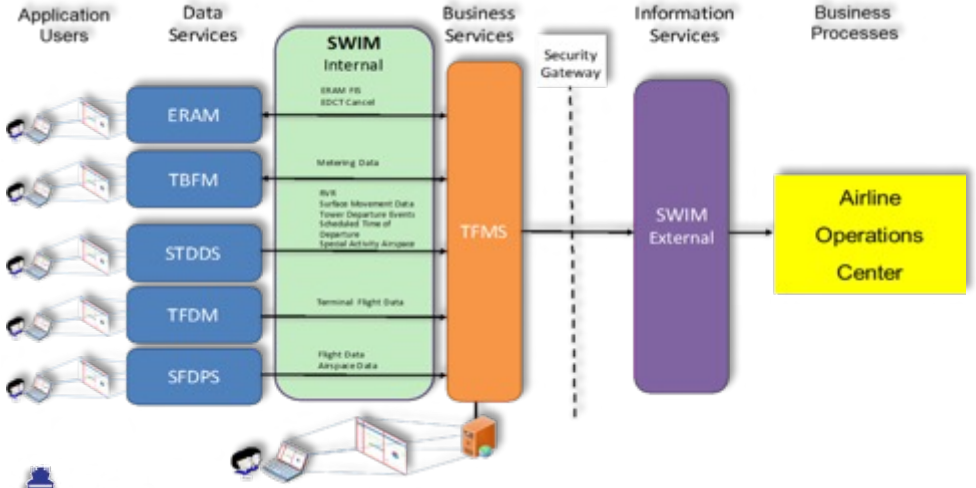
SWIFT: SWIM Industry-FAA Team

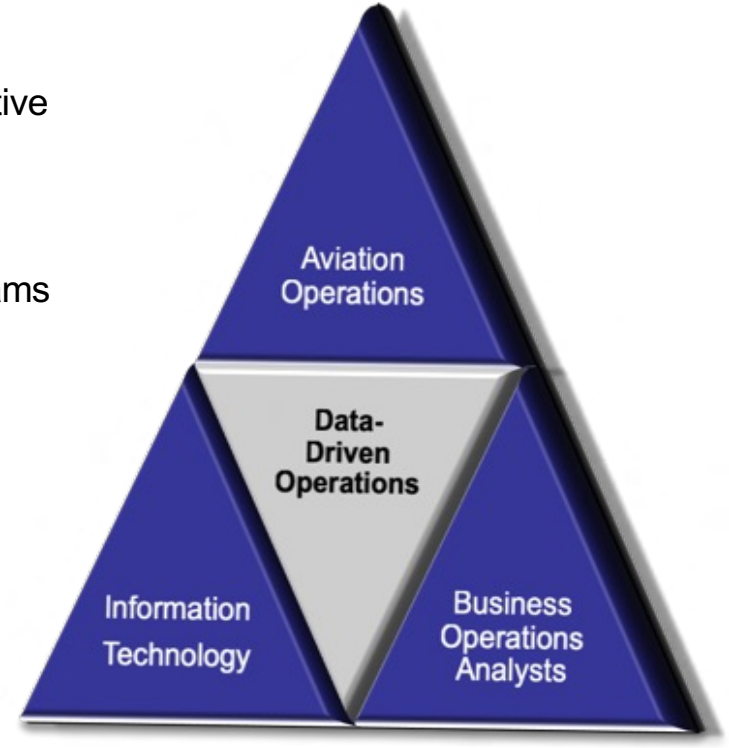
SWIFT #18 Collaboration Workshop

Date: 05/25/22

SWIFT: The Intersection of Operations, Technology & Data

- SWIFT addresses industry recommendation to:
  - A community forum that acts as a clearinghouse for collaborative engagement around NAS information and data sharing
  - **Educate**: Synchronize community on information services
  - **Collaborate**: Discuss issues most relevant to community
  - **Communicate**: Inform community about SWIM & NAS programs





Next Fix on the SWIFT Flight Plan…

2022

Applying SWIM information services to support NAS operational problems
Application of information services roadmaps, open source and tools for analytics
NY Area Airport Study: refined issue, identified tools, source data & started analysis

2021

Update on NAS Programs & FAA Initiatives
Industry partnership on flight planning & data
NY Airport Study: Ops & SWIM Services

2020

Widget Case Studies: Data "Art of possibilities"
Expanded Vendor engagement
Focus: Ops Issues & Data Analytics

2019

Understanding SWIM data & NAS ops context
Partner with TFDM on new services
Develop & review case studies

2018

SWIM awareness, connectivity & data access
Standardize lexicon for information & services
Airspace user access to SWIM data

FAA Collaborative Workshop #18

- **Welcome and Introductions:**
  - Introductions: David Almeida – LST
  - Opening remarks: Mark DeNicuolo – FAA
  - SWIFT Focus Group Updates: Ray Mitchell & Xavier Pratt – LST

- **NAS Programs: TFMS Program Update:** Wayne Hubbard – FAA

- **Special Topic: TFMS Flight Data Transition to SWIM:** Chris Burdick – FAA & Brandon Wang – Eyrie Networks

- **Special Topic: NY Area Airport Study Deep Dive**
  - Aviation Operations Roundtable on Operational Challenge
- **SWIM Information Services: Deviations off Trajectories:**
  - Information Services Roadmap: Applying the Roadmap to NY Study: Xavier Pratt – LST
  - NY Study Information Services Deep Dive: TFMS, SFDPS, & STDDS Services
  - NASA's Deep Dive into Digital Information Platform (DIP): Jeremy Coupe & Mirna Johnson – NASA
- **Special Topic: AES Update and the Developers Workshop**
  - Developers Workshop & Series: Kevin Long & Jeff Stein – MITRE
  - SWIFT Portal: Lucas Curns – FAA

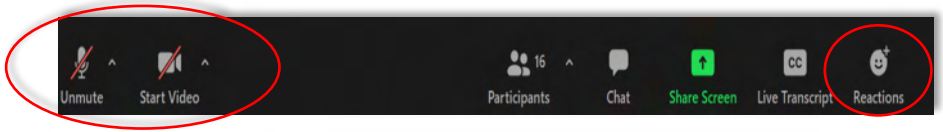
“Airwave Procedures”

- Please note during the session all attendees will have full control… “Hot Mics” and cameras.

- Please be mindful and mute when not interacting during the presentation.

SWIFT 18

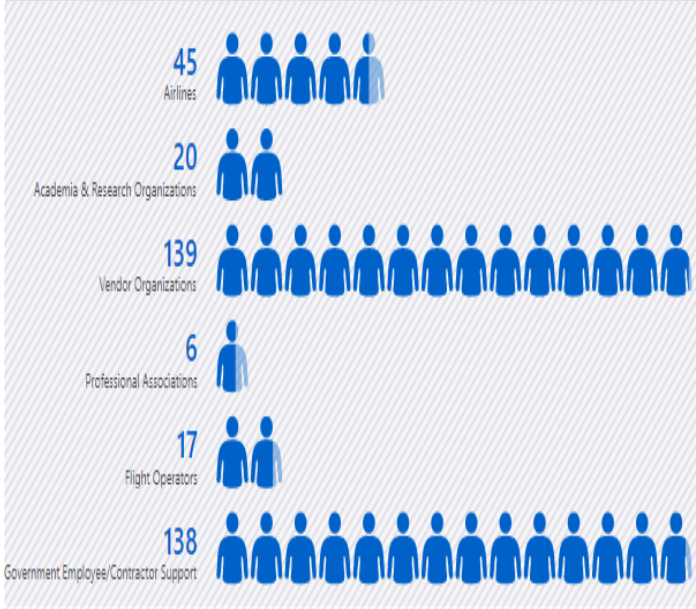
Zoom Controls: Mic and Camera identified via red circles



- The “Chat & Raise Hand ” features will also be available.
  - During the presentations to ensure you are recognized for an opportunity to voice comments /questions please leverage the “raise hand” feature found under reactions.

Who is in the “ZOOM Room” at SWIFT #18?

Attendee Organizations



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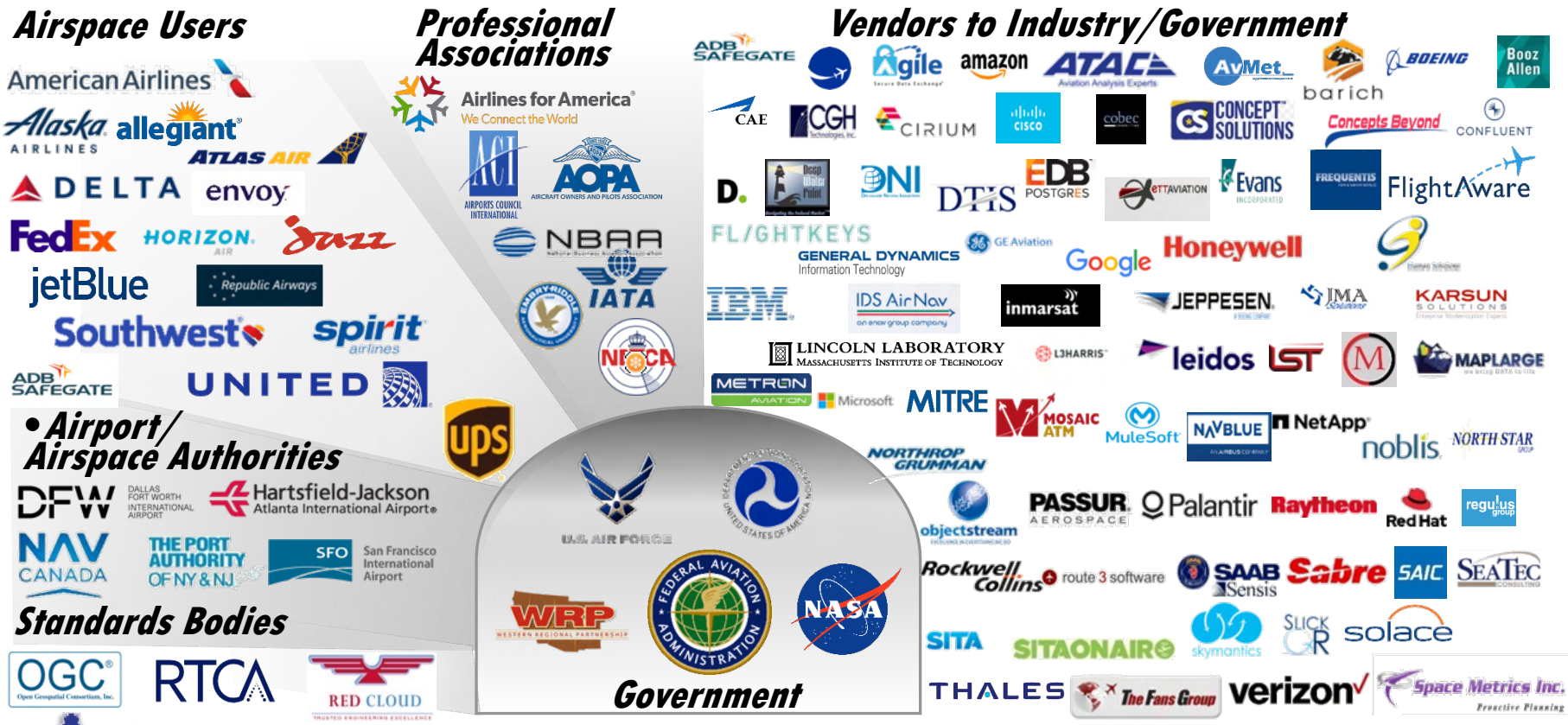
Attended a SWIFT Meeting Before?

I’m a Veteran: 329

No, I’m New: 36

365 attendees

SWIFT Stakeholders



General Announcements

Search and Rescue Pilot Contact Information Data Field Update

Feedback Requested

Presented by:
Lucas Curns
SWIM Program Office

May 25, 2022

System Wide Information Management AJM-316

SWIM Search and Rescue Pilot Contact Information
Data Field Update

- SWIM Flight Data Publication Service (SFDPS) **Field #18, Tag Name: OPR (operator) may soon be removed from SFDPS**.
  - Information is still available through RMK/ field

- What is Field #18, OPR?
  - This field provides Operator name via flight plan filing and is currently included in the feed republished via SFDPS to SWIM users. Due to planned updates to the OPR tag, this information may soon be omitted from SFDPS.

- What is most frequently listed in this field?
  - Identification (name) of air carriers

- **What is the impact to you if you no longer had access Field 18, OPR? We would like to hear from you!**
  - **https://forms.gle/fPFAPW1n1APowBjR9**

- **Responses due by: June 3, 2022**

TFMS Monthly Technical Webinar

- Reminder the next TFMS meeting will be held on **June 9th at 1pm E.T.**
- For questions or more information on the webinar please reach out to Thomas Paccione @ thomas.ctr.paccione@faa.gov

SWIFT Focus Group Updates

Operational Issues Focus Group

SWIFT 18 Update

Presenter: Chris Gottlieb - JetBlue

Date: May 25, 2022

Ops Issues Focus Group

Leads: Chris Gottlieb (JBU) and Xavier Pratt (LST) (Contract Support)

Background & Purpose Recap:

Ops Analysis

- Address NAS-wide operational issues that might benefit from information sharing between organizations
- Identify SWIM services, messages and data elements to resolve NAS user challenges

SWIM Data Use Cases

- Explore Ops issues through use case studies
- Leverage SWIM Operational Context documents and SWIM Info-services Roadmap to inform user investment decisions

Want to join us? Contact Us:

Chris Gottlieb - Christopher.Gottlieb@jetblue.com

Xavier Pratt - Xavier.Pratt@lstechllc.com

Current Status:

- NY Area Case Study: Applies SWIM data context to N90-bound flight trajectory deviation around convective WX at ZOB/ZNY boundary
- CSS-FD Risk Reduction Activity: FAA and industry kickoff meeting to evaluate and refine proposed SWIM Flight Planning functionality in support of stakeholder buy-in

Next Steps:

- Case Study team will leverage Data Lake analytical support tools for NY prediction model development. Engage DAFG for support
- CSS-FD team will schedule workgroups and Technical Interface Meetings to validate SWIM Flight Planning use cases and client demos

Current Prioritized Ops Issues:

- **TBFM delay (UAL) who, what, why it matters**
- **Flight Planning over IP (SWA)**
- **Early Planning for Disruptions**
  - ***Early Detection of Deviations over a Fix (JBU)***
  - ***Early Detection of Airport Surface Delays (JBU)***
  - *Taxi Out Return to Gate tracking / visibility (DAL)*
  - *Long taxi issues at JFK (JBU)*
- TBFM/TFMS (double) delay assignment

Bolded Issues – actively engaged

Development & Analytics Focus Group

SWIFT 18 Update

Presenter: Erin Cobbett – DAL
Mike Jagmin – UAL
Ray Mitchell – LS Technologies

Date: May 25, 2022

Development & Analytics Focus Group (DAFG)

Leads: Erin Cobbett (DAL), Mike Jagmin (UAL) and Ray Mitchell (LST) (Contract Support)

Background & Purpose Recap:

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 problems

Development

- Create logical software design to solve problems
- Develop physical representations of data as designed by group

Current Status:

- May 11th SWIFT Developer Workshop Discussion held. This was the second DAFG meeting of 2022. On January 27th of this year the group met for a very interesting informative session on NASA DIP and they potential application to DAFG initiatives.

Next Steps:

- DAFG will continue the quarterly and or ad hoc cadence. The group is on standby to support the NY Case Study.
- Developers are encouraged to attend SWIFT 19 and the Workshop Series more details on the workshop coming soon.

Want to join us? Contact Us:

Erin Cobbett - erin.cobbett@delta.com

Mike Jagmin - michael.jagmin@united.com or Ray Mitchell – ray.mitchell@lstechllc.com

Operational Context Document

SWIFT 18 Update

Presenter: Ray Mitchell – LS Technologies

Date: May 25, 2022

Operational Context Document Update

- **Important Notices**
  - Documents will be previewed in close concert with SWIFT events moving forward as applicable
  - No longer a formal focus group with standing meetings

- **Documentation can be found via NAS Service Registry & Repository (NSRR) or by contacting**
  - ***Ray Mitchell @ ray.mitchell@lstechllc.com***
  - ***Xavier Pratt @ xavier.pratt@lstechllc.com***
  - ***Sandie Steele @ sandie.steele@lstechllc.com***
  - ***John Kelley @ john.kelley@lstechllc.com***

- ***Links to our most recent NCR documents in NSRR:***
  - **NCR Subscription Service**: https://nsrr.faa.gov/nsrr-library-document/9991
  - **NCR AIXM/WXXM Feature Access Service (XM)*:*** https://nsrr.faa.gov/nsrr-library-document/9982

Note: NSRR access requires user account, new accounts can be requested at https://nsrr.faa.gov/user/register

TFMS Release 15 Overview

Presented to: SWIFT #18

By: TFMS Deployment Team

Date: 05/25/22

Federal Aviation Administration

Contents

- ReRoute Impact Assessment (RRIA)
- Tactical Reroute Enhancements
- Trajectory Options Set (TOS)
- Near Border PDRR

Informational Updates

- Release 13 (TFMData v2.0.5) will be retired in March 2023
  - R14 Request/Reply re-certification testing must be completed prior to R13 retirement
  - Reach out to the test team to get scheduled
  - TAP2 is now on v3.2
- Release 14 Patch 2 will be targeted for the end of May
  - Historical Route Issue, AIMS 248184
  - Adaptation Cutover Issue, AIMS 250229
  - Oracle Patches to resolve recent ghostbuster issues at ZUA and ZSU
  - United Onboarding Issue, AIMS 252291 United SS Block Fix
- Release 15 – Targeted for Fall 2022
  - Reroute Impact Assessment (RRIA)

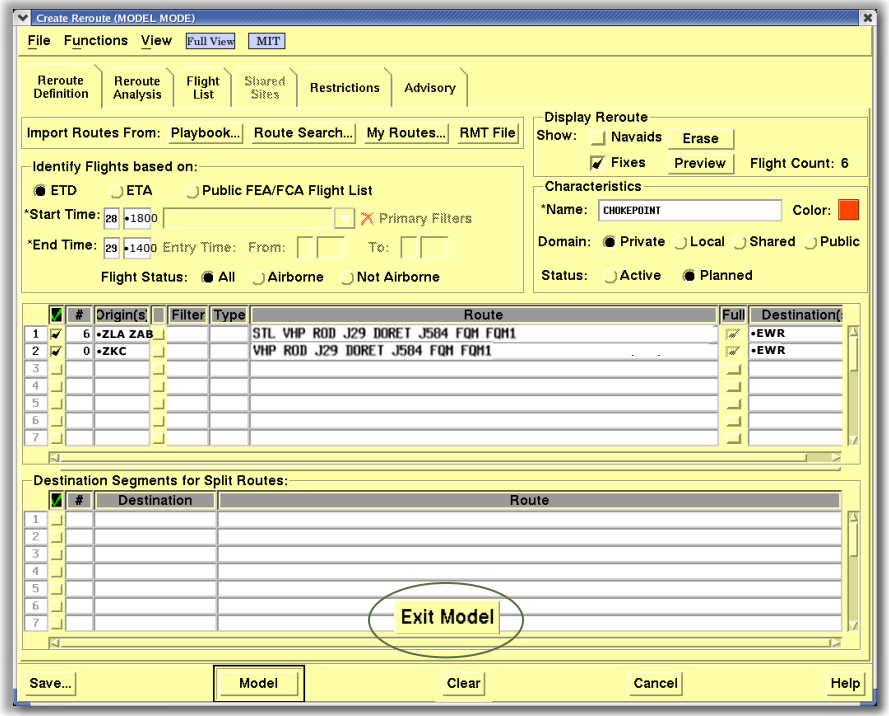
RRIA Background

- The TFMS reroute modeling capability has been re-engineered. This re-engineered modeling leverages the modernized TFMS Core architecture, flight data, adaptation, etc., to provide more consistent data between reroute models and operational TFMS data.
- In addition to these reroute modeling changes, remote site TSD changes have also been added. These changes include:
  - An ‘Exit Model’ button
  - Enhanced Static Flight List Information (Not able to merge to any assigned route)
  - CTOP Awareness (Blue ACID for flights included in CTOP; Flight count for flights in CTOP in Reroute Analysis)
  - MIT flight list with seconds

RRIA

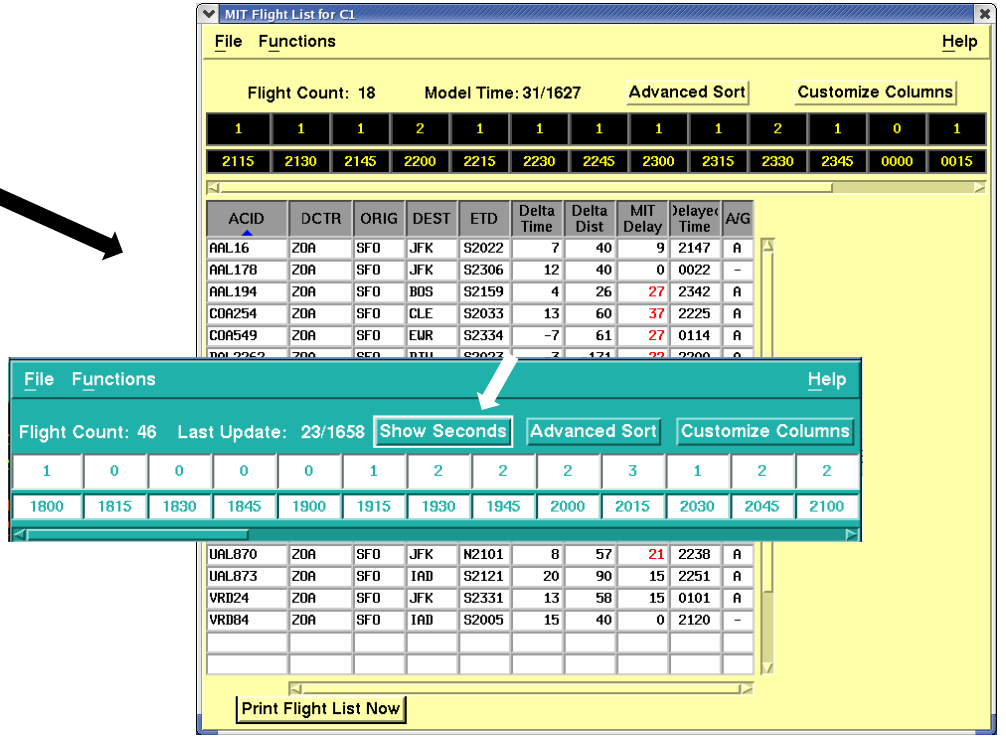
- **Moving to the TFMS Core**
  - Better performance
  - Higher processing loads
  - Less timeouts
  - Reduced need to reissue reroutes

- **Tool Enhancements**
  - ➢ Highlights flights that are not able to join assigned routes
  - ➢ Identifies flights controlled in CTOP/AFP on flight list, model metrics, and TMI update indicator.



RRIA

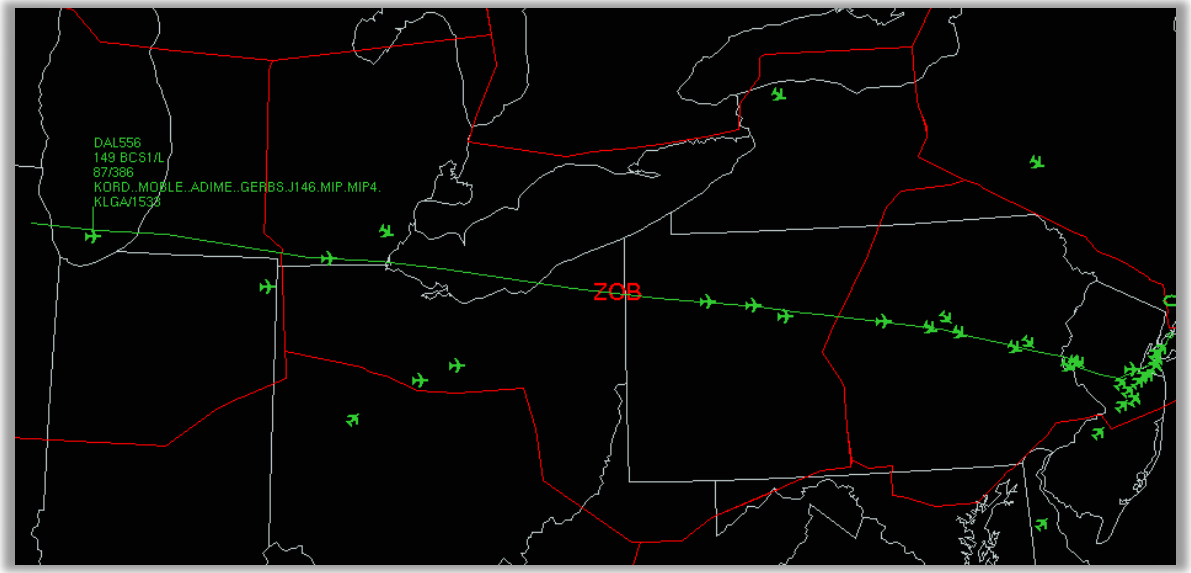
- **More Tool Enhancements**
  - Display times in the MIT flight list with an accuracy including seconds.
  - Revised indicator for flights having excessive Estimated Time Enroute (ETE) as a result of defined MIT restrictions.



- **Benefits Summary**
  - More detailed knowledge of flight trajectories, reroute impacts, and user options

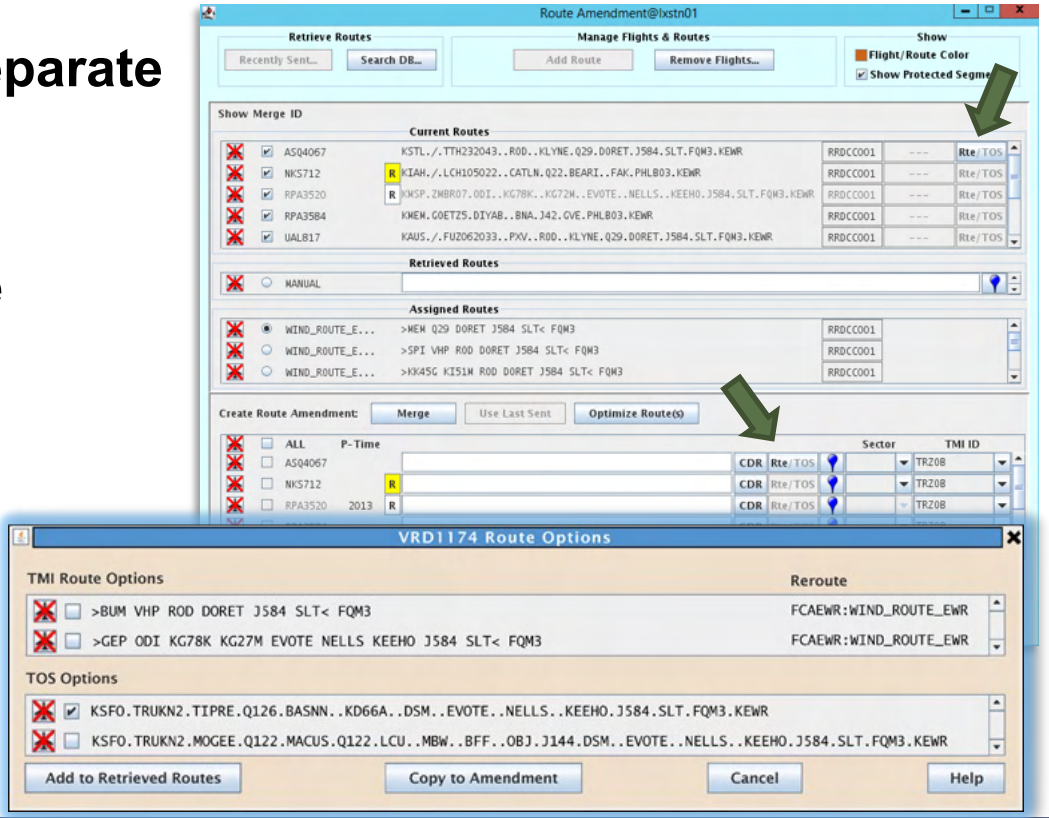
Tactical Reroute Enhancements

- **Hold for Center**
  - Allows traffic managers to send reroute for a flight outside their ARTCC's airspace. The reroute will be held until the aircraft reaches the first sector.



Trajectory Options Set

- **Indicates TOS availability separate from Route Options**
- **Displays multi-TOS in Route Options menu**
- **Benefits summary**
  - Automation ranks TOS above historical/scheduled reroutes
  - Better awareness of user intent
  - Potentially less reroutes

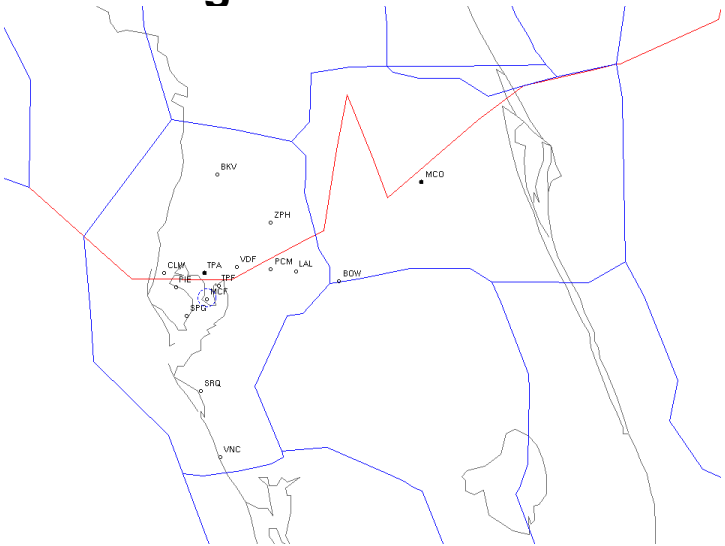


TOS Available Indication

- **“Smart” indication**
  - Will compare a single option TOS to filed route and not indicate the availability of a TOS if they are the same.
- **Data Block of flight icon**
- **In Lists – New “TOS” Column**
  - FxA Dynamic List
  - Departure Viewer
  - Reroute Monitor
- **In RAD**

Near Border PDRR

- **Added permissions for ZJX to issue PDRR amendments for Tampa area airports (under ZMA)**
- **Of interest to other regions in NAS**



Federal Aviation Administration

SWIFT 18
CDM Member Transition to SWIM

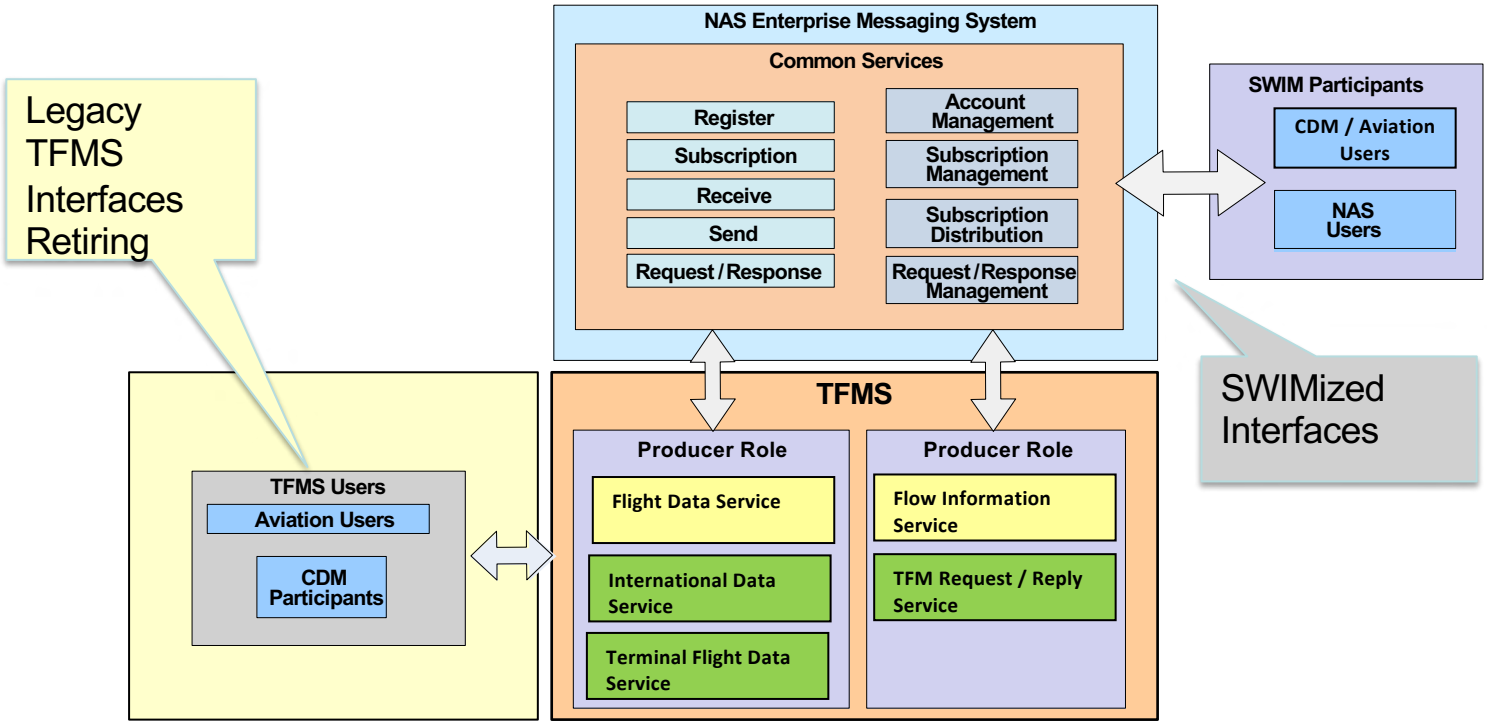
Agenda

- Legacy Interface Retirement
- TFMData Service Review
- TFDM External Data Flow
- Aggregate Demand List TFMData Recreation

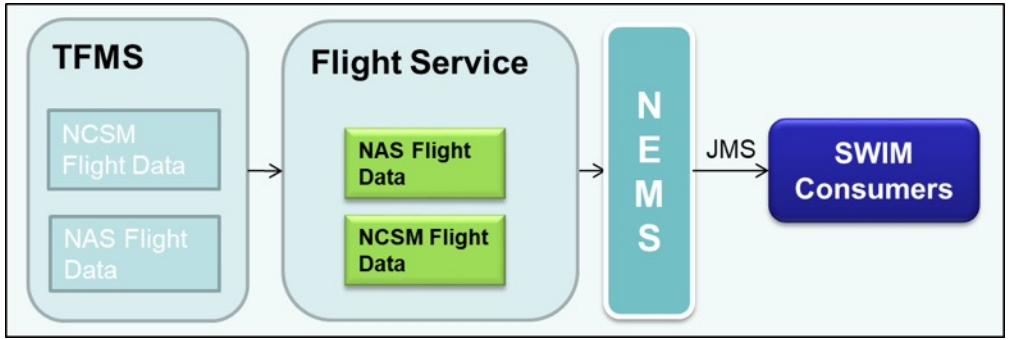
Retirement of the Legacy Interfaces

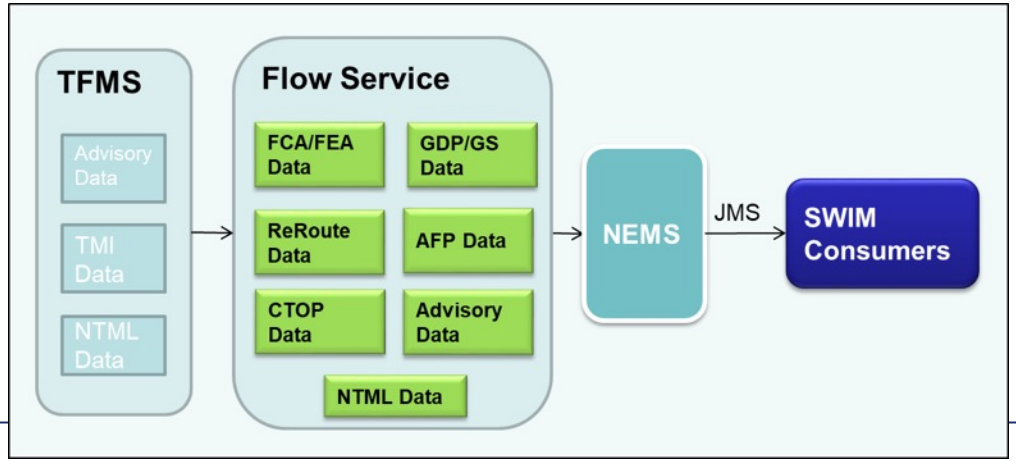
- **FAA is planning a new investment to replace the aging TFMS system and interfaces**
- **Retirement of the FDFE/AOCNet Interface will be a critical dependency**
- **The FAA is currently targeting a decommission date in Q4 2023**
  - All Legacy data exchange capabilities are replicated in the TFMData Request/Reply
    - Early intent
    - Flight Data - Flight create/ modify/ cancel
    - Simplified Subs
    - FOS – TOS Messages / Requests, Trajectory Options Requests, CTOP Subs
- **Other TFMS direct applications such as CTOP (TSD-C), FSM and TSD-C are not yet planned for deprecation.**

Retirement of the Legacy Interfaces



TFMData Flight Service



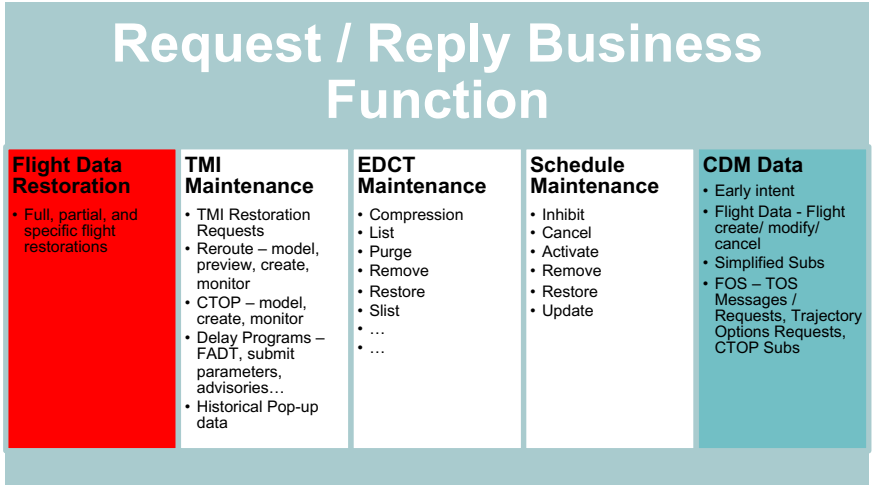


- TFMS publishes flight data to SWIM
- Clients subscribe to SWIM TFMData Service via NEMS to receive data

- Industry users can utilize TFMData Flow to receive TMI data
- TMI Data is published as changes occur to consumers

TFM Request / Reply Service

- **Provides SWIM access to TFM data and services**
  - Provide TFMS CDM and FOS interface capabilities
  - Provide historical pop-up data
  - Model, create, modify, cancel TMIs
  - Provide schedule data changes into TFMS
  - Request EDCT updates and reports
  - Request Flight data and TMI reconstitutions



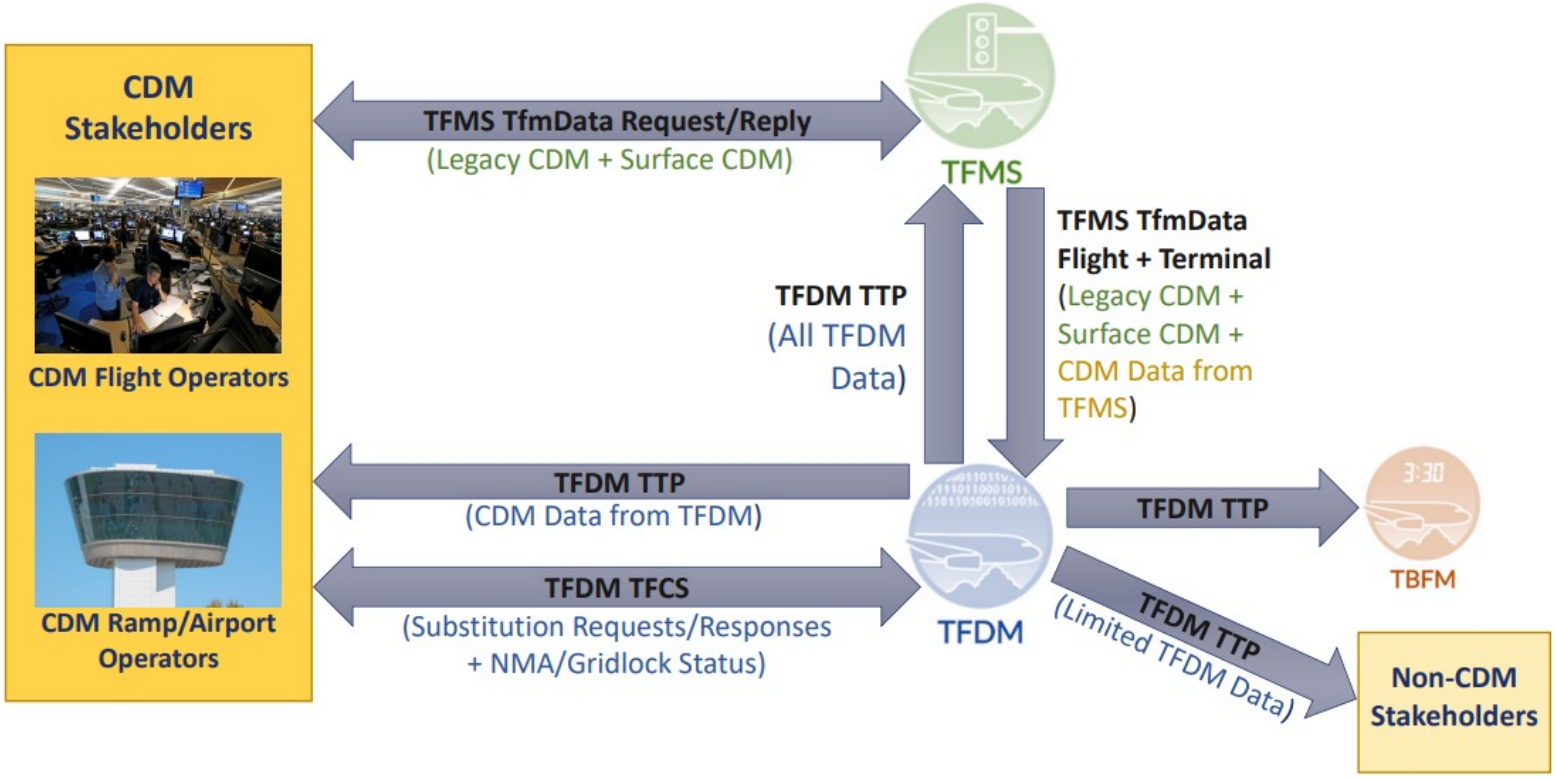
Terminal Flight Data Service

- **2-way data exchange**
  - TFDM data consumed by TFMS via both legacy CDM interfaces and new TFDM TerminalFlightData business function
  - All TFDM Data published over TFMData

TFDM Business Function

Flight Operator Provided	Flight Operator Provided	Flight Operator Provided	TFDM Supplied
•Earliest Off-Block Time [EOBT] •Departure Stand assignment •Arrival Stand assignment •Arrival Stand availability •TMAT Relinquish indication •TMAT Marked For Substitution indication •Aircraft Registration Mark •List of acceptable departure runways •List of unacceptable departure runways •Departure Readiness Status	•Intent to hold in the Airport non-Movement Area during departure •Intent to hold in the Airport non-Movement Area during arrival •Intent to hold in the Airport Movement Area during departure •Intent to hold in the Airport Movement Area during arrival •Intent for a flight to be deiced •Intended deicing location •Intended Departure Spot •Intended Arrival Spot	•Gate return intent •Actual Off-Block Time [AOBT] •Actual In-Block Time [AIBT] •Actual Take-Off Time [ATOT] •Actual Landing Time [ALDT] •Flight Cancellation	•Initial Off Block Time [IOBT] •Target Movement Area Entry Time [TMAT] •Target Off-Block Time [TOBT] •Target Take-Off Time [TTOT] •Projected Wheels Up Time [PWUT]

TFDM External System Data Flow



Benefits of Transitioning to TFMData Request/Reply

TFMData Request/Reply…

- **Is a modernized, XML-based interface utilizing the FAA's SWIM Enterprise Service Bus**
  - Supports rapid and more agile updates
- **Will support enhanced network failover**
  - Currently, TFMS only enables Disaster Recovery Center (DRC) services when the TFMS Production Center (TPC) becomes unavailable
  - Consumers can utilize many NEMS for avoidance and failover.
- **Is compliant with FAA security orders**

ADL Contents Through TFMData Interface Request/Reply

- **Most flight data fields are available via:**
  - Request Reply
    - Airport Monitor
      - Provides flight information for all fights arriving/departing the specified airport
    - TMI Resync
      - Provides definition and flight information for all flights in a TMI
  - Flow Information TMI Flight data
      - Provides flight information updates for flights in TMIs
- **The remaining data is available through the Flight Data service**

SWIFT: SWIM Industry-FAA Team

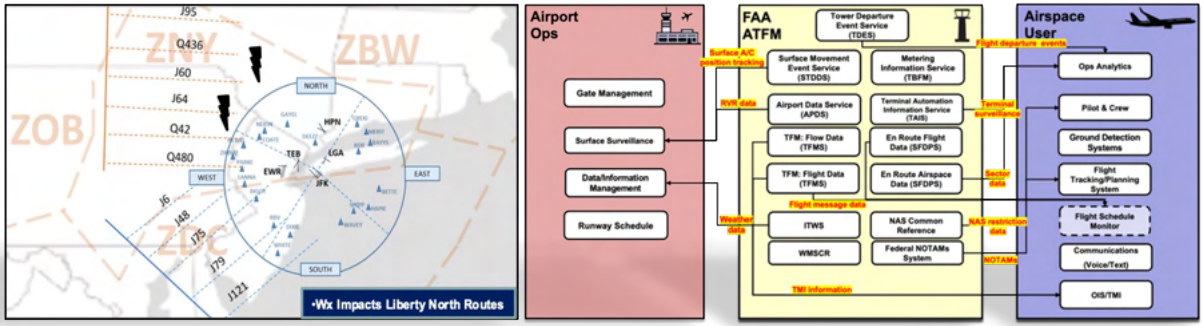
Early Planning for Disruptions

Aviation Operations Roundtable

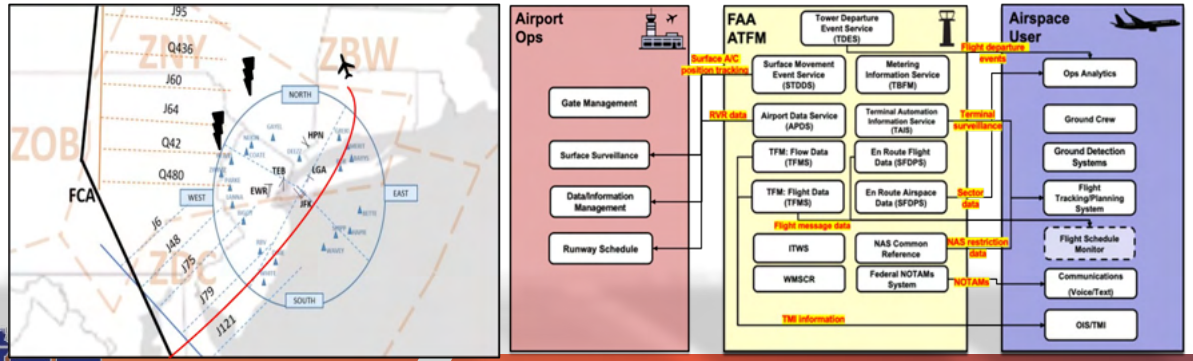
Date: 5/25/22

SWIFT #13 Tabletop Exercise

Vignette #1 Discussion: Weather Impacts Fixes Northeast Region



Vignette #2 Discussion: NBAA – Circumventing ZNY Flow Restrictions



- Reviewed operational conditions in airspace
- Discussed scenario for Ops impact due to weather event
- Presented scenario on circumventing resulting flow restrictions due to weather impact
- Identified operational decisions and underlying systems driving decisions
- Ascertained relevant information services available in **SWIM** to help!

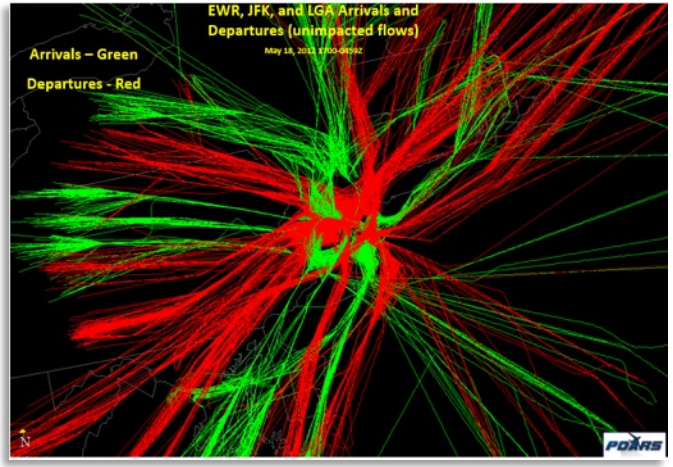
Aviation Operations Roundtable

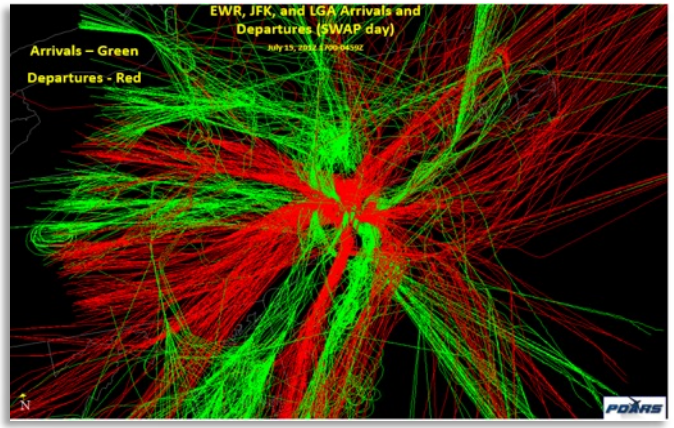
- Meet the experts!
  - Chris Gottlieb: JetBlue
  - Ralph Tamburro: PANYNJ/NY TRACON
  - Rob Goldman: Delta
  - Pat Somersall: LST, former Command Center
  - Sandie Steele: LST, former American IOC
  - John Kelley: LST, Pilot

Executive Summary

- Operations Problem Statement:
  - Determine departure delay impacts resulting from aircraft deviation along flight trajectory.
    - There is no clear way to readily identify aircraft deviation indicators (e.g., weather, traffic volume) and anticipate ground delays
    - Lack of available post-ops data analysis to determine threshold boundaries for traffic deviation and where disruptions are severe
    - This limits the operational community from effectively planning or implementing work-arounds for airspace condition changes and resource constraints drive

- Operational Environment:
  - NAS Northeast Region Centers: ZNY, ZOB, ZBW
  - New York metro airports: LGA, JFK, EWR, TEB
  - Airways and jet routes impacted by Traffic Management Initiatives (TMI) events or closures

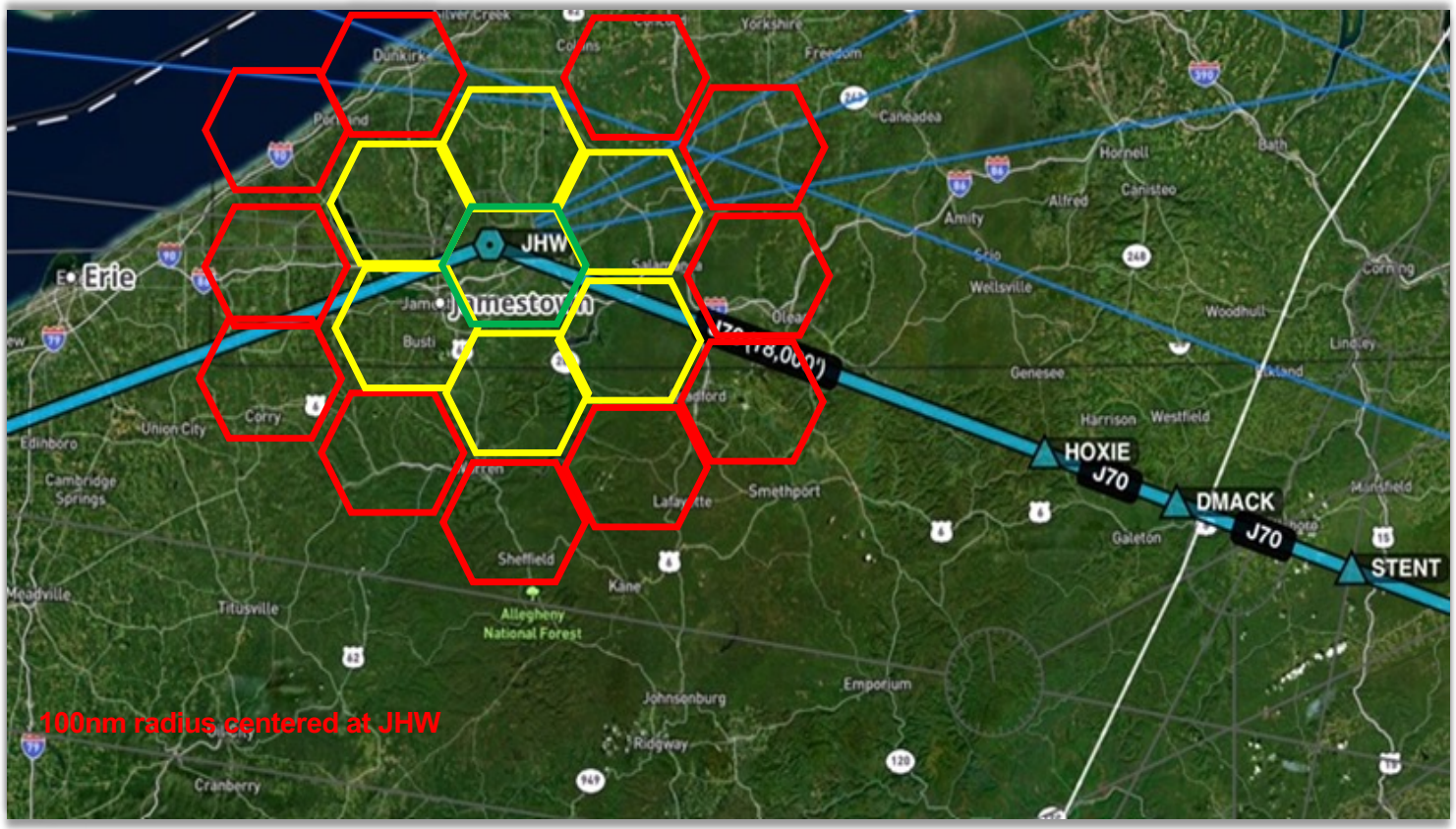




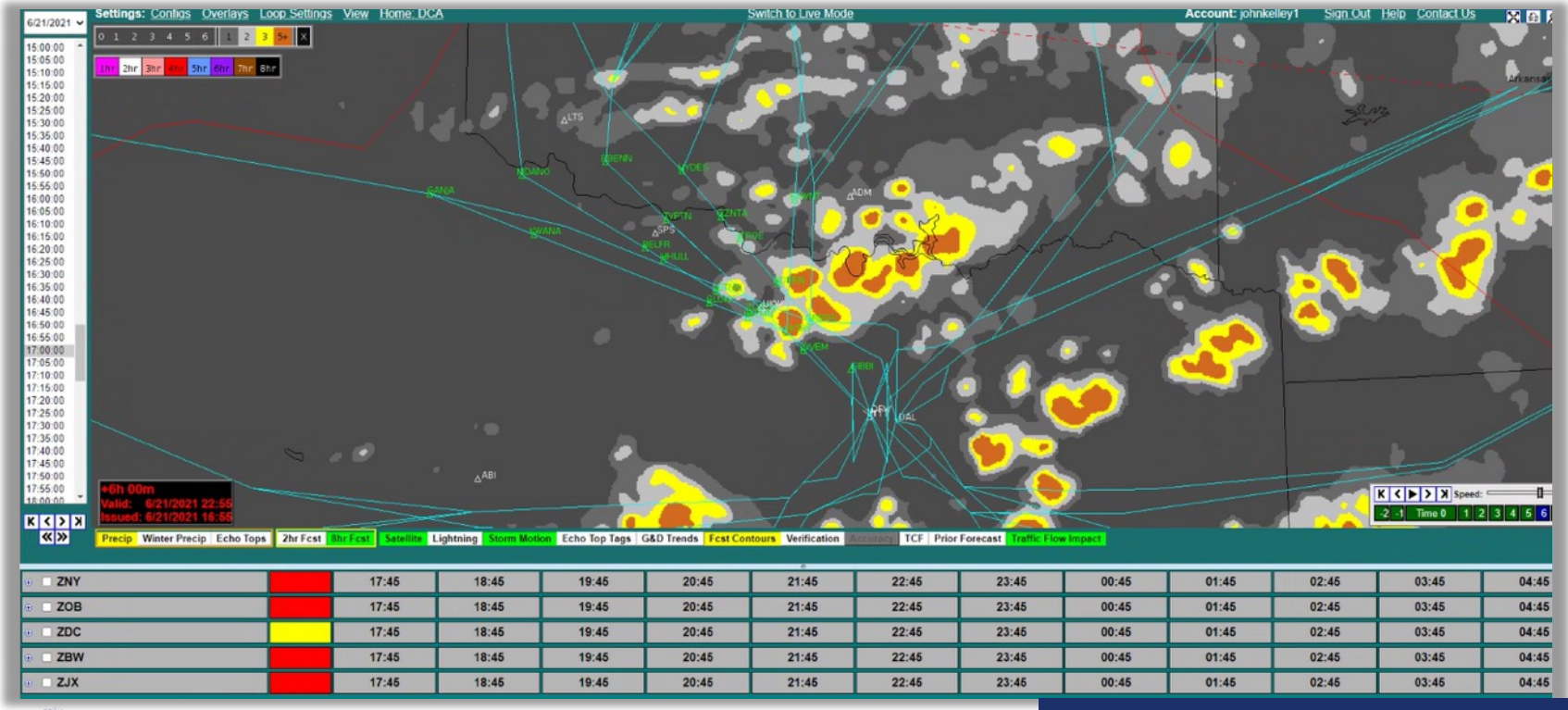
What happens on a day like today?

Playback captured from https://cospa.wx.ll.mit.edu/

What about deviating from trajectories?



Where else do we see deviations?



Graphic captured from https://cospa.wx.ll.mit.edu/

Early Planning For Disruptions

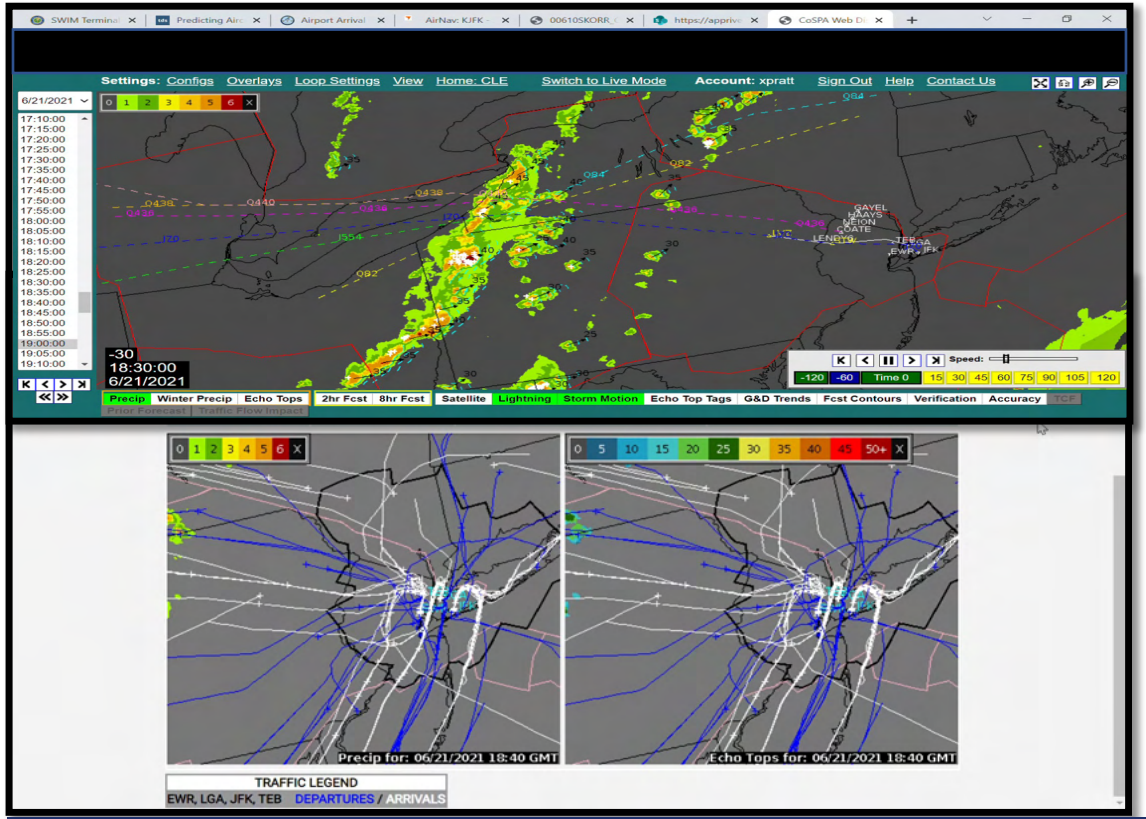
SWIFT 18 Update

Presenter: Chris Gottlieb – JetBlue
Xavier Pratt – LS Technologies
Mark Hopkins – LS Technologies

Date: May 25, 2022

Case Study – Convective Weather

- **We selected June 21, 2021 as the candidate sample for the prediction model baseline behavior**
- **Between 1730Z -2100Z, we observed EWR, TEB, LGA, and JFK ARR/DEP through RAPT Evaluation Post-Event Analysis Tool (REPEAT)**
- **As convective weather moved eastward from ZOB into ZNY:**
  - *1730 – 1830Z: Pathfinders penetrate weather on near JHW along J554 and J70, with one-offs around Q438*
  - *Some arrivals are coming down from the north, not quite to ALB, but near as they deviate around the north of the line of storms. Most all arrivals and departures are from the south through ZDC*
  - *2130Z: LENDY arrival traffic ceases and ceases to depart via the north gates due to line of storms approaching from the west*



Playback captured from https://cospa.wx.ll.mit.edu/ and https://repeat.wx.ll.mit.edu/archive/ZNY

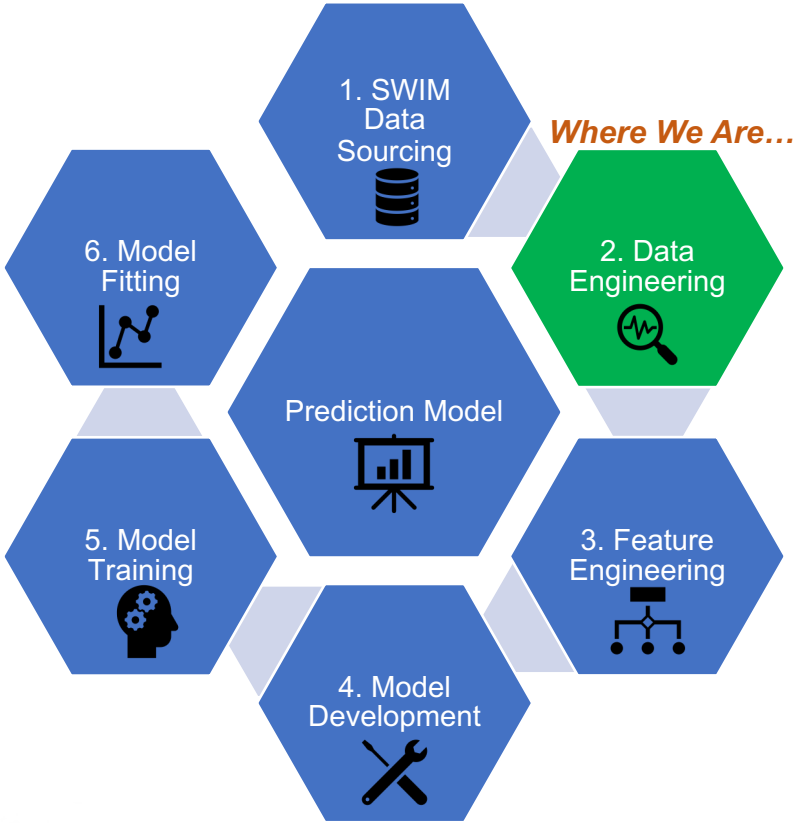
Case Study – Analyzing Trajectory Deviation

- **As convective weather develops west of N90, arrival aircraft may transit enroute sectors from multiple directions, deviating off the anticipated course (primarily due to pilot requests).**
  - *A* controller *may request traffic management restrictions to help manage traffic complexity*
  - *If the workload or complexity is not mitigated, a stop on departures may be requested*
- **We want to explore ZNY requests for arrival vectoring, in which we observe arrival deviation into departure sector airspace.**
  - *Arrivals that deviate into departure airspace can potentially cause volume and complexity issues in the impacted departure sectors.*
  - *Consequently, this pushes delays/stops back to the surface at the departing airport.*

100nm radius centered at JHW (not to scale)

***Capturing approved deviations from planned trajectory**: We focus in the vicinity of Jamestown VOR (JHW) on any of the J,Q or other trajectory cleared through that area, in which, local convective weather forces N90 arrivals north. Downstream, this prompts N90 arrivals to approach from the north instead of the west.*

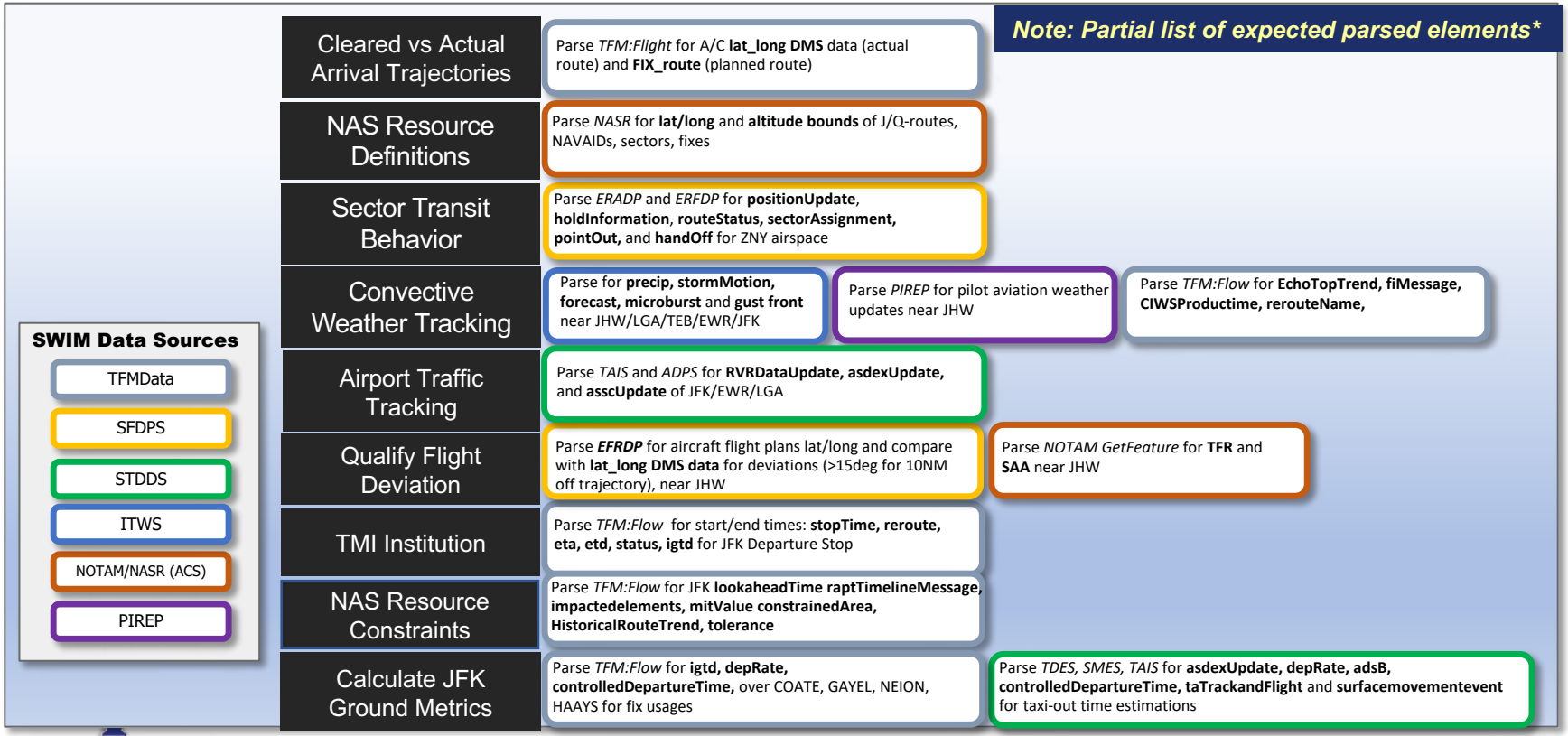
Prediction Model



SWIM Data Engineering

- **Data Cleansing June 21, 2021 TFMData and SFDPS Messages**
  - ❑ Missing Element Value Resolution
  - ❑ Format Conversion (e.g. CSV File Format)
  - ❑ Data Syntax Error Detection
  - ❑ Duplicated Flight Information Removal
- **Prep Data for Feature Engineering**
  - ❑ Model Input Data *(e.g. active, cleared, amended FPs, fix assignment, sector capacity)*
  - ❑ Model Correlation Behavior *(e.g. actual Wx location and intensity, fix/NAVAID constraints, ZNY/ZOB LOAs)*
  - ❑ Model Output Metrics (e.g. JFK GS, fix closure likelihood)

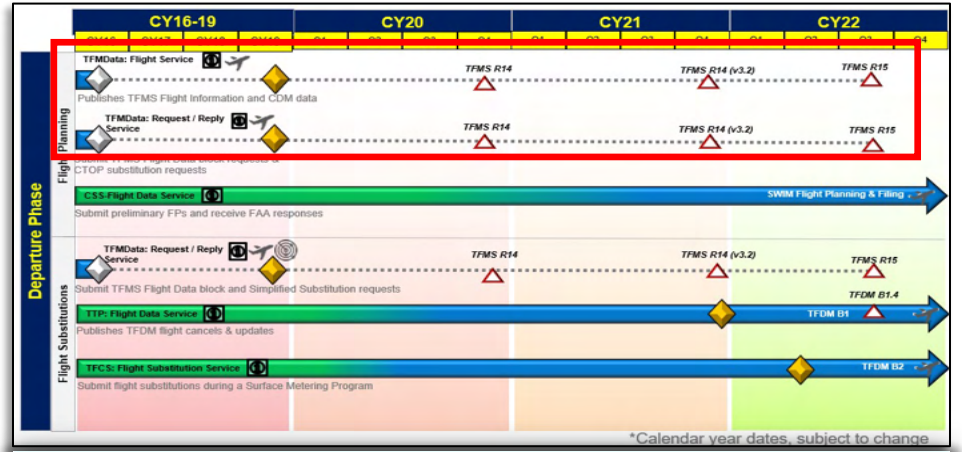
SWIM Information Services Prediction Model

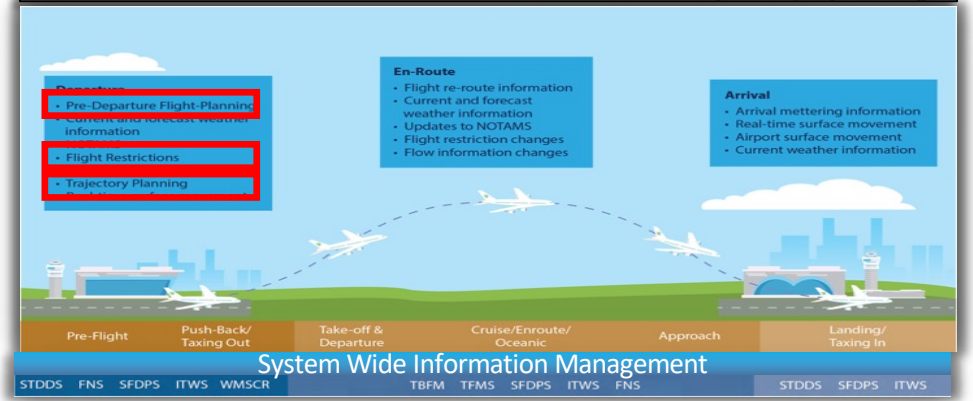


SWIM Services (Case Study Perspective)

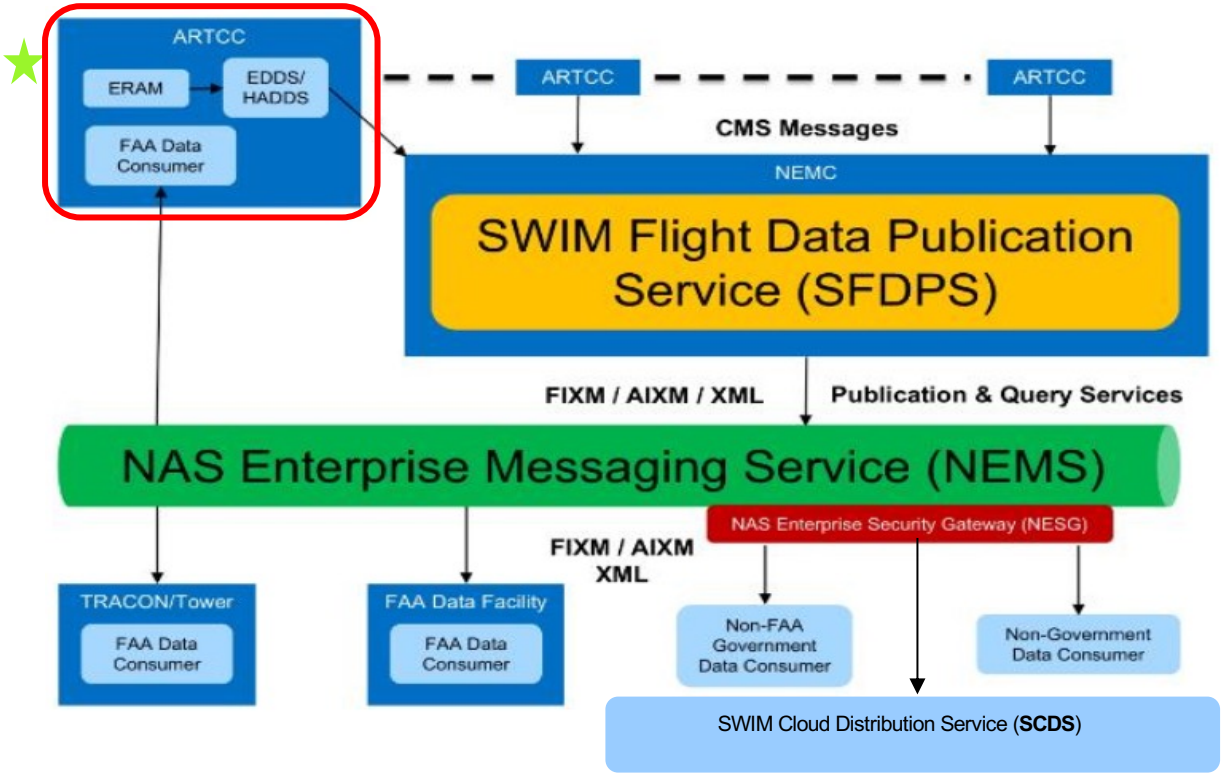
Leverage SWIM services to assess LGA, JFK, EWR and TEB reaction to convective weather.

- **TFMData R14 v3.2 available now…**
  - *Flow Service: Publishes TFMS TFM initiatives and definitions. Correlate ZNY-bound traffic deviations with changes in restriction times in N90 environment:*
    - *AFP Advisory, Cancel, Compression, Update*
    - *FEA/FCA Broadcast*
    - *GDP Advisory, Blanket, Cancel, Compression, Update*
    - *GS Advisory, Cancel, Update*
    - *RAPT Timeline message*
    - *Restriction message*
    - *TMI Flight Data List*
  - *Flight Service: Publishes TFMS Flight Information and CDM data for LGA,TEB, JFK bound flights to observe ZNY traffic flow:*
    - *Flight Plan, Flight Plan Update, Flight Amendment, Cancellation*
    - *Boundary Crossing Update*
    - *Departure Information*
    - *NCSM Flight Sectors, Flight Schedule Activate, Flight Control, Flight Times*





SWIM Flight Data Publication Service (SFDPS) Architecture



SFDPS Services

SFDPS Service	Description
ERADP/Q - En Route Airspace Data Publication and Query services	Near real-time dynamic configuration of ARTCC sector, TRACON, DoD and Special Activity (SAA) airspace
ERFDP/Q- En Route Flight Data Publication and Query services	Near real time flight plan and track messages; flight plan route changes matched with aircraft location; Aircraft track location updated every 12 seconds
ERGMP/Q- En Route General Message Publication and Query services	An assortment of general purpose free text messages
ERODP/QQ- En Route Operational Data Publication and Query services	Restricted operational center data includes controller sector sign in and sign out; Traffic Count and weather-related data

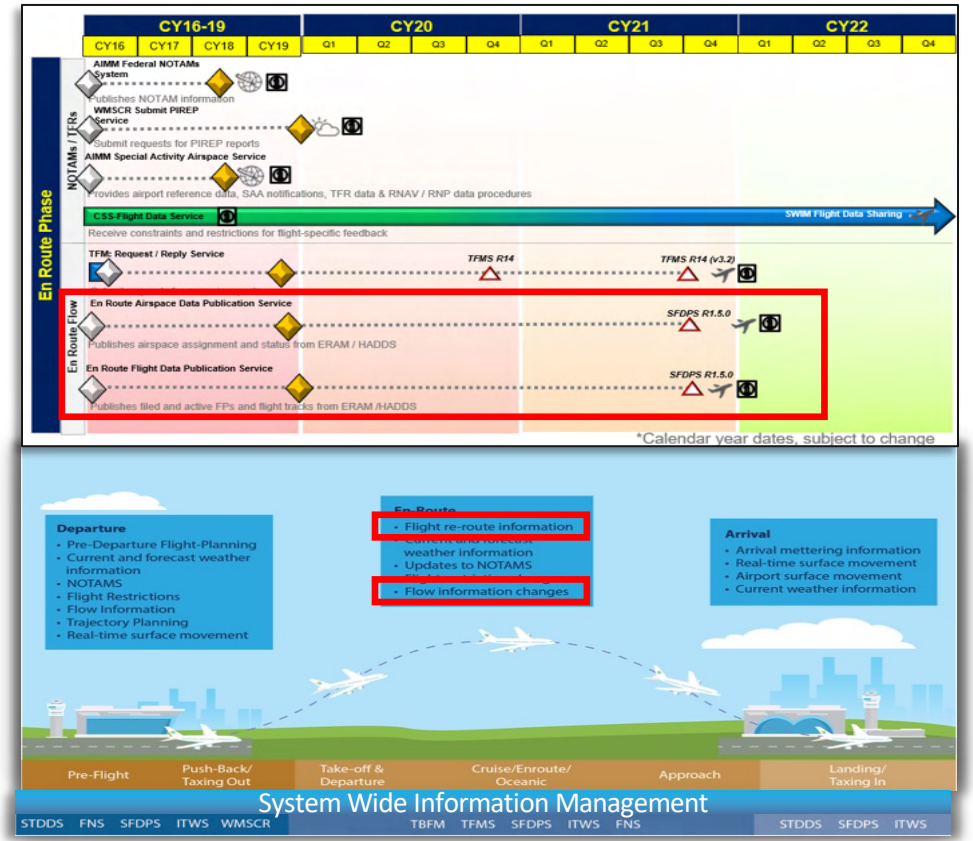
New SFDPS Data Fields Summary

- **FH (Flight Plan), AH (Flight Plan Amendment) and (HU Flight Plan Update) messages**
  - From Traffic Management sources
    - Traffic Management Reroutes
    - Time-Based Flow Management (TBFM) Constraint Satisfaction Point (CSP) ID and speed advisories
  - Adding Flight Plan (Flight Strip) Revision Number
  - Fixing Flight Plan Sequence Number
- **TH (track) messages**
  - From ERAM ADS-B source
    - Added 6 additional data fields derived from ERAM ADS-B source data
- **Adding 00E (time in hhmmss + 4-digit sequence number) field for all FIXM message types**
- **Addressing ERAM Special Activity Airspace Status (SAA) Message Functional Change**
  - Update SFDPS SAA message to current EDDS message format to include all controller entries

SWIM Services (Case Study Perspective)

Leverage SWIM services to assess LGA, JFK, EWR, TEB reaction to convective weather.

- **SFDPS R1.5.0 available now…**
  - *Airspace Data: En Route Airspace Data Publication (ERADP) provides Airspace Assignment from ERAM /HADDS. Examine ZNY-bound flights impacts in N90 environment:*
    - *Route Status messages*
    - *Sector Assignment status messages*
  - *Flight Data: En Route Flight Data Publication (ERFDP) publishes filed and active FPs and flight tracks from ERAM/HADDS. Identify ZNY-bound flight deviations at ZOB-ZNY boundary:*
    - *Flight Plan, Flight Plan Update, Flight Amendment, Cancellation*
    - *Hold Information*
    - *Flight Departure, Arrival Information*
    - *Point Out Information, Handoff*
    - *Track Information*
    - *Position Updates*



SWIM Terminal Data Distribution System (STDDS)

- **SWIM Terminal Data Distribution System (STDDS) converts legacy terminal data collected from airport towers and Terminal Radar Approach Control (TRACON) facilities into easily accessible 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 / PC-RVR - Runway Visual Range
  - EFSTS - Electronic Flight Strip Transfer System
  - TDLS - Tower Data Link Services
  - SFDPS – SWIM Flight Data Publication Service
    - STDDS enhances ASDE-X/ASSC, STARS, and EFSTS/TDLS data with SFDPS flight plan data where applicable
- **STDDS publishes data to NAS and non-NAS subscribers, via NEMS in accordance with SWIM standards**

STDDS Services

STDDS Service	Description
APDS - Airport Data Service	RVR data including runway visual range, trend information and runway edge lighting
ISMC - Infrastructure, Monitor, and Control Service	Provides periodic status information for all STDDS sites and services
SMES* - Surface Movement Event Service	ASDE-X/ASSC data including Cat11/Cat10 position reports, safety alerts and OOOI events (Spot Out, Off, On, Spot In)
TAIS* - Terminal Automation Information Service	STARS data including status, track and flight plan, alert, SISO event, IMC status, traffic count, and performance monitoring
TDES* - Tower Departure Event Service	TDLS/EFSTS data including D-ATIS, clearance delivery time, taxi start time, takeoff time and departure runway

***SMES, TAIS, and TDES services are enhanced with SFDPS flight plan information where applicable**

STDDS R6P2 Updates

- **STDDS R6P2 IOC 4/23/2022**
  - Successful deployment at all 38 STDDS TRACONS
  - STDDS R6P2 Contains no required schema changes
  - Please see NSRR for Release Notes, JMSDDs, Schemas
  - Several associated TDLS changes expected:
    - Pre-departure clearance messages: Spring 2022
    - Clearance delivered messages: Fall 2022
- **STDDS Site Monitor Tool (SMT) offline due to enhanced security (Shields Up order)**

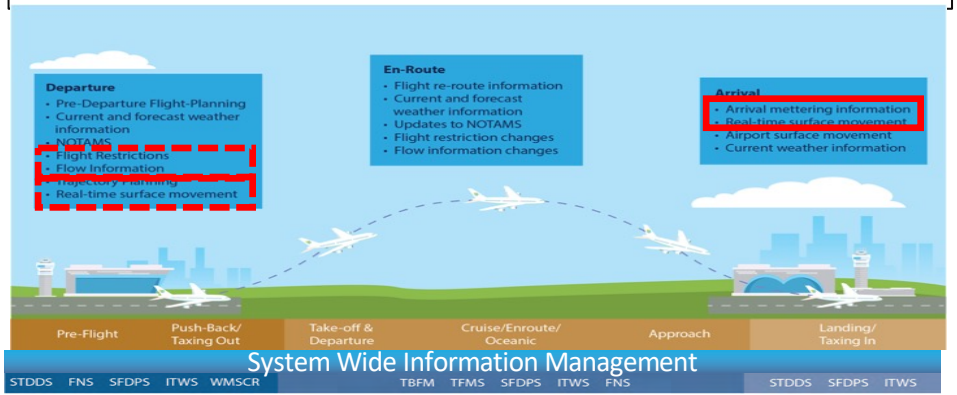
STDDS R6P2 Content

Service	Highlighted Changes
All	• In R6P2, the namespace will not increment • Add Limiting Aircraft Display Data (LADD) filtering
TAIS	• Add rawFlightRules field to the TerminalAutomationFlightPlan message • Publish all associated tracks regardless of altitude • Publish STARS AIG210 in TAIS service • Reduce AIG200/210 message loss on STARS switchover by parsing dual inputs
TDES	• Enhance TDES with additional TDLS messages • Publish additional TDLS data in TDES messages • Parse and publish entire dataHeader in DATISMessage
SMES	• Enhance SMES with additional airport movement events • Add new optional fields to SMES events • Add *_COVAR fields to the MLAT and ADSB CAT10 messages • Remove legacy “v” attribute from asdexmessage.xsd • Enhance SMES CAT10 data using SFDPS data • Add ASDE-X/ASSC data published in Maintenance Mode to STDDS feed
ISMC	• Publish messages in MMIXM format • Split the STDDS Status message by content sensitivity

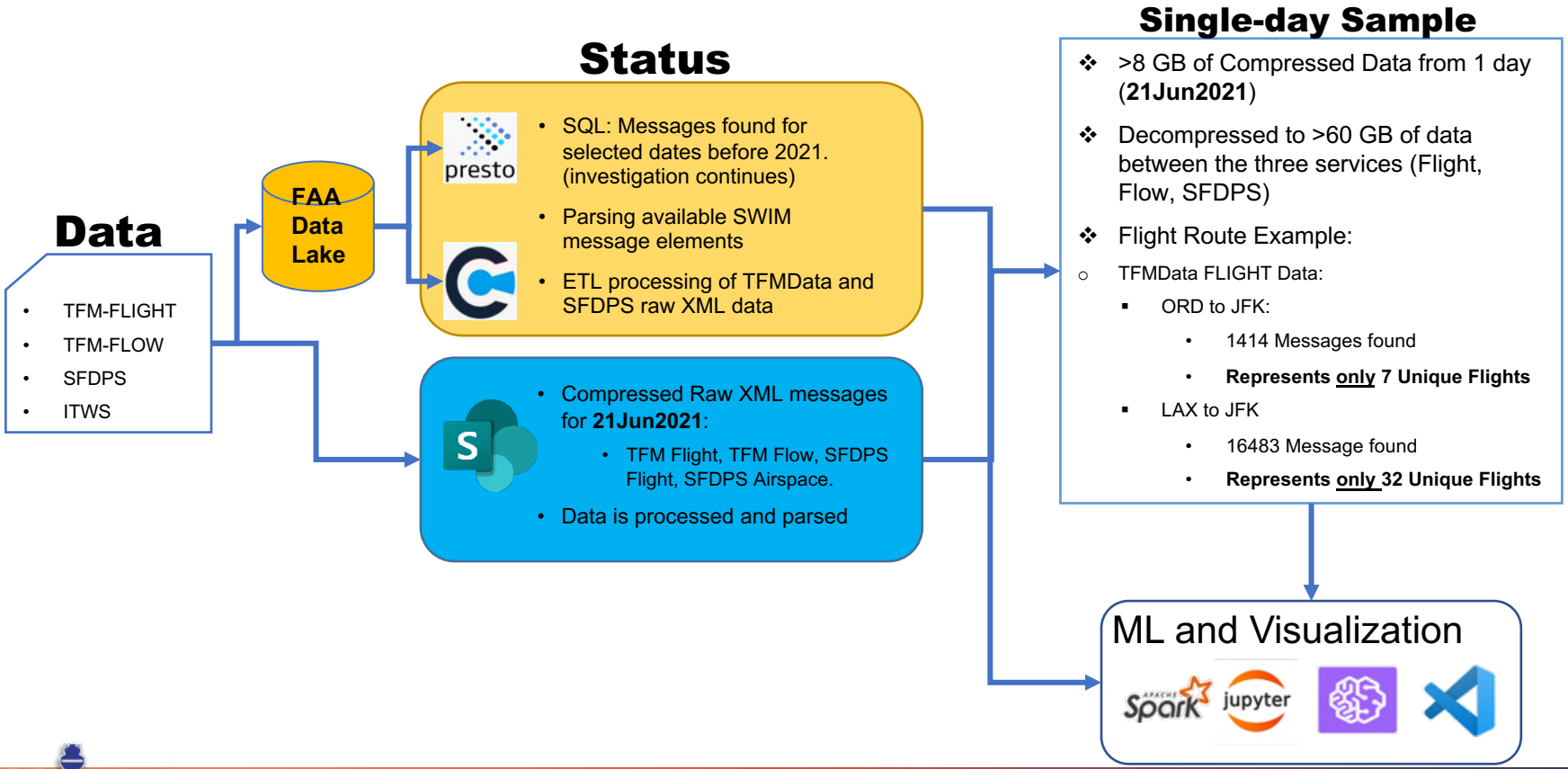
SWIM Services (Case Study Perspective)

Leverage SWIM services to assess LGA, JFK, EWR, and TEB reaction to convective weather.

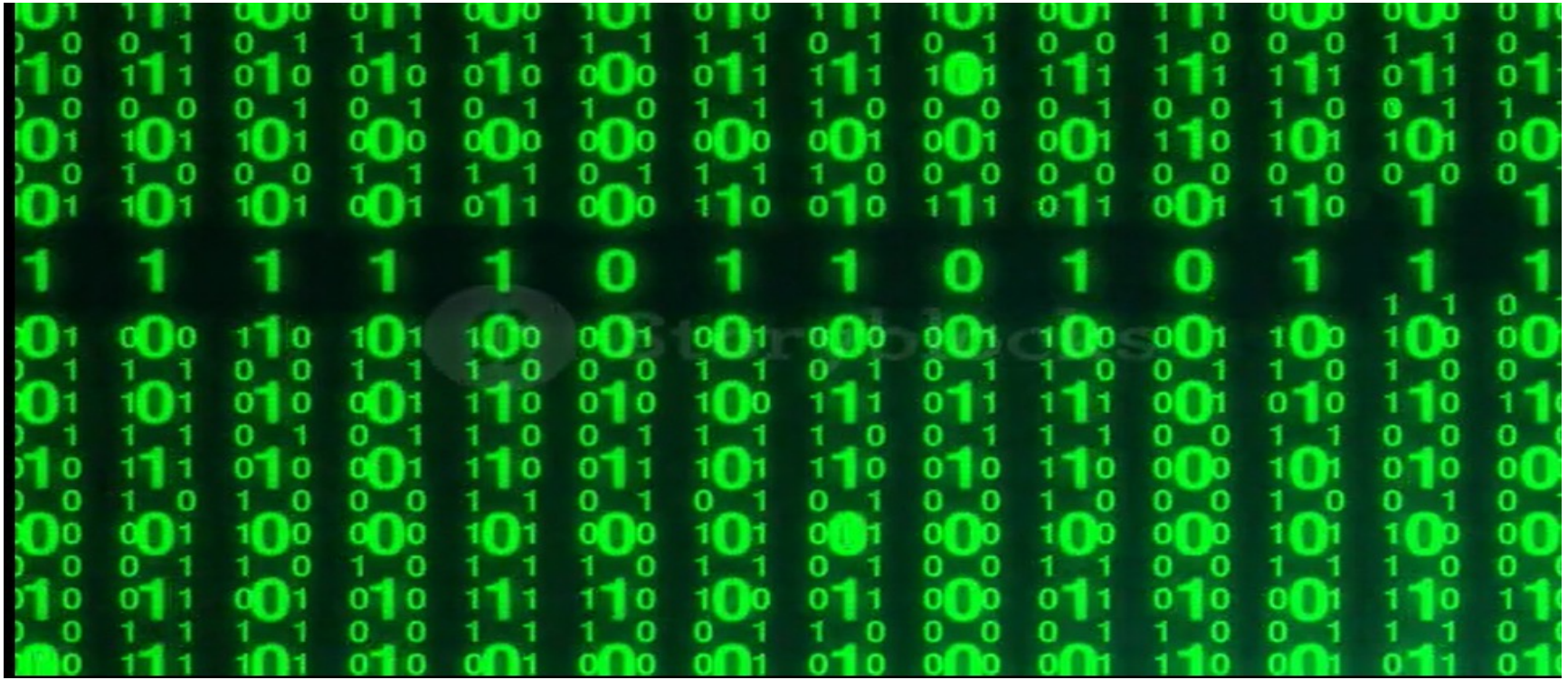
- **STDDS R6P2 available now…**
  - *Airport FlightTracks: Terminal Automation Information Service (TAIS) publishes live FP, track data and traffic count data from STARS:*
    - ! *! "#!$%&'#%()#*+,--./#0+%(*
    - ! *1"2*3"#4$5%)&%6/*
  - *Airport Movement: Surface movement Event Service (SMES) publishes aircraft movement from JFK, LGA, and TEB aircraft track positions (ASDE-X/ASSC):*
    - ! *"78 19:#;<66%-<*
    - ! *7=$>%&<#?5@<;<(/#1@<(/#;<66%-<*
  - *Airport Departures: Tower Departure Event Service (TDES) publishes EFSTS and D-ATIS N90 departure events:*
    - ! *3+<%$%(&<#8<+,@<$<)#,(>5$;%/,5(*
    - ! *89"!A7#,(>5$;%/,5(*
- **TFDM – TTP for NY airports (Future Model Enhancement)**
  - *Surface Management: TTP Build 1 will enhance the prediction model by providing N90 Airport and Flight Information along with specific demand/delay information and airport-initiated departure stop restrictions:*
    - ! *",$B5$/#A(>5$;%/,5(#;<66%-<6*
    - ! *+,--./#8<+%C#?<66%-<6*
    - ! *7=$>%&<#?</<$,(-#0$5-$%;6@#!$%>>,&#?%(%-<;<(/#E<6/$,&/,5(6#A(>5$;%/,5(*



Prediction Model - Current Status



Deviation Capture Visualization



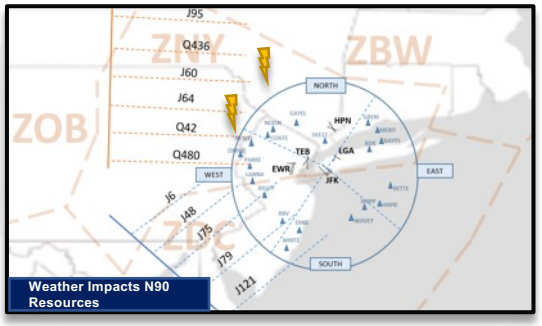
Prediction Model – Case Study Vignettes

Airspace Resource Closures

Convective weather (e.g., thunderstorms) moving toward N90 impacts airspace east and north fixes and departure routes.

Drivers to Observe:

- *Weather Location & Intensity, TMI Restrictions, Departure Fix Utilization, Arrival Deviations off Original Trajectories*

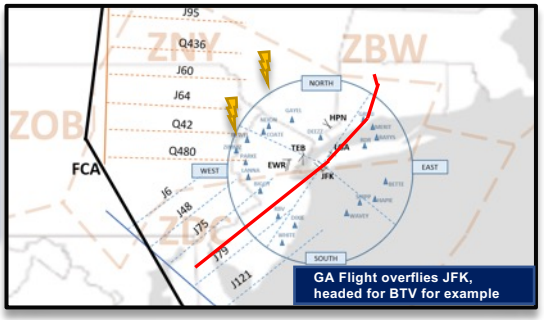


Flow Restrictions Workaround (NBAA)

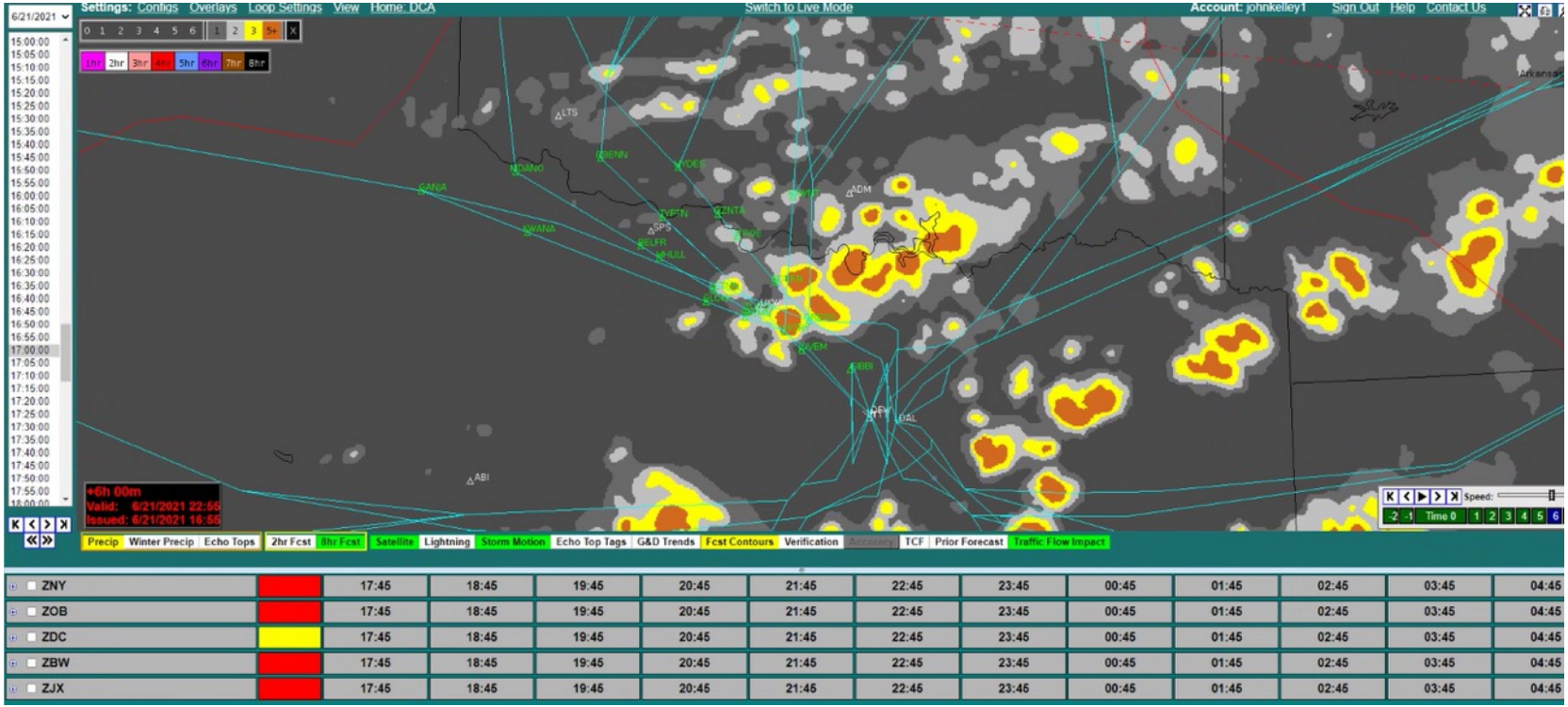
Assisting GA flights, subjected to TMI constraints, with ZNY flyovers.

Drivers to Observe:

- *TMI Restrictions, Jet Route & fix availability, N90 Airspace Traffic Demand, Weather location, intensity & echo tops*



6.21.21 NTX Thunderstorms



SWIM Data ETL Considerations…

- When working with multiple SWIM data sources (e.g., TFMData, SFDPS), recommend initially fusing datasets to create a “common” operational story
- Working with SWIM Data requires hands-on attention for data ETL* data processing (e.g., using XML vs FIXM formats)
- Account for buffer time (~3 days) for data engineering to parse SWIM messages prior to performing any analysis
  - *This time varies based on the “shape” of the extracted data and scope of SWIM data sources required*
- Consider the right data storage capabilities and data analytics environment/tools to leverage for analysis
  - *This is particularly important, if historical vs live data serves as the focus of study*
- Leverage available SWIM Service JSDDs, WSDDs, and other SWIM artifacts along with NAS operations expertise greatly expedites interpreting raw XML data

ETL = (Extract, Transform, Load) Data Processing

Want to get involved? Please join us!

Please contact us:

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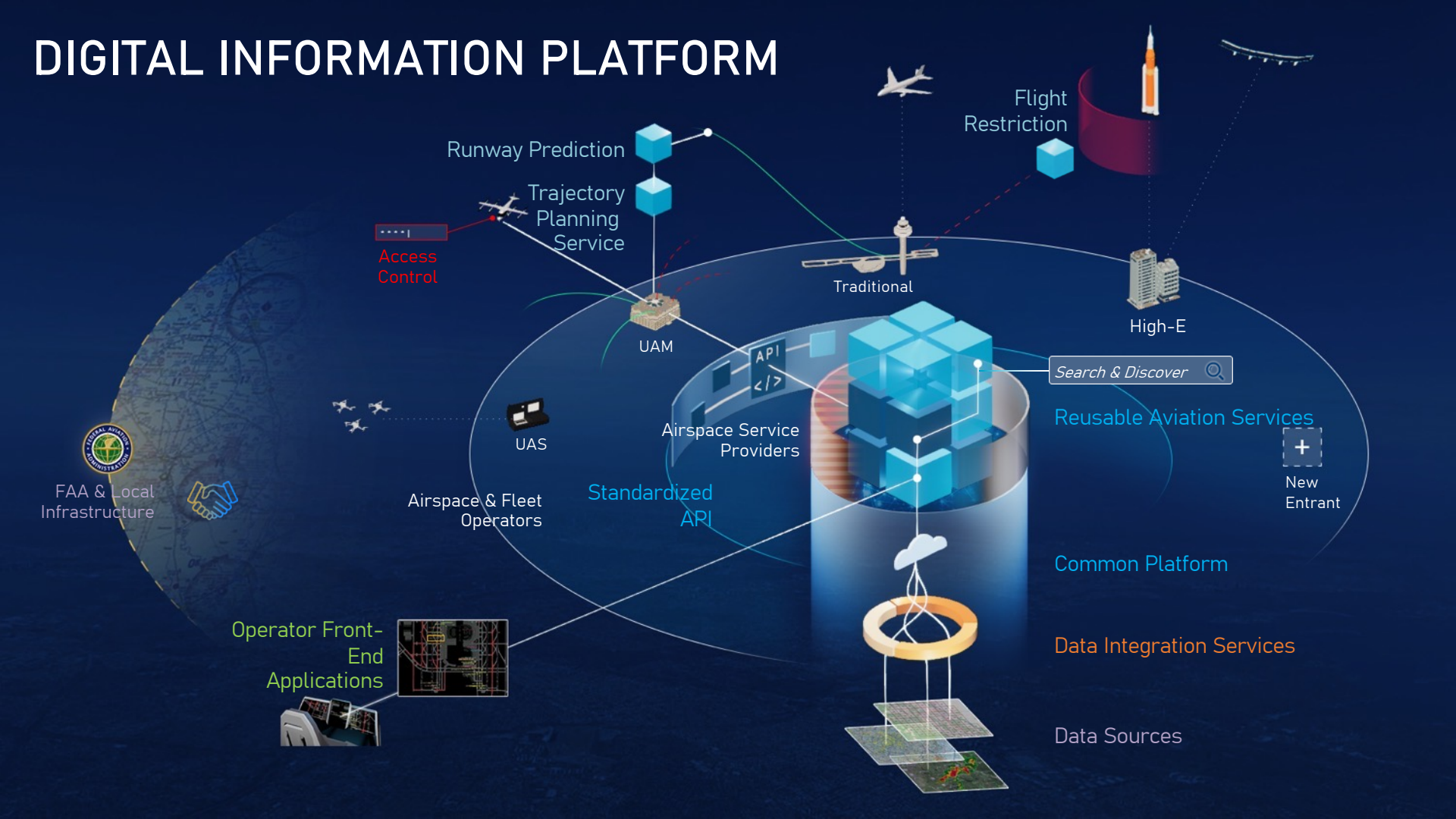
Mark Hopkins – mark.hopkins_nlst@lstechllc.com

Sandie Steele – sandie.steele@lstechllc.com

John Kelley – john.kelley@lstechllc.com

Mirna Johnson, DIP Sub-Project Manager
Jeremy Coupe, DIP SA CDDR Demo Lead

DIGITAL INFORMATION PLATFORM



Converting TOS for DIP

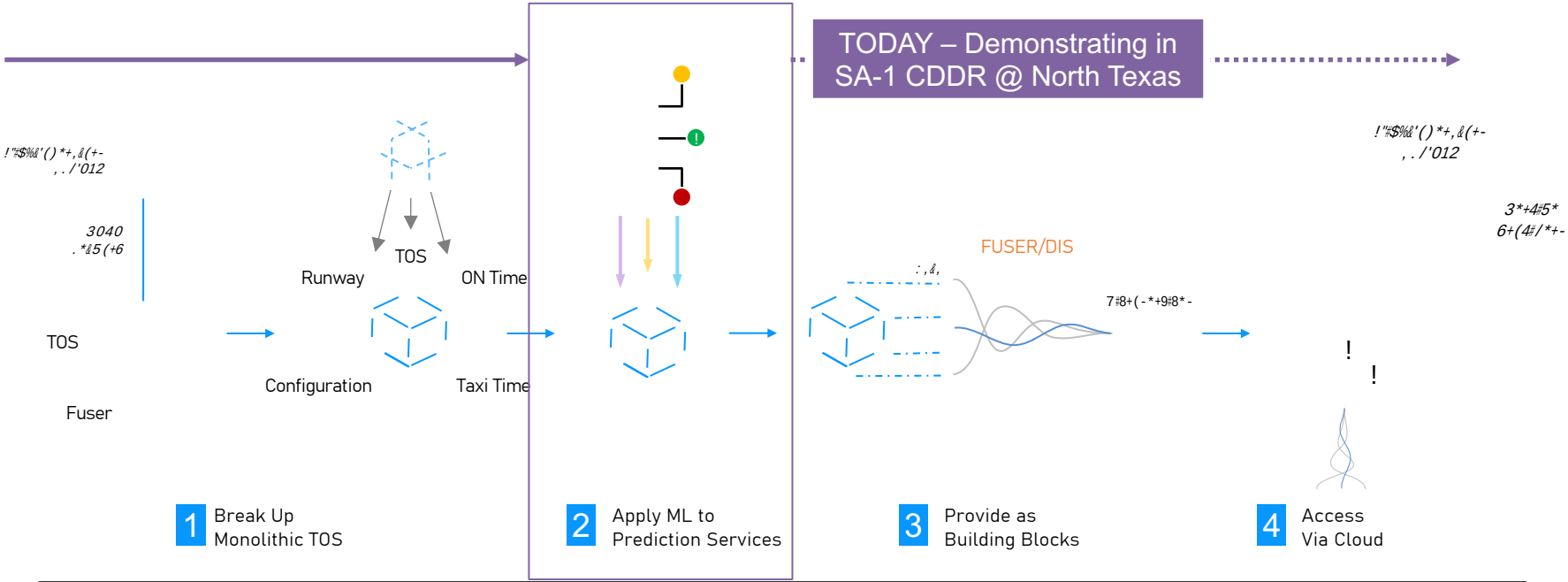
! "#$%"&''()*+,

Monolithic service for single application, using adaptation-based algorithms to generate trajectory predictions as input to terminal scheduler; requiring site-to-site deployment

#-)-%"&''*./

Transformed into service-oriented architecture of highly reusable digital services accessible on the platform to support many advanced applications; upgraded to machine learning-based algorithms for predictions to enable NAS-wide scalability

TODAY – Demonstrating in SA-1 CDDR @ North Texas



1 Break Up Monolithic TOS

2 Apply ML to Prediction Services

3 Provide as Building Blocks

4 Access Via Cloud

Changing technology and applying advanced techniques designed to scale and adapt for the NAS

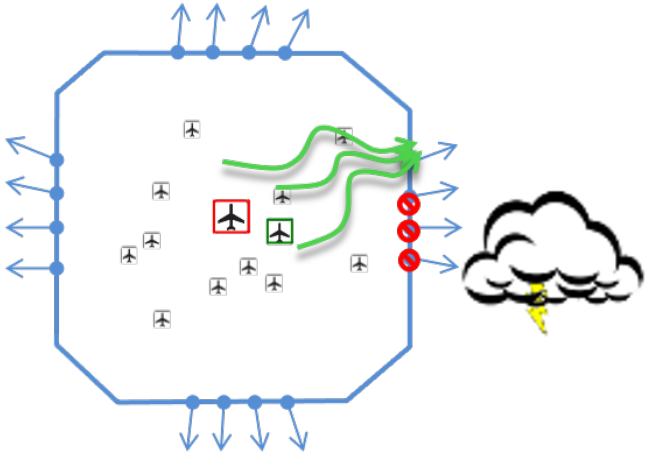
Outline

- Sustainable Aviation 1 Field Demo Progress in North Texas

- Scalable DIP Solution Analyzed Outside North Texas

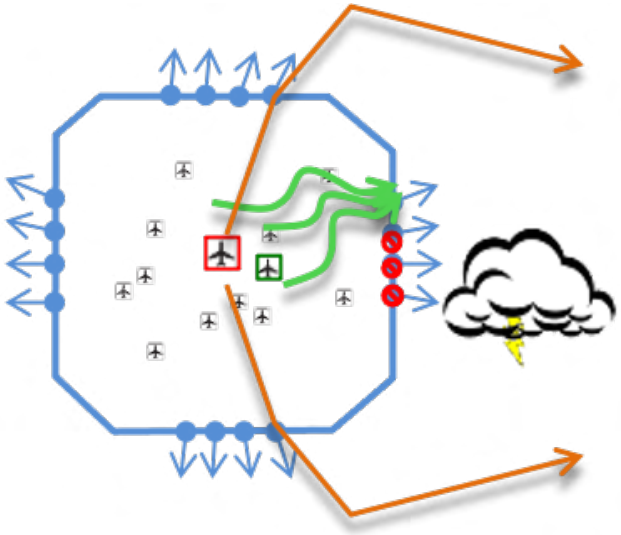
Collaborative Digital Departure Reroute (CDDR)

The Problem



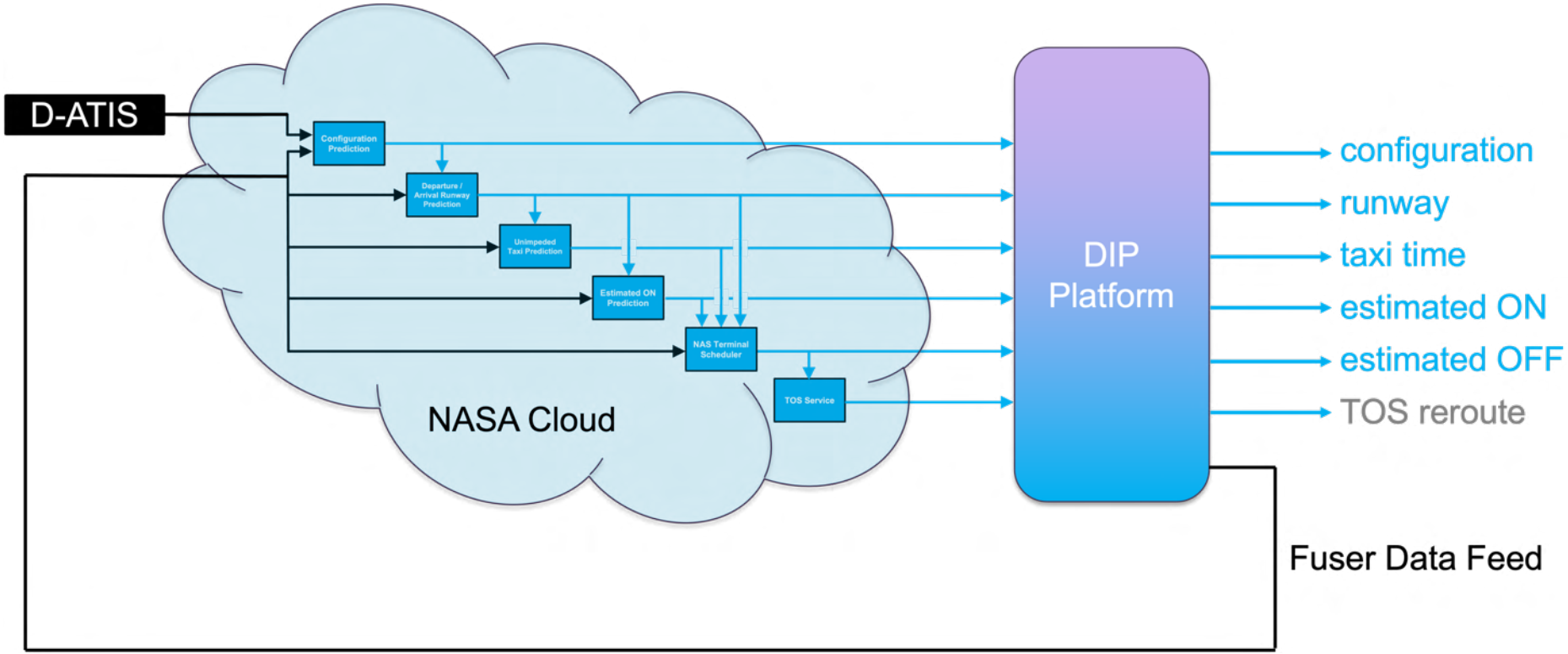
Terminal airspace ***demand/capacity imbalance*** leads to departure delays on the airport surfaces

The Solution

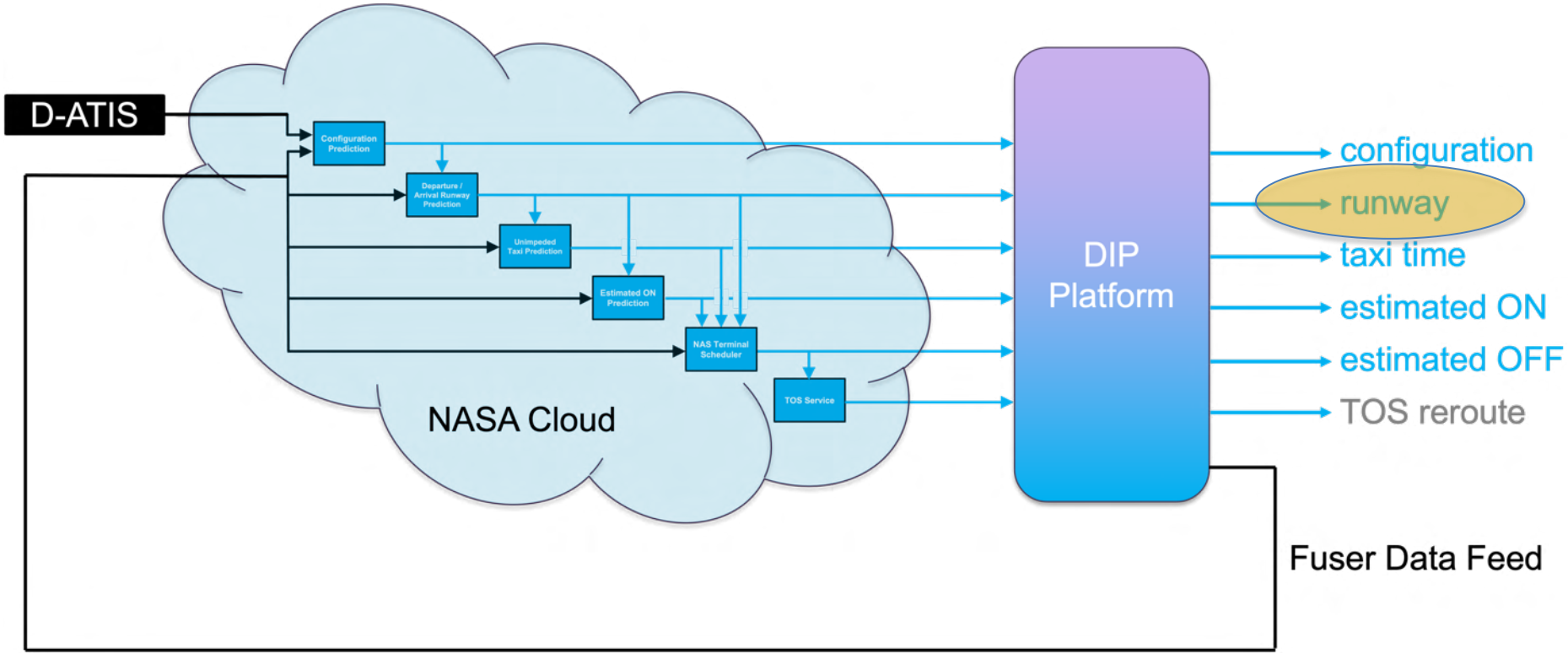


CDDR system enables Flight Operators to ***intelligently*** request reroutes from Air Traffic Control for departure fix ***load balancing***

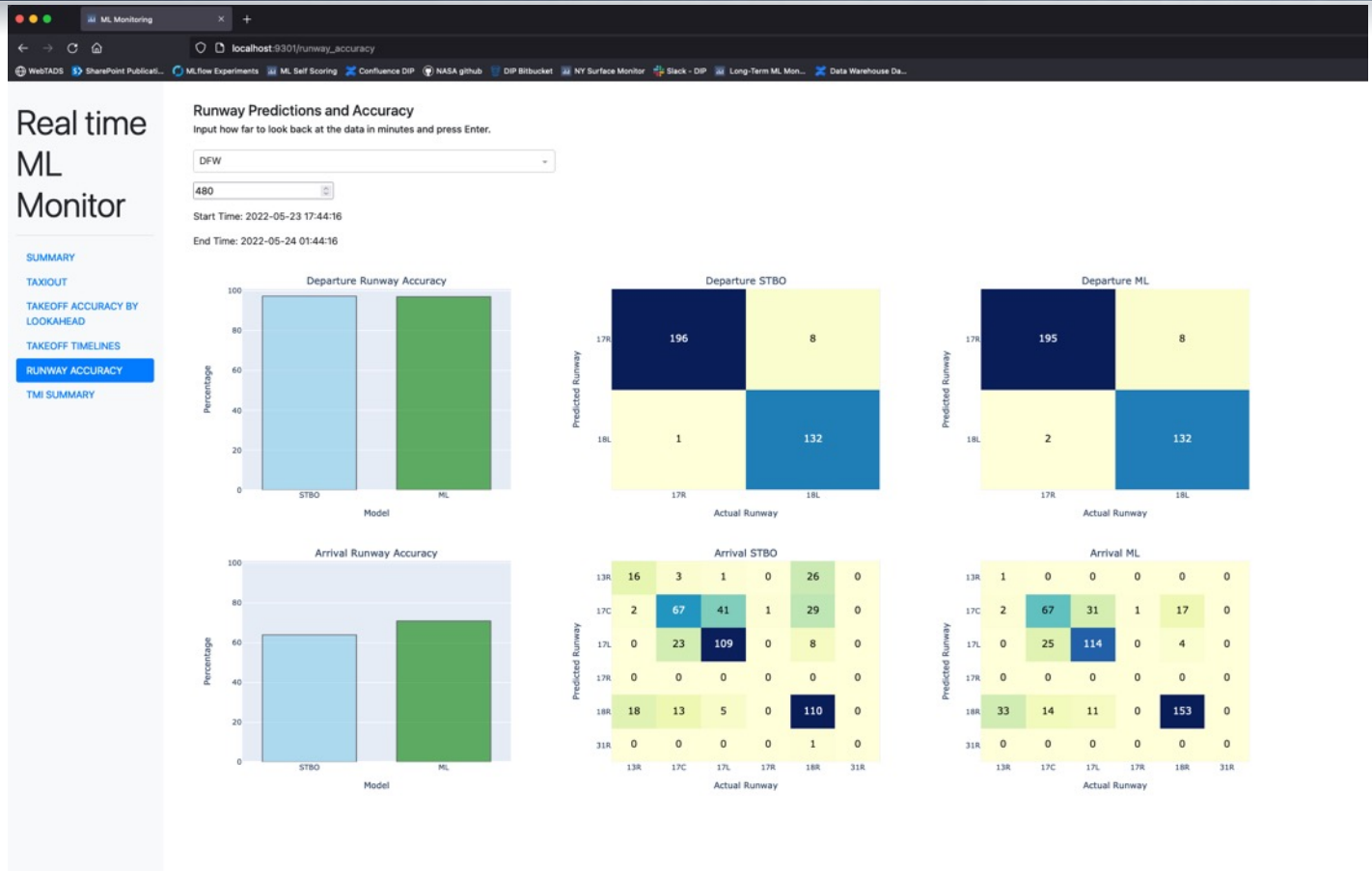
ML Services Used in Sustainable Aviation 1 Field Demo



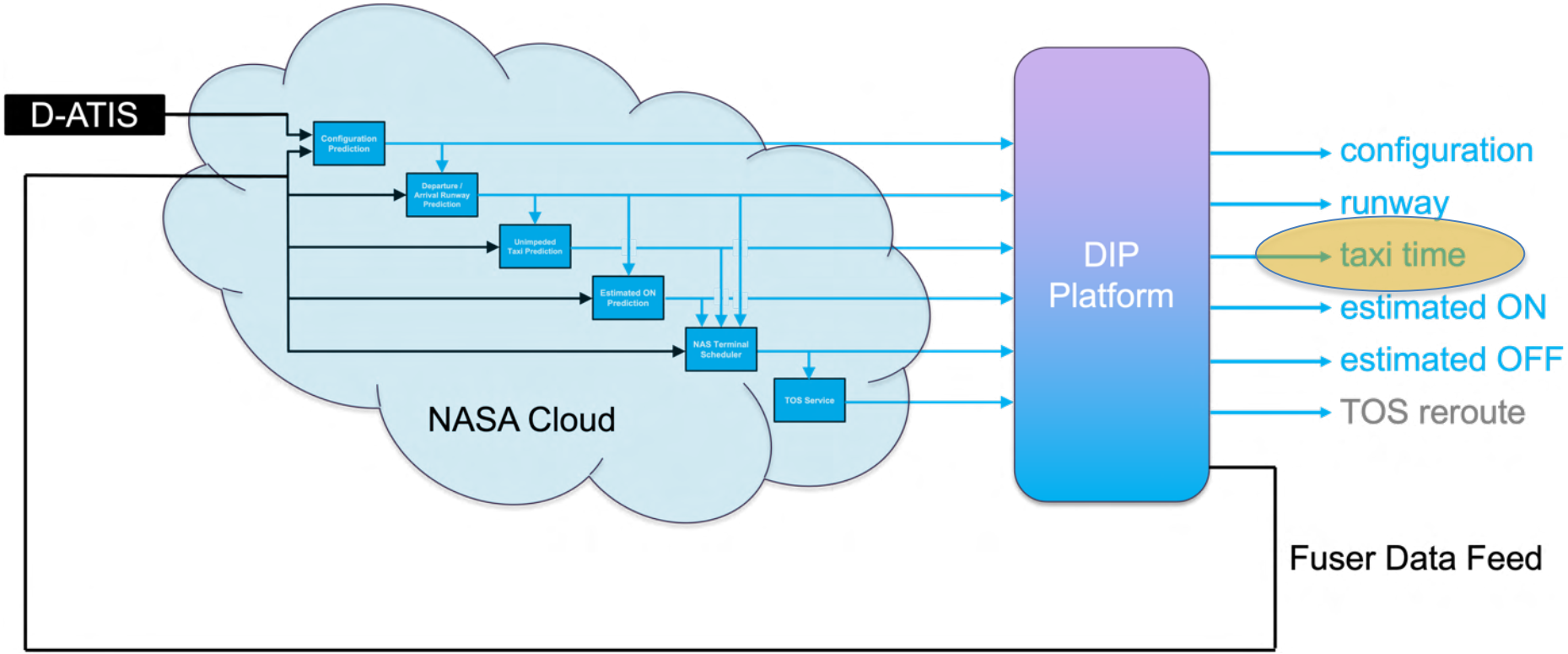
Runway: Initial Performance in SA-1a Field Demo



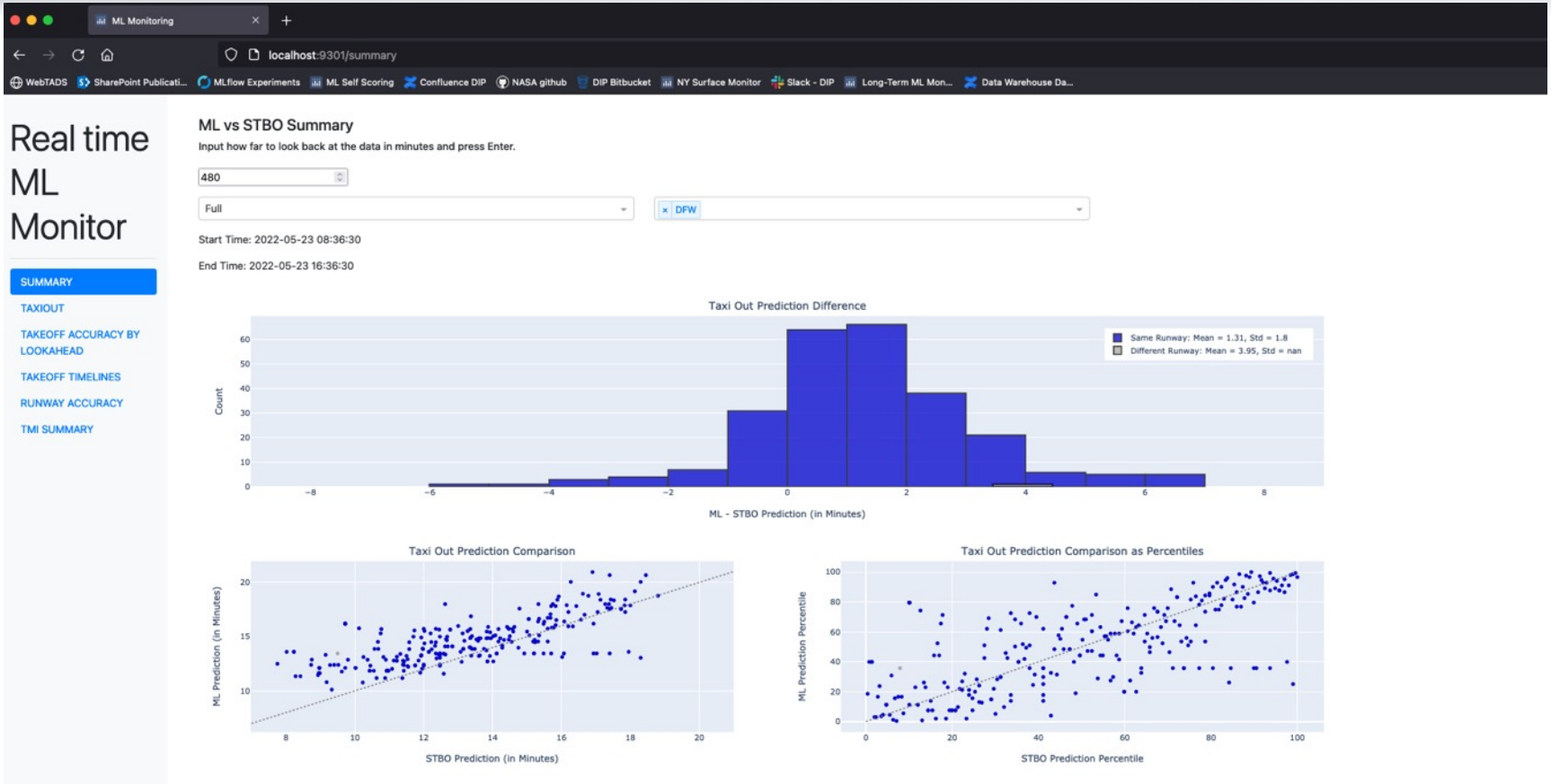
Runway: Initial Performance in SA-1a Field Demo



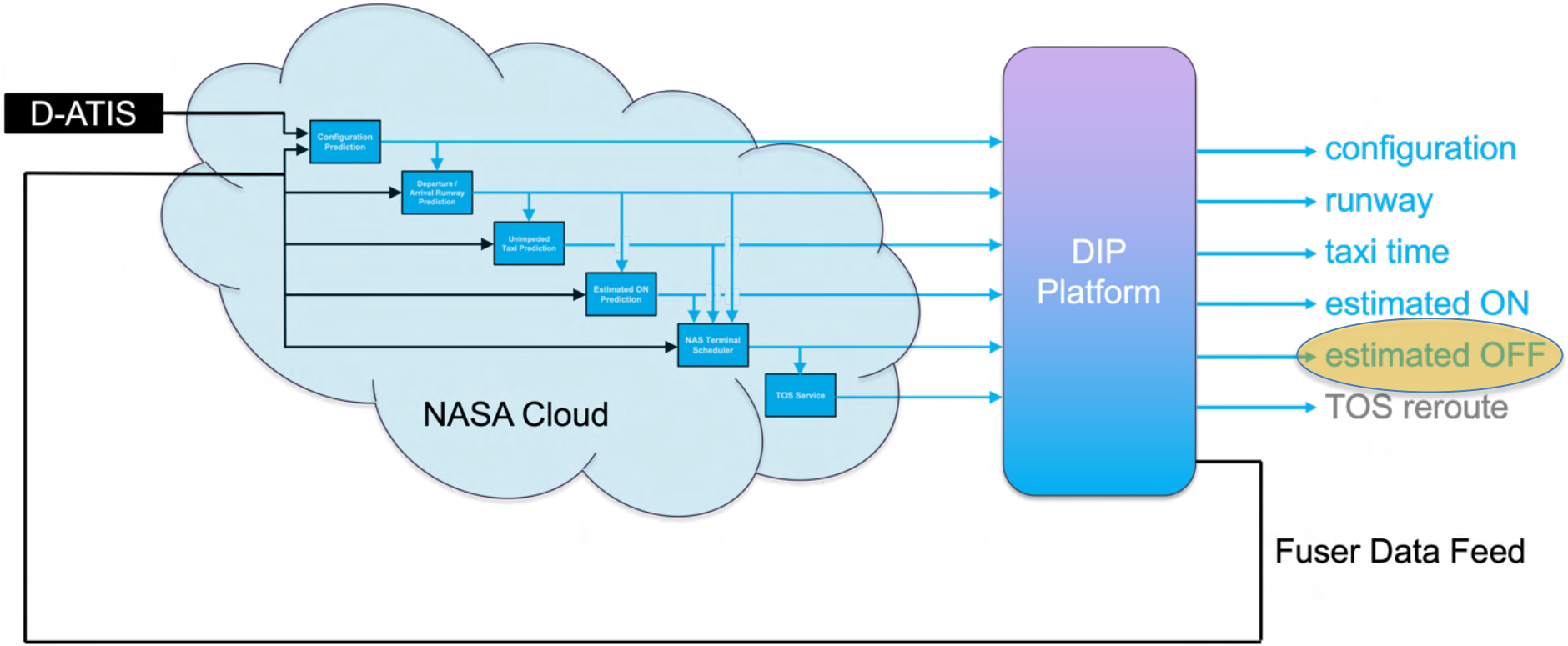
Unimpeded Taxi: Initial Performance in SA-1a Field Demo



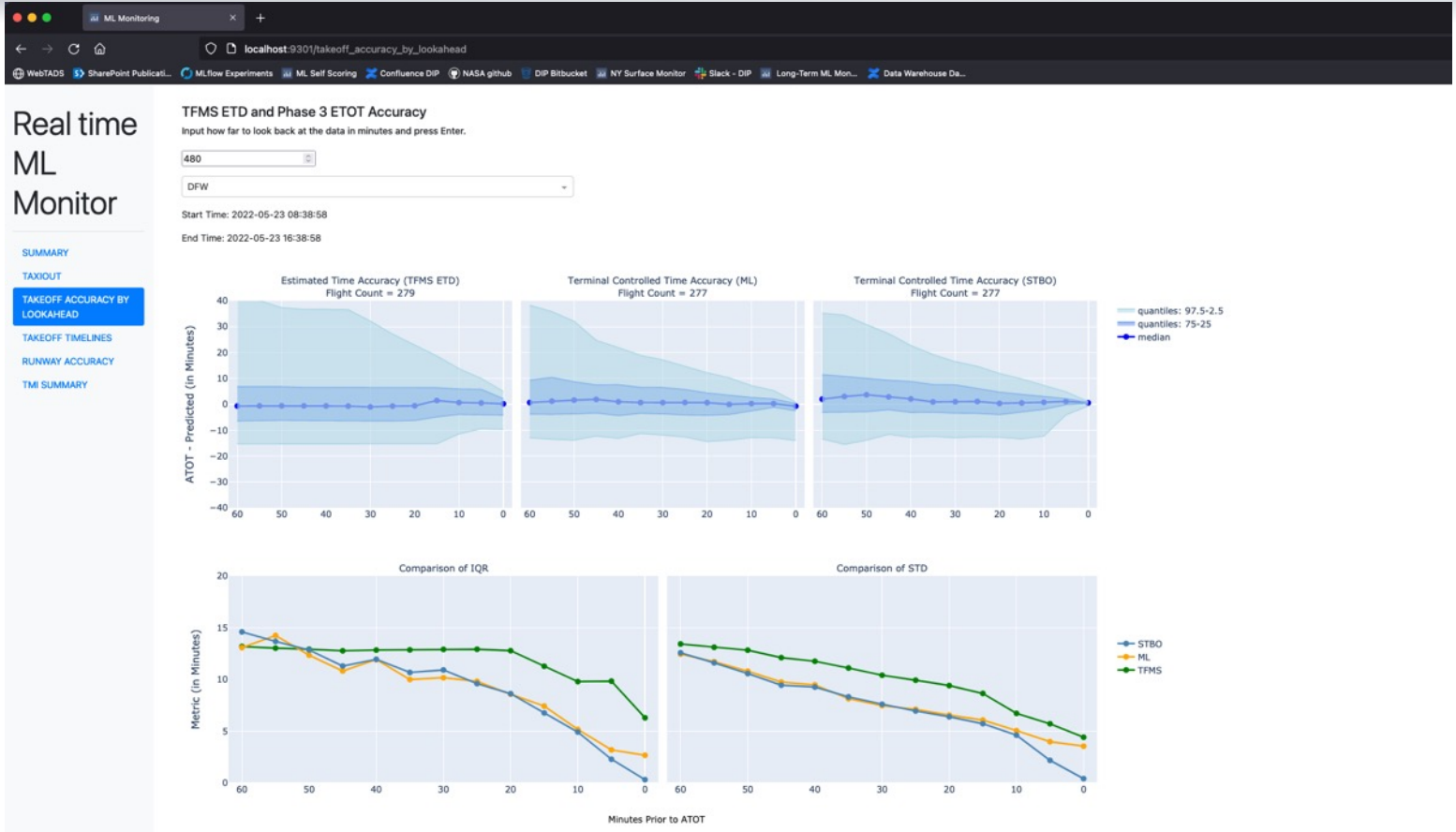
Unimpeded Taxi OUT: Initial Performance in SA-1a Field Demo



Estimated OFF: Initial Performance in SA-1a Field Demo



Estimated OFF: Initial Performance in SA-1a Field Demo



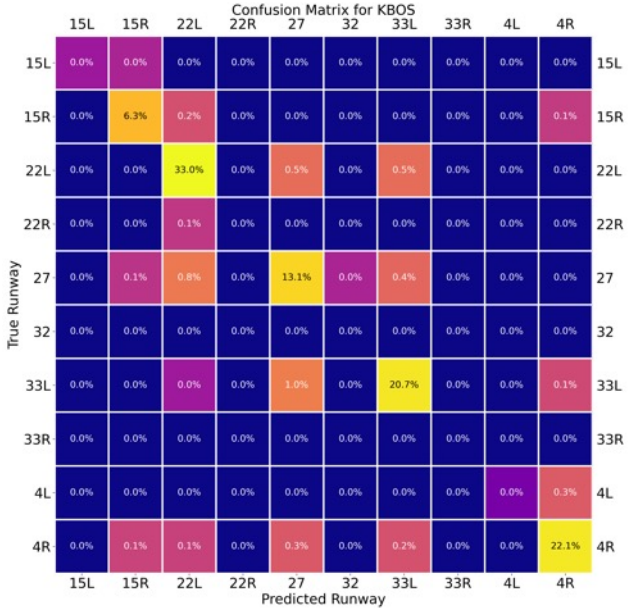
Outline

- Sustainable Aviation 1 Field Demo Progress in North Texas

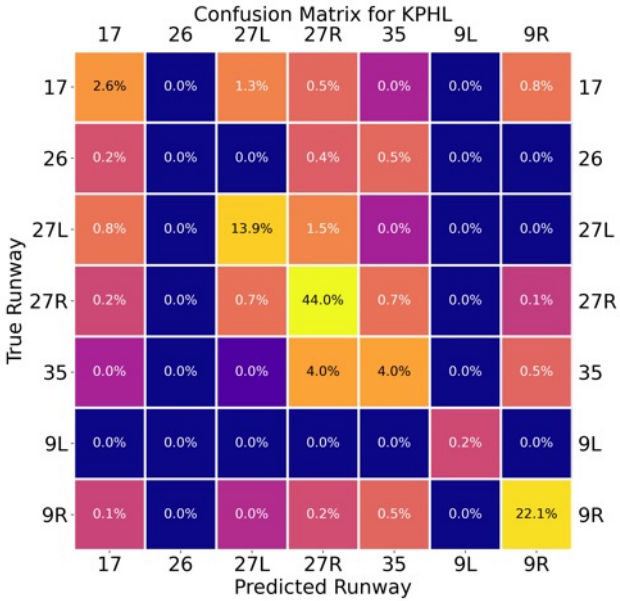
- Scalable DIP Solution Analyzed Outside North Texas

Arrival Runway Prediction

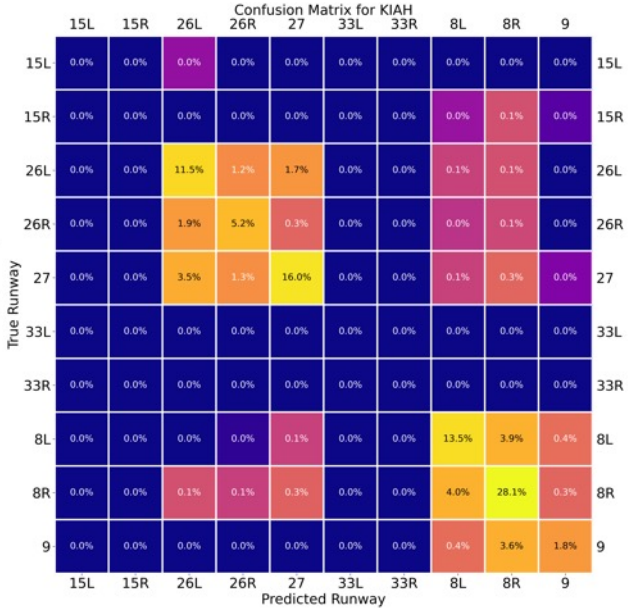
KBOS Arrival Runway
accuracy = 95.1%



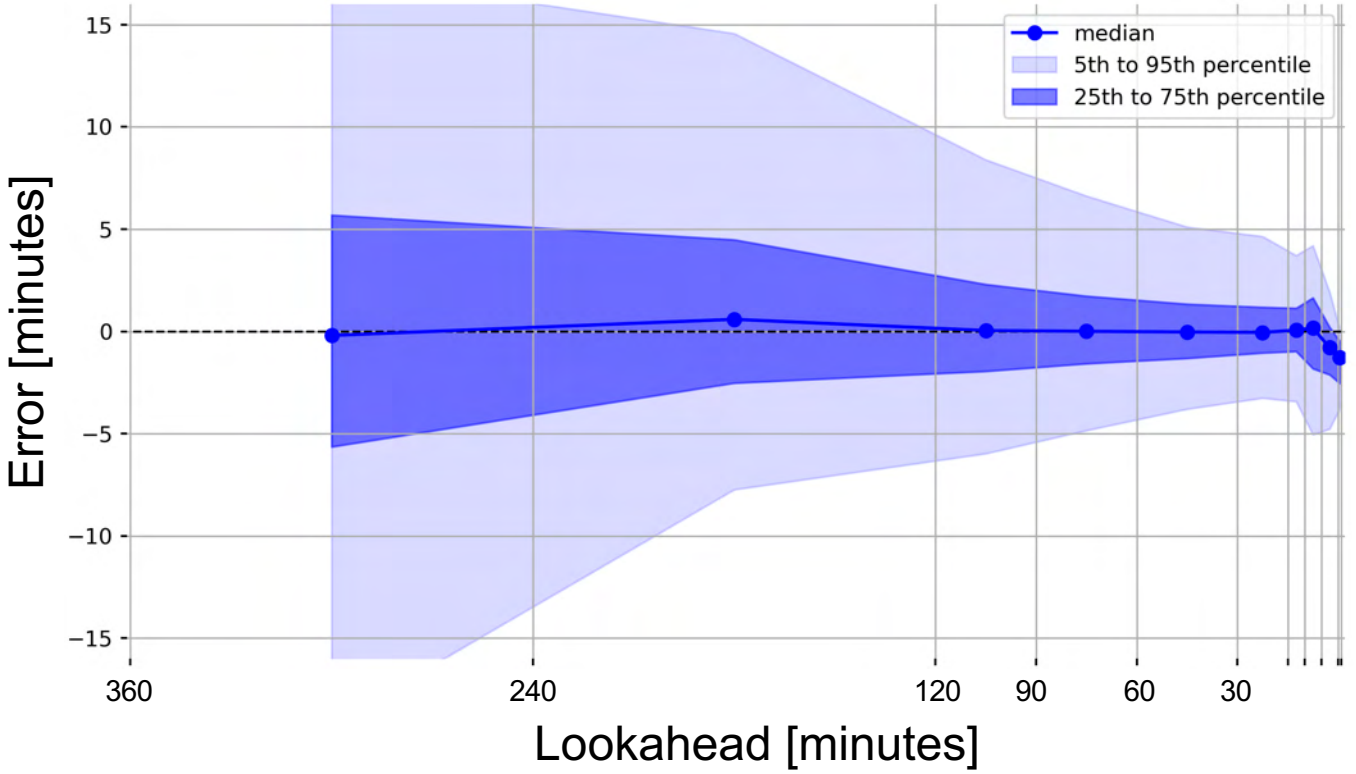
KPHL Arrival Runway
accuracy = 87.1%



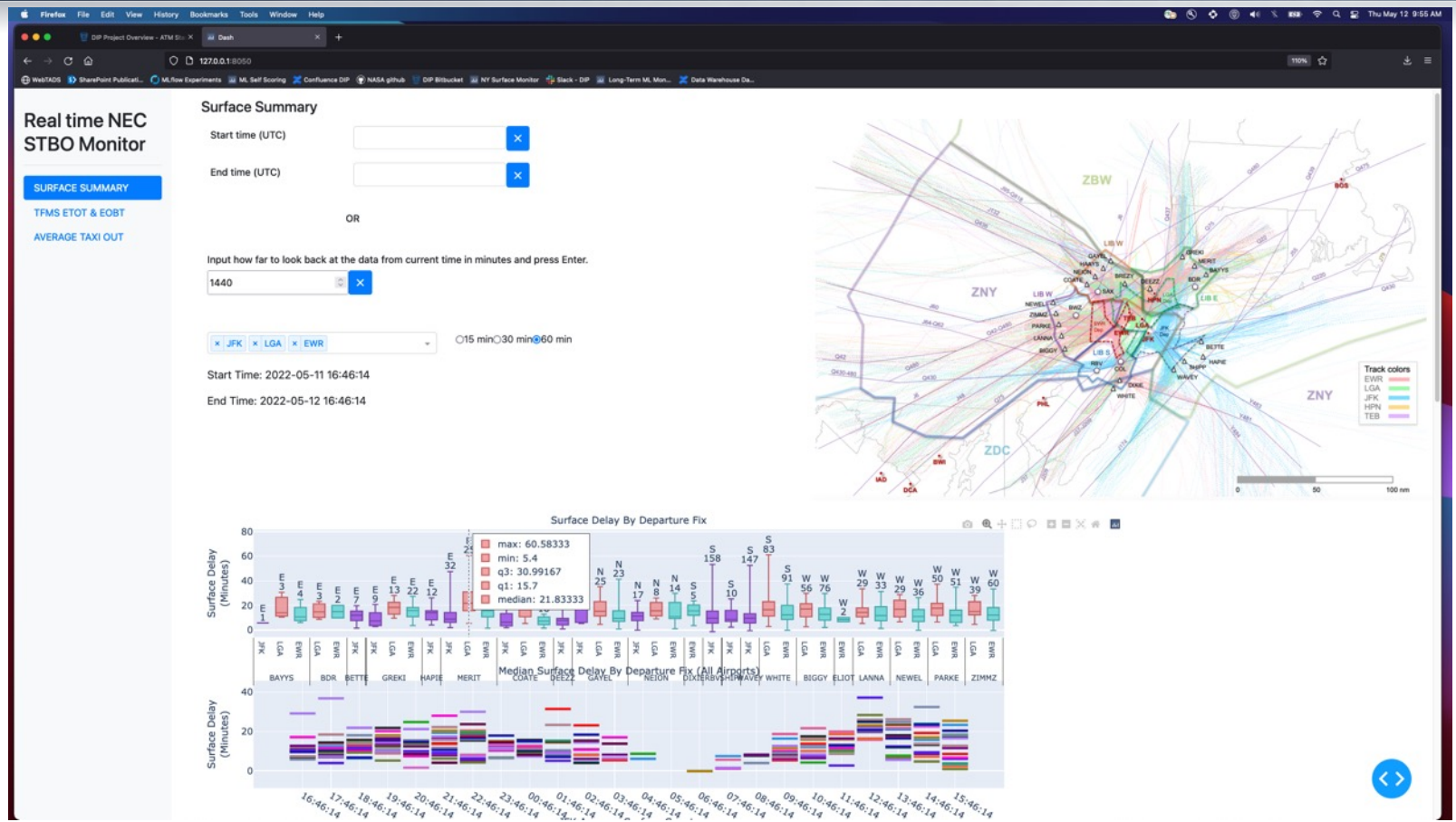
KIAH Arrival Runway
accuracy = 76.1%



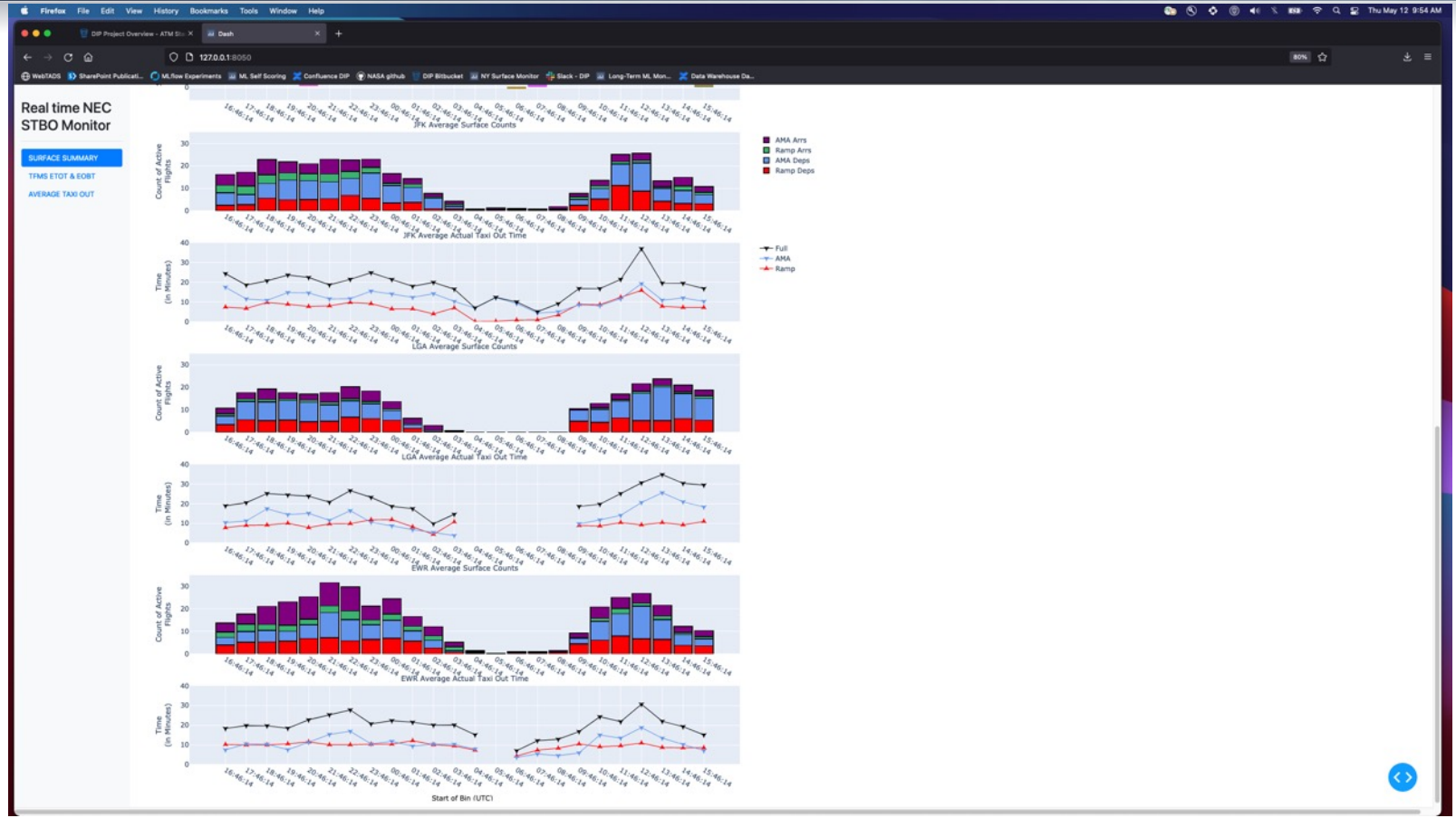
ML Estimated ON Time for KIAH



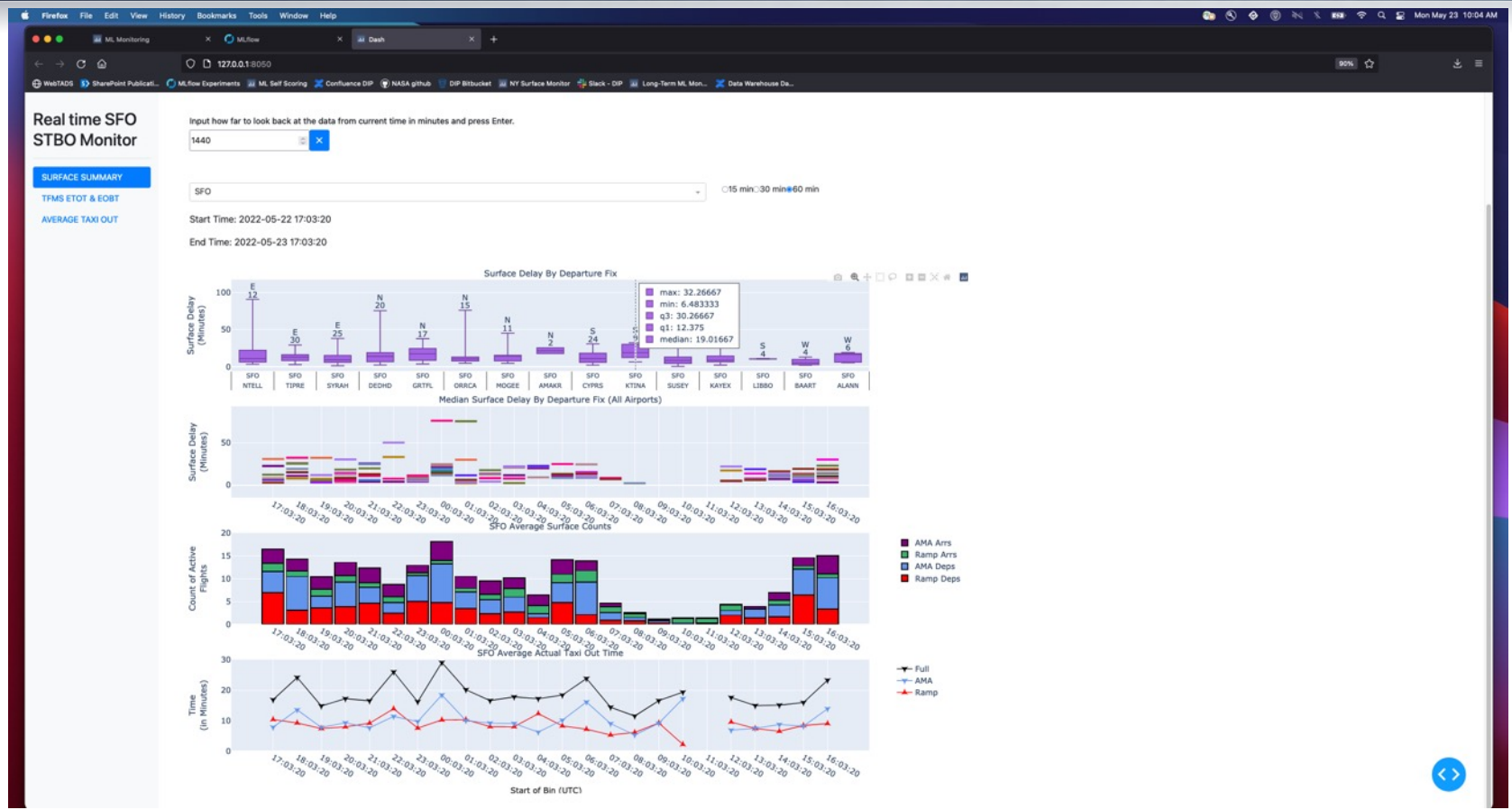
NEC Traffic Monitor



NEC Traffic Monitor

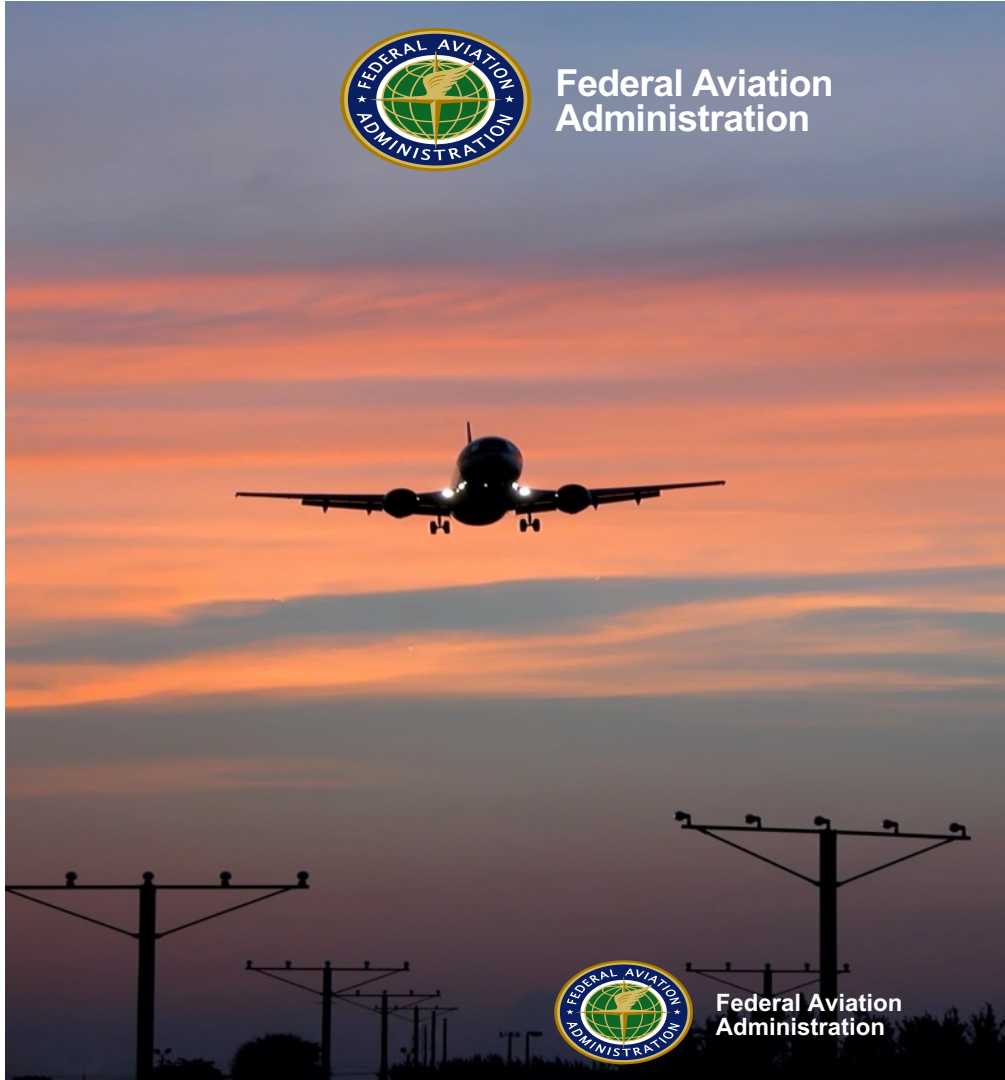


KSFO Traffic Monitor



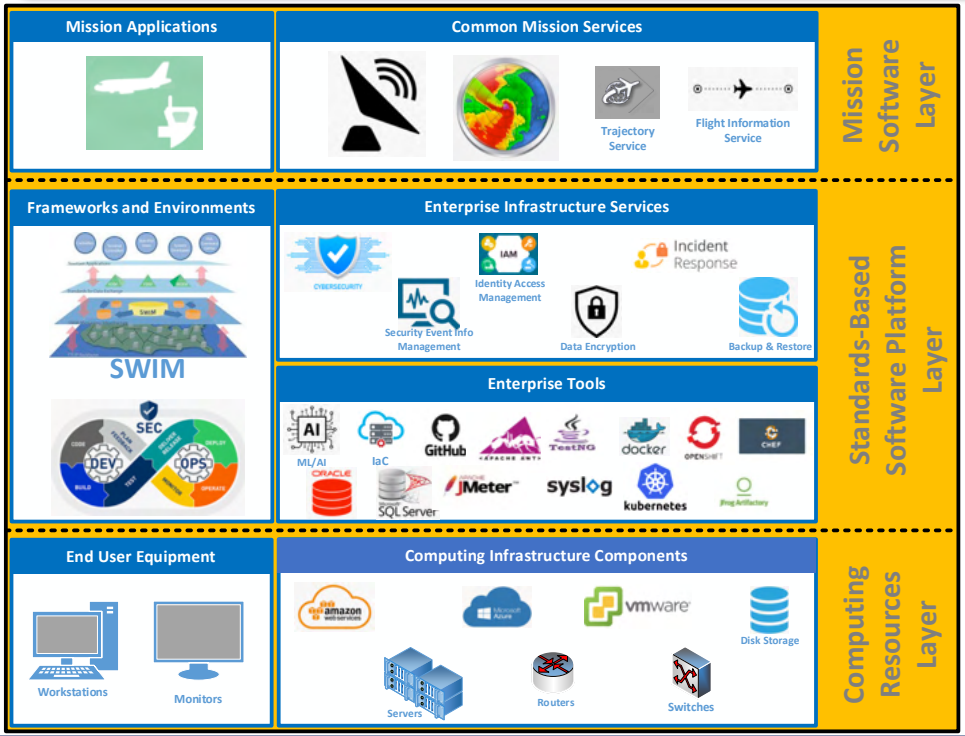
SWIFT Developer Workshop Series

Date: May 25, 2022



AES VISION

Create a NAS composed of automation capabilities that utilizes layered enterprise components and reusable services which can be developed, acquired, and sustained independently



Software developers can focus on providing aviation-specific applications and services

A set of Enterprise Services and Tools are made available to maximize reuse, accelerate development and deployment of capabilities as well as expand the vendor base

Allows for rapid availability of infrastructure and improved resiliency

Enterprise services and tools depicted in the diagram are examples of capabilities that can be available within the AES architecture

SWIFT Developer Series: Objectives

- **Review the basics of connecting and consuming SWIM data**

- **After the series, participants will:**
  - Have a deeper understanding of integrating SWIM data and be empowered to develop solutions to address a problem space
  - Understand how the AES concept will enable iterative development and common services to meet the needs of the users (internal and external)
  - Appreciate how capabilities can be built and evolve over time

Developer Workshop Overview

- **Logistics**
  - Hosted at MITRE McLean facility, targeting August 29th and August 30th
    - Half-Day (afternoon) on the 29th for set up and troubleshooting
    - Full day on the 30th for the Developer Workshop
- **At developer workshop, participants will create an Application Programming Interface (API) that will drive an analytics chart**
  - Consume data from a common data service
  - Process the data to make it available for table using a known schema
  - API will be deployed via pipeline
- **As the exercise progresses – new versions of common service will become available with more extensive data.**
  - Participants will update their applications accordingly
- **Participants will have some level of language choice**

The Big Idea

Inspired by the NY Fix Deviation Use Case

SWIM

STDDS

SFDPS

Process Flight Data

DATA

Common Service V1

Common Service V2

Common Service V3

Teams will incrementally build the API to expand their awareness of the problem space

Widget API

DEP	ARR	FIX	# Flights	# DEV	% DEV
KSFO	KJFK	FIX1	10	8	80%
KATL	KLGA	FIX1	6	2	33%
KORD	KJFK	FIX2	4	2	50%

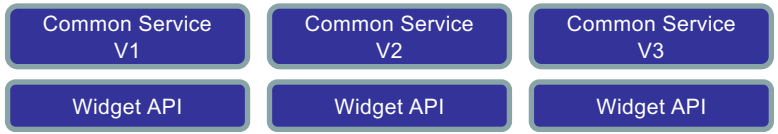
Iterative versions will be built and deployed “live” by the platform team

The Big Idea

Incremental and Iterative Capability Development

STEP	Data
Step 1	Flight Counts
Step 2	Deviation Counts
Step 3	Deviation %

- **Attendees will be split into groups that together will help deliver the capability**
- **As teams progress, they will have additional data needs**
  - "Platform Team" will update and push new services to address the missing data
  - Once new services work their way through the pipeline, teams will have access to new data element to incorporate into their API
- **Progression through the workshop will unlock increased awareness of the problem space**



DEP	ARR	FIX	# Flights	# DEV	% DEV
KSFO	KJFK	FIX2	10	2	20%
KSFO	KLGA	FIX1	6	2	33%
KORD	KEWR	FIX1	10	5	50%

Making it Successful

Fill in the blank template applications will be provided (java, python, node)

Checkpoints for reconciling issues and jumping in without getting left behind

Team of SMEs on-site to assist when issues pop-up

Making it Successful

- **Demystify (as much as possible) the various concepts prior to the in-person event**

- **Voluntary, but highly encouraged webinars**
  - June 21, 2022
    - *Containerization & Orchestration*
  - July 19, 2022
    - *Connecting & Consuming SWIM Data*
  - August 16, 2022
    - *Understanding the Problem Space (NY Case Study Review)*

- **Half-Day set up and troubleshooting on afternoon of Monday August 29th**
- **For Early Registration Information please email SWIFT@faa.gov**

SWIFT Portal Release

Overview and Update

Presented to: SWIFT

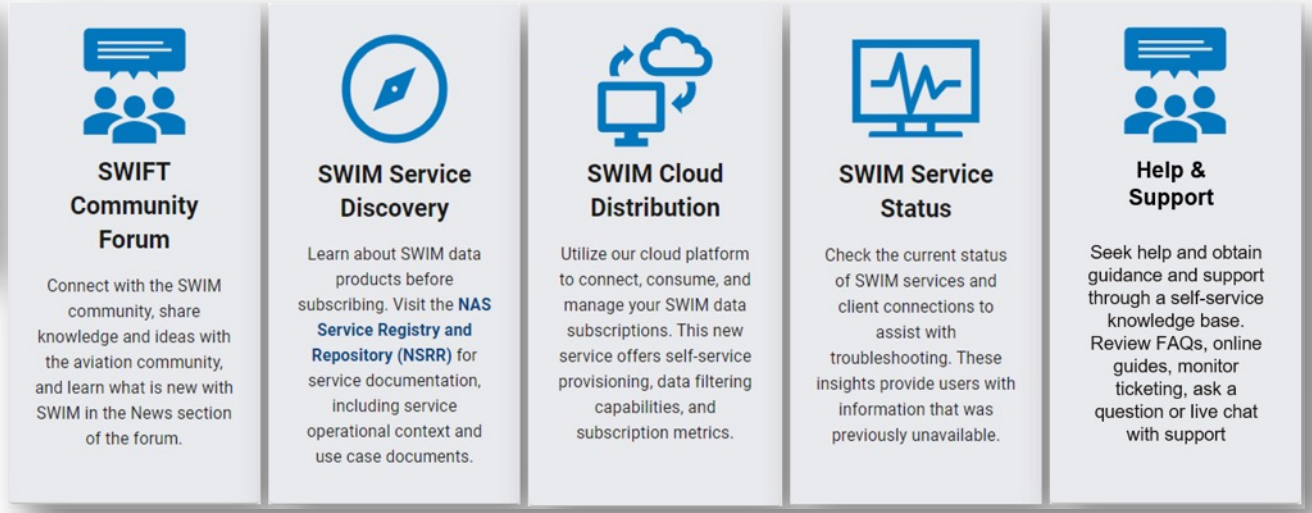
By: Lucas Curns – FAA
Waldo Ford – FAA

Date: May 25, 2022

Federal Aviation Administration

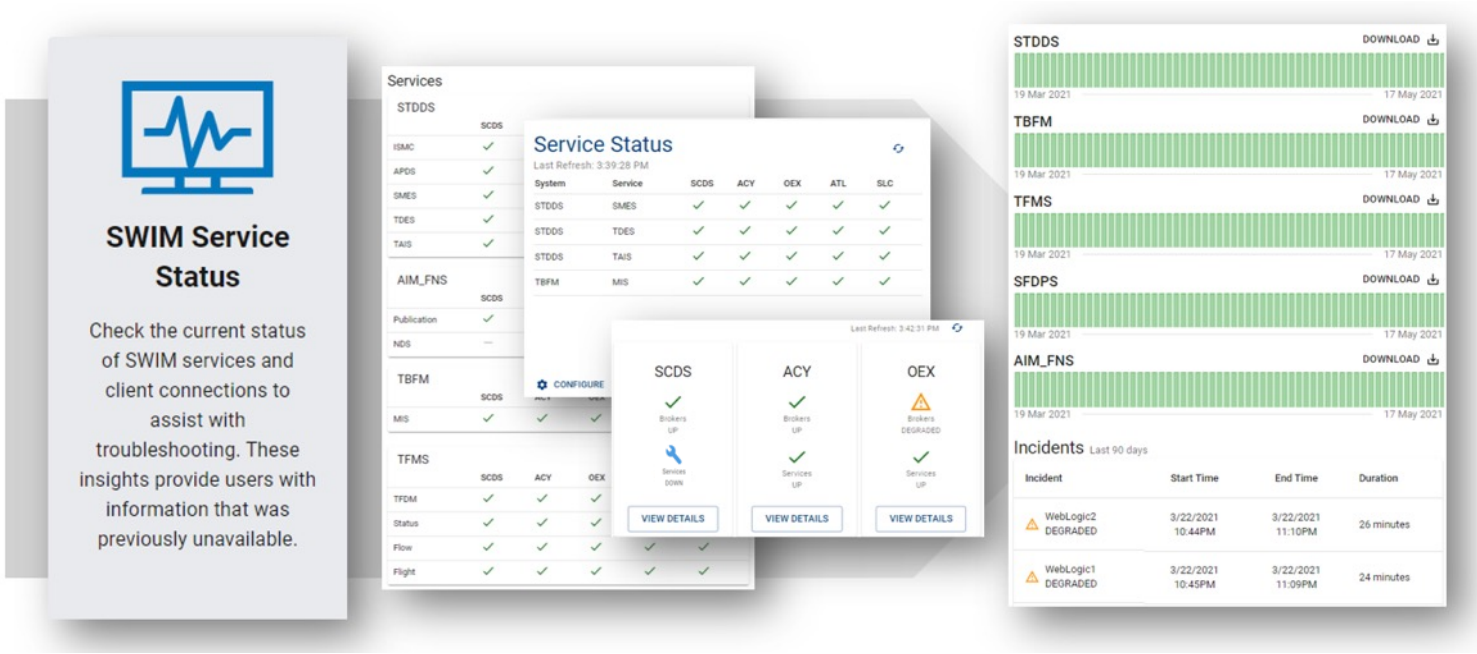
SWIFT Portal Overview

SWIFT Portal is a publicly accessible cloud-based infrastructure that brings new capabilities which build upon the SWIM Cloud Distribution Service (SCDS)



This release brings a new initial portal interface comprising of five (5) high-level capabilities that aim to enable aviation partners and community members to discover, learn, support, collaborate, and benefit from access to SWIM data

Service Status



SWIFT Portal

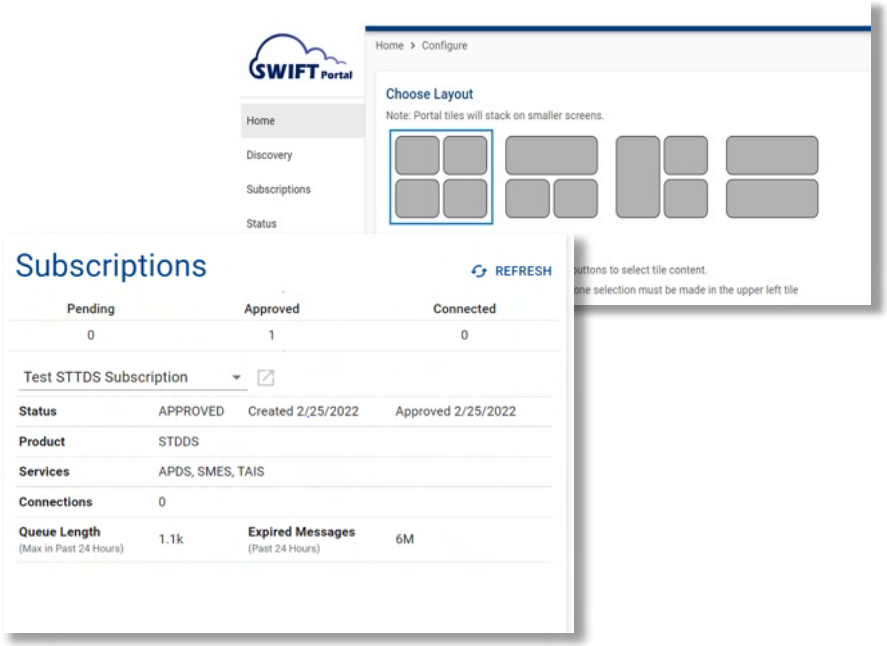
- ✓ Monitoring
- ✓ Real-time
- ✓ Configurable
- ✓ Outages
- ✓ Incidents
- ✓ Health
- ✓ Historical
- ✓ Maintenance*

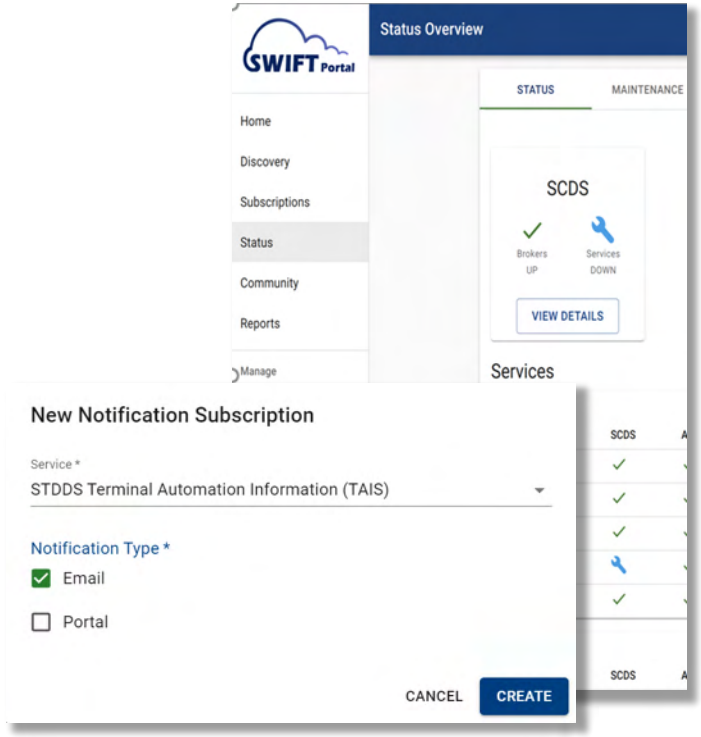
Quickly review and monitor real-time or historical status of SWIM services
Choose services for real-time status tracking or view historical outages and incidents

Maintenance status coming summer 2022

SWIFT Portal V3/3.1 Update

Available now: V3 Homepage tile layout customization and enhanced subscription and service tile information.



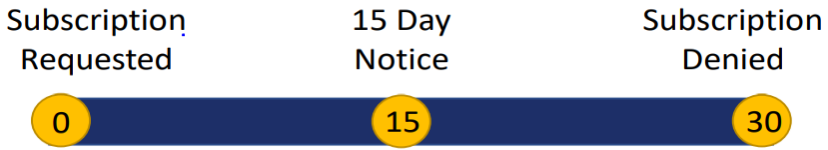


Coming Soon: V3.1 Maintenance Events and Alerting Service Status to show when a service is down for maintenance.

SCDS Subscription Disconnect Policy

Live Summer 2022

- **Pending Subscriptions**
  - Notify users at time of subscription request of any additional required actions; e.g. sign access agreement
  - If the required user action is not completed within 15 days another notice will be sent
  - If the required user action is not completed within 30 days, the subscription request will be denied; the request can be resubmitted if so desired by the user



SCDS Subscription Disconnect Policy

Live Summer 2022

- **Unused Subscription**
  - After a subscription has been approved, a check will occur every 30 days
  - If the subscription hasn't been used in 30 days a notice will be emailed to the user indicating that if the subscription isn't used within the next 30 days, 60 days from approval or last connected date, it will be disabled
    - If a subscription is being used as a backup or is needed for any reason, users can reach out to the SWIM Support Team via the "ask a question" functionality to have their subscription whitelisted from this audit process (SWIFT Portal Support (faa.gov))
  - A final notice will be sent 7 days prior to the subscription being disabled
  - If not connected within 60 days from the last connected time, the subscription will be disabled
    - After a subscription is disabled, a user can request it be re-enabled by contacting the SWIM Support Team via the "ask a question" functionality (SWIFT Portal Support (faa.gov))
  - Once a subscription has been disabled a notice will be sent to the user indicating their subscription has been disabled and will remain disabled for 30 days at which point if no action is taken by the user the subscription will be deleted
  - If no request is received to re-enabled the subscription within 30 days from disablement (90 days from last connect time) it will be deleted from the system

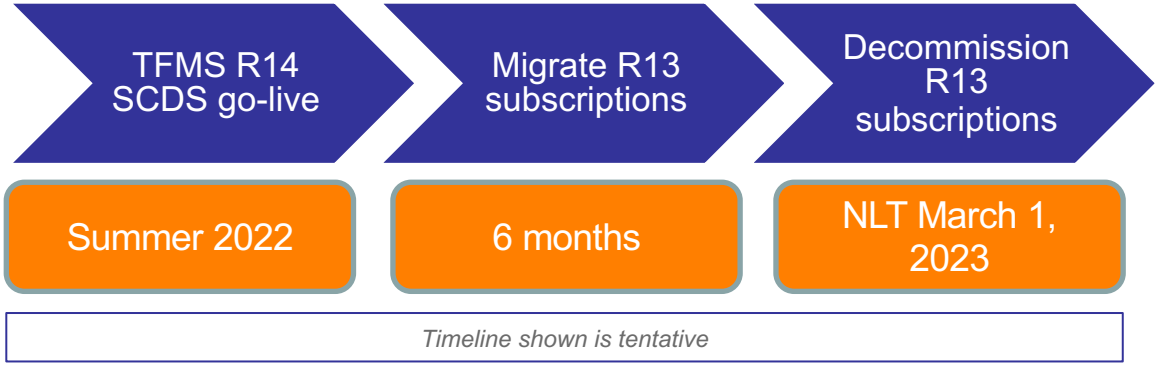
TFMS R14 Coming Soon to SCDS

Functional changes from R13:

- TFMData - Update_Cancel_Schedule-Timeout is no longer a valid trigger name
- TFMData – EDCT Time must be required in NEMS CTOP OVERRIDE & OVERRIDE PREVIEW
- ZTC_TFMS: FAA – TFMData SSBLOCK SCS message earliestDepartureTime and latestArrivalTime labeled incorrectly
- TFMData Cleanup Unused Elements

Schema changes from R13:

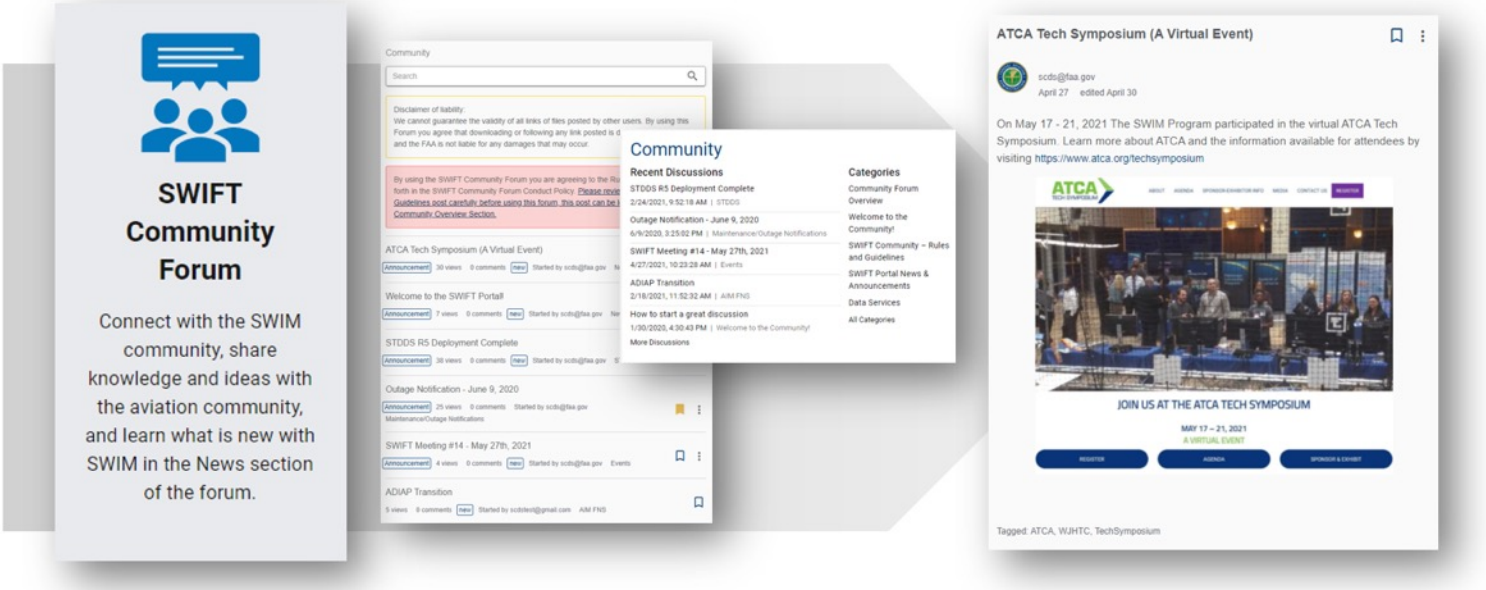
- 30 changes to FICommonMessages.xsd
- 9 changes to TfmRequestReplyTypes.xsd
- 3 changes to FlightDataCommonMessages.xsd
- 3 changes to FlightData.xsd
- 1 change to TFMData_Service.xsd



1. Login to your SWIFT Portal account and go to Subscriptions > New Subscription
2. Select TFMS as your product type
3. Select R14 as your format
4. From this page forward, select the services for each existing subscription for which you have an R13 counterpart. Complete the setup process as usual

Once the migrations are complete for each of your R13 services, you can safely delete the old R13 subscriptions. Additionally, you will also need to update the corresponding notifications and alerts related to those services.

Community Forum



SWIFT Portal

- ✓ News
- ✓ Sharing
- ✓ Knowledge
- ✓ Discussion
- ✓ Ideas
- ✓ Collaboration
- ✓ Community

Learn the latest SWIM news, share your ideas with others and expand the knowledge base
Discuss and collaborate with fellow aviation partners and community members

Community Forum Overview

The SWIFT Portal Community Forum is a place to interact with members of the SWIM Community, discuss ideas, and stay up-to-date on the latest news and events.

To get started, visit:
https://community.swim.faa.gov/

or scan the QR code above

Get Involved!

- All users are welcome to post questions and/or respond to other users
  - **We strongly encourage you to engage with other Community members through the Community Forum!**
- The SWIM Team actively reviews discussion posts to ensure questions/comments are responded to in a timely manner
- For FAQs, Guides (including Familiarization Videos), or to Ask a Question please visit the SWIFT Portal Support Page
  - https://support.swim.faa.gov

Contact us

Feel free to reach out with question, comment or suggestion to:

SCDS Help Desk

scds@faa.gov

Waldo Ford, FAA

waldo.ford@faa.gov

Lucas Curns, FAA

lucas.a.curns@faa.gov

Mark Parra, Noblis

mark.ctr.parra@faa.gov

mark.parra@noblis.org

Final Announcements

SWIFT #19 Hybrid Workshop

Developer Workshop:

- August 29-30, 2022
  - Half Day starting 1pm 8/29
  - Full Day of fun 8/30
  - Early Registration Information:
    - SWIFT@faa.gov
- Location
  - *MITRE – McLean, VA*

SWIFT 19:

- August 31, 2022
- Location
  - *MITRE – McLean, VA*

SWIFT Site Information

SWIFT@faa.gov
- Any SWIFT-related questions
- Sign up for SWIFT mailing list

https://www.faa.gov/air_traffic/technology/swim/swift
- Register for future SWIFT meetings
- Stay up to date with SWIFT
- Past meeting slides

SWIFT Contact Information

SCAN ME

Joshua Gustin, Deputy Director Air Traffic Systems (Acting)

- Email: Joshua.Gustin@faa.gov

Stefanie Calabrese, SWIFT Chair & FAA Lead

- Email: Stefanie.C.Calabrese@faa.gov
- Email: SWIFT@faa.gov

David Almeida, SWIFT Community Moderator

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

Back Up Slides

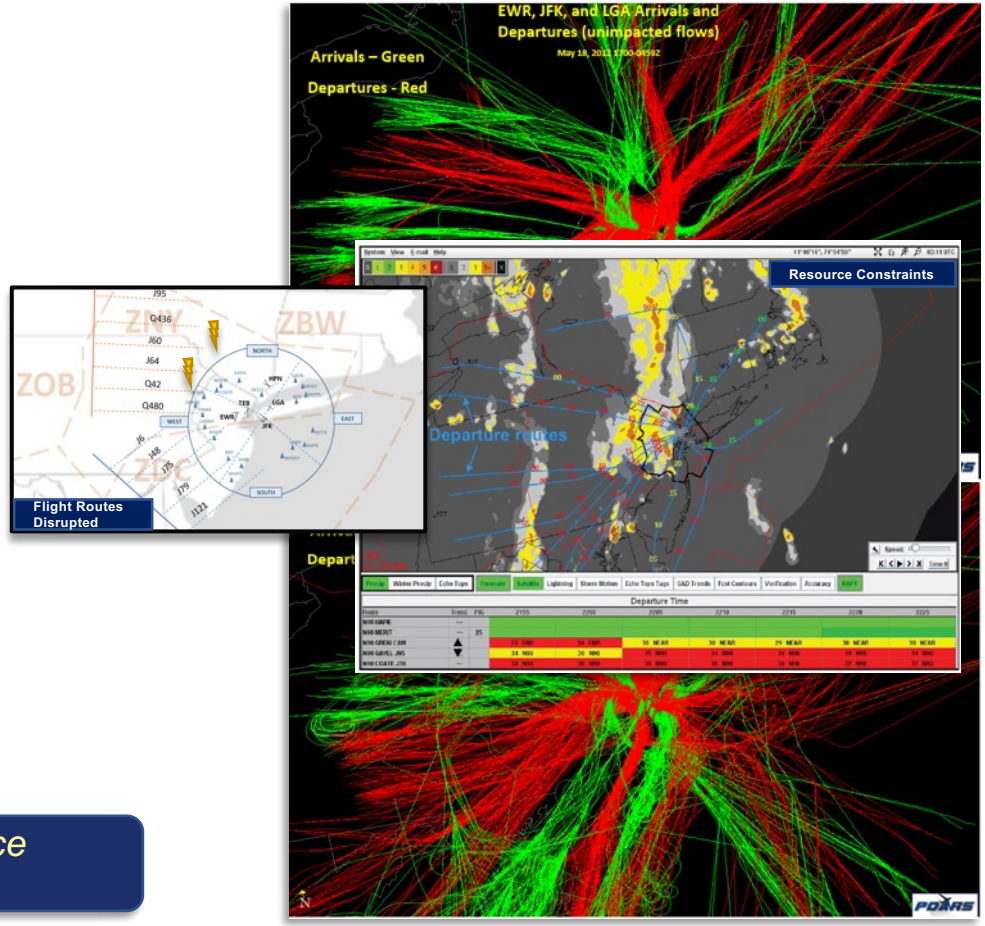
NY Area Case Study

SWIFT 17 Recap & Context

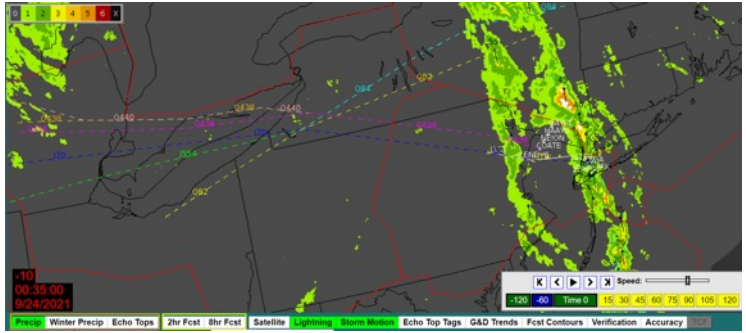
- **Case Study Goals:**
  - Identify drivers and key indicators that would inform disruptions to airspace user operations earlier
  - Apply SWIM Information Services to improve operational decision-making through advanced planning
  - Capture key information to study application of data analytics/ML to improve operational decision-making
- **Case Study Problem Statement:**
  - Determine departure delay impacts resulting from aircraft deviation along flight trajectory.
    - No clear way to readily identify arriving aircraft deviations along the flight trajectory (e.g. due to weather, traffic volume), that drive ground delays
    - Lack of available post-ops data analysis to determine threshold boundaries for traffic deviation and where disruptions are severe
    - Limits the operational community from effectively planning or implementing work-arounds for airspace condition changes and resource constraints
- **Operational Environment:**
  - NAS Northeast Region Centers: ZNY, ZOB
  - New York metro and Vermont airports: LGA, JFK, EWR, TEB
  - Select set of impacted airways and jet routes

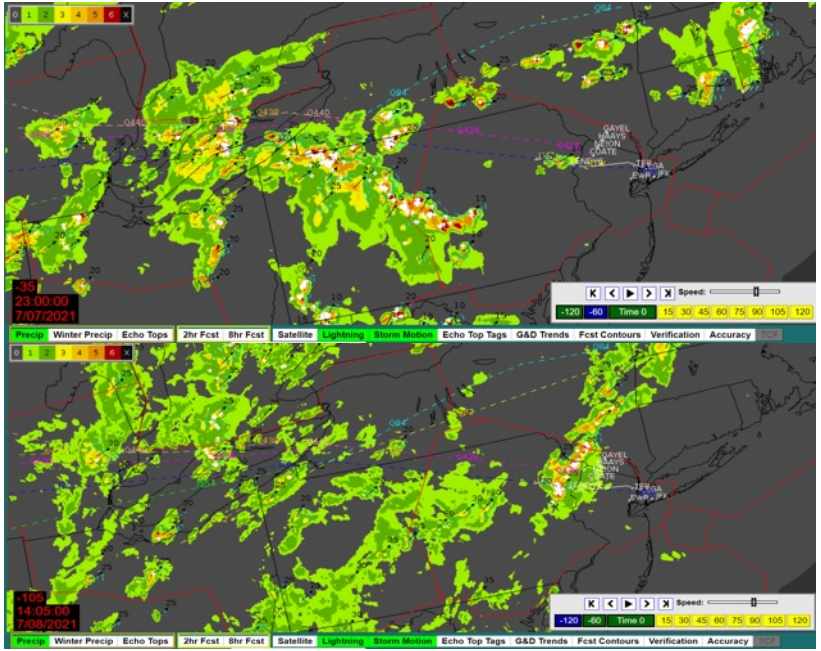
Case Study

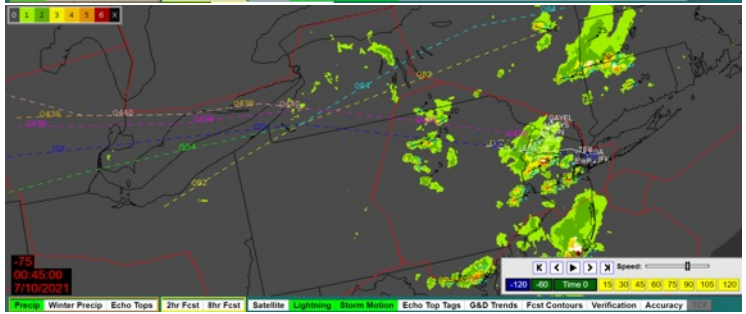
- **Issue:** Approximate JFK surface delay and ground metrics from ZNY arrival trajectory deviations.
- **Model JFK Output Metrics:**
  - Departure fix delay probability
  - Departure fix closure(s) probability
  - Arrival deviation from cleared trajectory
  - Departure Stop occurrence probability



Objective: Predicting JFK surface and resource disruptions beyond the 1-hour mark





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ZNY *H*54260NEW YORK                HIGH    40-33-00.0N   077-52-45.0W  TO
ZNY *H*54370NEW YORK                HIGH    40-51-30.0N   078-07-40.0W  TO
ZNY *H*54540NEW YORK                HIGH    41-15-20.0N   077-51-00.0W  TO
ZNY *H*54690NEW YORK                HIGH    41-40-40.0N   077-32-30.0W  TO
ZNY *H*54830NEW YORK                HIGH    42-10-30.0N   077-14-10.0W  TO POINT OF BEGINNING
ZNY *L*60290NEW YORK                LOW     42-43-40.0N   076-41-50.0W  TO
ZNY *L*60360NEW YORK                LOW     42-53-00.0N   076-40-00.0W  /COMMON ZNY-ZOB-ZBW/TO
ZNY *L*60050NEW YORK                LOW     42-56-30.0N   076-29-00.0W  TO
ZNY *L*60010NEW YORK                LOW     42-56-15.0N   076-05-20.0W  TO
ZNY *L*60040NEW YORK                LOW     42-51-45.0N   076-00-50.0W  TO
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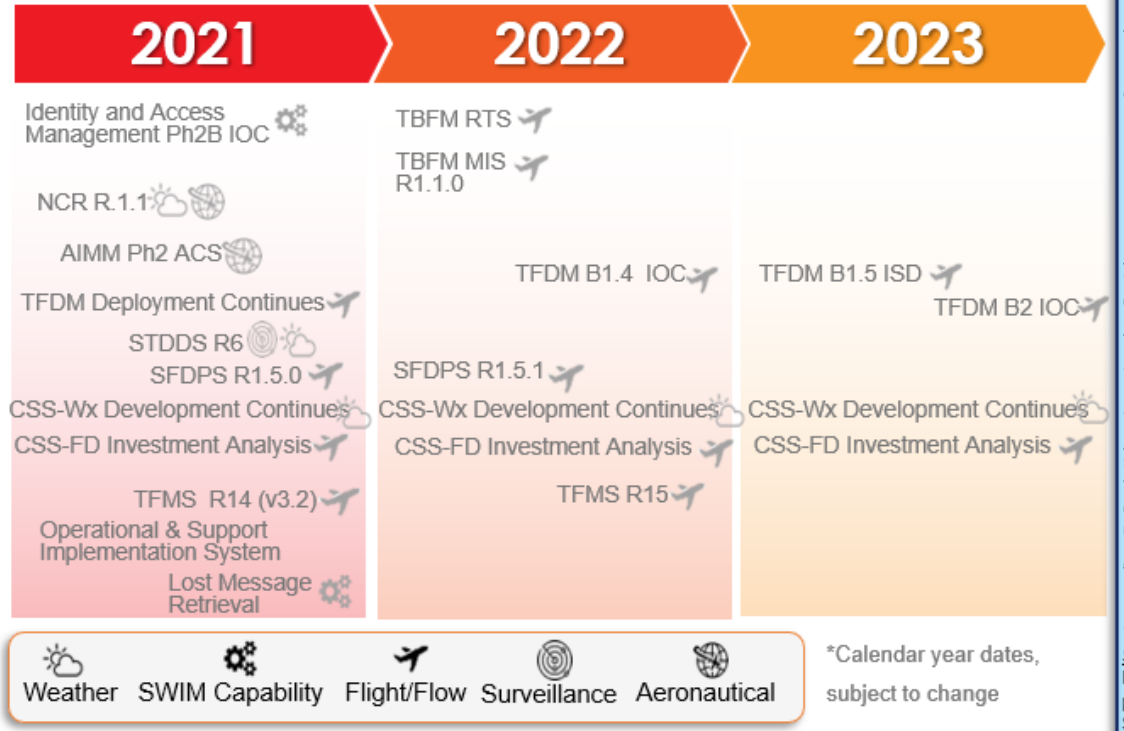
Information Services Roadmap

SWIM Services Deployment (Near-Term)



What's New?

***TBFM MIS*: R1.1.0 targeting Spring 2022.** New JMS properties for message routing based on additional A/C data attributes,.

TFDM Build 1*: IOC on TFDM Build 1.4 (CLE Keysite) October 2022.** ISD on TFDM Build 1.5 in ***March 2023 (allows deployment of Build 1 to additional sites)

***TFMS*: R15 targeting Fall 2022.** Include Reroute Impact Assessment (RRIA). Retirement of FDFE Direct Service; FDFE data exchange replicated in Request/Reply.

***SFDPS*:** Release of COTS update to OS, FUSE software and Hadoop database planned for remainder of 2022

***CSS-Wx*: IOC Targeting 2024.** Integration with ERAM and system testing at WJHTC. End user systems, SWIM to support CSS-Wx & NWP testing

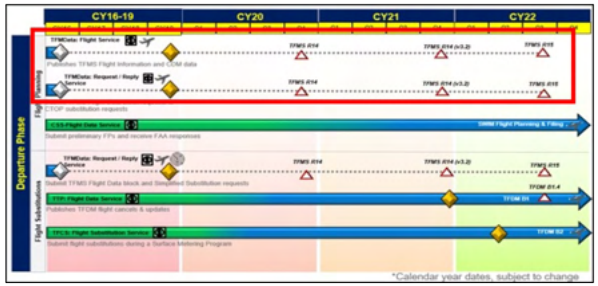
***CSS-FD*: RRA Industry demo/ testing targeting Q4 2022.** Gather feedback and findings on FP use case, R&D connection testing and user test client development.

***AIMM ACS Ph 2*: completed Dec 2021.** Providing integrated aeronautical information via WS subscriptions and queries.

***STDDS*: R6P2 completed Sep 2021.** Includes TAIS message enhancements, publish additional TDLS messages, and SMES runway event and CAT10 enhancements

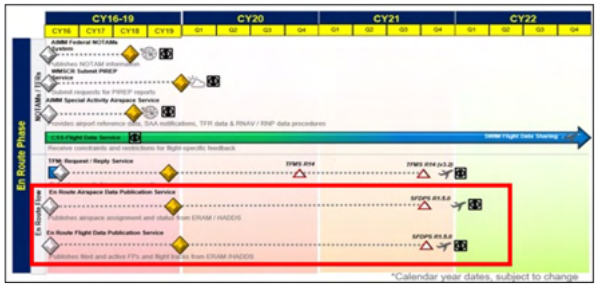
SWIM Information Services AI/ML Roadmap

TFMS Information Service



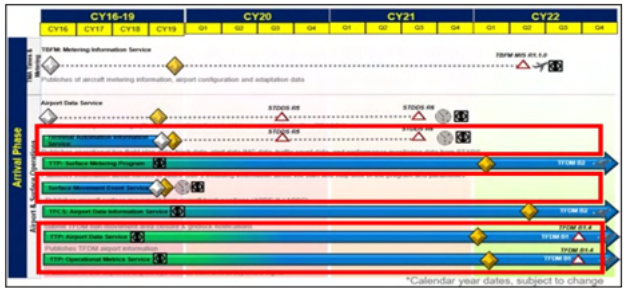
- Flow Service: Publishes TFMS TFM initiatives and definitions. Correlate ZNY-bound traffic deviations with changes in restriction times in N90 environment
- Flight Service: Publishes TFMS Flight Information and CDM data for LGA,TEB, JFK bound flights to observe ZNY *traffic flow*

SFDPS Information Service



- *Airspace Data: En Route Airspace Data Publication (ERADP) provides Airspace Assignment from ERAM /HADDS. Examine ZNY-bound flights impacts in N90 environment*
- *Flight Data: En Route Flight Data Publication (ERFDP) publishes filed and active FPs and flight tracks from ERAM/HADDS. Identify ZNY-bound flight deviations at ZOB-ZNY boundary:*

STDDS Information Service



- *Airport Flight Tracks: Terminal Automation Information Service (TAIS) publishes live FP, track data and traffic count data from STARS*
- *Airport Movement: Surface movement Event Service (SMES) publishes aircraft movement from JFK, LGA, and TEB aircraft track positions (ASDE-X/ASSC)*
- *Airport Departures: Tower Departure Event Service (TDES) publishes EFSTS & D-ATIS N90 departure events*

TFDM – TTP (Case Study Enhancement)

- *Surface Management: TTP Build 1 will enhance the prediction model by providing N90 Airport and Flight Information along with specific demand/delay information and airport-initiated departure stop restrictions*