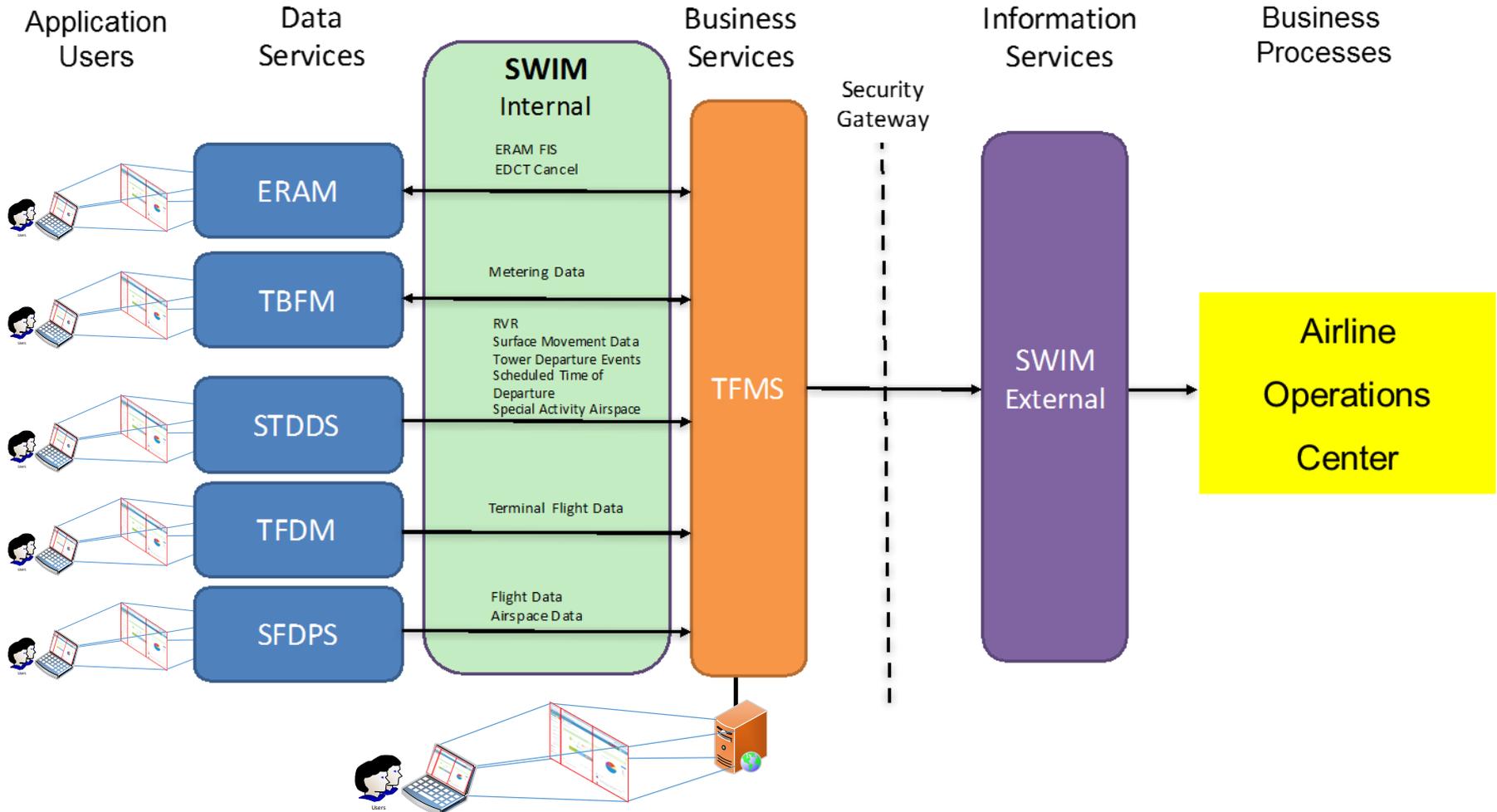


SWIM Industry FAA Team (SWIFT)

- **SWIFT addresses industry recommendation to:**
 - Establish a community forum that acts as a single environment for collaborative engagement around NAS information and data sharing
 - **Communicate:** Inform community about SWIM & NAS programs
 - **Educate:** Synchronize community on information services
 - **Collaborate:** Discuss issues most relevant to community
- **Industry partners**
 - Subject matter expertise in airline, airport or FAA operations, processes, procedures and related systems
 - Open to public: meeting notes, presentation material posted on a publicly accessible web site.
 - Anyone can join, anyone is invited.

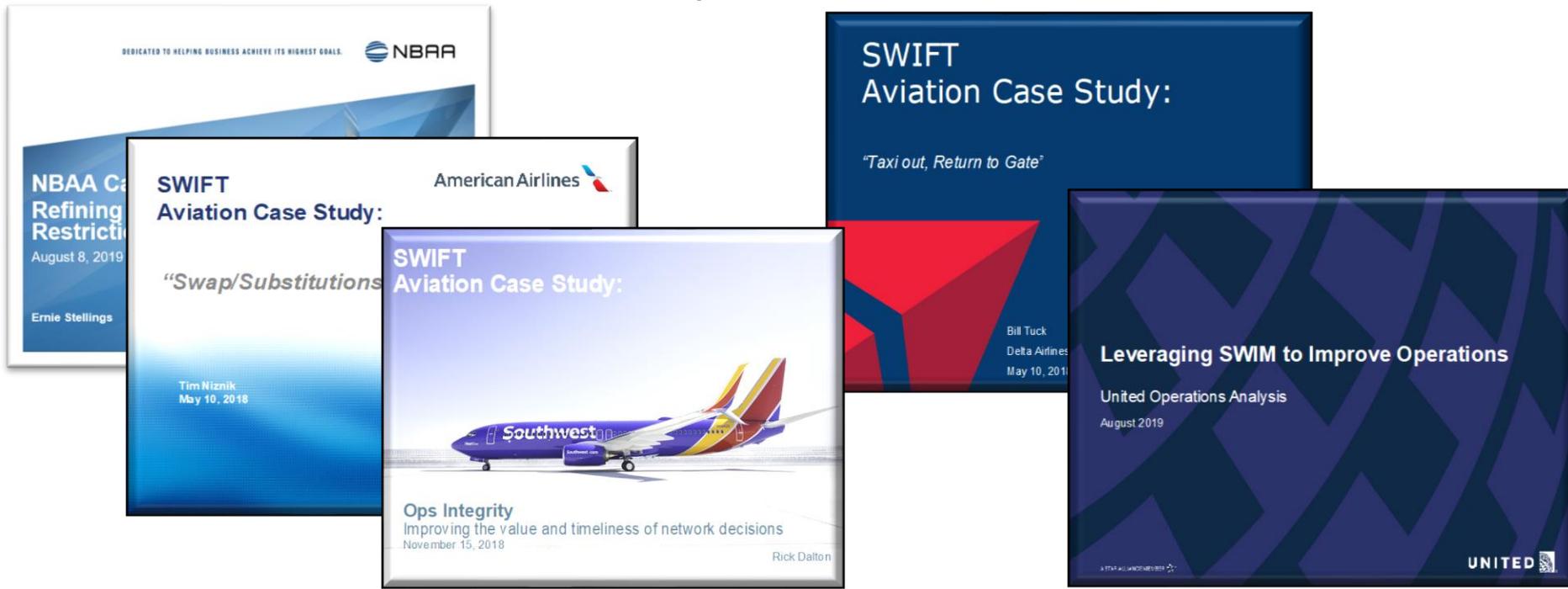


Speaking the same language!



SWIFT Industry Case Studies

- **SWIFT works with industry to solve real-world problems**
 - **“Show and Tell”**: Offer a venue to share uses of SWIM Information Services and related lessons learned with the community
 - **“Here is problem I have”**: Provide a forum to discuss real-world operational problems and identify underlying NAS systems/related SWIM information services that can contribute operational solutions



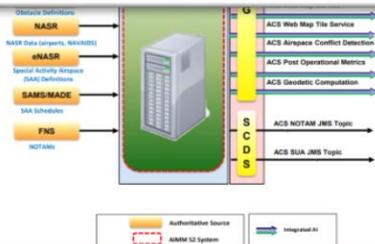
FAA Producer Program Updates

New Information Service Capabilities and Updates

Producer Focus: Aeronautical Information Management Modernization

Aeronautical Common Service (ACS)

By: AIMM Program Office
To: SWIM Industry-FAA Team (SWIFT)
Date: August 15, 2018



SWIFT
August 15, 2018



72

SWIM Terminal Data Distribution System (STDDS)

SWIFT Conference

Presented to: SWIFT
By: Brian Love, SWIM Engineering Support
Date: August 8, 2019



Information, which is published via the National Airspace System (NAS) Enterprise Messaging Service (NEMS).

- STDDS publishes data from selected FAA airport and terminal systems:
 - ASDE-X - Airport Surface Detection Equipment - Model X
 - ASSC - Airport Surface Surveillance Capability
 - STARS - Standard Terminal Automation Replacement System
 - RVR - Runway Visual Range
 - EFSTS - Electronic Flight Strip Transfer System
 - TDLS - Tower Data Link Services
- STDDS publishes data to NAS and non-NAS subscribers, via NEMS in accordance with SWIM standards

SWIFT #7
August 8, 2019



Federal Aviation
Administration

58

Producer Program

Traffic Flow Management
System: Program & SWIM
Service Updates

Chris Burdick
System Engineer
Traffic Flow Management System Development
May 21, 2019



SWIFT #6
May 21, 2019



Federal Aviation
Administration

75



Special Topics

SWIFT User Driven Topics

Needs Assessment: External Stakeholders

- **Cloud to Cloud Transfers**
 - More efficient for Consumers
 - FAA Cloud to Tier 1 Consumer cloud negate through Consumer's data center to their cloud
- **Development and Test of New Services**
 - Enhanced cloud services supports quicker on services (through expedited qualification/test rapid approval versus NESG.
 - Test and Accrediting still required, but in a m and streamline manner.
- **Playback versus Reconstitution**
 - Consumers can utilize playback of events for of post-ops analysis.
 - Longer term data reconstruction/reconstitution Consumers re-establishment of their operati



SWIFT: What's Next?

Facilitated Discussion on Industry Priorities

David J. Almeida
SWIFT Community Moderator
August 8, 2019



SWIFT: 2019 Year in Review

- ✓ Increase community engagement
- ✓ Move meeting venue from Washington DC
- ✓ Use case studies to identify information solutions to real operational problems
- ✓ Engaging NAS programs in SWIFT
- ✓ Finalize Ops Context Documents
- ✓ Survey community for priorities



Sharing business process approach



User Driven Ops Case Studies



Offering insights into FAA Programs & Special Topics

Congratulations SWIFT Team!!!!



2019 Pinnacle Award: Project of the Year by WashingtonExec



SWIM Planned Deployment Roadmap



Surveillance



Aeronautical



Weather



Flight/Flow



SWIM Capability

STDDS R4  
Deployment Complete

SWIM Cloud Distribution
System (SCDS) 

2019

Lost Message
Retrieval 

AIMM ACS 

TFDM Deployment Begins 

NCR  

TBFM RTS 

Identity and Access
Management 

STDDS R5  

CSS-Wx Deployment
Begins 

TFMS R14 

TBFM MIS 

2020

TFDM Deployment Continues 

CSS-Wx Deployment
Continues 

STDDS R6  

2021

*Calendar year dates, subject to change



Federal Aviation
Administration

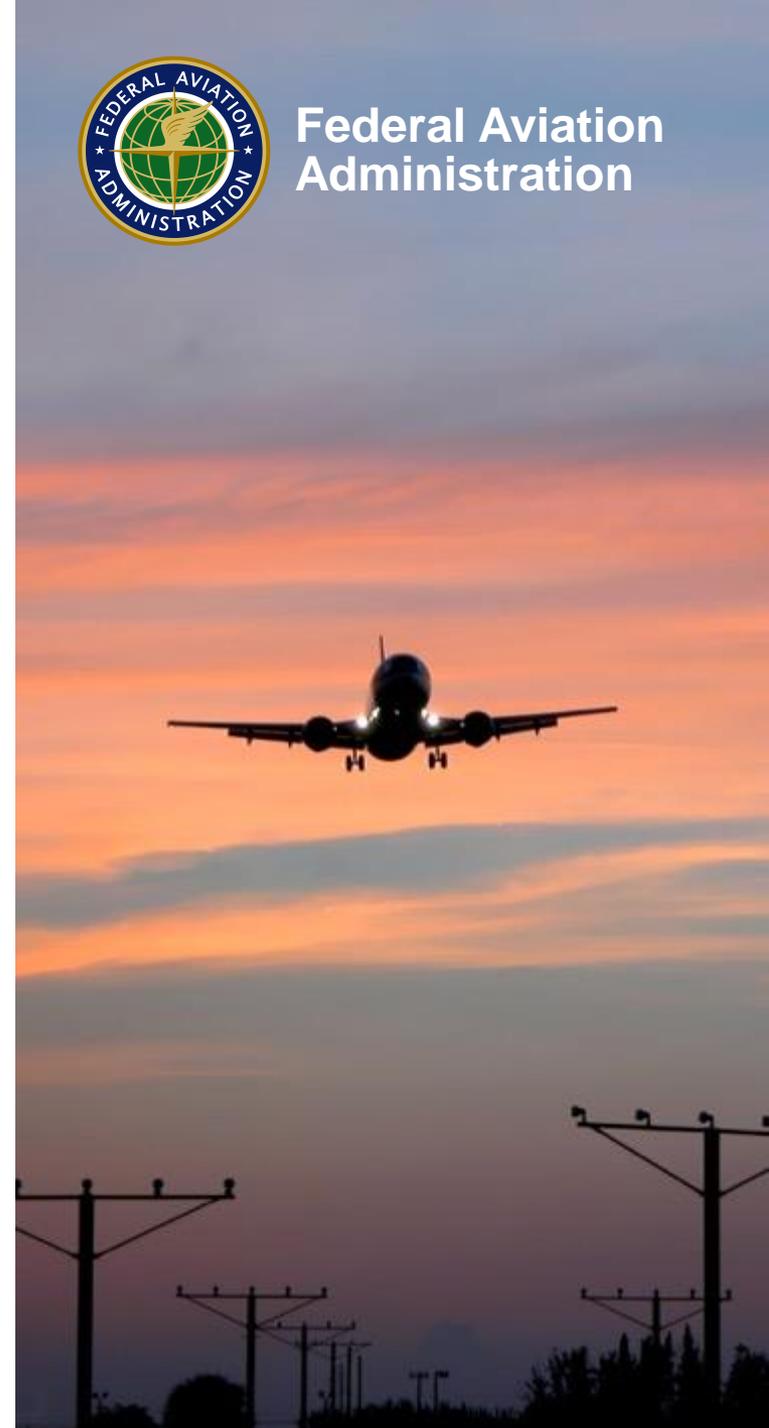
SWIFT: What's Next?

Summary of SWIFT #7 Special Topic Session

David J. Almeida

Moderator, The SWIFT Community

November 7, 2019



Summary of “What’s Next” Session 2020 Planning

- **17 items were identified during Aug 8 session in Denver**
 - Items generated through brainstorming session
 - These items have been analyzed and categorized as:
 - Part of SWIFT 2020 planning
 - Following up Actions items
 - Establishment of a Focus Group

“ We should be looking at the business rules/logic that are used behind the scenes at the FAA systems so we are all doing the same thing. Demand predictions. Should be looking at that in addition to the data. FAA business rules, airline business rules, training rules ”

“ SCDS platform – how to move where we can extract data directly from the website and not have a connection. Download a month of a message to see what the data looks like ”



“ How do we (industry) get data that producer systems/programs are not providing? How do we influence changes at the producer programs? What data is the FAA willing to share vs not. ”

Establishing SWIFT goals for 2020

Items are within the scope of 2020 planning

Summary of “What’s Next” Session Action Items

“ CDM Data — the airlines want it and want to partner with vendors to process and we run into issues with having airlines sponsor vendors to push this data back to vendors ”

“ A few of the problems that have come up — we need to work together as vendors/FAA to help operators — but some of the problems are things that where we are going with FF-ICE that will help address. When we start to make those changes, we will need to show those benefits. ”



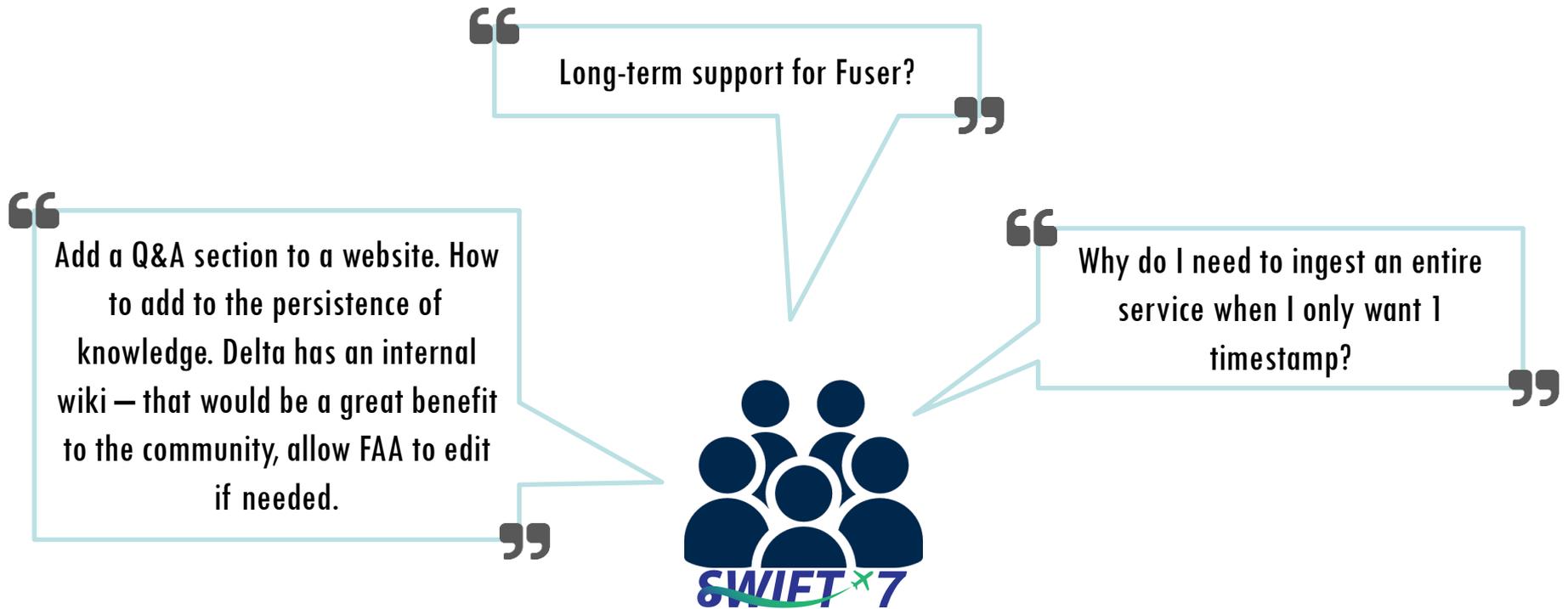
“ TFMS FAQ has lots of questions on there, we try to keep that updated with questions we have gotten from the community as well as our monthly calls. We have engineers around to answer questions. Often community won’t ask questions on the phone, but we have other options. ”

“ International — FAA NOTAM reform — discussion about where that would live. So much the SWIFT has done to organize data, is SWIM a place where this should be living? We may want to put that in the hopper for what is coming — international harmonization ”

Follow Up Actions

Working on identifying key POC’s for future SWIFT Briefings
FF-ICE and flight planning in February 2020

Summary of “What’s Next” Session Action Items



Follow Up Actions

Look into approaches and solutions to support these requests

Summary of “What’s Next” Session Focus Group

“Quarterly meetings are great, but I would like to see what it would look like to support community more frequently – web meetings? Many software applications can’t wait 3 months for an answer.”

“Ops Context show what everything is, what if we start with a need – demand over an airport – and how do we identify the elements to do that? Allow people to vote on what the next topic is for the focus group”

“Quick wins with SWIM, widgets etc.”

“Route predictability – if we had that on a common situational display it will stop us from calling them and stop us from guessing where to go.”



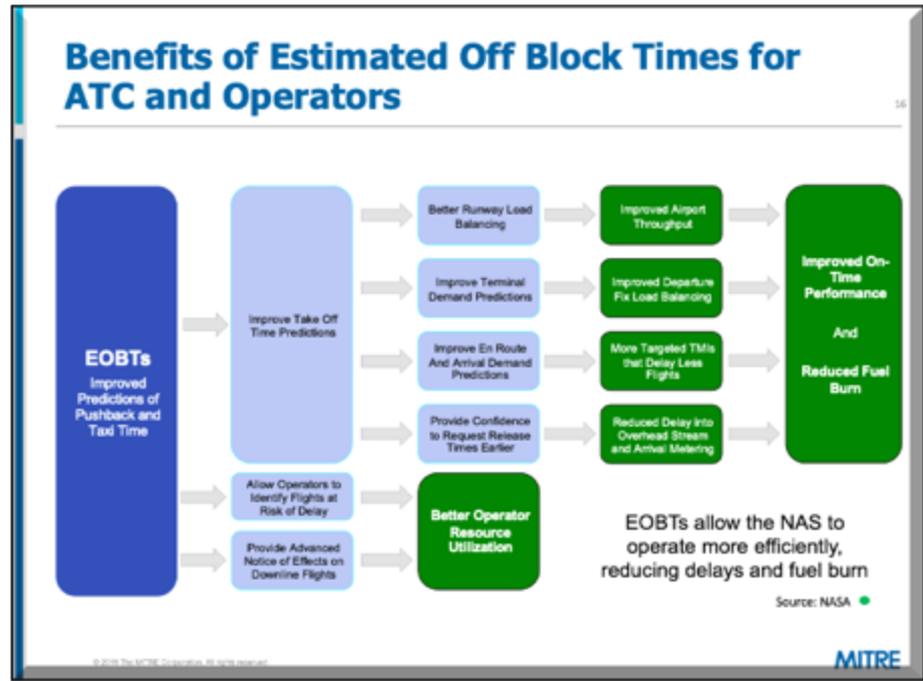
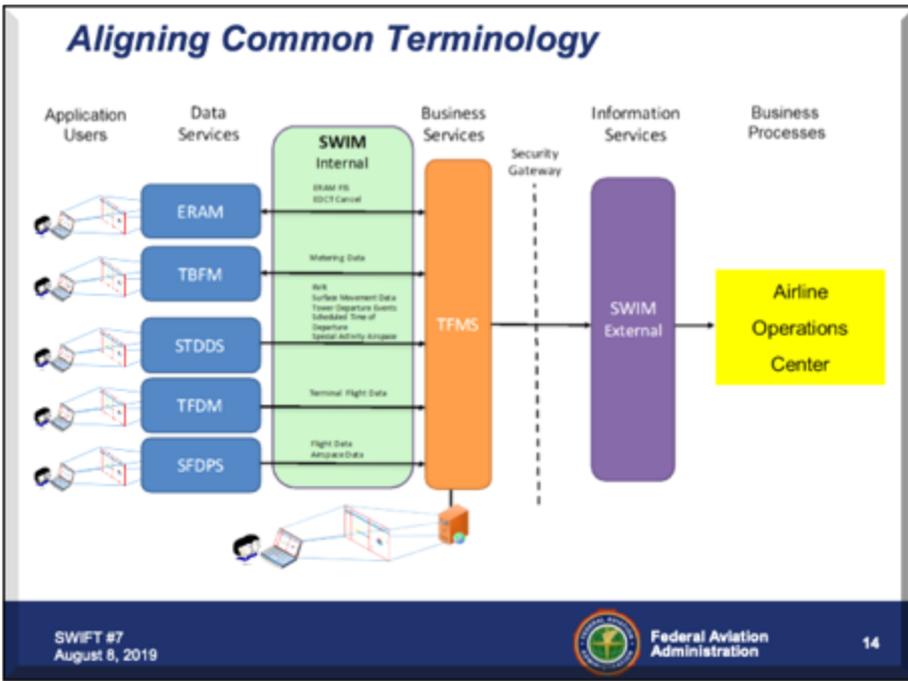
“We have had several meetings where we provided case studies, when do we solve those case studies? We need to get some work groups and identify program offices if it is something in the future or now. Get the team together, IT can identify the data elements. How can we get there and identify the vehicle to get there.”

“Flight plan filing over SWIM IP connection.”

“United case study from earlier – does that resonate across the industry? Can we collaborate across carriers for a quick win? Part of the issue is each airline has their own perspective/enterprise needs. Need to articulate the problem statement to make people see it in their own ways. I will talk to SP about this use case and see how we can tailor it to the full community.”

Working to establishing Focus Group supporting SWIFT community needs

Operational Improvements using SWIM



Operationalizing SWIFT Case Studies & Widgets

Operations

Analysts

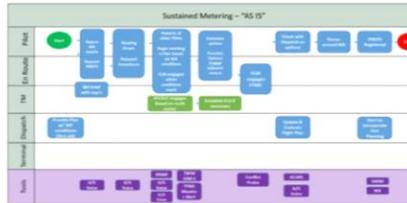
Information Technology

Case Study Overview

- **Case study overview**
 - Maximum 1 to 2 slides
 - Words that elaborate the problem statement & discussion
 - Discussion points as necessary to describe the problem
 - Information here may include relevant business process references involved in executing the operation
- **Slide that illustrates the environment & operational systems involved in the case study**
 - 1 to 2 slides containing graphics
 - Graphics should include operational environment (ie, picture of airport surface area affected, etc.)

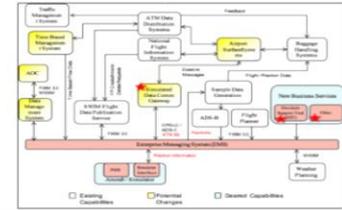
Operational Workflow

- **Description of the workflow**
 - Actors involved in the operation & work being performed
 - This can include process flow charts, etc.
 - How actors achieve their work (ie, references to relevant systems)
 - Associated performance metrics that are affected by the operation



Operational Support Systems

- **Identification Systems Involved**
 - List of systems involved in the work being performed
 - Examples include tools used by the Actors in executing the work
 - Generic system names (internal system, or 3rd party COTS, etc.)
 - Example: airport surface tool, or 3rd party airport surface viewer



SWIM
February 8, 2018



21

SWIM
February 8, 2018



21

SWIM
February 8, 2018



24

System Wide Information Management (SWIM)

Traffic Flow Management System (TFMS) -
Flow Information

System Wide Information Management (SWIM)

Time Based Flow Management (TBFM) -
Metering Information Service (MIS)
Operational Context Document



Version 1.0

September 4, 2014

• Operations & Analysts identify Processes, KPI's & Use Ops Context Docs

• Analysts & IT identify, analyze, access & manage data using Technical Docs



Example: Delta's "Return To Gate" Case Study

Ticker

30 Min Outlook

60 Min Outlook

Over Capacity
Near Capacity
Below Capacity

GAYEL NEION COATE DEEZZ NEWEL ZIMMZ PARKE BIGGY LA

ZIMMZ PARKE BIGGY LANNA RBV BEADS WHITE WAVY

DCA to LGA Route



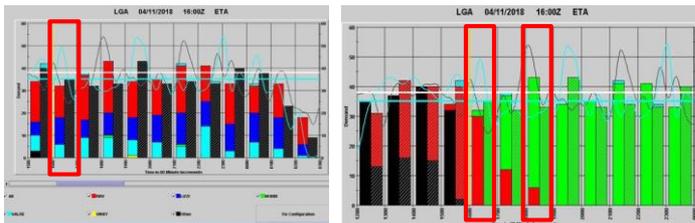
Operational Problem

Current Tools

Workflow Analysis

Widget
Potential
Decision
Tools

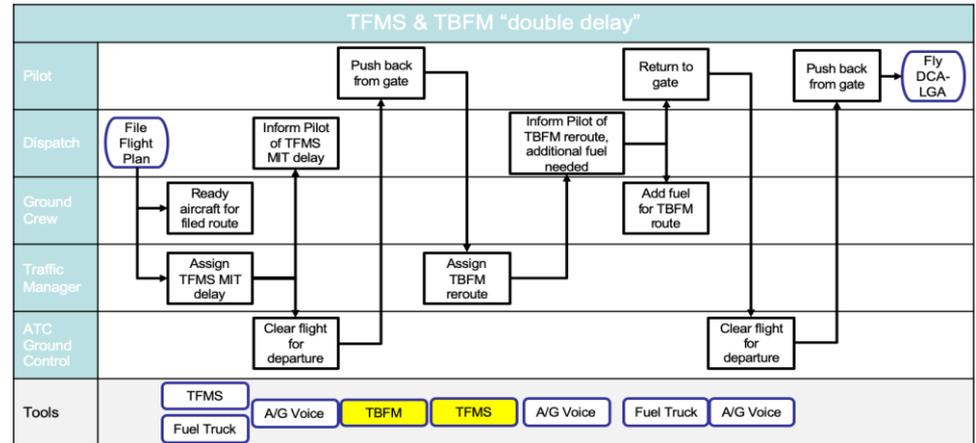
LGA Arrival Demand at Departure Time 4/11/18



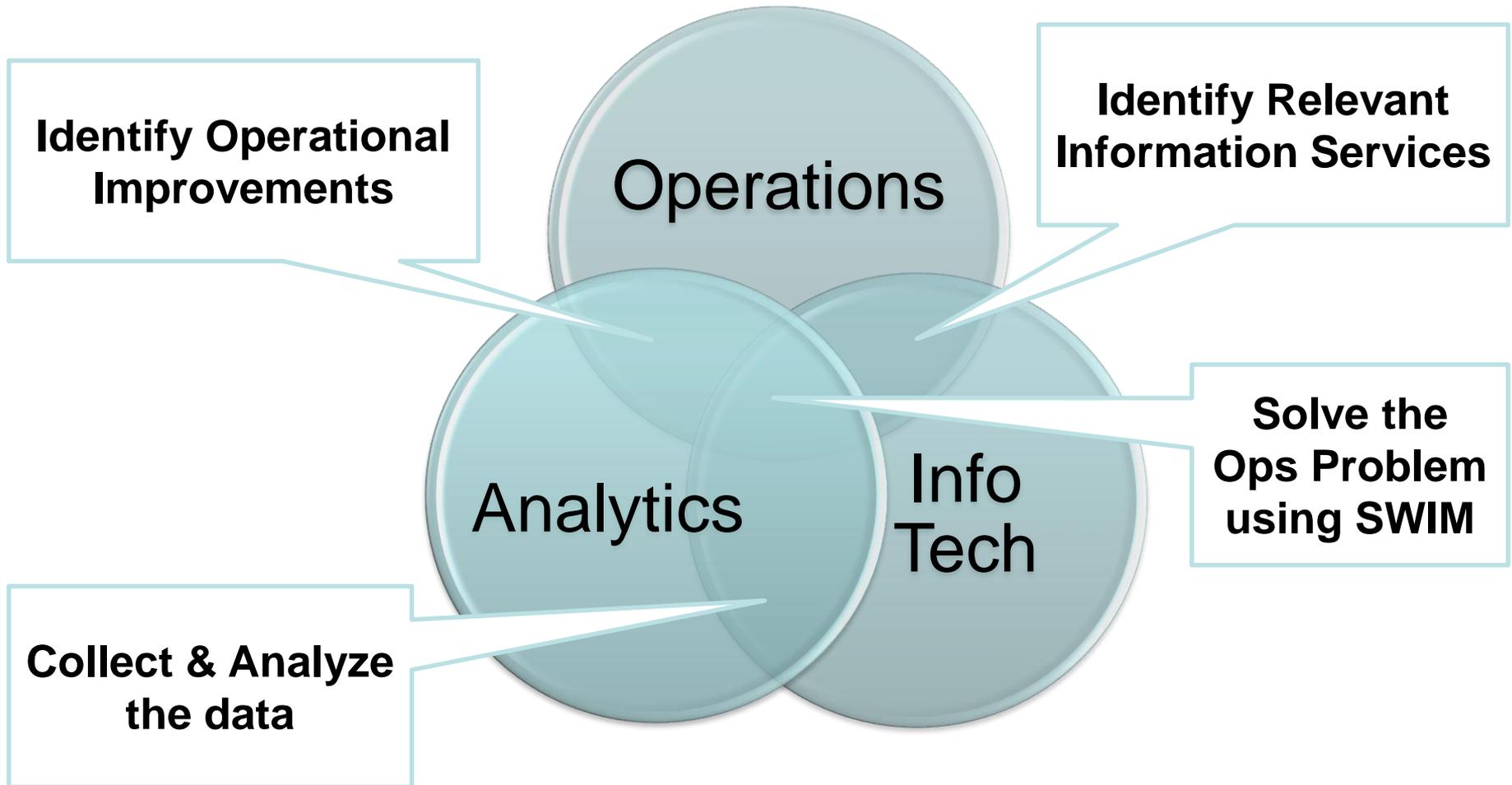
- An hour before RPA6140 departure (16:00z ADL) LGA arrival rate is ~38.
- Overall demand for 18:00z is 43 and 23 are coming over RBV
- RPA6140 was supposed to be in the 17:00z bucket (17:43z) and TMA moved it back to the 19:00z due to demand over RBV
- Appears to be a MIT or TMA restriction at ZDC which affects overall airport landing efficiency
- In overall Status view at 16:00z, there was an arrival spike at 18:00z, over half of which was over RBV

28 SWIFT Case Study: "Taxi-out, Return-to-Gate" 8/9/18

DELTA AIR LINES, INC.



Ops Improvements using Information Services



SWIFT: Where Information Supports the NAS

SWIMming in Gate Returns

November 7, 2019



Agenda

- Delta SWIM Journey
- Gate Return Use Case
- Gate Return Demo
- Lessons & Next Steps
- Questions



Delta SWIM Journey

- Delta has ingested FAA data for use in operational tools for a long time
- Many sources exist (Legacy TFMS, TBFM, NADIN)
 - The process is cumbersome
 - Each source requires a separate Security Request, Piping, Storage
- The TBFM STD was the first consumed SWIM element and took over a year to complete
- Required TFDM elements took multiple iterations and considerable time/ resources to get right

ATL, All Fleets, DL -3:00 +12:00

652 Arrivals

26 Impacted Turns : 11 Aircraft : 17 Pilot : 4 F/A : 31 FAR : 0 Stale Times : 0 Taxi Times : 1 Route/Config : 0 MRT : 0 IROP : 0 Fems : 0/6 ATC : 27 MEL

ix	Val	G.	D.	Turn	Ship	Fleet	Flight	DEST	ETD	TAXI	ETO	EDCT	Door	TBFM	LATT	Status	A Dly	D Dly	FAM	Pax	Val	G.	D.	ETA
165	119	B22	45	ATL	DL	3708	738	1181	MKE	1252	04:04				1656		-00:05	-00:05	1	157	94	B22	46	1344
139	91	B04	44	ATL	DL	975	M88	1971	CHS	1754	03:37				2131		-00:05	-00:05	1	153	119	B04	64	1905
194	118	A17	76	ATL	DL	5648	75H	2993	TPA	2227	05:55				0422		-00:05	-00:05	1	171	147	A17	75	2353
117	82	C42	79	ATL	DL	9577	717	1513	CLT	0852	07:28	0911	0852	0927	1620	Taxi Out	-00:13	-00:07	1	81	71	C42	77	0959
153	119	D06	59	ATL	DL	973	M88	2436	BHM	2332	07:20				0652				0	114	67	B11	96	2326
172	...	A19	88	ATL	DL	5656	75D	1491	TPA	1728	03:16				2044		-00:06	-00:05	1	178	116	A19	75	1855
201	130	F04	76	ATL	DL	668	75D	0904	GLA	1041	06:02				1643	Dec date	-00:15		0	198	84	F04	70	1155

Delta SWIM Journey

- SWIM is the largest and most complex data source ever brought into Delta
- While SWIM is an ocean of data, it:
 - Was not built for industry or analytics
 - Requires considerable infrastructure and support team
 - Requires extensive cross-divisional knowledge

Versus Delta flight event data, SWIM* is

7X the number of Flights

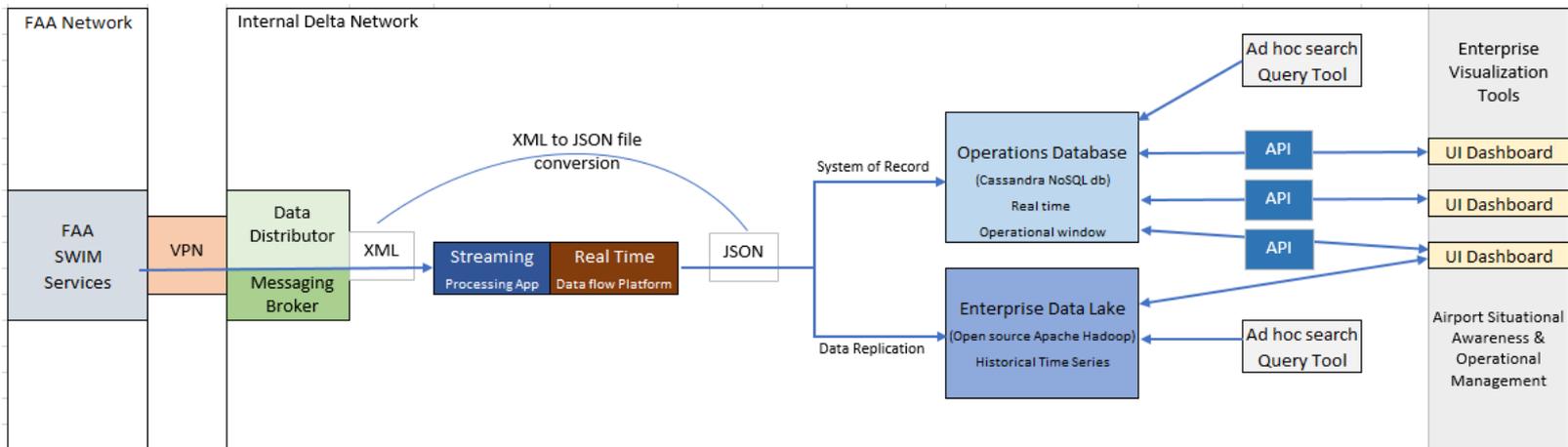
41X the annual storage size

14X the flow rate

*Only TFMS/ TBFM Feeds, full SWIM even larger

Delta SWIM Journey

- SWIM is an opportunity to have a single source of FAA data and create a sustainable process
- Our Digital Transformation program has created a new Enterprise operations infrastructure including:
 - Real-time Operations Database
 - Historical Data Lake
- SWIM is not possible without infrastructure capable of handling size and scope of SWIM data



Delta SWIM Journey

*“The more I learn, the more I realize how much I don't know.”
- Einstein*

- SWIM is not something that can be done in a bubble
 - SWIFT is a critical piece of our success
 - Our SWIM team has representatives from Operations, Analytics, IT, and ATM
 - Form strategic partnerships



Stakeholder Engagement Team (SET)

- FAA Advanced Planning Team (PERTI) joined stakeholders in finding improvement opportunities during Summer '19
- SET worked to develop goals that represent industry objectives
 - Driving throughput
 - Timely issuance of routes
 - Developing exit strategies
 - Fewer Gate Returns

Goals

NAS Operations
ATOSysOps

PRELIMINARY GOALS FOR 07/11/19

- Manage EWR, LGA, JFK, TEB, PHL, BWI, IAD, DCA airport operations to keep departure delays to less than 75 minutes after 1700z.
- If TRANSCON or CAN routes are issued to manage forecast convection, implement at least 90 minutes prior to effective start time.

PERTI

14

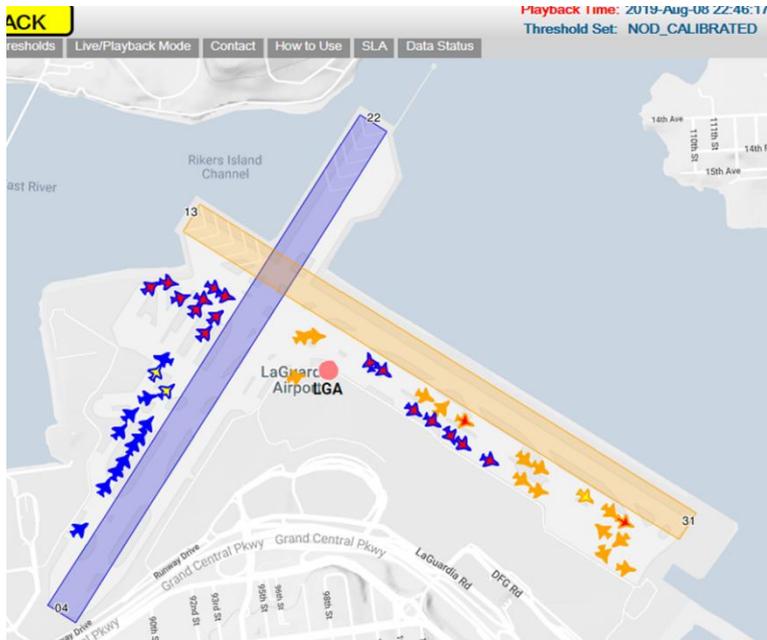
SET Gate Return Goal

- Gate Return goal encountered some FAA opposition
 - No ability to monitor in real time
 - Quality Control (QC) cannot pull yesterday's data to evaluate
 - No easy way to get Flight Operator data into FAA system
- Team agreed to provide data prior to the NSR

Keep weather-related gate returns to 5 or less per airport at Delta and DFW.

[AAL, Delta, SWA, and UAL will provide gate return data to PERTI email.]

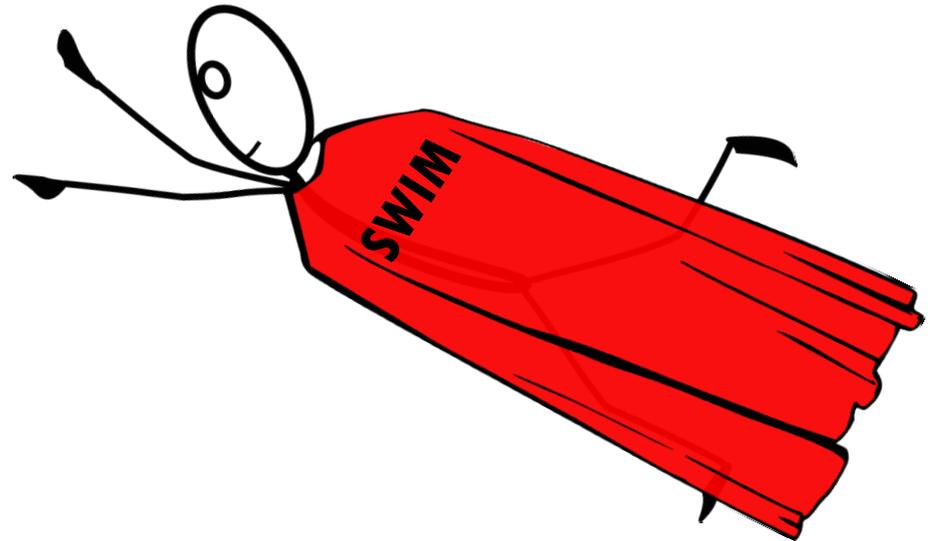
Gate Returns Use Case



- Gate Returns are extremely impactful
 - Customers experience delays, long taxi times, and cancellations
 - Controllers experience significant rework
- Many carriers have in-house tools to monitor lengthy taxi times
- However, FAA lacks a real-time monitor

The Answer is Simple!

SWIM can enable both FAA and Delta to improve aid in prevention and recovery of Gate Return scenarios



What can we do fast?

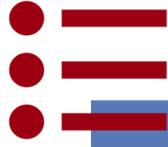
- Of course working with SWIM isn't simple!
- Wanted to work with a partner skilled in fast prototyping and agile projects
 - Aren't 100% positive the idea will work
 - Unknown data (Gate Returns aren't a "field")
 - Any product will need adjustment, wouldn't we want to find that sooner rather than later
- Engaged MITRE to help create the POC
- POC Roles
 - Delta: Provide use case and internal data
 - MITRE: Build prototype

A widget for The Widget



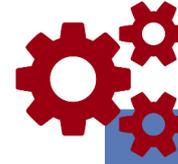
Use Case

- Auto-detect and track Gate Returns using SWIM



Objectives

- Grow knowledge of SWIM
- Use for day of management and analytics

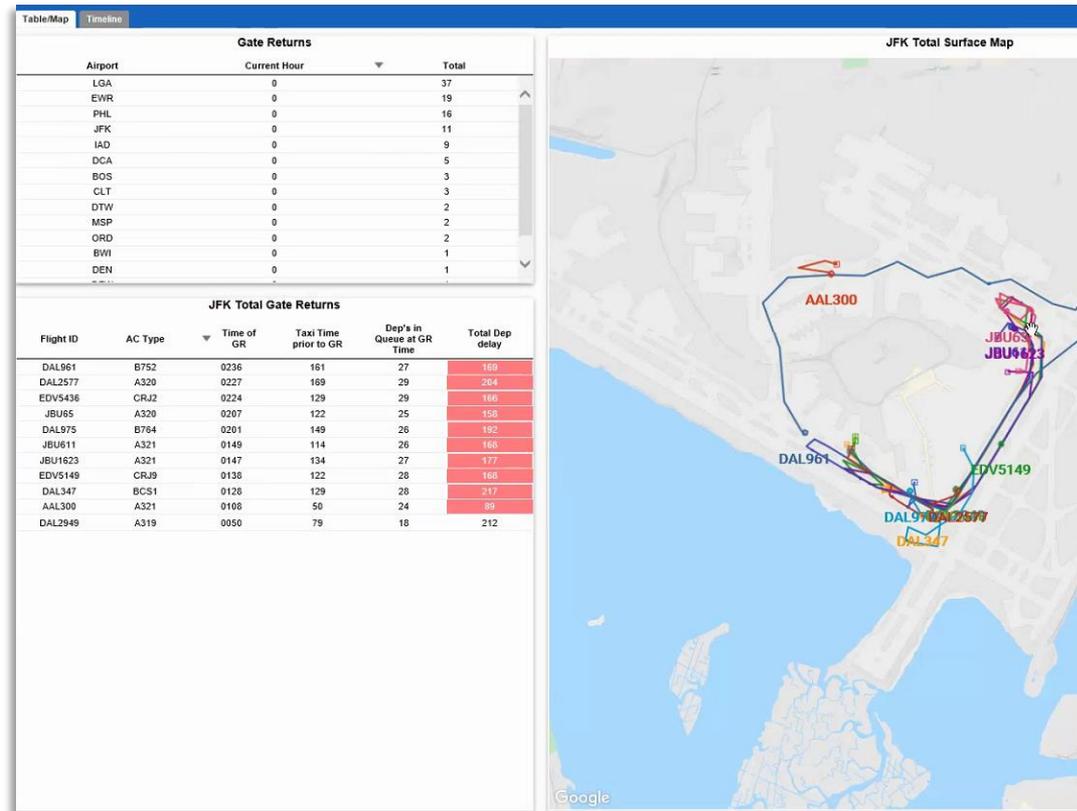


Other needs

- Develop fast
- Leverage FAA tool
- Test SCDS platform

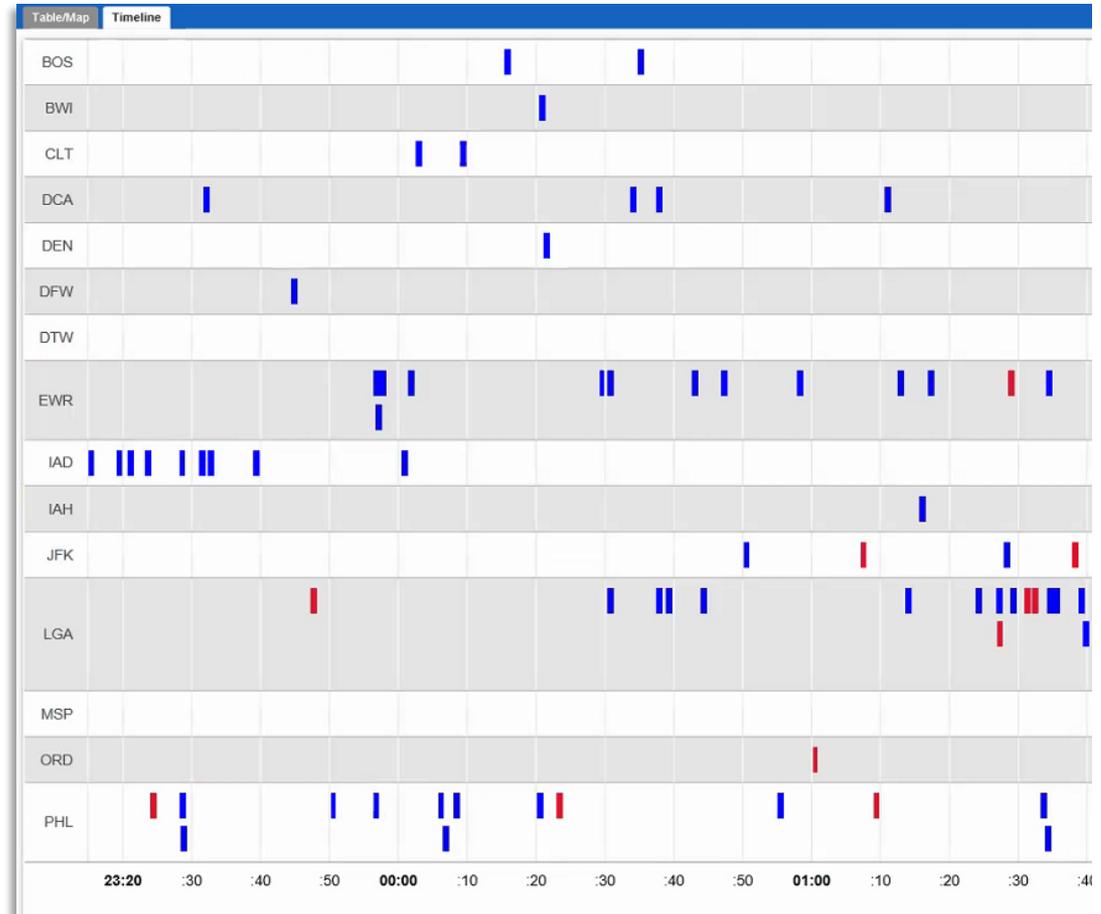
Gate Return Monitor – Station View

- ASDE-X (*STDDS-SMES*) provides track and detects the Return
- Combine with other details (*TFMS Flight*) and calculations
 - Out to Turn Around
 - Out to Return In
 - Out to Off



Gate Return Monitor – Timeline View

- Ability to see how often gate returns are occurring
- First step in diagnosing carrier versus Weather / ATC gate return



Gate Return Monitor Demo

Lessons

- Thought this was a simple ask, turned out to be more interesting and difficult
 - More fuel for the agile fire
 - Thinking through the visualization sparked more questions
- SCDS connection process took much longer than expected from Delta side
- Learned what an experienced, dedicated, and data ready team can do
 - Use case definition to POC in 10 weeks

Next Steps

- Real-time monitoring is only the first step
- Continue development by adding features
 - RAPT Fix Closures
 - MIT
 - Flight route history
- Store data to develop alerts
- Industry support to push into the NOD
 - This is the real value



Questions?

SWIFT Focus Group: Operational Context & Use Case Documents

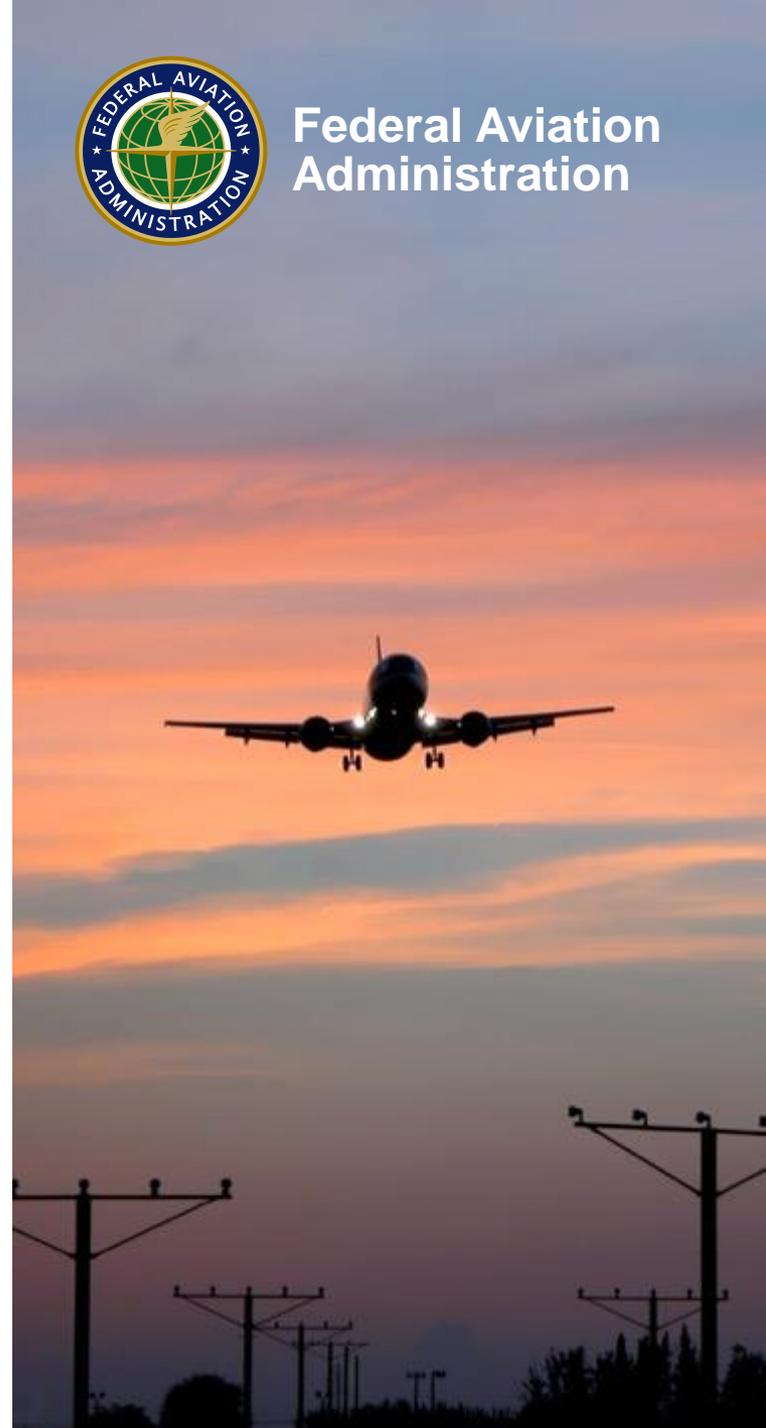
Update on Focus Group

Jay Zimmer, LS Technologies

November 7, 2019



Federal Aviation
Administration



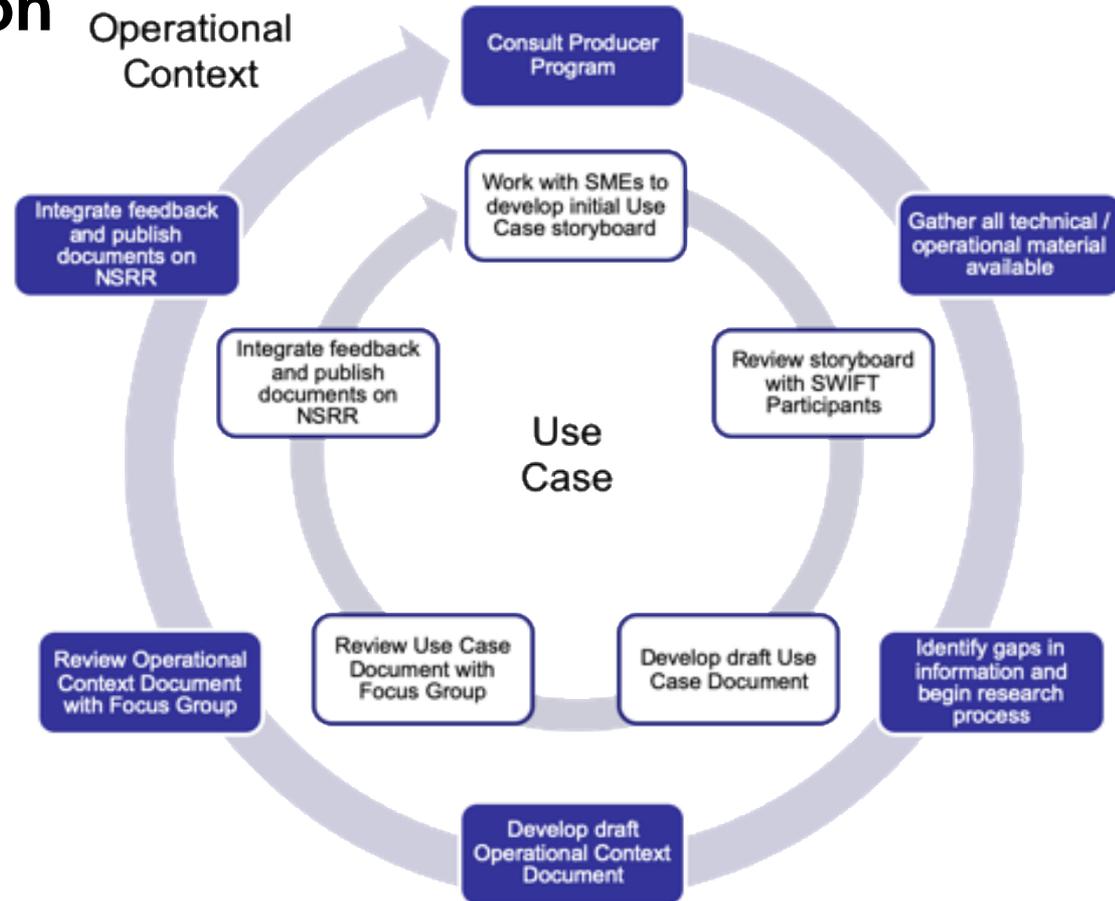
Focus Groups

Operational Context for SWIM Data

- **SWIFT Participation on Operational Context and Use Case Documents**

- Participants provide comments
- Structure of feedback & nature of questions answered meeting

- **Engage SWIFT Participants in development of Ops Context & Use Case Documents**



Operational Context Document Template

1. Introduction

- Briefly describe purpose of document
- Briefly describe the FAA systems with which the information service interfaces and what type of information it publishes

2. Domain System Description

- In depth discussion of internal FAA systems that create the data ingested and published by the information service
- References to additional information (e.g., ConOps, JMSDD, ICDs)

3. Information Service Overview

- Describe how the FAA system data interfaces with, and is published by, the information service
- Describe each message published by the information service

4. Information Service Message Types

- In depth description of XML structure and each data element
- Includes data formats and examples of populated data elements, as needed

Appendix A: Acronyms

Operational Context Documents Produced

 Surveillance	 Aeronautical	 Flight/Flow	 Weather	 Status
STDDS TAIS ✓ DELIVERED	SFDPS Airspace ✓ DELIVERED	TFMS Flow ✓ DELIVERED	ITWS ✓ DELIVERED	TFMS Status ✓ DELIVERED
STDDS SMES ✓ DELIVERED	FNS NDS ✓ DELIVERED	TFMS Flight ✓ DELIVERED	STDDS APDS ✓ DELIVERED	STDDS ISMC ✓ DELIVERED
SFDPS Flight ✓ DELIVERED	DCNS DLD ✓ DELIVERED	TBFM MIS ✓ DELIVERED	Submit PIREP IN DEVELOPMENT	
	SFDPS Airspace Data Query UNDER REVIEW	STDDS TDES ✓ DELIVERED		
		SFDPS General ✓ DELIVERED		
		TFMData Request/Reply UNDER REVIEW		
		SFDPS Flight Data Query IN DEVELOPMENT		

Focus Group will continue to develop documents as new SWIM services come online

Use Case Document Template

1. Introduction

- Purpose of document
- Description of SWIM information services to be addressed
- Discussion of how the data provided by these information services will be used in an operational context and the phase of flight with which the services will apply

2. Current State

- Problem statement describing issues/inefficiencies with current operations
- Perspectives/roles of operational decision-makers
- Current state operational example describing a specific end-to-end flight and how operations would proceed under a given set of constraints

3. Future State

- Future state operational example describing a specific end-to-end flight and how operations would proceed under a given set of constraints with the addition of SWIM information for more informed decision-making
- Benefits describing increased efficiencies gained by SWIM information
- Conclusions

Appendix A: Acronyms

Use Case Documents

- **Documents Produced**

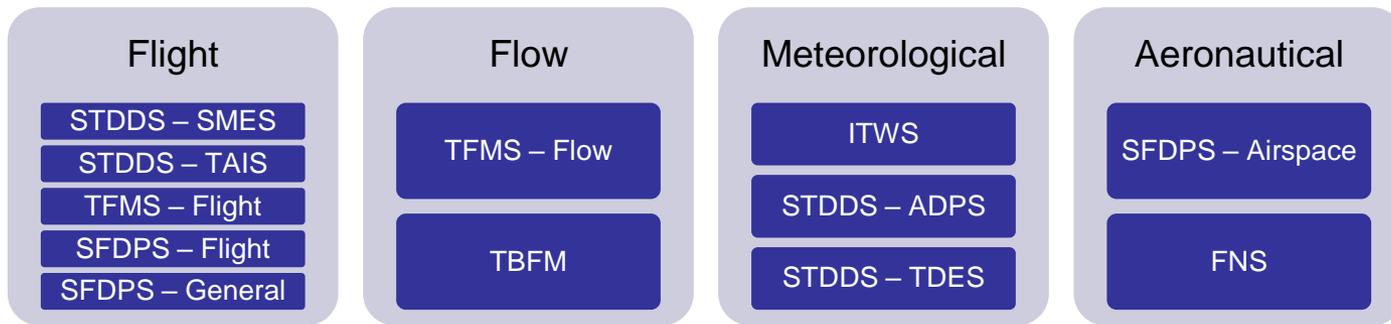
- Individual Information Service Documents

- STDDS – SMES 
- TFMS Flow 
- TFMS Flight 
- TBFM – MIS 
- SFDPS – Flight 

- Domain Information Service Documents

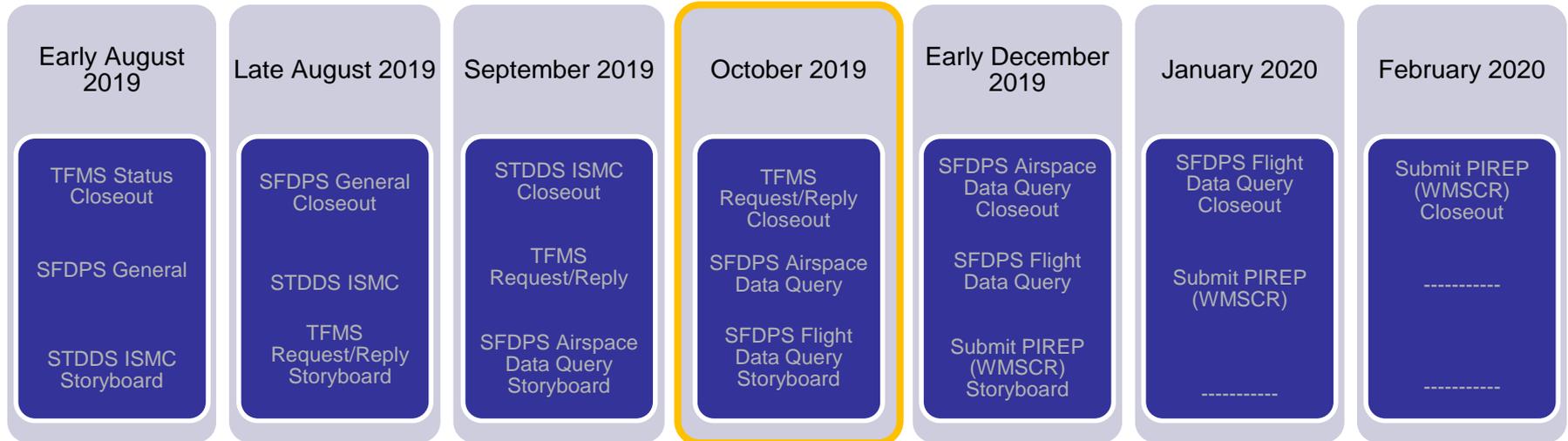
- Flight Domain 
- Flow Domain 
- Meteorological Domain 
- Aeronautical Domain 

- **Focus Group will revisit existing use cases as new SWIM information services come online to see if they need to be updated**



Current Document Schedule

*OCD – Ops Context Document, UCD – Use Case Document



- In June 2019 delivered final Use Case document, Use Case Focus Group will be suspended unless new services require documentation
- Began addressing Request/Reply services in late August
- Schedule subject to change if service updates are released and existing Operational Context documents need to be updated

Next Steps: Operational Context & Use Cases

- **Awaiting feedback on:**
 - TFMDData Request/Reply
 - SFDPS Airspace Data Query Operational Context
- **In development:**
 - SFDPS Airspace Flight Query Operational Context
- **Harmonizing Operational Context Documents**
 - Continue to retroactively update older documents to new template (TFMS Flight)
 - Continue to retroactively update older documents as they are reviewed by producer programs

Where to Find SWIFT Documentation?

- **NAS Service Registry and Repository (NSRR) is the FAA web site with detailed information about all existing and planned SWIM services**
- **Site registration takes seconds, recommended for all SWIM users**
- **SWIFT Operational Context and Use Case documents can be found at:**
<https://nsrr.faa.gov/library>



Interested in the SWIFT Focus Groups?

- **For more information please contact**
- **Jay Zimmer, SWIFT Focus Group Lead**
 - Phone: (703) 963-4979
 - Email: jay.zimmer@lstechllc.com
- **In addition to the NSRR, all SWIFT Documentation can also be found at:**
 - <https://connect.lstechllc.com/index.cfm/main/swifthome>

Traffic Flow Management System (TFMS)

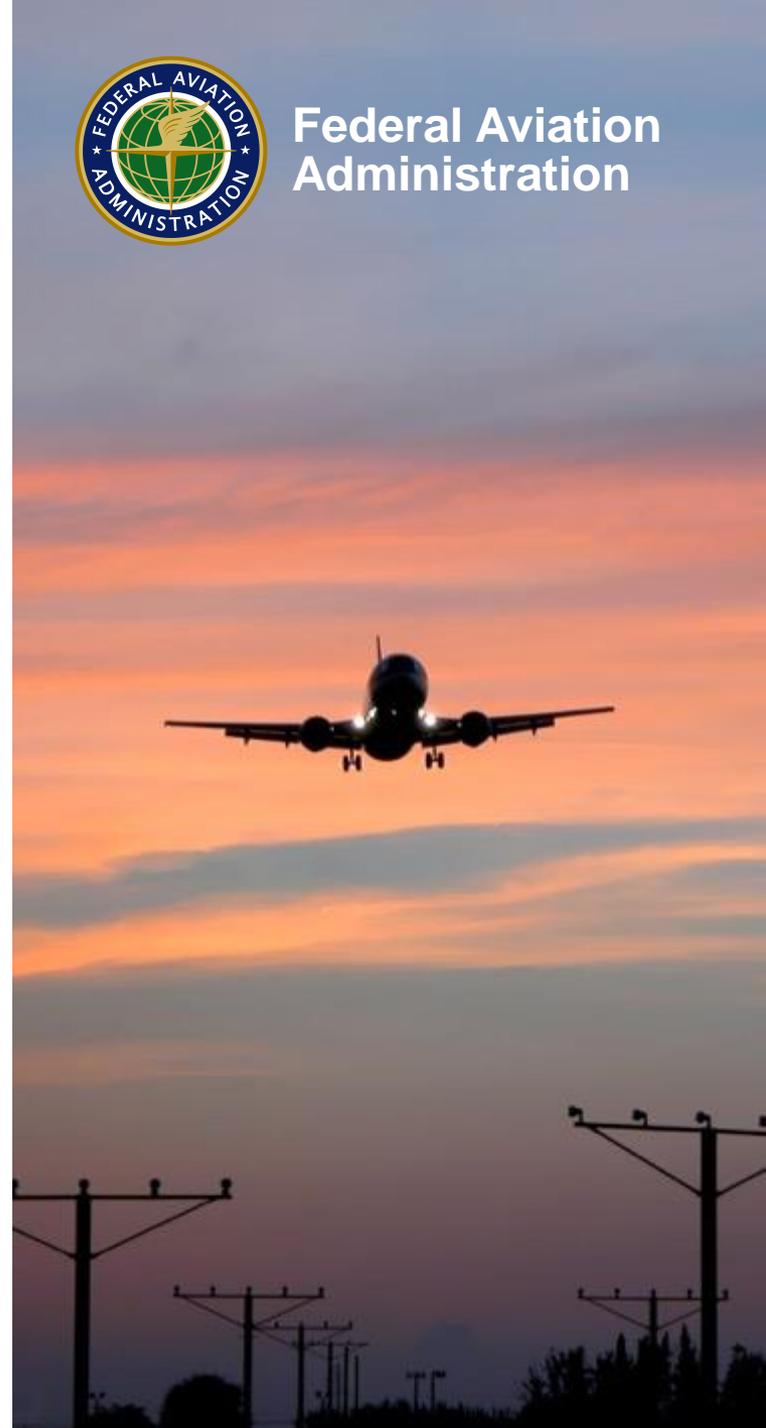
TFMData R14 and R13 Updates

Chris Burdick
David Providakes
Bob Bogdan
Brandon Wang
Cynthia Marzette

November 7, 2019



Federal Aviation
Administration



- **Agenda**

- TFMS Release 14 Scope and Impacts
- Common Stumbling Blocks and Lessons Learned
- Release 13 Patch 18
- Testing and Support
- Questions?



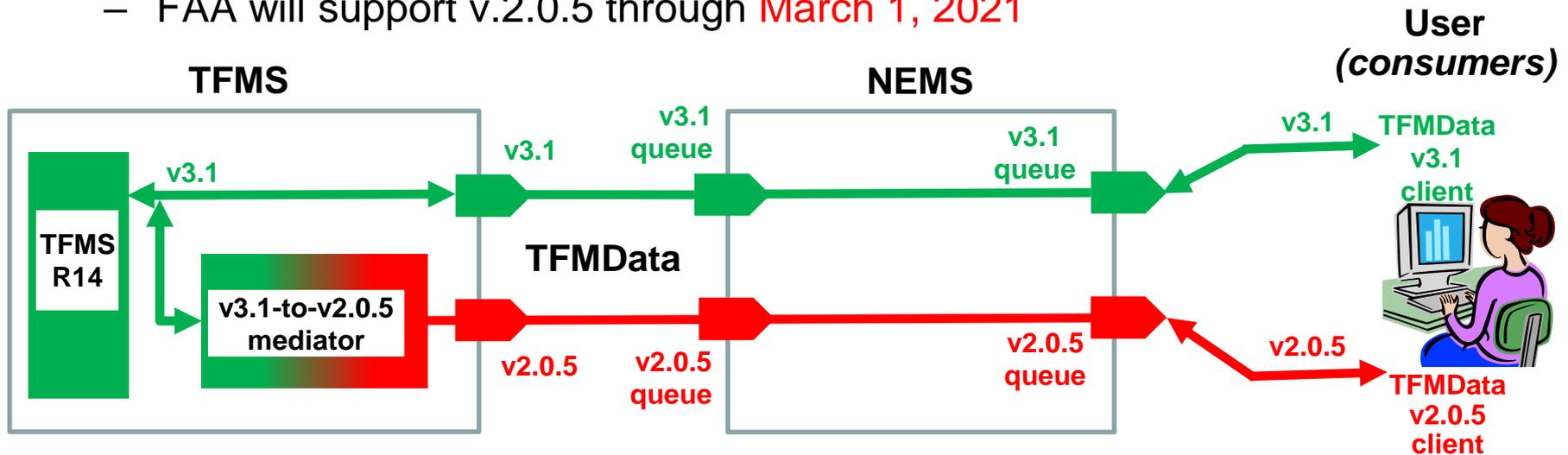
TFMS Release 14 Scope and Impacts

- **New Surface Viewer (SV) application for FAA users at Towers, TRACONs, ARTCCs, and the Command Center by October of 2020**
 - The SV displays real-time airport information, TFDM data, and surface movement on airport maps at 44 ASDE-X/ASSC equipped airports
 - The SV will enhance ATC situation awareness and begin to enable real-world benefits of TFDM



TFMS Release 14 Scope and Impacts: User Transition

- **Cutover to TFMDData v3.1 will be user-driven**
 - All existing inbound and outbound business functions and queues will remain at v2.0.5
 - Users may contact their SWIM representatives to begin on-ramping to v3.1 in the FAA Test Environment by January 2020.
 - FAA will support v.2.0.5 through **March 1, 2021**



TFMS Release 14 Scope and Impacts: Download Package and SWIM Routing Changes

- **TFMData v3.1 is now available for download from the NSRR**
 - Download package includes:
 - JMSDD (JAVA Message Services Description Document)
 - XSD (XML Schema Definition) files
 - README file
 - Sample messages are found here:
 - https://cdm.fly.faa.gov/?page_id=2287 (refer to slide 16)
- **TFMData v3.1 SWIM Routing Changes:**
 - Users **must** include new JMS Property SchemaVersion=3.1 for REQ & IDP messages sent to TFMS
 - Users may choose to route upon new 'major' property to receive data pertaining to affiliated regional carriers.



TFMS Release 14 Scope and Impacts: JMSDD/Schema Change

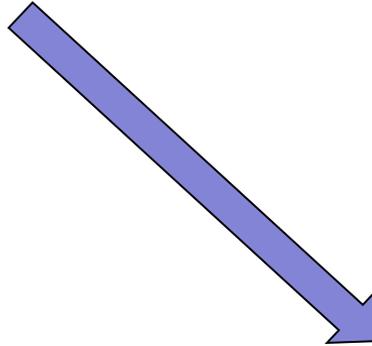
- **High Interest Release 14 Changes – Problems users reported**
 - replyOption – Request/Reply’s FDBLOCK
 - Optional in the schema but required by TFMS SW
 - SW was updated to now default to no-reply if the user does not specify the replyOption
 - Aircraft ID – Flight Data, Flow Information, Request/Reply
 - Changed to [A-Z0-9]{1,7}
 - Aircraft Registration Mark – Request/Reply
 - Changed to [A-Z0-9]{1,7}
 - ETD Type METERED in Flight Data is now being set
 - TIME_OUT_DELAY (ADL param LTOD) in Flow Information is now populated
 - ncsmControlDataType – FlightData
 - New element added to identify the control program type AFP, GDP, GS, CTOP



TFMS Release 14 Scope and Impacts: JMSDD/Schema Change

- **High Interest Release 14 Changes – New Content**
 - Added **new element** restrictionCategory – FlowInformation
 - TFMS now sends APREQ notifications

```
<xsd:simpleType>  
<xsd:restriction base="xsd:string">  
<xsd:enumeration  
value="APREQ"/>  
<xsd:enumeration value="DSP"/>  
<xsd:enumeration value="MINIT"/>  
<xsd:enumeration value="MIT"/>  
<xsd:enumeration value="STOP"/>  
<xsd:enumeration value="TBM"/>  
<xsd:enumeration value="TXT"/>  
</xsd:restriction>  
</xsd:simpleType>
```



```
<restrictionMessage>  
  <eventTime>2019-01-15T18:41:00Z</eventTime>  
  <entryTime>2019-01-15T18:42:00Z</entryTime>  
  <facility>ZLC</facility>  
  <action>4</action>  
  <restrictionId>6835255</restrictionId>  
  <restrictedNasElements>EWR</restrictedNasElements>  
  <startTime>2019-01-15T18:40:00Z</startTime>  
  <stopTime>2019-01-15T19:00:00Z</stopTime>  
  <airports>EWR</airports>  
  <aircraftType>ALL</aircraftType>  
  <restrictionType>DEPARTURE</restrictionType>  
  <restrictionCategory>APREQ</restrictionCategory>  
  <mitNumber>278544</mitNumber>  
  <reasonText>WX:Lightning Strike</reasonText>  
  <qualifier>NONE</qualifier>  
  <passback>N</passback>  
  <providerStatus>ZLA/0/Â£</providerStatus>  
  <referenceRestrictionId>0</referenceRestrictionId>  
  <remarks>test</remarks>  
</restrictionMessage>
```



Common Stumbling Blocks and Lessons Learned

- **Users must test and certify their applications with the FAA prior to deploying to Operations**
- **The rules in the AOCNET/CDMNET, and FOS ICDs apply to the associated requests in TFMDData**
- **TFMDData Request/Reply User ID coordination (commonly ‘center’ code)**
 - Users must use the same ID for both TFMS and NEMS
- **When a user sends an FDBLOCK request without the replyOption the request would previously be dropped**
 - SW was updated to default to no-reply if the replyOption is not present
- **Users were not clear what JMS properties were required**
 - The v3.1 JMSDD now includes a required column for all inbound JMS properties
- **When a Request/Reply JMS Property is included that also exists as a message attribute, they must match each other**
 - center, uniqueMsgId/UUID, requestorId, serviceCode



Common Stumbling Blocks and Lessons Learned

- **It is recommended that functions be designed to use one or the other interface**
 - TFMDData vs. Legacy
 - Messages cannot be duplicated across both interfaces
- **If using both interfaces, extreme care must be taken - especially if there are two separate applications using the two interfaces**
 - Race conditions
 - Data synchronization
 - Functional considerations
- **Retries should be no faster than 2 minutes (up to three times is normal)**
- **Validate XML messages before sending them**
 - NEMS on the NESG and TFMS validate external messages
 - Invalid messages create unnecessary load and will not receive a response



Common Stumbling Blocks and Lessons Learned

- **Set the UUID in Request/Reply interface to a unique value for each message sent including retries**
 - Allows for tracking and debugging of each individual message
 - TFMS rejects requests in which the JMS property UUID does not match the uniqueMsgid element in the message body
 - The TFMS response includes UUID set by the client, allowing end-to-end tracking of the interaction across all domains
 - End user to help match the TFMS reply to the issued request
 - NEMS for tracking messages
 - TFMS to debug potential processing issues
- **Use ICAO formatted Call Signs**
 - TFMS accepts multiple format types but ICAO is utilized for international flights



Common Stumbling Blocks and Lessons Learned

- **The IGTD time should not be modified unless absolutely necessary because it is used to match flights in TFMS**
 - The CDM/AOCnet ICD suggests that you don't modify this time
 - If it must be modified, there is a risk of creating a new flight if you are also using the Legacy interface/application and do not have the data synchronized across the 2 systems
 - Modification to this field is an *optional* data element in flightModify messages
- **To support Flight Matching the following fields are required**
 - Call Sign
 - Departure Airport
 - Arrival Airport
 - IGTD
- **flightCreate should not be sent for an active/existing flights**



Common Stumbling Blocks and Lessons Learned

- **flightCreate required fields**
 - gateArrivalTime (AIMS177569/CR45911)
 - gateDepartureTime (AIMS177569/CR45911)
- **The arrival airport cannot be changed prior to departure**
- **Rules regarding Flight Times**
 - Departure time must be before arrival time (this has happened!)
 - Actual Times must be in the past, TFMS allows a small 5 min window
 - **If modifying runway estimated departure/arrival times, the estimated time enroute (arrival time - departure time) must be within:**
 - **A minimum change factor of 0.6**
 - **A maximum change factor of 1.4**
 - ALL Times should be in ZULU and should be accurate (all times are very important)
 - Timestamps in TFMDData should **not** include milliseconds
 - Format should be yyyy-mm-ddThh:mm:ssZ i.e. 2019-11-07T10:00:00Z



Common Stumbling Blocks and Lessons Learned

- **Paired Fields**

- runwayDepartureTime & runwayArrivalTime
- gateDepartureTime & gateArrivalTime
- actualRunwayDepartureTime & actualRunwayArrivalTime
- actualGateDepartureTime & actualGateArrivalTime
- For diversion, if originalFlightIdentification is included, you must also include originalUTCDepartureDateTime (and vice-versa)



Release 13 Patch 18 Changes

- **TFMData Airport Monitor responses do not include sequences**
 - Added seqNumber and maxSequenceNumber as JMS Properties to the ARPTM Responses
- **TFMData Airport Monitor limits initial flight list to requesting airline**
 - Changed Airport Monitor responses to include all flights
- **TFMData FDBLOCK requests do not authorize properly – more than one user ID should be allowed for an airline**
 - Request/Reply authorization logic was changed to use LDAP where it looks up user authorizations that are configured based on FAA and Airline authorization
- **TFMData Airport Monitor limits flight list updates to requesting airline**
 - Changed Airport Monitor updates to include all flights
- **tmiFlightDataList messages do not set hasMinitoredDepApt or hasMonitoredArrApt**
 - Updated FlowInformation publication service to include hasMinitoredDepApt and hasMonitoredArrApt



TFMData FAQ updated for TFMData v3.1

cdm.fly.faa.gov/?page_id=2287



Federal Aviation Administration

FAA Home

About FAA

Jobs

News

A-Z Index



CDM HOME

CDM INFO

SUB TEAMS

PRODUCTS

TRAINING

DATA FORMAT

ARCHIVES

CALENDAR

CONTACT US

TFMData Service FAQ

These are frequently asked questions about the TFMS TFMData Service. The questions are grouped by the categories shown below. Click on a question to view the answer.

[Search the questions](#)

[Ask a Question](#)



CDM
Collaborative
Decision Making

TFMData – IMPORTANT NEWS!

TFMData v3.0 Sample R14 Messages are now available. Click on one of the links below to access the specific messages:

- [Flight Data](#)
- [Flow Information](#)
- [IDP](#)
- [Request/Reply](#)

[Click here for sample messages](#)



TFMData v3.0 JMSDD and schema now available for download

[Click here for more information](#)



Federal Aviation Administration

TFMS Technical Webinar Schedule

Every Second Thursday of the month.

Next TELCON Nov 14th, 2019 **1:00ET**

- Register ahead of time to receive the bridge number and passcode
- Send questions or advance TELCON topics

Chris.Burdick@faa.gov and/or
Thomas.ctr.Paccione@faa.gov







jetBlue®

EDCT/D-ATIS POC

Christopher Gottlieb | It Products NextGen

SWIM POC 2019

EDCT Dashboard POC



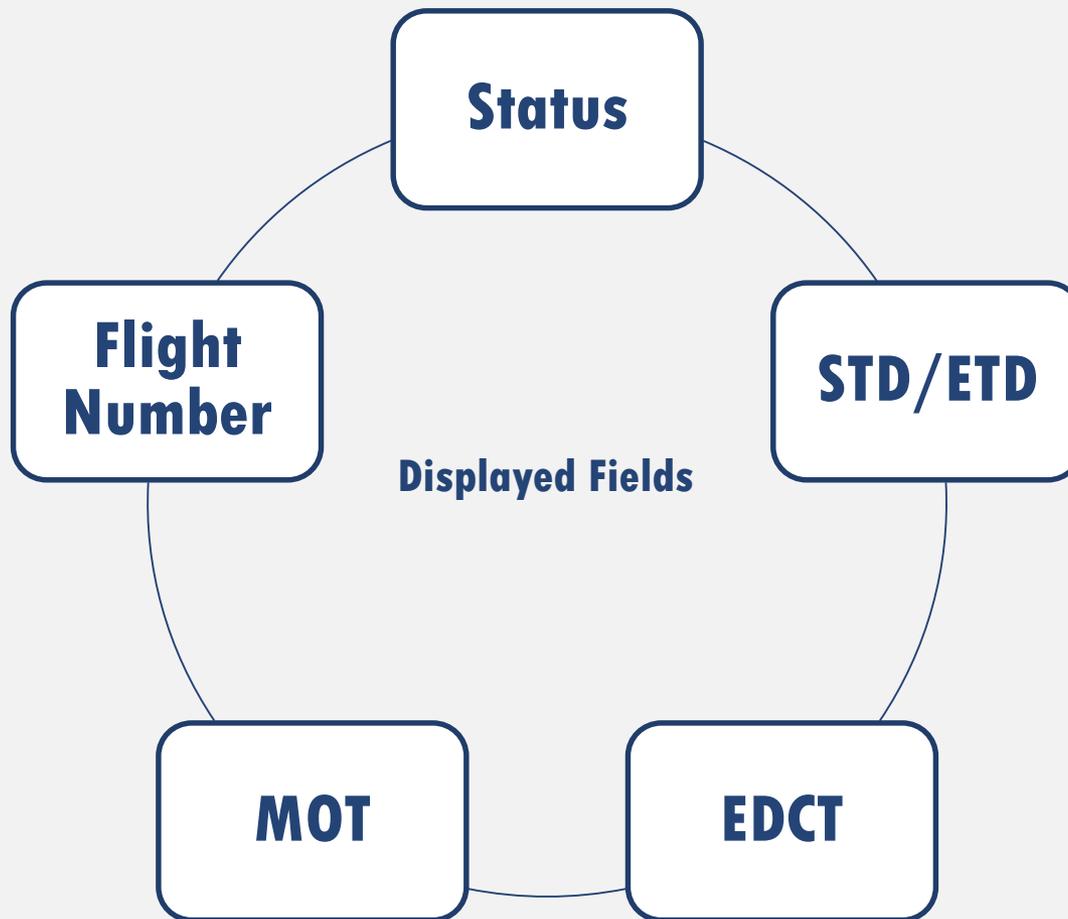
Current State

Spotfire reports, File copying

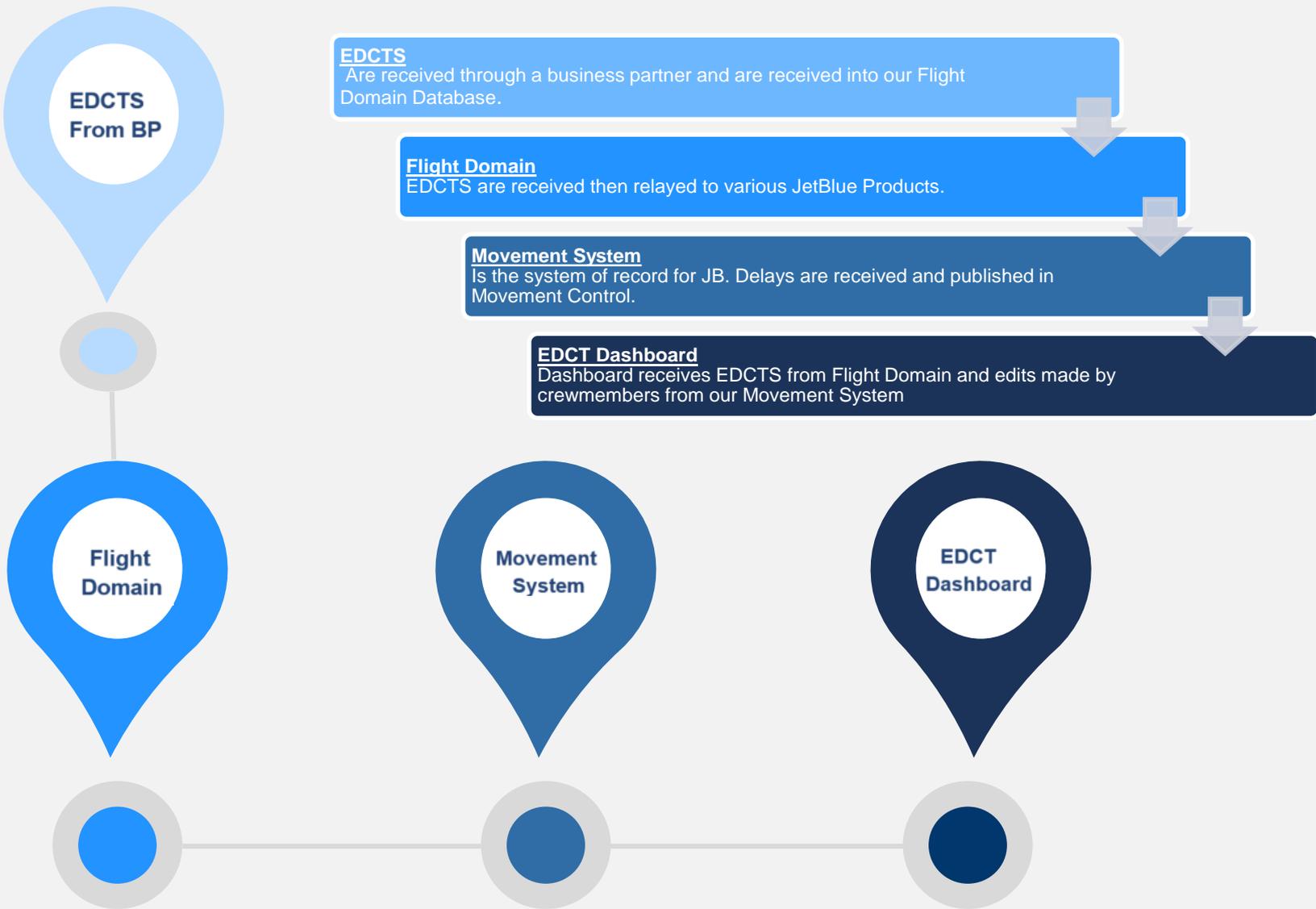
Future State

SWIM Data, More Consumed Data Fields,
EOBT





Current State



Future State

SWIM Data

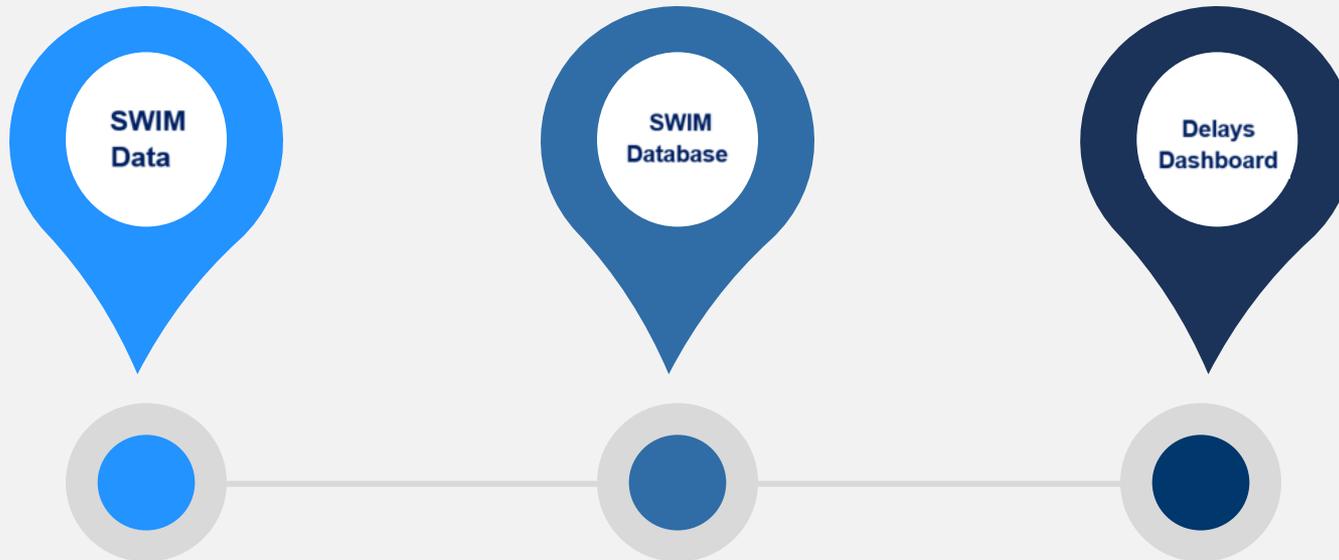
Data received from the FAA.

SWIM Database

JetBlue Hosted database to house SWIM Data

Delays Dashboard (GS,GDP,AFP,Metering)

Delay Dashboard would encompass increased sets of data , increasing our ability to make critical real time decisions.



Current

Benefits

Common situational display between workgroups.

Real Situational Awareness for Crew Legality Issues.

Yields quicker Crew Replacements.

Reduces risk of real time cancels.

Future

Benefits

Visibility into all Controlled Times.

Visibility into Metering Times.

Recording of FAA delays in single database could be used by multiple analysis teams

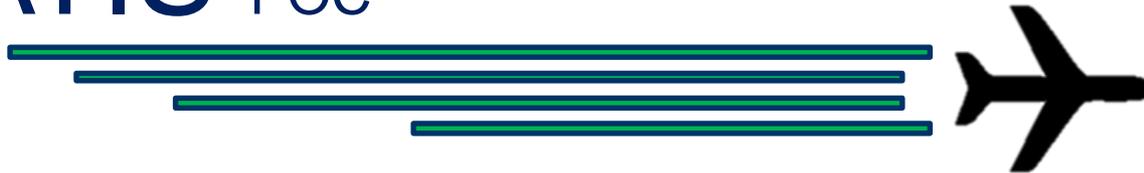
Estimated Departure Clearance Time (EDCT) Report

Last Refresh: 10:55(EST) / 14:55(UTC)

SOC Region	Flight#	Departure	Arrival	Flag	Color Coding
Type to search in list <input type="text"/>	Type to search in list <input type="text"/>	Type to search in list <input type="text"/>	Type to search in list <input type="text"/>	All <input type="text"/>	
(All) 4 values 1 2 3 4	(All) 1075 values 0001 0002 0003 0004	(All) 95 values ABQ ALB ANU ATL	(All) 95 values ABQ ALB ANU ATL	<input type="button" value="Reset Filters"/> <input type="button" value="Refresh Data"/>	

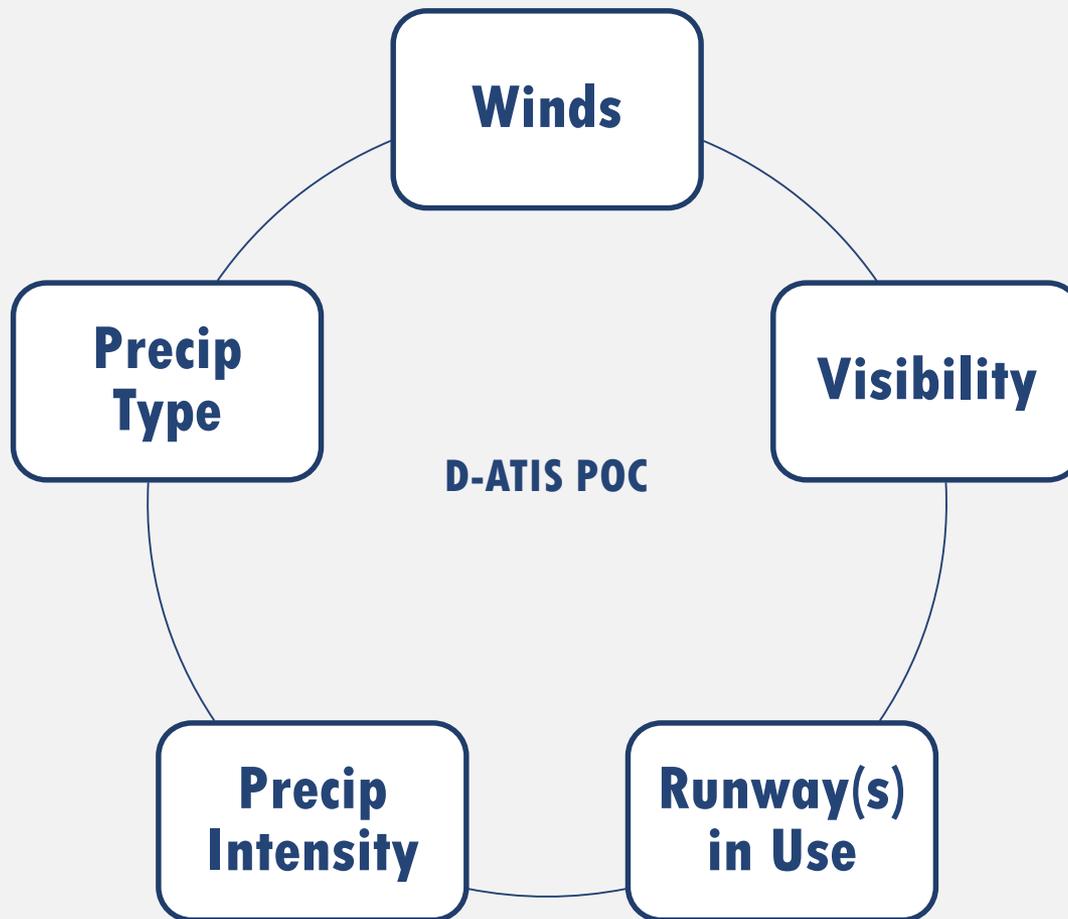
SOC Region	Dep Date	Flight#	Departure	Arrival	Status	Sch Dep (UTC)	Est Dep (UTC)	EDCT (UTC)	MOT (UTC)
3	10/31/2019	1512	RSW	EWR	On Time	11/1 00:33	11/1 00:33	10/31 02:18	
3	10/31/2019	2828	MCO	EWR	On Time	11/1 00:30	11/1 00:30	10/31 02:29	
1	10/31/2019	1059	BOS	PHL	On Time	10/31 16:33	10/31 16:33	10/31 17:13	11/1 00:44
3	10/31/2019	0574	TPA	EWR	On Time	10/31 15:48	10/31 15:48	10/31 17:47	10/31 23:23
1	10/31/2019	2379	BOS	EWR	On Time	10/31 16:28	10/31 16:28	10/31 18:01	11/1 02:32
1	10/31/2019	1711	BOS	ORD	Delayed	10/31 16:00	10/31 17:51	10/31 18:21	10/31 23:01
3	10/31/2019	0928	MCO	EWR	On Time	10/31 16:53	10/31 16:53	10/31 18:44	11/1 03:44
4	10/31/2019	0306	FLL	EWR	On Time	10/31 16:50	10/31 16:50	10/31 18:52	11/1 00:31
1	10/31/2019	2259	BOS	PHL	Delayed	10/31 18:10	10/31 18:45	10/31 19:15	11/1 03:56
3	10/31/2019	1044	PBI	EWR	On Time	10/31 18:45	10/31 18:45	10/31 21:17	11/1 05:16
1	10/31/2019	2979	BOS	EWR	On Time	10/31 19:10	10/31 19:10	10/31 21:41	11/1 07:10
4	10/31/2019	0006	FLL	EWR	On Time	10/31 19:10	10/31 19:10	10/31 21:56	11/1 05:36
1	10/31/2019	2711	BOS	ORD	Delayed	10/31 19:00	10/31 21:47	10/31 22:17	11/1 05:25
1	10/31/2019	1159	BOS	PHL	On Time	10/31 21:36	10/31 21:36	10/31 22:39	
3	10/31/2019	1628	MCO	EWR	On Time	10/31 20:16	10/31 20:16	10/31 23:06	
1	10/31/2019	2579	BOS	EWR	On Time	10/31 20:37	10/31 20:37	10/31 23:20	
2	10/31/2019	0105	JFK	ORD	On Time	10/31 20:31	10/31 20:31	10/31 23:25	
3	10/31/2019	1944	PBI	EWR	On Time	10/31 21:00	10/31 21:00	10/31 23:37	
3	10/31/2019	2074	TPA	EWR	On Time	10/31 21:07	10/31 21:07	10/31 23:41	
1	10/31/2019	1011	BOS	ORD	On Time	10/31 23:05	10/31 23:05	11/1 00:31	
3	10/31/2019	0828	MCO	EWR	On Time	10/31 22:23	10/31 22:23	11/1 01:09	
4	10/31/2019	0706	FLL	EWR	On Time	10/31 22:56	10/31 22:56	11/1 01:36	
1	10/31/2019	2679	BOS	EWR	On Time	10/31 23:32	10/31 23:32	11/1 02:17	

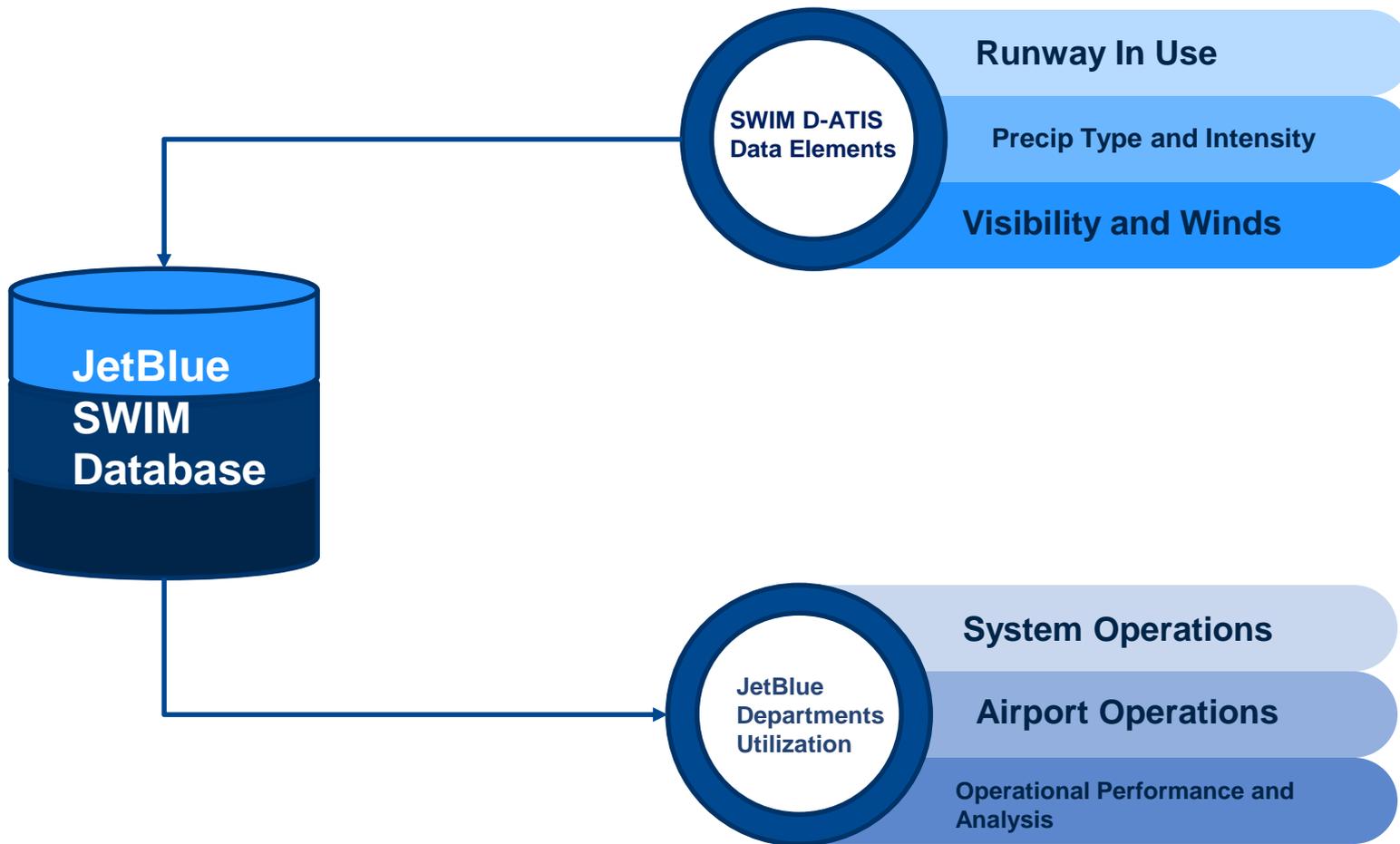
D-ATIS POC

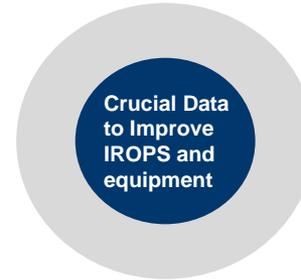
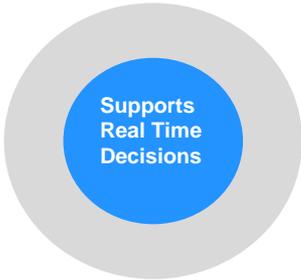


D-ATIS POC

Ingest Data to improve internal Airport throughput, equipment and Block Times









jetBlue®

THANK YOU

AIMM ACS Engagement

Presented to:
SWIFT

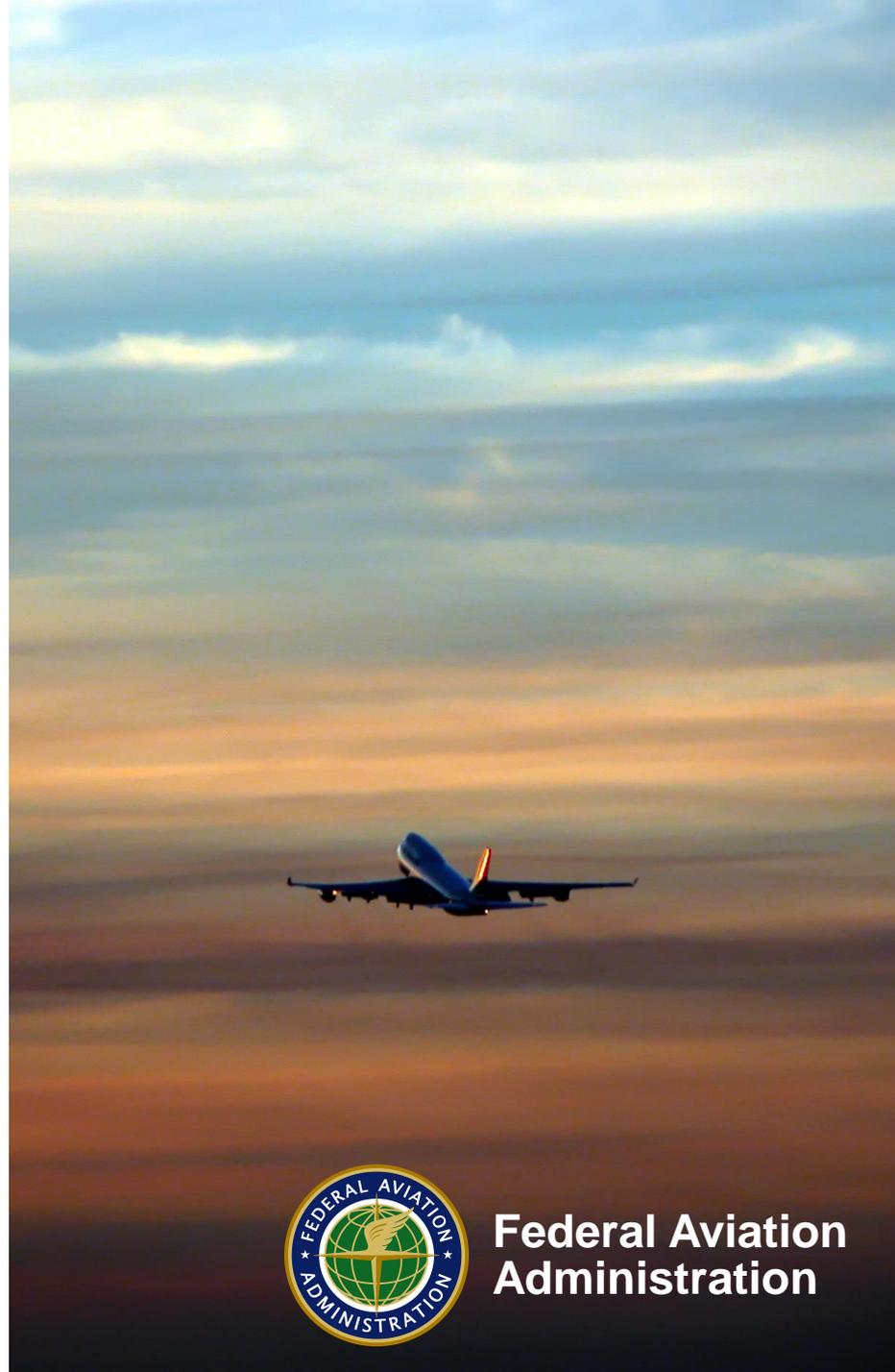
Suzanne Koppanen
FAA AIMM S2
Program Manager

Davy Andrew
FAA AIMM S2
Program Manager

November 7, 2019



**Federal Aviation
Administration**



Agenda

- **Aeronautical Common Service (ACS)**
 - AIMM Overview
 - ACS Data and Services
 - ACS Operational Scenarios
 - ACS Consumer Testbed (ACT)



AIMM Overview

- Three phases planned for Aeronautical Information Management Modernization (AIMM)
- Aeronautical information delivered as data instead of products

AIMM S1 

- Established FNS
- Improved airspace reservation system

AIMM S2 

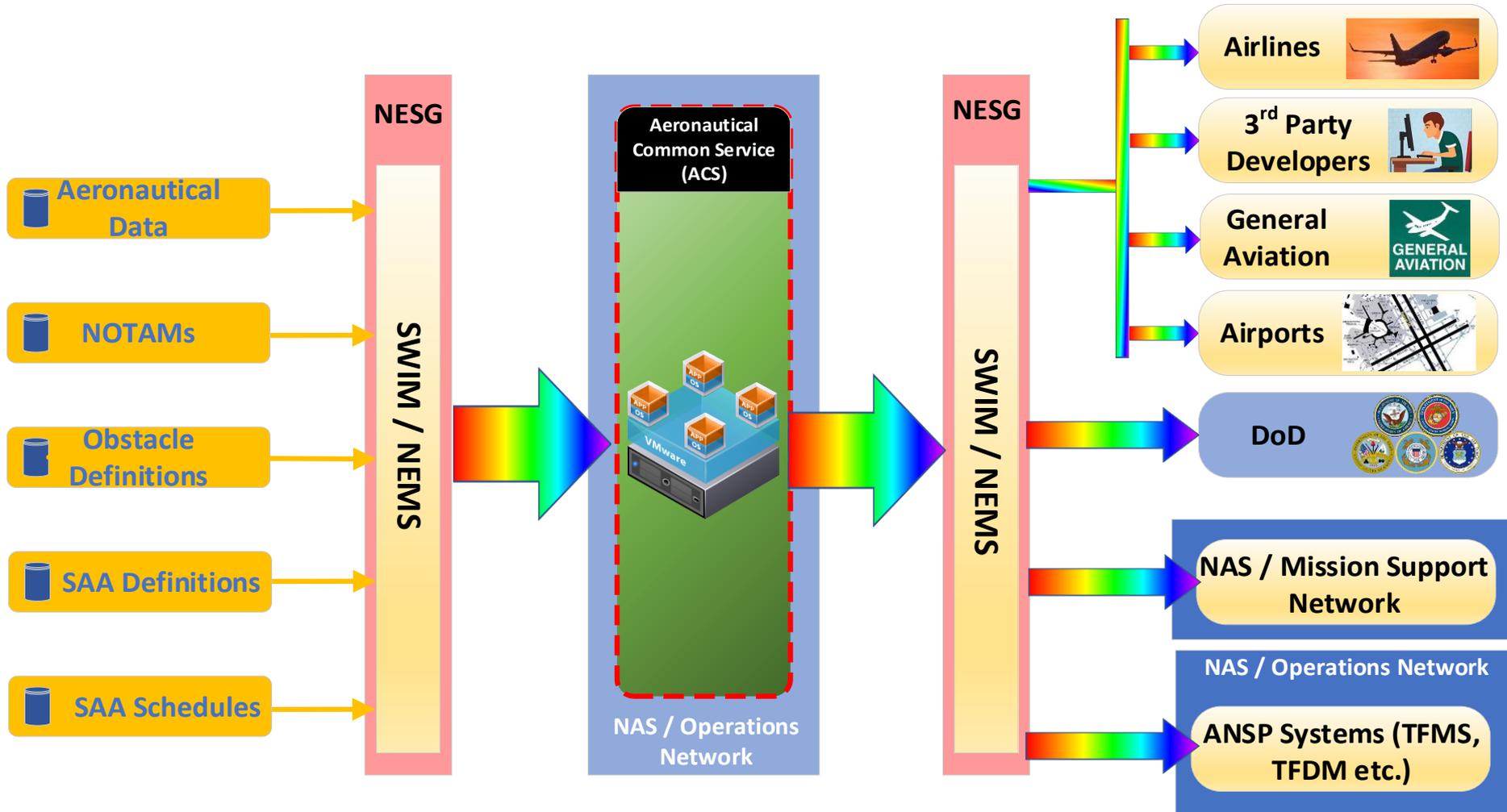
- Implements Aeronautical Common Service
- Distribute Aeronautical Data over SWIM

AIMM E1 

- FNS improvements
- Airspace tool
- Improved ACS Queries



ACS Data Sources and Web Services



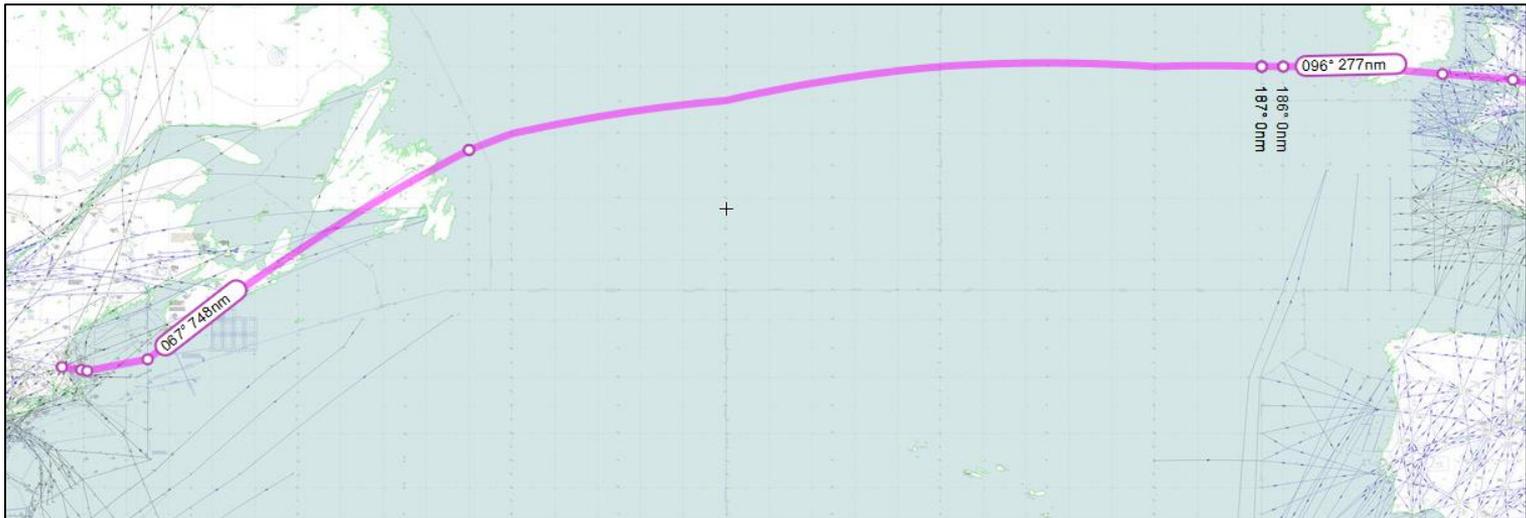
ACS Web Services

- **Users have the ability to query Aeronautical Information through the ACS**
- **ACS currently provides eight different web services (nsrr.faa.gov):**
 - Web Feature Service
 - Data Query Service
 - Data Subscription Service
 - Web Map Service
 - Web Map Tile Service
 - Airspace Conflict Detection
 - Geodetic Computation
 - Post Operational Metrics



Operational Scenario: Alternate Airport Planning

An international flight is planning to return to Boston (BOS)



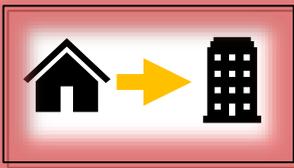
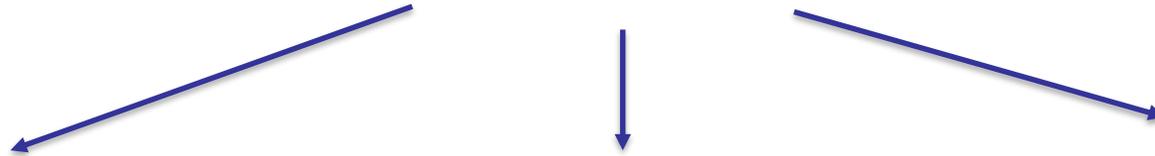
Operational Scenario: Alternate Airport Planning

Crew selects Bangor (BGR) for alternate airport

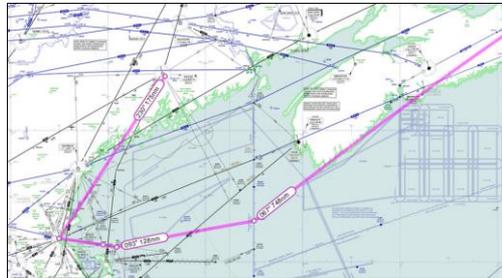


Operational Scenario: Alternate Airport Planning

Present Day: FOC uses variety of sources for planning



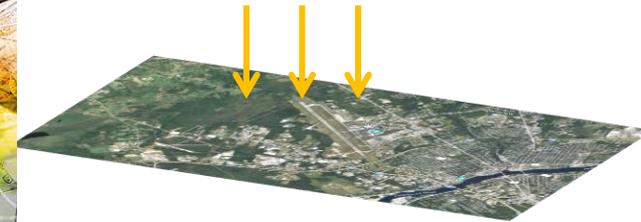
**Obstacle
Search**



Multiple Charts



NOTAM Search



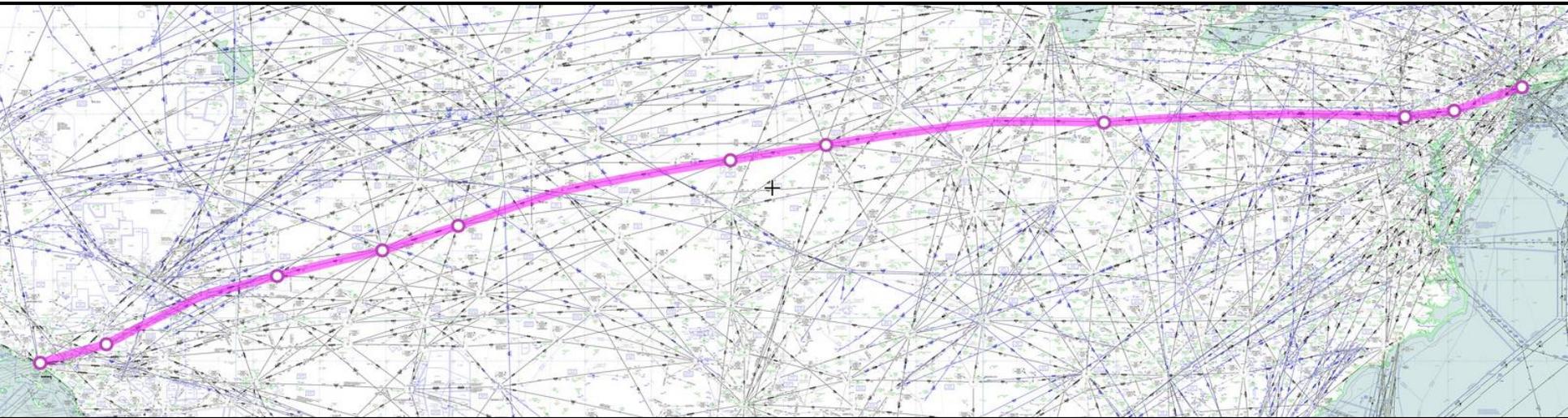
Operational Scenario: Alternate Airport Planning

To-Be: FOC uses ACS Web Services for alternate planning



Operational Scenario: Pre-Flight Planning

Dispatch is planning LAX – JFK and runs queries in ACS for Aeronautical Information and NOTAMS



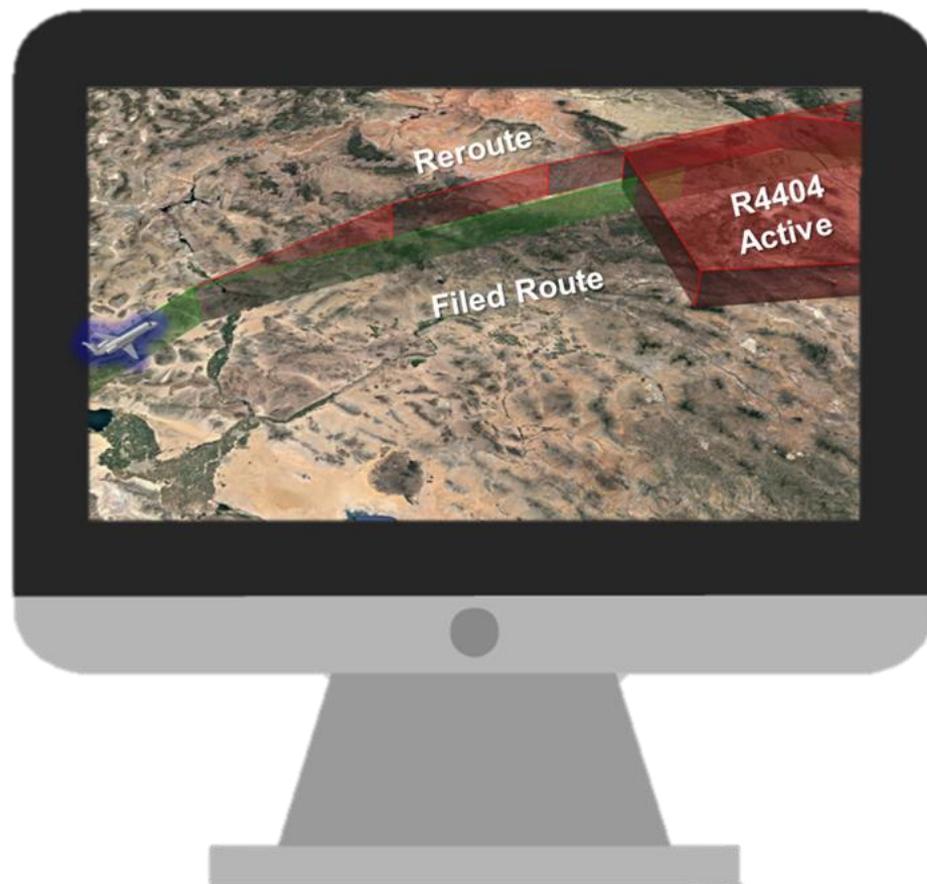
Operational Scenario: Pre-Flight Planning

Subscription Service Notifies dispatch of two updated NOTAMs



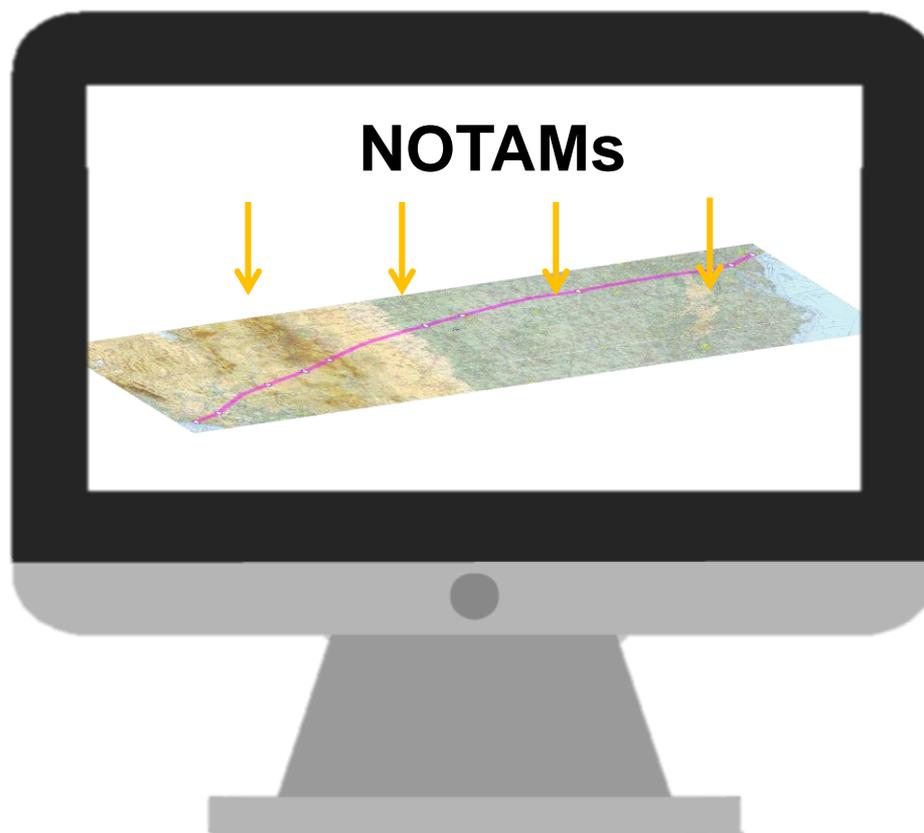
Operational Scenario: Pre-Flight Planning

Airspace Update: Dispatch identifies alternate route to avoid active airspace



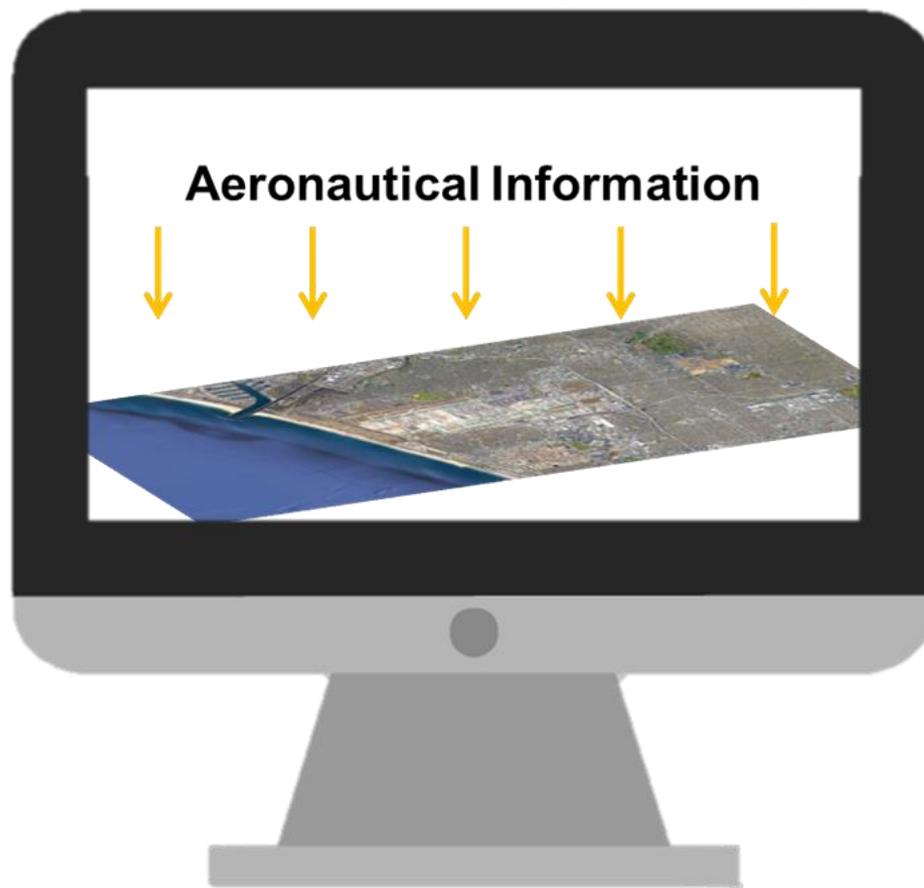
Operational Scenario: Pre-Flight Planning

Dispatch utilizes Web Feature Service Queries identifying NOTAMs and overlays on Web Map Service



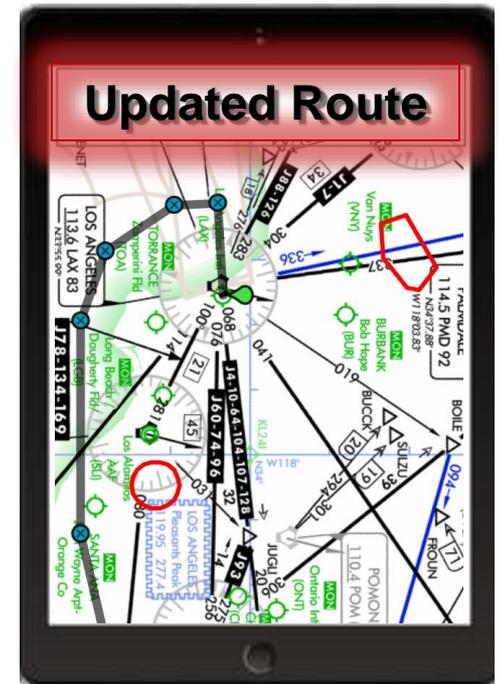
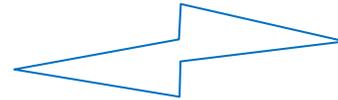
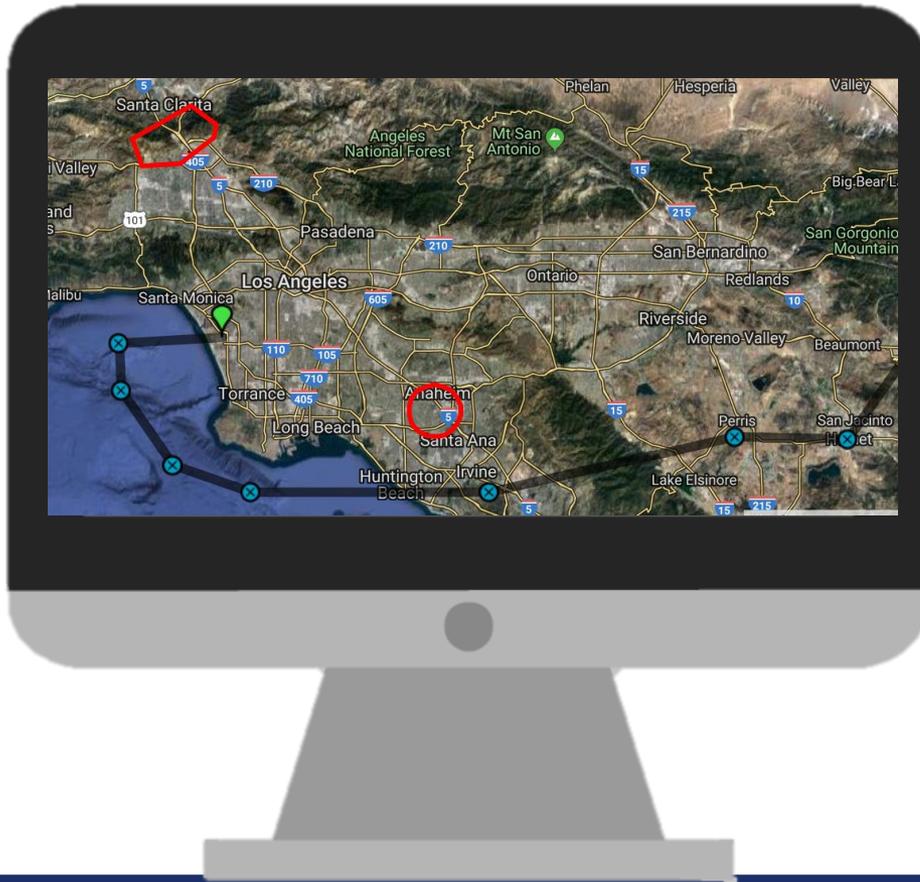
Operational Scenario: Pre-Flight Planning

Crane NOTAM: Dispatch uses Web Feature Query to display crane & other aeronautical information along route of flight



Operational Scenario: Pre-Flight Planning

Dispatch consolidates data from ACS and updates departure and route of flight



ACS Consumer Testbed (ACT)

- **Created in the SWIM R&D domain**
 - Stakeholders get an early access to available ACS data, functionality and SWIM onboarding processes
 - Familiarization with the integrated aeronautical data environment
- **The ACT will provide users the ability to:**
 - Develop and test functionality, and capability of ACS
 - Interact with and understand the aeronautical information available through the ACS



ACT / ACS Timeline

**ACT 1:
Canned Data**

**ACS
Operational**

November

December

January

February

March

April

May

June

July

**ACT2:
Live Data**



ACS Consumer Test-Bed (ACT 1)

- **Ready for users now**
 - Working with STDDS and other FAA Stakeholders
- **Complete static data set**
- **8 Web Services available to query data set**
 - Data Subscription Web Service available by request only
 - ACT Team will coordinate with stakeholders to generate changes to trigger service
- **Steps needed to use ACT 1:**
 - Become a SWIM Consumer
 - On-ramping credentials from NEMS
 - Coordination with ACT Team



ACS Consumer Test-Bed (ACT 2)

- **Ready by Spring 2020**
- **Operational data**
- **Stakeholder load testing**
- **All 8 Web Services will be available to query data**



Questions

- **For Technical and Programmatic Questions**

Email: 9-ATO-ACSCConsumer@faa.gov



DEDICATED TO HELPING BUSINESS ACHIEVE ITS HIGHEST GOALS.



NBAA Case Study: Refining Airspace Restrictions with SWIM Update

November 7, 2019 | Atlanta, GA

Ernie Stellings
Jay Zimmer



Executive Summary



Environment:

- Many NBAA operators are caught in Airspace Flow Programs (AFP) when they are overflying areas with no plans to descend, so they receive unnecessary restrictions
 - Common in ZJX on southbound flights to Caribbean, ZOB/ZNY on eastbound flights to New England
- ZJX ATC is aware of the situation but unable to issue waivers to only high-altitude overflights due to airspace design (only 1 altitude block in higher en route sectors)
- ZNY has both low and high-altitude en route sectors
- NBAA members vary in size and lack access to pertinent NAS data (OIS, etc.) in a mobile delivery mechanism

Problem statement:

- No clear tools available to help traffic managers determine if overflights should be captured in AFP initiatives when landing in more distant areas than the constrained area

Executive Summary (Cont'd)



Impact:

- If it can be proved that delayed overflights are a common problem across user groups, it may be beneficial to amend AFP procedures in ZNY, potentially other airspaces with similar issues
- Depending on top of altitude where flight are exempt, for example, an AFPs at FL120-FL380 would also benefit some of the air carriers who operate above that on overflights.
 - In essence, by removing NBAA flights/higher air carrier flights, the AFP delays are less for all operators due to less demand

Goal:

- Use SWIM data to resolve how common it is for overflights to be caught in AFPs and unnecessarily delayed
- Use CDM processes to make ZNY aware of the issue and see if it can be ameliorated

Problem Description



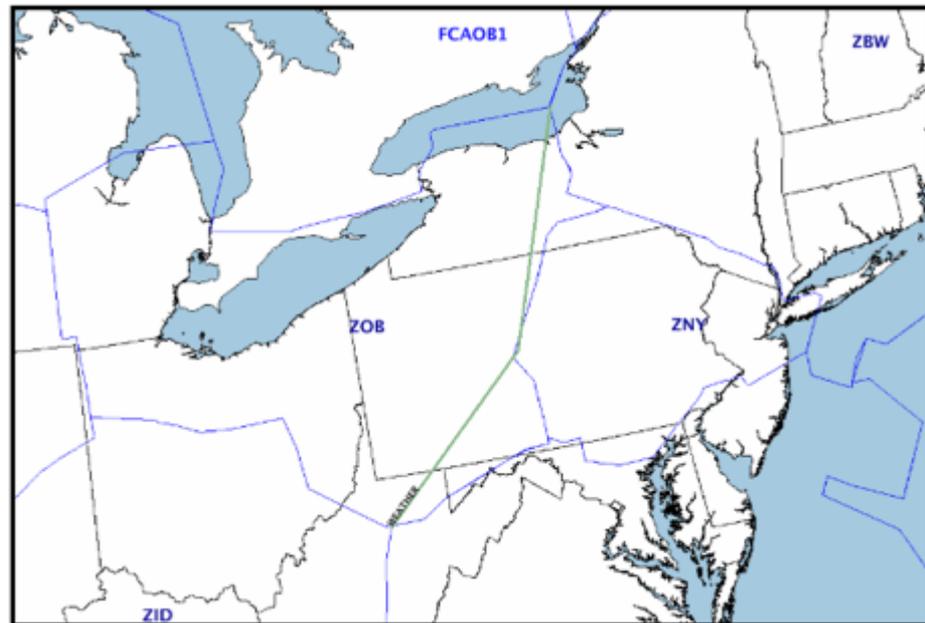
- ZOB/ZNY AFPs include traffic restrictions for overflights at higher altitudes that are landing outside of ZOB/ZNY
- Can we use SWIM data to show restrictions can be refined to lower altitudes to avoid overflights that are adversely impacted?
- Metrics: Minutes saved per program, time savings for members (loss of efficiency), arrival airport resources (i.e., logistical problems, like Limo Services; potentially qualitatively)

ATCSCC Advisory

ATCSCC ADVZY 029 FCAOB1 06/06/2010 CDM AIRSPACE FLOW PROGRAM

MESSAGE: CTL ELEMENT: FCAOB1
ELEMENT TYPE: FCA
ALTITUDES INCLUDED: FL120 TO FL600
ADL TIME: 1425Z
DELAY ASSIGNMENT MODE: DAS
ENTRY ESTIMATED FOR: 06/1700Z - 07/0259Z
CUMULATIVE PROGRAM PERIOD: 06/1700Z - 07/0259Z
PROGRAM RATE: 90/90/95/95/100/100/100/100/100/100
POPOP FACTOR: 6/6/6/6/6/6/6/6/0/0
FLT INCL: ALL FLIGHTS IN FCAOB1 DYNAMIC FLIGHT LIST
DEP SCOPE: (ALL) ZAB ZSE ZFW ZKC ZME ZTL ZOA ZLC ZLA ZAU ZMP ZDV ZID
ZMA ZHU ZJX ZBW ZOB ZDC ZNY
CANADIAN DEP ARPTS INCLUDED: NONE
MAXIMUM DELAY: 104
AVERAGE DELAY: 43
IMPACTING CONDITION: WEATHER / THUNDERSTORMS
COMMENTS:

EFFECTIVE TIME: 061429 - 070359
SIGNATURE: 10/06/06 14:30



Study Methodology



- Develop widget to ingest SWIM data to provide insights
- Record flight data for days with ZOB/ZNY AFPs
- Identify flights that do not descend in ZOB/ZNY
- Analyze route strings/altitudes to identify the where ‘non-descending’ flights operate
 - “Are there common routes where this situation commonly occurs?”
- Identify flight stratum/locations where majority of flights are overflights that receive unnecessary restrictions
 - “If my flight is at X altitude above Y fix it always gets hit with this delay unnecessary so what can I do about it?”

Post-Study Solutions



- If study can prove unnecessarily delayed overflights are a systemic problem, conclusions can be used improve CDM options:
 - Direct negotiation with ZNY/ZOB for specific flights/altitudes for tactical flight management
 - Reduce ceiling of AFPs so high altitude flights are not restricted/throughput restricted
 - Exempt flights landing outside of ZOB/ZNY or ARTCCs that do not require descent in ZOB/ZNY (e.g., eastbound to New England)
 - Modify shapes of AFPs to allow a track for overflights

Planned Widget Development to Support Study



- Ingest AFP data from Traffic Flow Management System (TFMS)
- Identify all flights affected by an AFP
 - Ingest TMI Flight List message, which lists all flights affected by an AFP (and other TMIs)
 - Began recording TMI Flight List message in July to prepare for severe weather season
- Cross reference TMI Flight List with SWIM Flight Data Publication Service (SFDPS) flight plans/track data to identify filed routes of each flight
- If necessary, query database directly to identify additional patterns in the data

Widget Development Issues & Future Development Planning



- TMI Flight List did not include the name of the TMI the list is for, unable to use list
 - Will revisit this message to see if there are alternate ways to correlate the messages
- Fuel Advisory Delay Table (FADT) lists unscheduled flights affected by a TMI, this message does include the name of the TMI, used this list instead
 - Due to development delays, did not start ingesting FADT until September – after severe weather season in Northeast ended
- Include flight lists for other TMIs (e.g., ground stops, ground delay programs, etc.)
- Reassess data Spring/Summer 2020 during severe weather season

Widget Development to Identify Affected Flights



SWIM: AFP x +

Not secure | ec2-52-10-209-24.us-west-2.compute.amazonaws.com/content/pages/afp.php

Incognito

SWIM Flight Table Bar Charts Pie Charts Flight Restrictions AAR/ADR Flight Table (extended) Weather Route Enroute Fix Load Ticker AFP DATIS

Airspace Flow Programs

Display records per page

Search:

Date and Time of AFP	AFP Name	AFP Status
2019-09-05 15:25:17	FCAMA9	ACTUAL
2019-09-05 15:25:17	FCAMA9	PURGED
2019-09-06 17:04:00	FCADO1	PROPOSED
2019-09-06 17:20:10	FCAMA9	ACTUAL
2019-09-06 17:20:10	FCAMA9	PURGED

Showing page 1 of 15

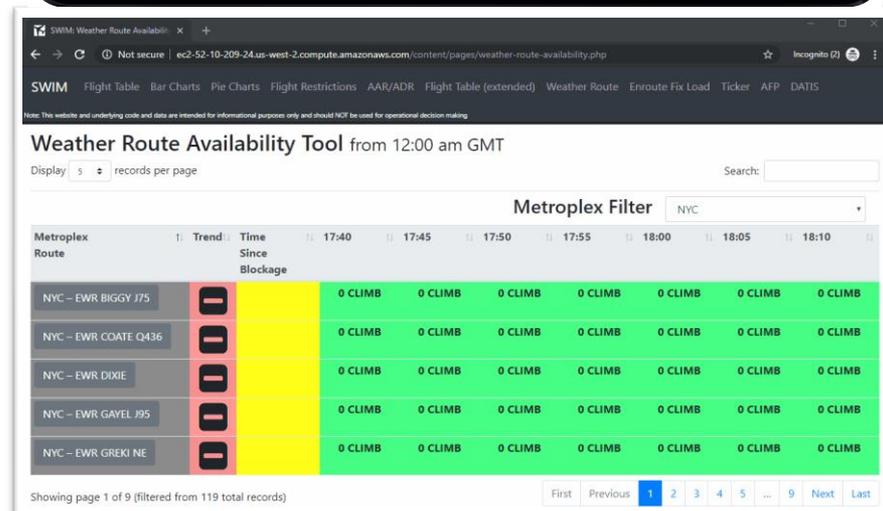
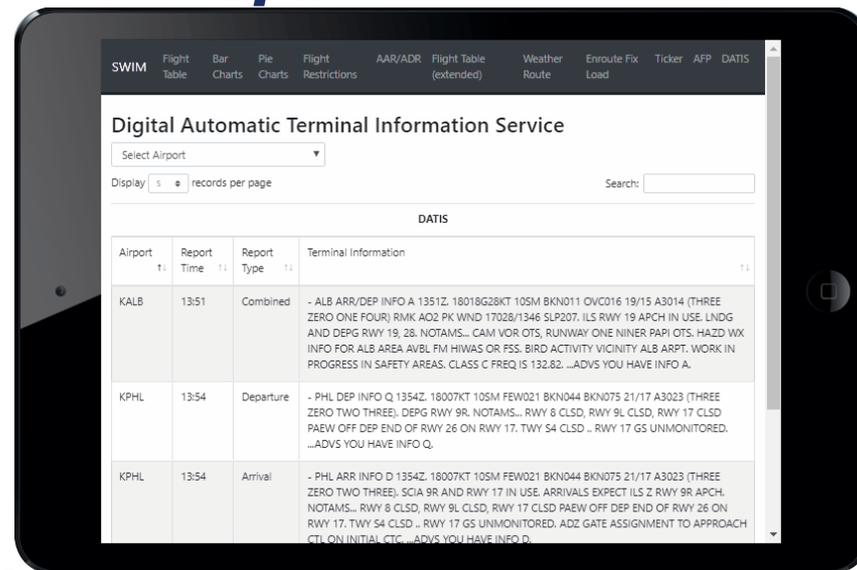
First Previous **1** 2 3 4 5 ... 15 Next Last

Airspace Flow Programs

This table shows days where Airspace Flow Programs were instituted to mitigation weather and air traffic flow management constraints. Each AFP includes the affected flights and associated flight information.

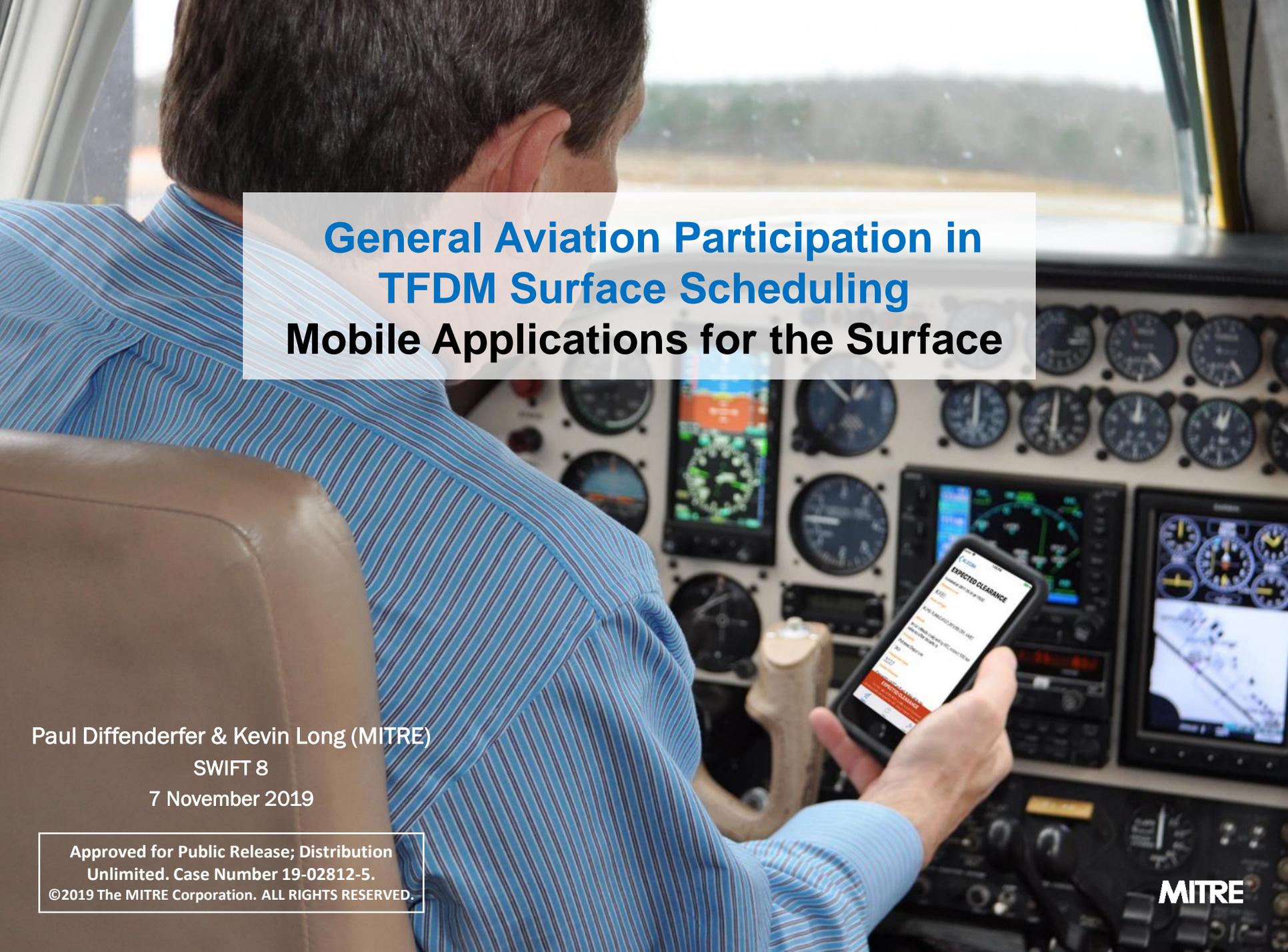
Additional SWIFT Widget Development

- Stay after the next break for a demo of other SWIFT widgets
 - Digital Automatic Terminal Information Service (D-ATIS)
 - Route Availability Planning Tool (RAPT)
 - Airport Arrival/Departure Rates
 - Flight Routes, Arrival/Departure times, delays
 - More!





**DEDICATED TO HELPING BUSINESS
ACHIEVE ITS HIGHEST GOALS.**



General Aviation Participation in TFDM Surface Scheduling Mobile Applications for the Surface

Paul Diffenderfer & Kevin Long (MITRE)
SWIFT 8
7 November 2019

Approved for Public Release; Distribution
Unlimited. Case Number 19-02812-5.
©2019 The MITRE Corporation. ALL RIGHTS RESERVED.

MITRE



Flight Plan Service Providers



Bring Value to the NAS



Bring Value to Their Customers

Research image by Unknown Author is licensed under [CC BY-SA-NC](#)

Reality image by Unknown Author is licensed under [CC BY-NC-ND](#)

Our Mission

Explore concepts and technologies to improve the handling of arrival, departure, and airport surface traffic.

Departure Management Overview

Initiatives and Factors Driving Surface and Departure Management Improvements



Surface and departure research



FAA investments in new surface automation – Terminal Flight Data Manager (TFDM)

89 TFDM Sites – 27 Config A.



Transition to time-based management in the NAS



Improved data sharing and connectivity, including mobile tech

Uncertainty Makes Departure Management Challenging

A large commercial airplane is parked on a tarmac at sunset. The sky is a mix of orange, yellow, and blue. The airplane is white with a blue stripe. The tail fin is visible on the right. The wings are spread out to the left. The ground is dark and reflective. In the background, there are airport buildings and other planes.

- Maintenance issues
- Connecting flights/passengers
- Crew status
- Passenger loading
- Baggage/cargo loading
- Fueling
- And more...

Flight operators are often the best source of information regarding the status of their flights

Another Source of Uncertainty



Charlotte

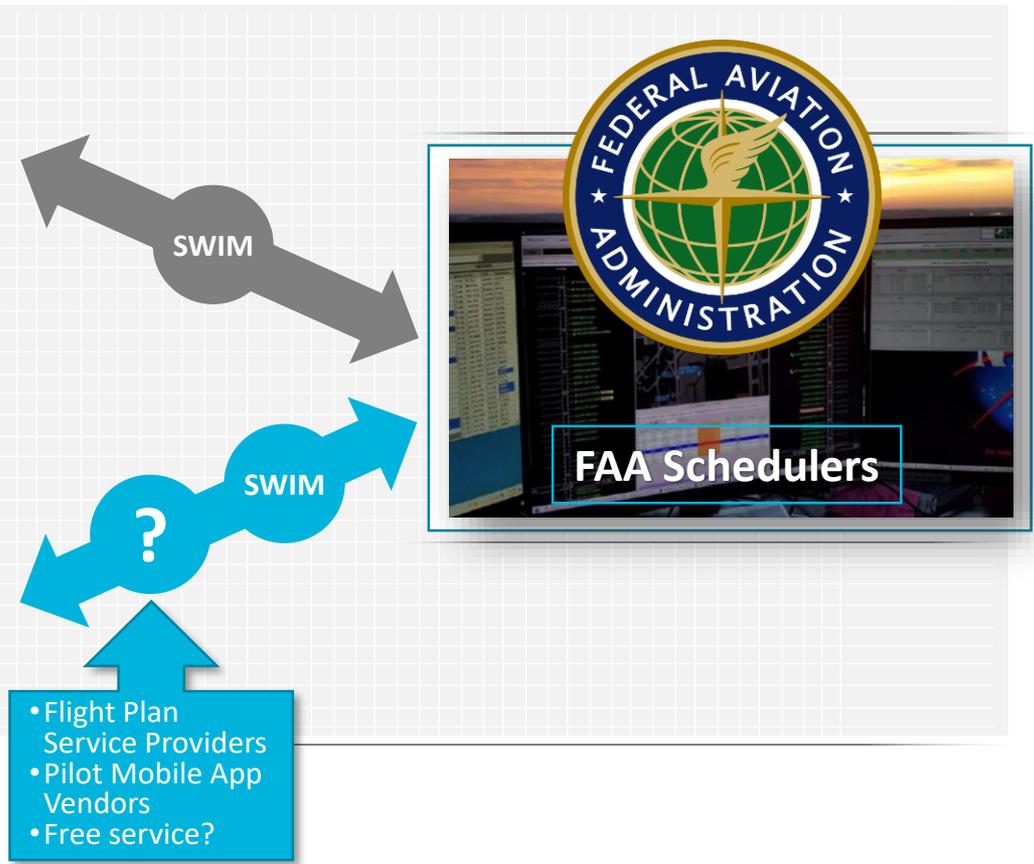


Las Vegas, Dallas Love



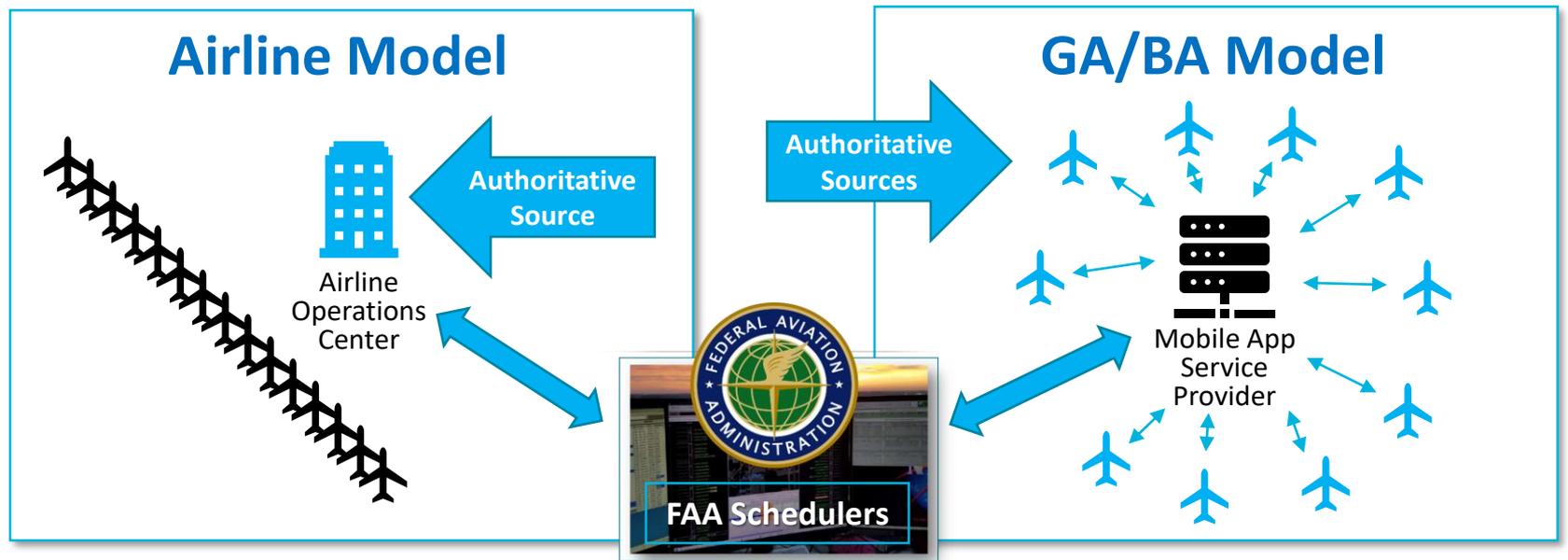
Teterboro

How Will GA/BA Operators Exchange Departure Readiness Data?



Policy Questions

- What is the responsibility of the service providers when exchanging CDM data for their customers?



- What is the consequence of inaccurate or incomplete readiness data in the GA/BA model?

Understanding the User Environment and Operations

Earliest Off Block Time (EOBT)

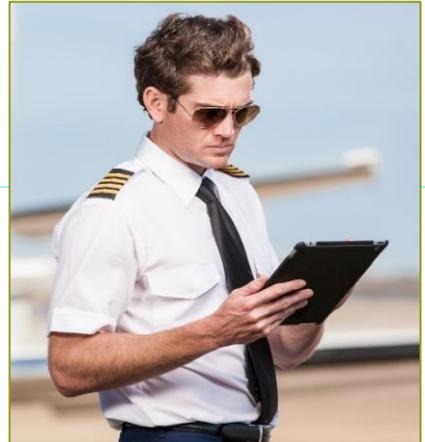
A time submitted by GA/BA flight operators or pilots to indicate when they plan to be ready to taxi. This means, engines running, at appropriate spot on the ramp, ready to contact Ground Control for taxi.

Departure Planning Flow for GA/BA Operators



Capabilities Should Be Integrated into Existing Applications

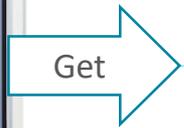
Ability to submit data



**Callsign
Parking Location
EOBT (estimated taxi time)**



**Maps – Charts
Flight Plan Filing
Traffic – Weather**



Ability to receive data



**Airport demand
TMATs (scheduled taxi time)
Expected runway
Delay & TMI information**

TMI = Traffic Management Initiative



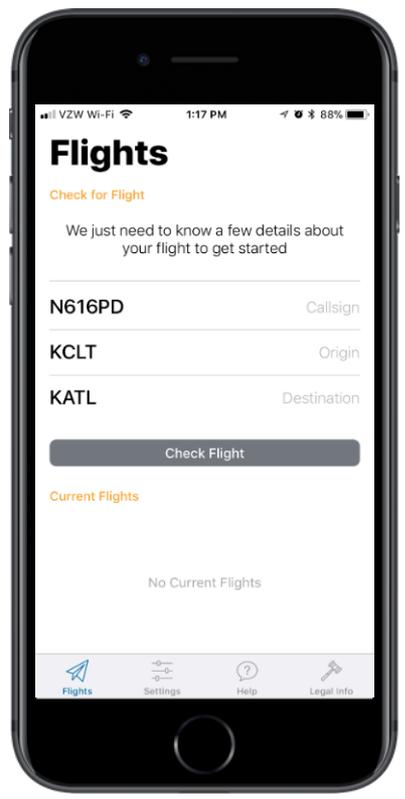
Research Overview

Current Research

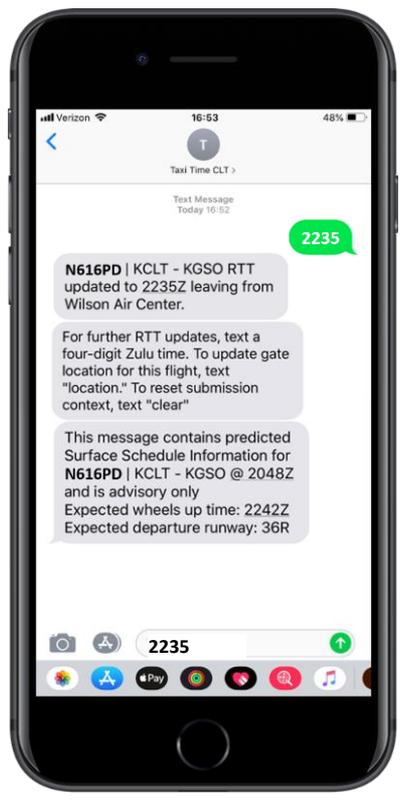
MITRE is using mobile technology to enable the submission of departure readiness information, specifically EOBTs, by GA and BA pilots at three airports:

			 
Readiness submission timeframe	Tactical		Strategic/Early intent
Managed resource	Airport Surface	Terminal Departure Fixes	Airport Surface
Info available to pilot	Surface/schedule data: runway, TTOT, delays	Airport surface demand	
	 <p><i>*In collaboration with NASA as part of ATD-2</i></p>		

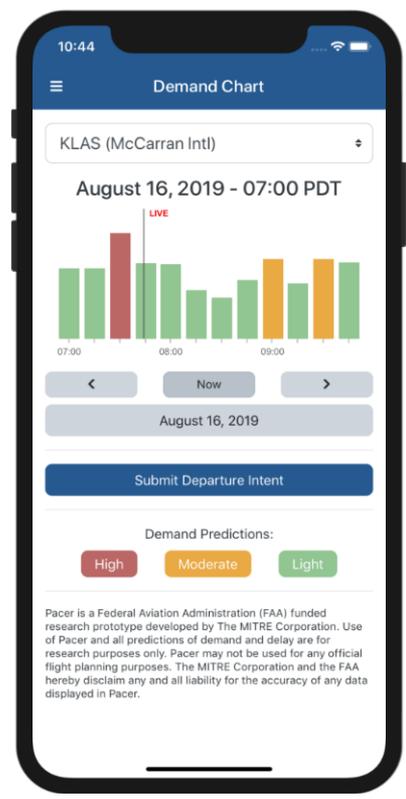
MITRE Prototype User Interfaces



Native apps



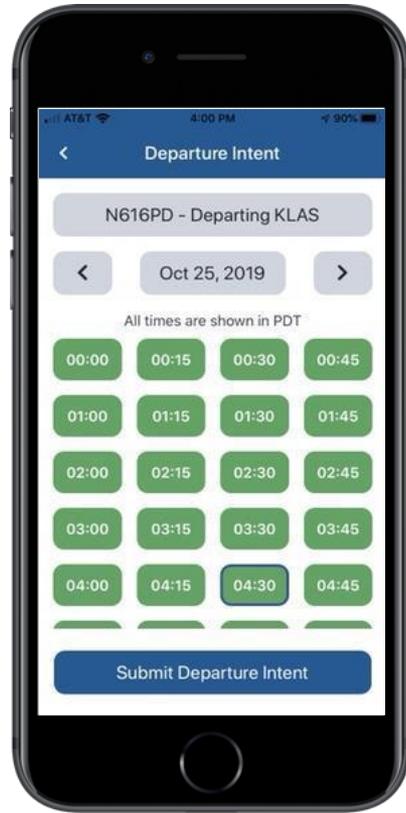
SMS/texting



Progressive web app



Progressive Web App – DAL, LAS, & HND www.pacer.aero



User Interfaces

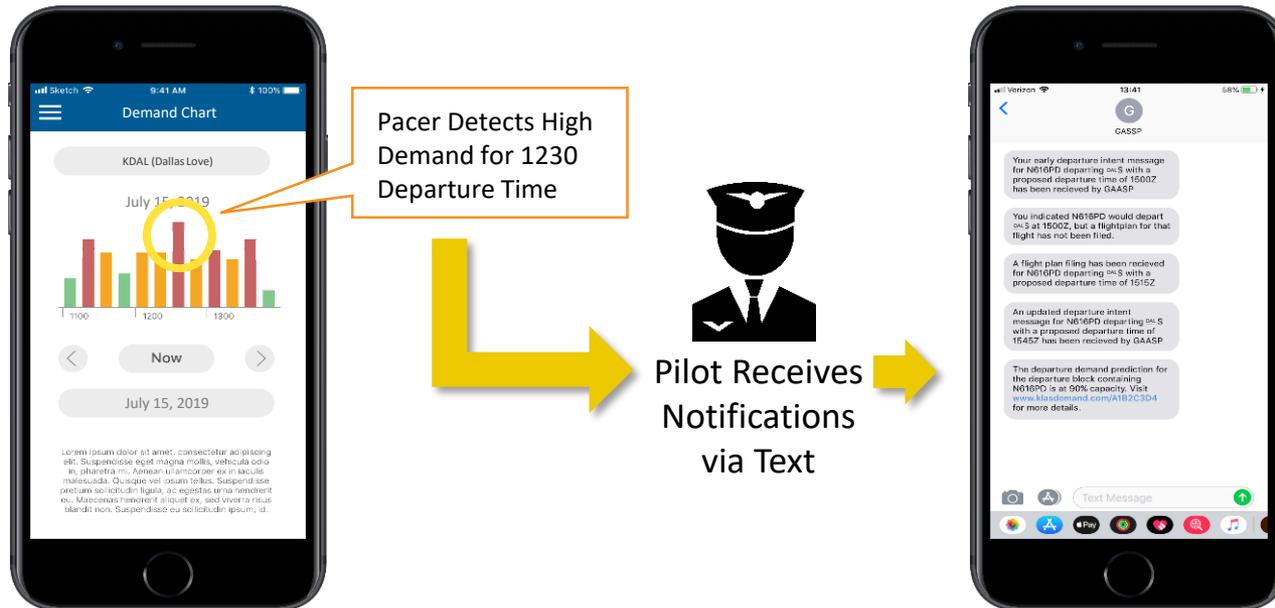
-  Pilot
-  Flight Ops Center / FBO
-  Traffic Managers
-  Special Events

Supported Devices

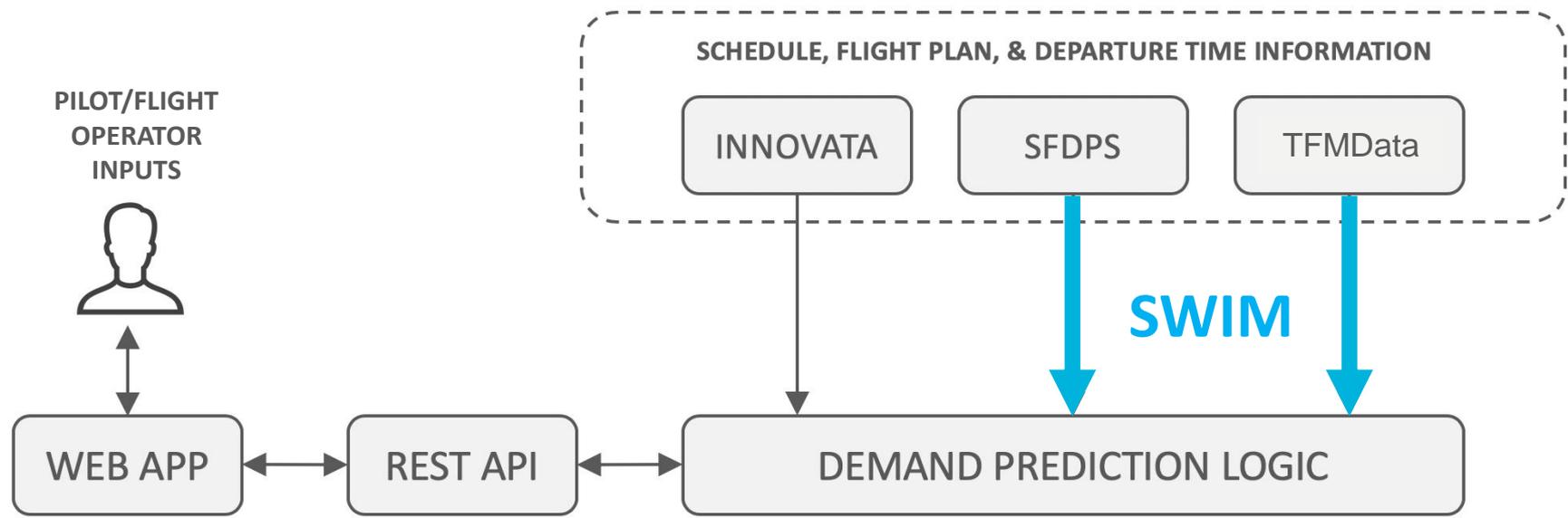
- 
- 
- 

Receiving Notifications with Pacer

- The mobile application will automatically notify users via text messages regarding certain conditions

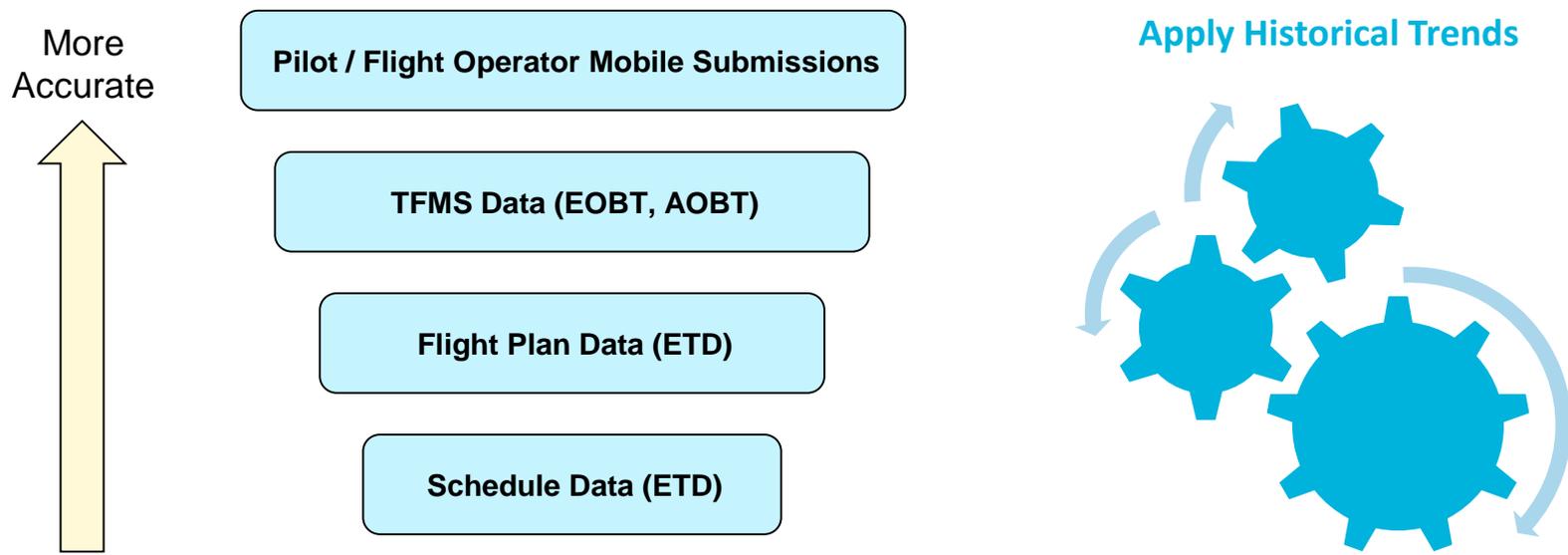


Building the Demand Picture in Pacer



SFDPS = SWIM Flight Data Publication Service
TFMDData = Traffic Flow Management Data Service

Predicting Departure Readiness in Pacer



Pacer Demonstration

Potential Impact of Tools Like Pacer

The Present – Demand Awareness Tools
Evidence shows that with an awareness of departure demand, GA/BA pilots tend to seek out lower departure demand periods, resulting in less delay.

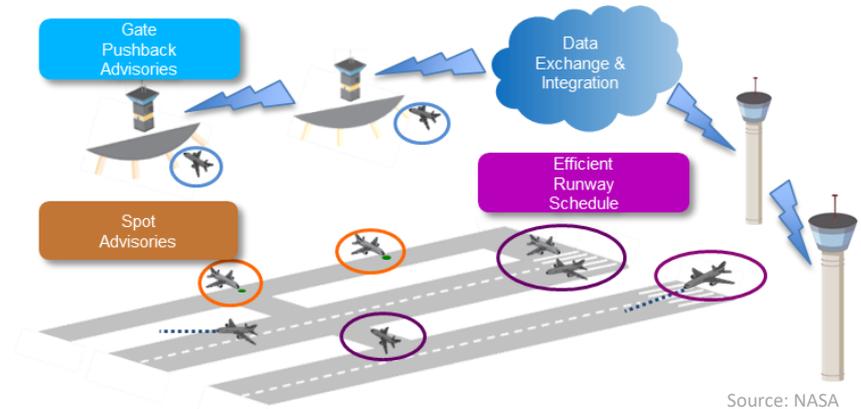


WITHOUT TOOL

Mayweather vs Pacquiao – May 2015
• **542 delays** – 1005 departure

WITH TOOL

Mayweather vs McGregor – Sep 2017
• **88 delays** – 1010 departures



The Future – TFDM Surface Metering Environment

- More accurate departure demand predictions
- GA/BA will participate in surface scheduling
- During metering, only holds slots for actual flights

2021 and Beyond: Exchanging Data

Using a Mobile Device to Exchange Departure Readiness Information Future State

1 Pilot transmits readiness time to app provider backend server



Ready-to-taxi Time: 1925Z
Parking Location: West Ramp

Expected departure runway: 36R
Expected taxi time: 1933Z
Expected wheels up time: 1945Z
No expected traffic mgmt delays

6 App provider forwards data to pilot

2 App provider server forwards EOBT and parking location to FAA

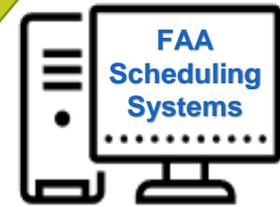


SWIM



5 FAA publishes schedule related information such as expected runway, TMAP, TTOT, and TMIs

3 Data is received by appropriate FAA scheduling systems



4 Controllers use information from TFDM, TFMS, and TBFM

NASA currently publishes TFDM Terminal Publication (TTP) data on the SWIM research and development network.

Roles of Mobile Application Service Providers

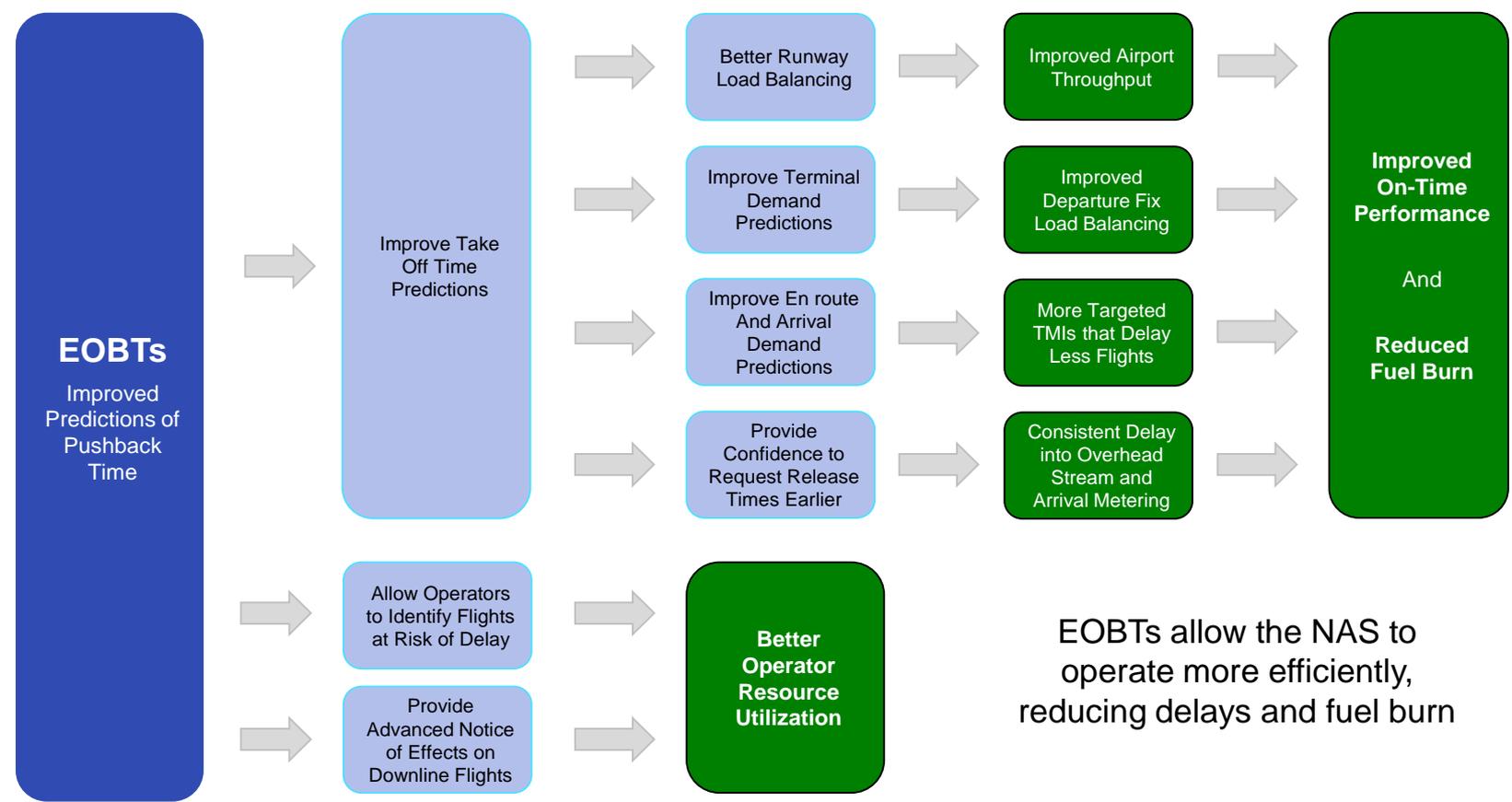
With Examples

- 1. Develop and deploy a GA data exchange capability**
 - Seamlessly integrate capability into apps used by pilot
 - Make it part of pilot's normal pre-departure workflow
- 2. Incentivize GA flight operator participation**
 - Through earlier awareness of expected departure delay and relevant TMI
- 3. Collect, validate, and provide data to FAA scheduling systems**
 - Ensure that data provided by GA operators is reasonable for the flight
- 4. Harmonize disparate operational environments**
 - Help translate nomenclature of GA operators into Collaborative Decision Making (CDM) terminology and vice versa
- 5. Establish and enforce policies**
 - Making customers aware of CDM Data Quality Code of Conduct

Benefits of Exchanging Departure Readiness Data

- Gives ATC a better view of surface demand and allows them to make more informed decisions
- Provides the flight operator more visibility into ATC scheduling and planning
- Allows better scheduling of resources, both on the surface and airborne
- Enables FAA to share relevant departure information with pilots, such as expected takeoff time, expected departure queue wait time, and TMI
- Reduces the need for uncertainty buffers in scheduling
- Facilitates better departure planning for flight operators
- Enables greater predictability for the flight operators

Other Potential Benefits of EOBT



EOBTs allow the NAS to operate more efficiently, reducing delays and fuel burn

Questions

MITRE NOTICE

This work was produced for the U. S. Government under Contract Number DTFAWA-10-C-00080, and is subject to Federal Aviation Administration Acquisition Management System Clause 3.5-13, Rights In Data-General, Alt. III and Alt. IV (Oct. 1996). No other use other than that granted to the U. S. Government, or to those acting on behalf of the U. S. Government, under that Clause is authorized without express written permission. The contents of this material reflect the views of the author and/or the Director of the Center for Advanced Aviation System Development. Neither the Federal Aviation Administration nor the Department of Transportation makes any warranty or guarantee, or promise, expressed or implied, concerning the content or accuracy of the views expressed herein.

Introducing New Focus Groups

Operational Issues

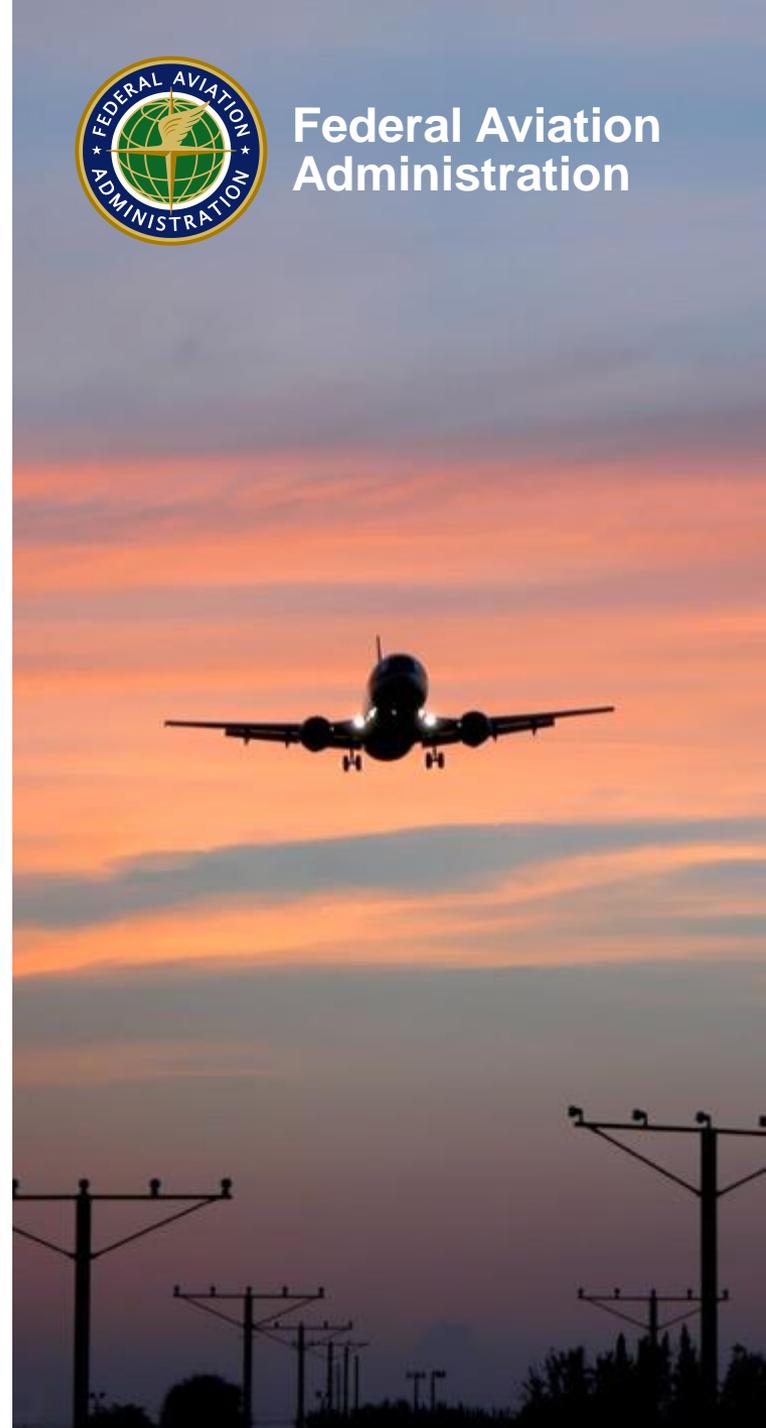
Development & Analytics

Jay Zimmer, LS Technologies

November 7, 2019



Federal Aviation
Administration



Why Add More Focus Groups?

- **Many issues arise at SWIFT meetings do not get resolved by existing focus groups**
 - SWIFT has presented multiple case studies with proposed solutions that have either been not fully solved or implemented
 - Multiple requests for instructions how to build widgets, requests for help building capabilities with SWIM feeds, etc.

Operational Issues Focus Group

- **Goal: Address NAS-wide issues that are raised at the SWIFT that we never fully resolve**
 - Taxi-out return to gate, TBFM/TFMS interaction issues, Flight planning over IP, etc.
- **Requires input from other NAS programs/SMEs, focus group alone cannot solve these problems, but it can identify the main problems to bring up with other programs**

Development/Analytics Focus Group

Goals

- **Democratize the widget building process**
 - Get input from focus group members about what problems they want to solve or capabilities they want to build/replace with SWIM
 - Previously SWIFT leadership would develop an idea and build a widget, not necessarily starting with an operational problem the group wants to solve first
 - NBAA AFP widget is a step in the right direction, but only developed for 1 stakeholder
- **Avoid requests for sharing code and teach users how to develop these capabilities on their own**
- **Move away from “widgets” and start building “instruction manuals” for SWIM-enabled capabilities that are technology agnostic**

New Focus Groups

Operational Issues

Identify systemic problems

Coordinate with FAA/Airline stakeholder to identify solutions

Feed solutions to Development/Analytics Focus Group for physical creation if applicable

Development & Analytics

Data Analytics

- Identify smaller scale data, operational, and analytical problems that already exist in the community
- Identify services, messages, data elements, logical transformations to solve problem

Development

- Create logical software design of widget to solve problem
- Develop physical widget as designed by group

Focus Groups
Interface as needed

Operational Issues Focus Group

Notional Operating Cadence

- **Schedule may be modified depending on complexity of the problem**
- **Month 1 – present storyboard of the use case**
 - Focus group lead works with use case “sponsor” a few weeks in advance to create the storyboard identifying the problem
- **Offline between month 1-2 – engage NAS programs/SMEs to identify how problem can be resolved or why systems function the way they do**
- **Month 2 – present draft document**
 - Progress highly dependent on how responsive NAS programs are
- **Month 3 – present final document**
- **Months 4+ - engage NAS programs/operations with SWIFT solutions**
- **Months 4+ - update document based on outcome of engagement if needed**

Operational Issues Focus Group

Notional Document Template

- **Introduction**
 - Describe the purpose of the document
 - Briefly describe operational environment of the problem (e.g., en route, arrival, etc.)
- **Operational Problem**
 - Describe the problem
 - Describe operational environment
 - Describe how the environment, in conjunction with current NAS systems/operations, contributes to the problem
- **NAS Systems**
 - Describe systems/NAS operations identified earlier
 - Include system-of-system diagrams to identify potential process improvement locations
- **Proposed Solutions**
 - Large-scale case studies will likely have multi-part “solutions”
 - Information-based Solutions
 - In some cases better information can help solve the problem or mitigate the effects of the problem, describe which, these could later serve as inputs to the Development/Analytics Focus Group
 - Operational process-based Solutions
 - Some problems can only be solved by engaging operators/ATC, explain how
- **Outcome**
 - Optional section would be left blank unless NAS/system engagement results in some change to solve the problem

Development/Analytics Focus Group

What does it look like?

- **Focus group meets and prioritizes a list of capabilities they want to build with SWIM**
- **In the beginning most of these capabilities could more common tools with well documented problem statements/benefits cases**
 - e.g., RAPT with flight planning lookup, Restrictions, TMI flight lists, etc.
- **As focus group gets more mature these capabilities can be driven by other focus groups (e.g., Operational Issues focus group)**
- **Build the logical flow mapping services/data elements to create this capability**
- **Main output will be a new document “SWIM-Enabled Capability Development Document”**

Development/Analytics Focus Group

Notional Operating Cadence

- **3 month rolling process like the Ops Context Focus Group**
- **Month 1 – Present Storyboard**
 - Problem statement, PowerPoint mockup of widget, mapping of services/data elements to various aspects of the widget
 - Development process flow
- **Month 2 – Present Draft Document and Widget**
 - First draft of document
 - Widget may just be a webpage mockup, but will present what we have
- **Month 3 – Present Final Document and Widget**
 - Final document incorporating comments from focus group
 - Final widget

Development/Analytics Focus Group

Notional Document Template

- **Introduction**

- Describe the purpose of the document
- Briefly describe operational environment where this capability lives
 - e.g., “Flight operators require knowledge of current NAS restrictions to do X... this document will explain how to Y...”

- **Operational Problem**

- Describe what the problem with current operations are and why this new/replacement capability is needed.
 - “Operations need a better source of X information to do Y”
- Cost may be a driver here, but need to provide other operational issues as well
- Limit the scope of the problem so it can be “solved” with this one capability/widget we are creating

- **SWIM-Enabled Capability Design**

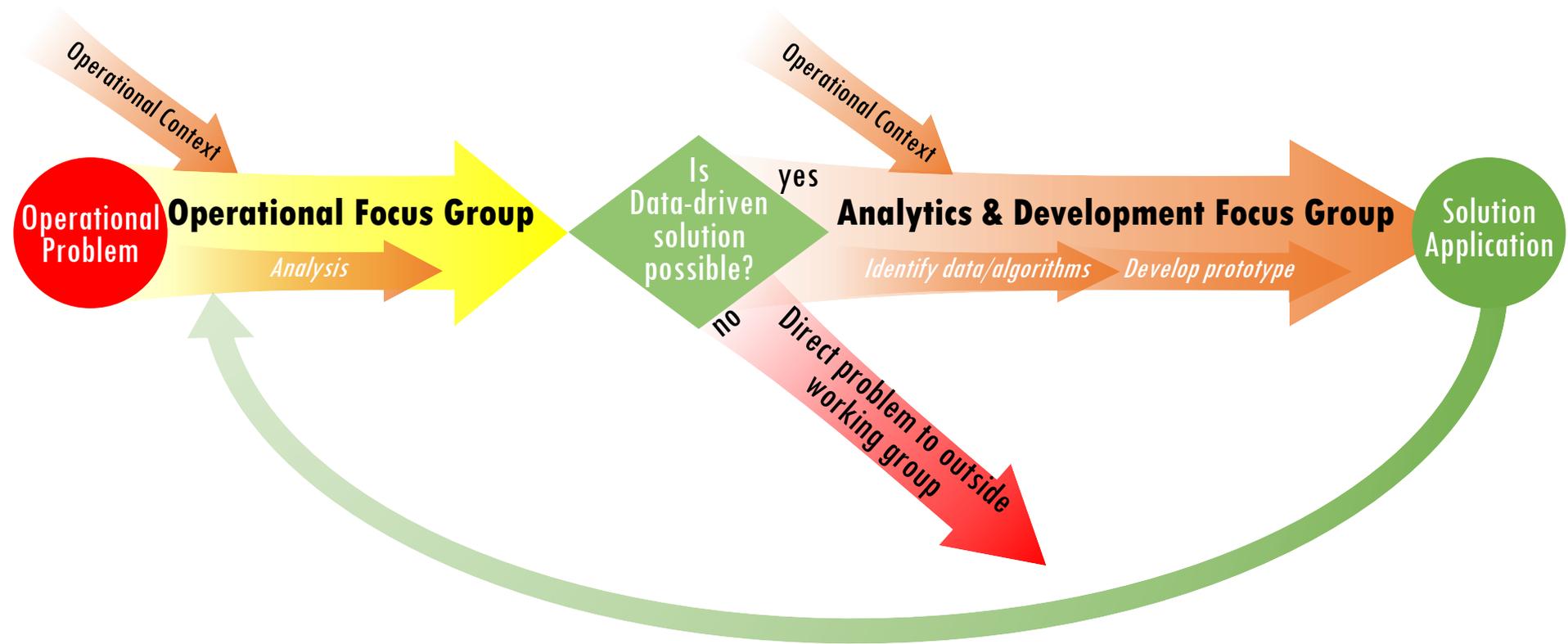
- Describe what a new capability would have to solve the operational problem
- Mockup of what new capability would look like with the information we want – pictures and words
- Describe SWIM Services/messages/functionality we will use to build this capability
- Map data elements to the mockup to show what element populates what – pictures and words

Development/Analytics Focus Group

Notional Document Template cont.

- **SWIM-Enabled Capability Processing Design**
 - Consumer Design – process flow chart of how data gets ingested and placed in database/data lake, include discussion of which data elements get kept and which are dropped (bandwidth considerations)
 - Graphical User Interface Design – process flow chart of how database/data lake gets transformed and inserted into the GUI
- **Appendices**
 - References – Ops Context, JMSDDs, Use cases, etc.
 - Acronym Lists
 - Sample consumer/GUI code for the widget we create – we will provide the logical steps in the document but give the code for our implementation of the capability
 - Highlight that there are other languages/ways to do it, but this is just one implementation

Focus Group Solution Development



SWIM NAS Common Reference (NCR)

Program Overview and Updates

Damon Thomas – SWIM Program Office
FAA SWIM Implementation Lead

Mark Strout – DOT Volpe Center
NCR Development Team Lead

November 7, 2019



Federal Aviation
Administration



Agenda

- Context & Purpose
- Shortfalls
- NCR Service Concept & Use Cases
- NCR Release 1.0
- Sample Q&A
- More Information



Context & Purpose

- At SWIFT Meeting #7, FAA Acting SWIM Program Manager (Melissa Matthews) proposed providing an NCR update at the November meeting
 - NCR Release 1.0 is less than a year away from Initial Operating Capability (IOC)
 - This is a good time to introduce the capability, or re-familiarize those already aware of it

- This will be mostly an informational briefing
 - However, the SWIM Program is seeking interest in early use of the capability
 - This is also a forum for beginning to gather input for potential future functionality



Shortfalls

- A longstanding SWIM mission has been to deliver the right information, to the right users, at the right time
- NCR addresses several obstacles to achieving this mission:
 - Filtering capabilities are implemented by each SWIM producer and can widely vary
 - Deriving geospatial and temporal elements from various message types can be complex and resource-intensive
 - Coordinate reference systems are not consistent across SWIM publication services
- Consequently, SWIM consumers might:
 - Receive more data than is needed
 - Develop redundant or inconsistent functionality for processing and using consumed data
 - Lack the resources (expertise, automation, or otherwise) to fully process certain data types or messages

Use Cases

- NCR Concept of Use (ConUse) was written in 2013, and included detailed scenarios on notional uses by the operational community
 - Scenarios developed by FAA AJV-7 with SME input from CDM Future Concepts Team (FCT)
- Additional enterprise use cases have emerged since then (e.g., CSS-FD, E-IDS), but also worth revisiting original scenarios for thinking at the time
 - Summary of these scenarios is on the next slide



Use Cases from NCR ConUse

Activity	Notional Use Case	Benefits
Flight Planning	FOC dispatcher evaluates multiple trajectories for a proposed flight against predicted Wx, flow constraints, airspace restrictions, and RVR	<ul style="list-style-type: none"> • Reduced fuel consumption by releasing flight on more optimal route • Improved situational awareness by reducing number of systems to be monitored during severe Wx event
Flight Operations	GA pilot continuously monitors multiple weather products in flight with a single publish/subscribe mechanism	<ul style="list-style-type: none"> • Mitigated risk of fuel shortage by diverting to alternate airport sooner • Reduced workload for en-route controllers knowing that flight will divert
Air Traffic Management	TRACON Traffic Management Coordinator (TMC) gathers weather, NOTAM, and TMI information in geographic area of interest from a single location at start of shift	<ul style="list-style-type: none"> • Reduced workload for gathering information across separate interfaces • Decreased time for decision-making due to earlier knowledge of relevant data • Improved operational efficiency, leading to reductions in departure delays, en-route delays, airborne holding, and surface departure queues
	ARTCC TMC monitors impacts of multiple real-time and forecast Wx products on major departure flows during a convective Wx event	

NCR Service Concept

➤ Fundamentally, NCR *is*:

- A real-time service for planning and/or situational awareness
- A GIS-enabled database
 - Stores parsed SWIM messages in common (1) format, (2) units of measure, and (3) coordinate reference system
- A geospatial server
 - Processes user requests and extracts matching data from GIS-enabled database

➤ NCR *is not*:

- A decision-support service (e.g., it will not recommend alternate routes that avoid intersections with potential constraints)
- An authoritative data source
- A SWIM data visualization tool
- A historical database

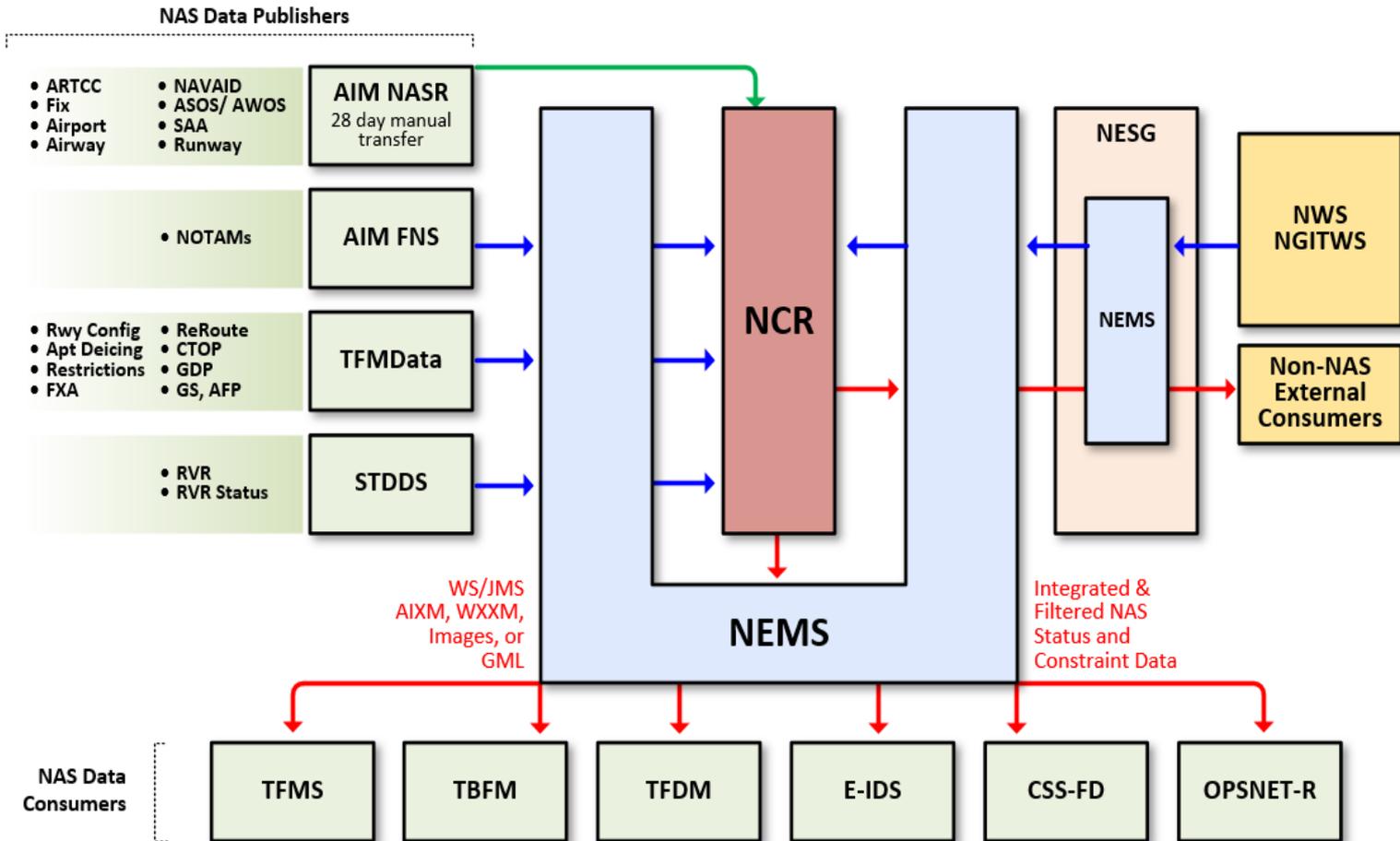
NCR Release 1.0

- IOC scheduled for Summer 2020; In-Service Decision for Fall 2020
 - Will be available to both Internal NAS and Non-NAS consumers

- Select data types from SWIM traffic flow, terminal, weather, and aeronautical services will be available
 - 39 total message types across 4 SWIM producer services
 - Flight-specific data not in scope (i.e., only RVR data from STDDS)

- Known Limitations / Design Decisions for Release 1.0
 - Data sources & message types (workarounds for aeronautical & weather data)
 - Trajectory model
 - Route query – constraint intersection locations/times

NCR Release 1.0 – Implementation Context



Sample Q&A

- When will NCR be available to SWIM consumers?
 - SWIM Program Office will begin to on-ramp initial set of users (tentatively ~3-5 users) upon NCR entering production, with wider availability to follow; timetable is TBD.

- Will a starter kit be made available as part of the on-ramping process?
 - Yes, to tentatively include some tools used in development & testing.

- Will NCR be available via the SWIM Cloud?
 - Not as part of Release 1.0, though formal discussions have begun with respect to future releases.

- How can I express interest in being an early NCR user?
 - Contact Acting SWIM Program Manager Melissa Matthews (Melissa.Matthews@faa.gov) and SWIM Implementation Lead Damon Thomas (Damon.Thomas@faa.gov)

More Information

- NCR ConOps, Draft JMSDD, and Draft WSDDs (4) are now available on NSRR

- Future SWIM User Forums & SWIFT Meetings

- Program Contacts
 - Damon Thomas (FAA SWIM Implementation Lead):
Damon.Thomas@faa.gov
 - Ramesh Ravella (NCR Program Support):
Ramesh.Ravella@noblis.org
 - Mark Strout (Volpe Development Team Lead): Mark.Strout@dot.gov

SWIFT:

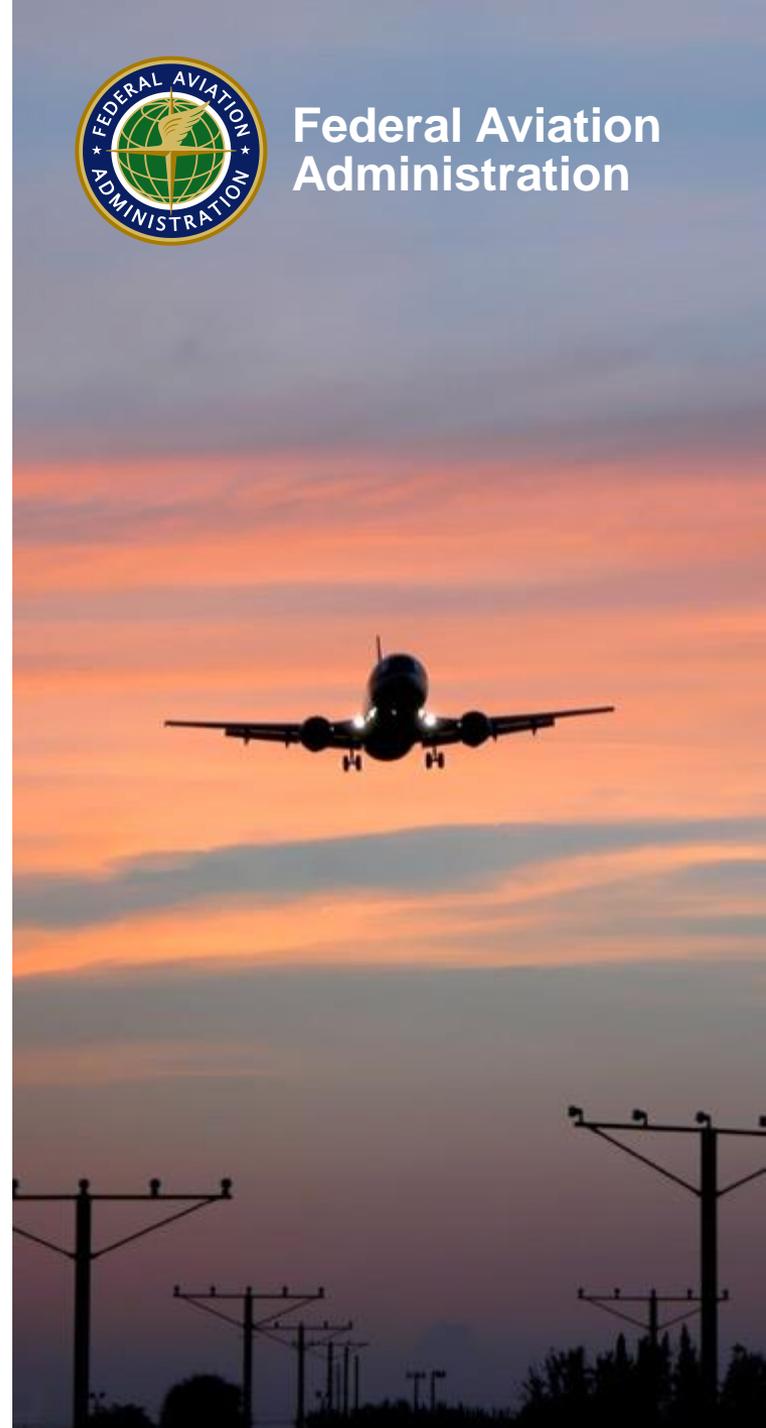
SWIM Industry

Collaboration

Workshop #8



**Federal Aviation
Administration**



Final Announcements

SWIFT **Workshop #9**

- **Date**
 - **February 26, 2020**
- **Location**
 - **FedEx Headquarters**
 - **Memphis, TN**



SWIFT Contact Information

Joshua Gustin, SWIFT Sponsor & Group Manager

- Communications, Information & Network Programs
- Email: Joshua.Gustin@faa.gov

Felisa White, SWIFT Chair & FAA Lead

- Phone: (202) 267-7994
- Email: Felisa.White@faa.gov
- Email: SWIFT@faa.gov



David Almeida, SWIFT Community Moderator

- Phone: (321) 735-2774
- Email: David.Almeida@LSTechLLC.com



Back-up Information



ACS Web Feature Service

- **The user can query and retrieve AI data via AI features**
 - Create, update, list, and delete stored queries that pertain to their user ID
 - Complex / Ad hoc
- **The user has access to AI stored in the ACS database: Airport, Runways, Navaid, Services w/in an airport, Obstacles, integrated SAA/SUA, and NOTAMs**

ACS Data Query Service

- **The user can submit pre-defined complex queries for retrieving AI feature data ingested from NASR, FNS, SAMS, and OAS and returns aeronautical features that match the query**
 - Different operations from the WFS

ACS Data Subscription

- **User receives notifications to topics of different feature groups that the user can subscribe to**
- **The user receives a notification when predefined AI has been updated / changed:**
 - Subscription services: the user subscribes to notifications of updated AI. The user automatically receives updates
 - Pull-Point: the ACS accumulates notification messages of updated AI. The user can retrieve the notifications when desired
- **The consumer can decide if they want their subscription to notify them automatically of AI updates / changes (subscription) or pull the AI update notifications when desired (pull-point)**

ACS Web Map Service

- **Users can request a geo-referenced map image that integrates and layers information in a spatial context of the requested geographic AI**
 - Airport/Heliport
 - Airspace
 - Navaid
 - Vertical Structure
 - Active Events at a specific point in time
- **The map image that is returned can be displayed in a browser application**
- **Receive information on specific features that are displayed on the map as well as a graphic that displays that map legend**

ACS Web Map Tile Service

- **The user can request a geo-referenced map tile image that integrates and layers information in a spatial context**
 - A map tile shows a fragment of a map representation of a layer.
- **The map tile that is returned can be displayed in a browser application**
- **The service can be used to get information on specific features that are displayed on the map tile.**
 - User can view very detailed geographic information in a tile
 - User can piece tiles together to look at a bigger picture

ACS Airspace Conflict Detection

- **This web feature allows users to be aware of airspace conflicts and resolve the conflicts as needed**
 - The creation or scheduling of airspace does not conflict with the protected airspace of any currently existing airspace restrictions or reservations

ACS Geodetic Computation Service

- **The user is provided a set of geodetic computations and the magnetic declination of a specific point on earth, for a given date, based on data from the National Geodetic Survey**
 - Accurate geodetic computations are important for creating and validating spatial aeronautical data

ACS Post Operational Metrics

- **Users can conduct statistical data research based on system logs and archives of AI processed by the system**
 - Users can specify the data contained in the metrics report.
 - The ACS will produce metrics reports about AI
- **Available pre-defined reports:**
 - Airport Event Report
 - Conflict Data Report
 - Feature Changes Report
 - Runway Characteristics Report
 - Runway Closure Event Report
 - SAA Utilization Report