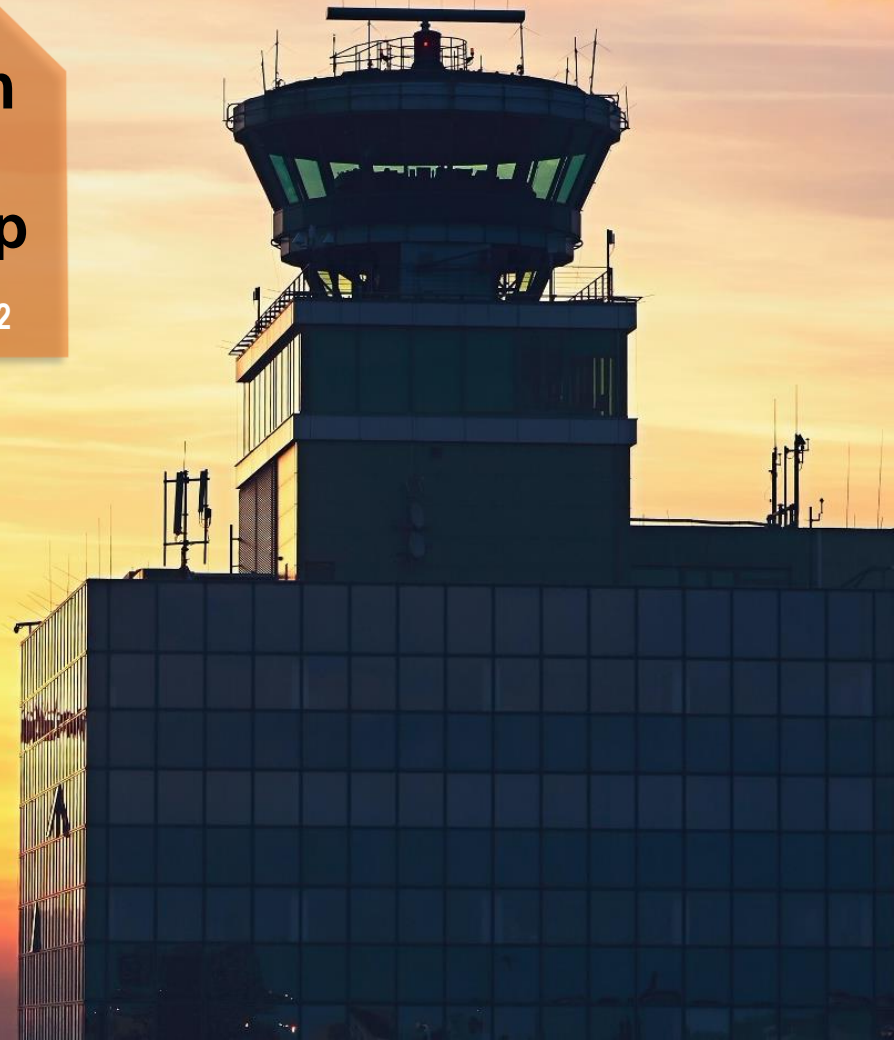


SWIFT: SWIM Industry-FAA Team

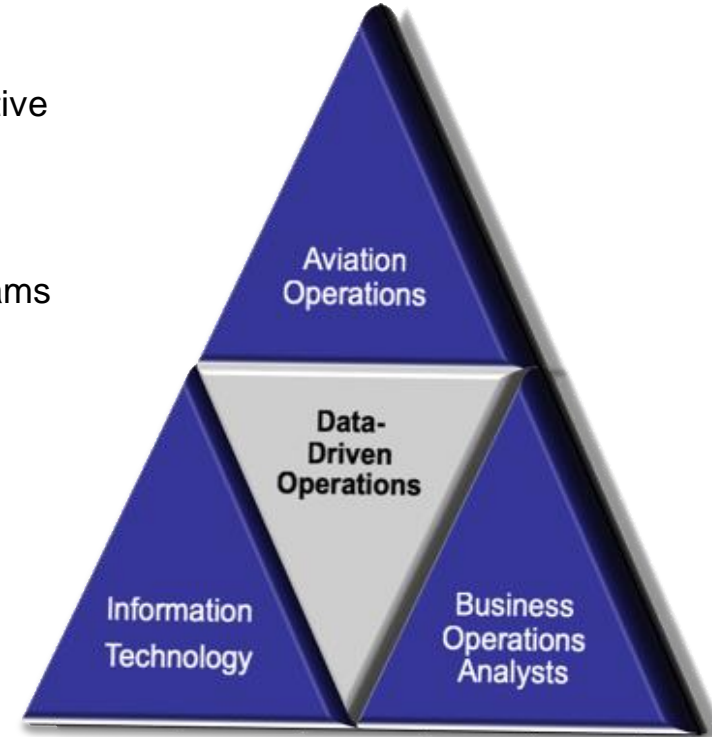
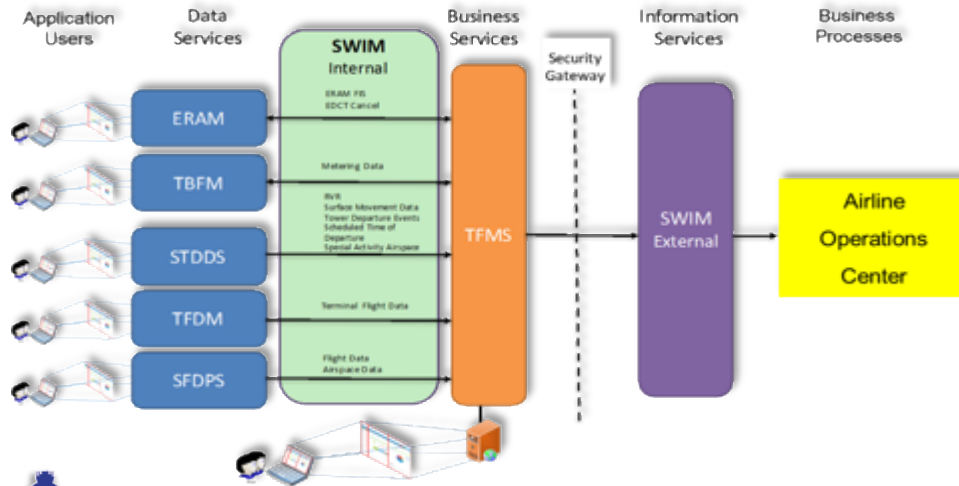
SWIFT #19 Collaboration Workshop

Date: 08/31/22



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

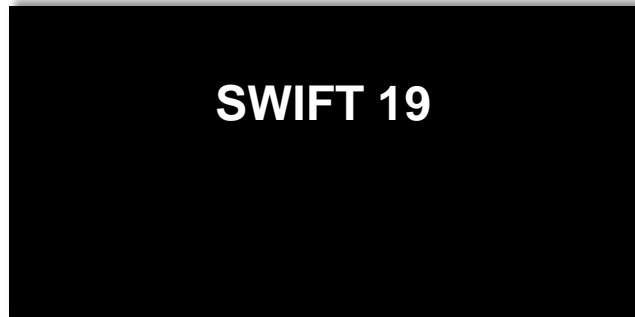


FAA Collaborative Workshop #19

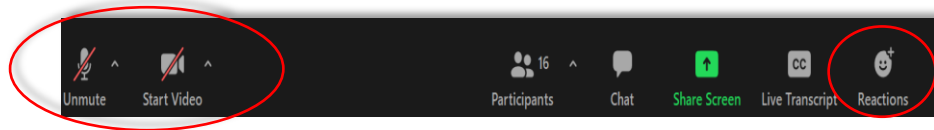
- **Welcome and Introductions (Start @ 10am EST)**
 - General Updates
- **SWIFT Focus Group Updates**
- **Quick update on Ops Issues and Developer & Analytics Groups**
 - TBFM update
- **Special Topic: AES Update and the Developers Workshop Results 1030-1100**
- **TFMS Request/Reply: Ops Technical Training 1100-1200**
- **Lunch 1200-1300**
- **Special Topic: Early Planning for Disruptions Case Study update 1300-1345**
 - Convective Season Model
 - Includes SWIFT Portal usage
- **NAS Programs: Weather Programs 1345-1430**
- **NAS Programs: TFDm 1430-1500**
- **Wrap up session 1500-1530**

“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.



Zoom Controls: Mic and Camera identified via red circles

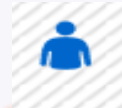


- The “Chat & Raise Hand ” features will also be available.
 - During the presentations to ensure you are recognized for an opportunity to voice comments /questions please leverage the “raise hand” feature found under reactions.

Who is in the “ZOOM Room” at SWIFT #19?

Attended a SWIFT Meeting Before?

I'm a Veteran: 198



No, I'm New: 62



260 attendees



Note: Data Timestamp 8/30 @ 9pm E.T.

Airspace Users



Professional Associations



Airport/Airspace Authorities



Standards Bodies



Government



Vendors to Industry/Government



General Announcements

TFMS Monthly Technical Webinar

- Reminder the next TFMS meeting will be held on **September 8th at 1pm E.T.**
- For questions or more information on the webinar please reach out to Thomas Paccione @ thomas.ctr.paccione@faa.gov

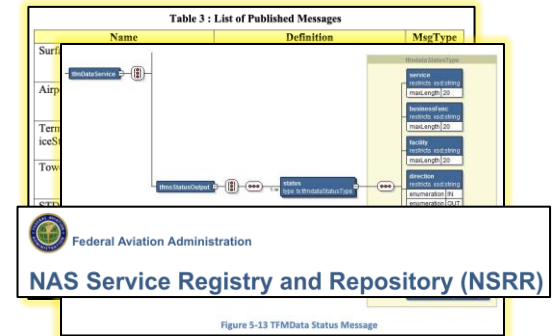
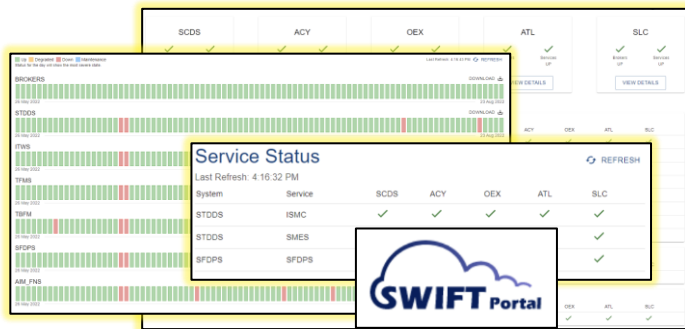
Feedback Requested: Service Health and Status

- Understanding how users monitor health and status of their SWIM services
- Right information without introducing noise
- We may also plan for individual discussions to learn more about individual needs and usage

Please provide feedback via survey
by COB September 16, 2022.



[QR Code Link](#)



SWIFT Focus Group Updates



August 31, 2022

SWIFT #19

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Operational Issues Focus Group

SWIFT 19 Update

Presenter: Chris Gottlieb - JetBlue

Date: August 31, 2022



Ops Issues Focus Group

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

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

Bolded Issues –
actively engaged

Current Status:

- Early Planning for Disruption: Explore North Texas Region (DFW) for Airspace Deviation analysis
- CSS-FD Risk Reduction Activity: RRA team developing internal demo to refine proposed SWIM Flight Planning functionality in support of stakeholder buy-in

Next Steps:

- Enhance prediction model with additional sample DFW convective weather dates data. Engage SWIFT community to support effort
- CSS-FD team will plan future outreach sessions with SWIFT community 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

Development & Analytics Focus Group

SWIFT 19 Update

Presenter: Erin Cobbett – DAL
Mike Jagmin – UAL
Xavier Pratt – LS Technologies

Date: August 31, 2022



Development & Analytics Focus Group (DAFG)

Leads: Erin Cobbett (DAL), Mike Jagmin (UAL) and Xavier Pratt (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:

- DAFG and the TBFM Time base Flow Management (TBFM) producer working held several sessions June/July
- TBFM producer group discovered shortfalls on the current MIS destination airport and flight plan speed schema
- Previewed the potential enhancements planned for TBFM Metering Publication Status (MIS) Publication, v1.2.0 schema, soliciting feedback from our airline partners

Next Steps:

- Engage Ops Issues Focus Group as needed
- Prepare for hand off on the Aviation Case Study
- Schedule next DAFG general session

Xavier Pratt – xavier.pratt@lstechllc.com

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Operational Context Document

SWIFT 19 Update

Presenter: Xavier Pratt – LS Technologies

Date: August 31, 2022



Operational Context Document Update

- **Important Notices:**

- Documents will be previewed in close concert with SWIFT events moving forward as applicable
- TFDM TTP: Services targeting September Release
 - *Flight Data, Flight Delay, Airport Information, Traffic Management Restrictions, Ops Metrics, Surface Metering*
- TFDM TFCS: Services targeting October Release
 - *Surface Metering Program Flight Substitution*

- **Documentation can be found via NAS Service Registry & Repository (NSRR) or by contacting:**

- **Xavier Pratt @ xavier.pratt@lstechllc.com**
- **Ray Mitchell @ ray.mitchell@lstechllc.com**
- **Nguyen “Dao” Vu @ dao.vu@lstechllc.com**
- **John Kelley @ john.kelley@lstechllc.com**

- ***To download the most recent documentation on NSRR please visit the link below:***

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

SWIFT Developer Workshop Recap

SWIFT 19 Update

Presenter: Kevin Long – MITRE

Date: August 31, 2022



We came...
We developed...
We deployed...



18 Developers

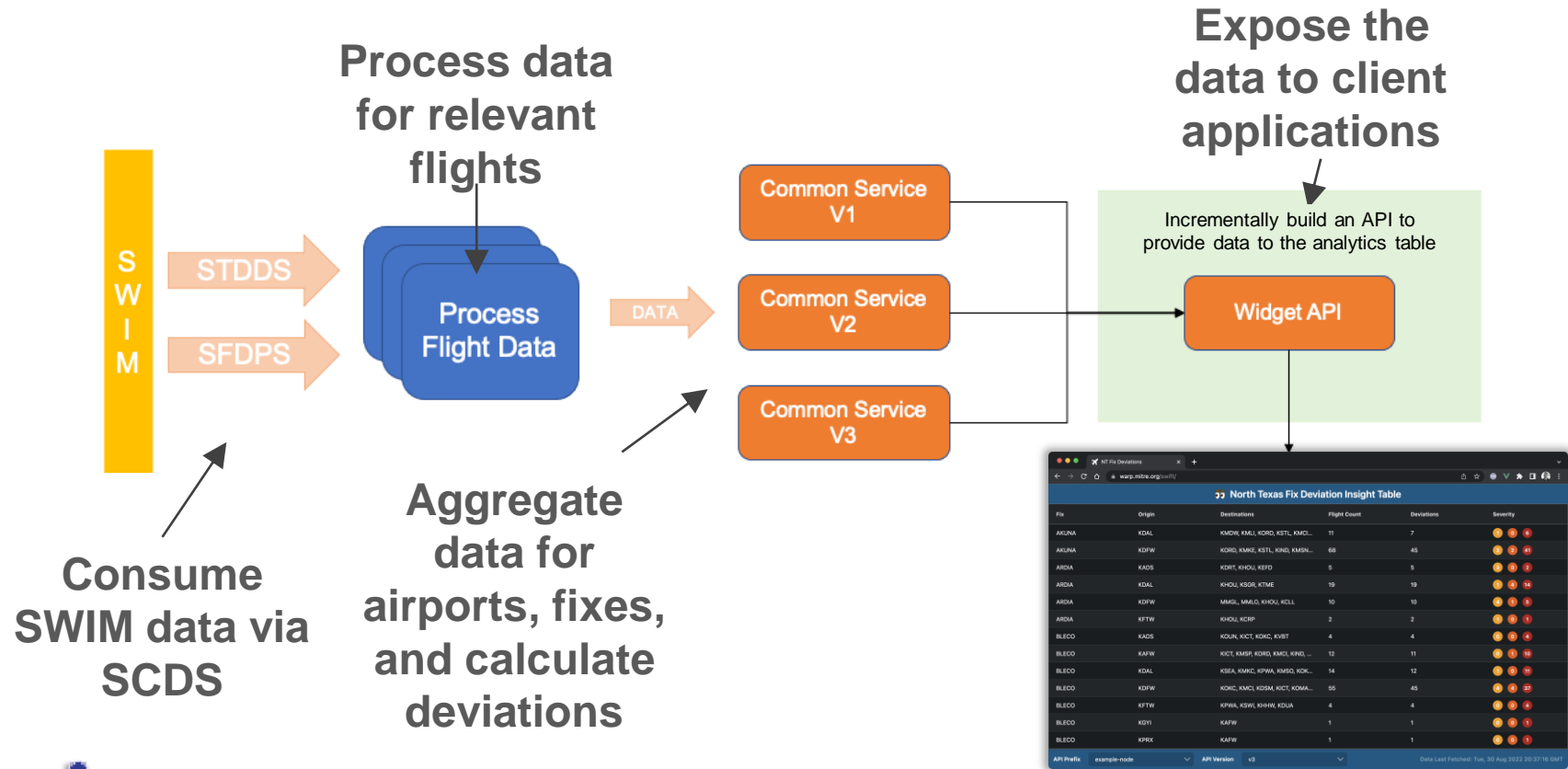


August 31, 2022

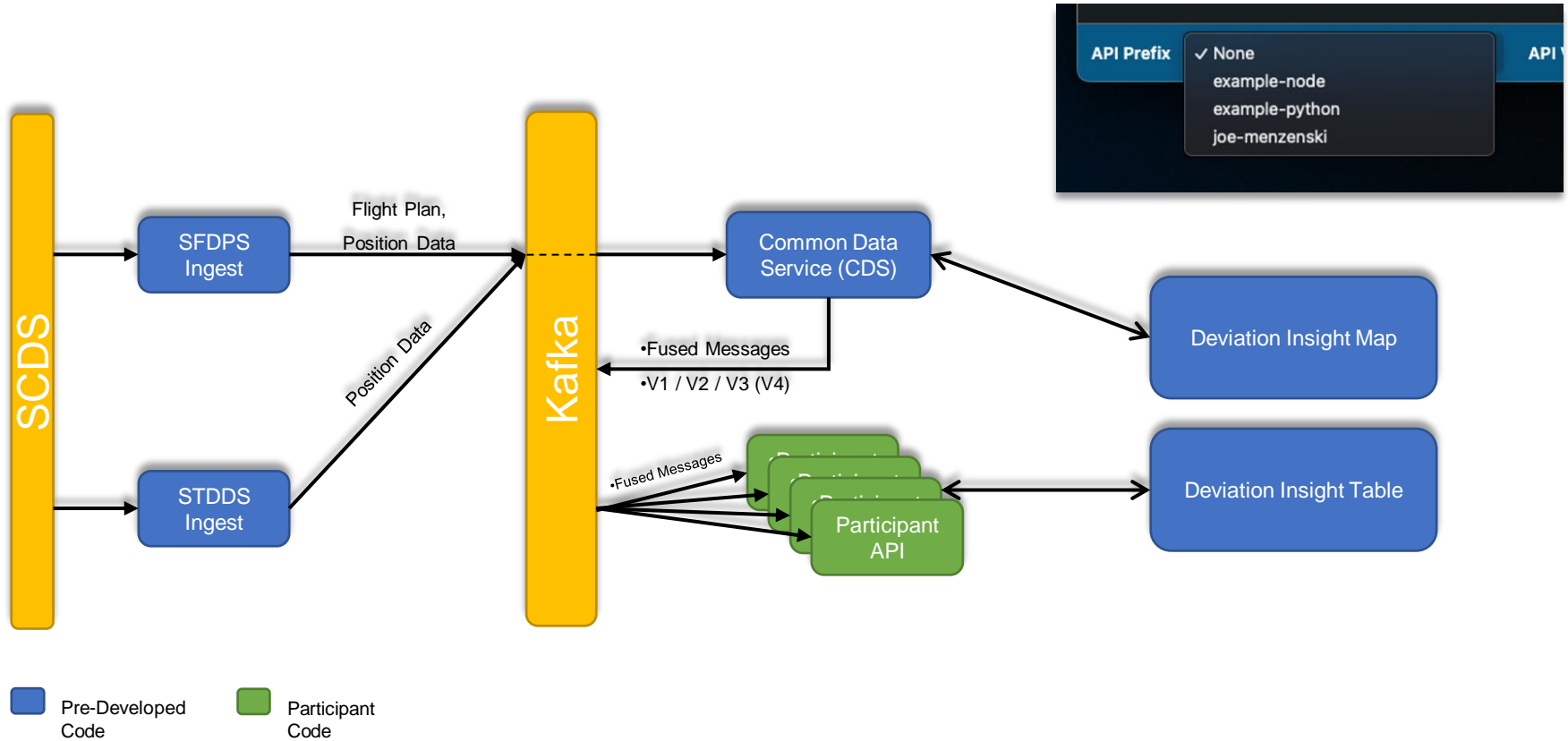
SWIFT #19

20

The Big Idea...

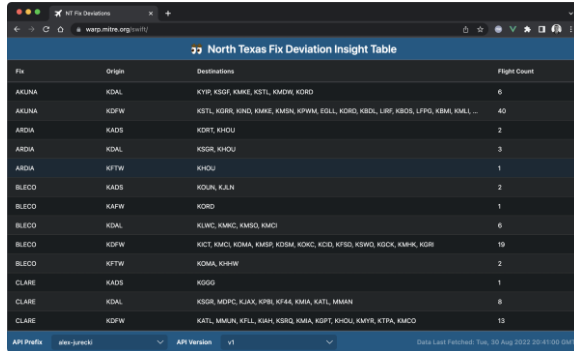


Workshop Architecture



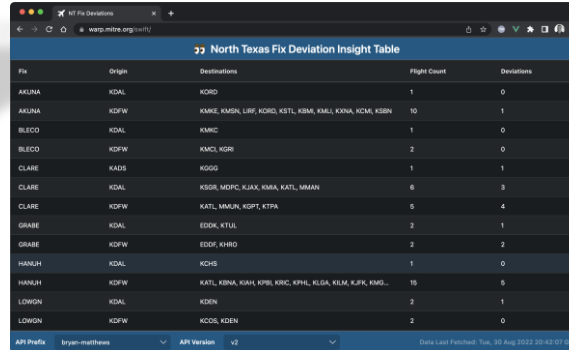
The Work...

How many flights are scheduled out of airports of interest?



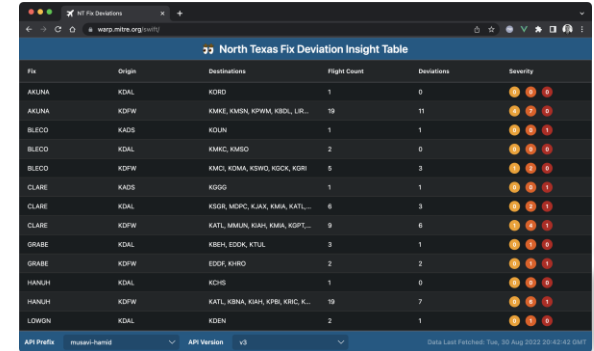
Fix	Origin	Destinations	Flight Count
ARLNA	KDAL	KYB, KSGF, KMAE, KSTL, KMDL, KORD	6
ARLNA	KDFW	KSTL, KGRB, KHD, KMAE, KMBN, KPW, KSL, KORD, KSD, LRF, KROS, LFPD, KMBL, KML, ...	40
ARDA	KADS	KDRT, KHOU	2
ARDA	KDAL	KSGR, KHOU	3
ARDA	KFTW	KHOU	1
BLECO	KADS	KOLN, KJLN	2
BLECO	KAFW	KORD	1
BLECO	KDAL	KLME, KMAE, KMSJ, KMO	6
BLECO	KDFW	KCT, KML, KOMA, KMS, KOSM, KORD, KDS, KPSL, KSWG, KGOX, KMK, KGR	19
BLECO	KFTW	KOMA, KHW	2
CLARE	KADS	KSGG	1
CLARE	KDAL	KSGR, MDPC, KJAX, KPB, KFA, KMA, KATL, MMBN	6
CLARE	KDFW	KATL, MMBN, KFL, KJAX, KSGR, KMA, KOPT, KPHL, KMYR, KTF, KMO	13

How many of these flights are experiencing deviations?



Fix	Origin	Destinations	Flight Count	Deviations
ARLNA	KDAL	KORD	1	0
ARLNA	KDFW	KMAE, KMBN, LRF, KORD, KSTL, KMA, KML, KMA, KMA, KMBN	10	1
BLECO	KDAL	KMAE	1	0
BLECO	KDFW	KML, KGR	2	0
CLARE	KADS	KSGG	1	1
CLARE	KDAL	KSGR, MDPC, KJAX, KMA, KATL, MMBN	6	3
CLARE	KDFW	KATL, MMBN, KOPT, KTF	5	4
GRABE	KDAL	EDOK, KTUL	2	1
GRABE	KDFW	EDOK, KHRO	2	2
HANUH	KDAL	KCHS	1	0
HANUH	KDFW	KATL, KJAX, KJAX, KPB, KRC, KPHL, KSL, KSL, KJAX, KJAX, KJAX, ...	16	5
LOWGN	KDAL	KDEN	2	1
LOWGN	KDFW	KCOS, KDEN	2	0

What is the degree of the deviations?



Fix	Origin	Destinations	Flight Count	Deviations	Severity
ARLNA	KDAL	KORD	1	0	0
ARLNA	KDFW	KMAE, KMBN, KPW, KSL, LRF, ...	19	11	0
BLECO	KADS	KOLN	1	1	0
BLECO	KDAL	KMAE, KMSJ	2	0	0
BLECO	KDFW	KML, KMA, KSGR, KGOX, KGR	5	3	0
CLARE	KADS	KSGG	1	1	0
CLARE	KDAL	KSGR, MDPC, KJAX, KMA, KATL, ...	6	3	0
CLARE	KDFW	KATL, MMBN, KJAX, KMA, KOPT, ...	9	6	0
GRABE	KDAL	KBEH, EDOX, KTUL	3	1	0
GRABE	KDFW	EDOK, KHRO	2	2	0
HANUH	KDAL	KCHS	1	0	0
HANUH	KDFW	KATL, KJAX, KJAX, KPB, KRC, KPHL, KSL, KSL, KJAX, KJAX, KJAX, ...	16	7	0
LOWGN	KDAL	KDEN	2	1	0

How did we do it?

~1.6M STDDS Messages

~422K SFDPS Messages

193

pipeline runs/builds

August 30, 2022 • 0830-1600

- 0830-0900 – Introductions and Logistics for the Day
- 0900-0930 – Development Approach & Building Blocks
- 0930-1000 – Development Session (Baseline)
- 1000-1015 – Break
- 1015-1115 – Development Session (Iteration #1)
- 1115-1130 – Webinar #2 "Homework" Showcase
- 1130-1300 – Lunch (MITRE 1 Whirlwind Café)
- 1300-1315 – Morning Recap, Check-In, & Afternoon Plan
- 1315-1415 – Development Session (Iteration #2)
- 1415-1430 – Break
- 1430-1530 – Development Session (Iteration #3)
- 1530-1600 – Wrap Up & Farewell

SWIFT



60

Containers

233 images



1.5M Platform
Messages

Preparing for the In-Person Developer Workshop

- **Webinar 1 – June 21, 2022**
 - Experience building and running containerized software
 - Familiarity with deploying containerized software
- **Webinar 2 – July 19, 2022**
 - Experience connecting to SWIM and consuming data
 - Some SWIM data knowledge
- **Webinar 3 – August 16, 2022**
 - Background on the operational problem space (Trajectory Deviation Study)

THANKS!



August 31, 2022

SWIFT #19

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TFMData Operations

SWIFT Technical Training Session

Presented to: TFMData Users

By: GDIT

Date: Aug 31, 2022



**Federal Aviation
Administration**



Overview

- **Review 3 Vignettes demonstrating how to use TFMDData business functions for**
 1. Using Multiple Trajectory Options with Reroute Amendments
 2. Monitoring Airports
 3. Monitoring Public TMs



Vignette #1

- **What**

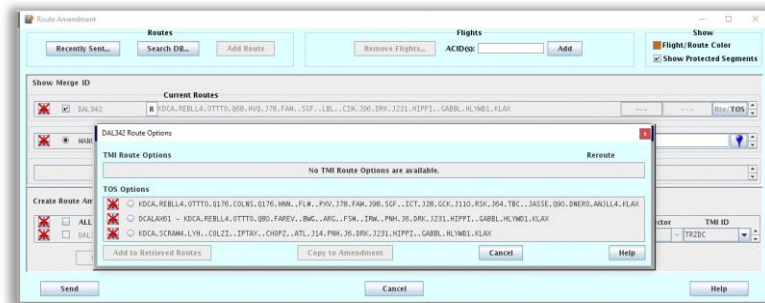
- User submits multiple ranked Trajectory Options for a flight (airline preferred routes)
- User can update Trajectory Options as conditions change
- User can view current set of Trajectory Options for a flight

- **Why**

- When a tactical reroute is required for a flight the FAA Traffic Manager can select from airline provided Trajectory Options ordered by most preferred option
 - Additionally, in R15 CDRs can be used as a Trajectory Option routes
- Allows TFMS to model flight on airline intent versus historical route data
 - Increases accuracy of demand calculations and associated decision making
 - Reduces likelihood of becoming a Popup in an AFP

Scenario Overview

- User submits multiple Trajectory Options using TFMDData Req/Reply fosRequest
- Traffic Manager reroutes flight using TFMS Route Amendment capability
 - Options listed with most preferred at top
- TFMS provides route to ERAM via ERAM FIS
- Flight is amended in ERAM, resultant amendment provided to flight operator via TFMDData Flight Data update publication



<trajOption>

<trajIndex>1</trajIndex>

<relTrajCost>10</relTrajCost>

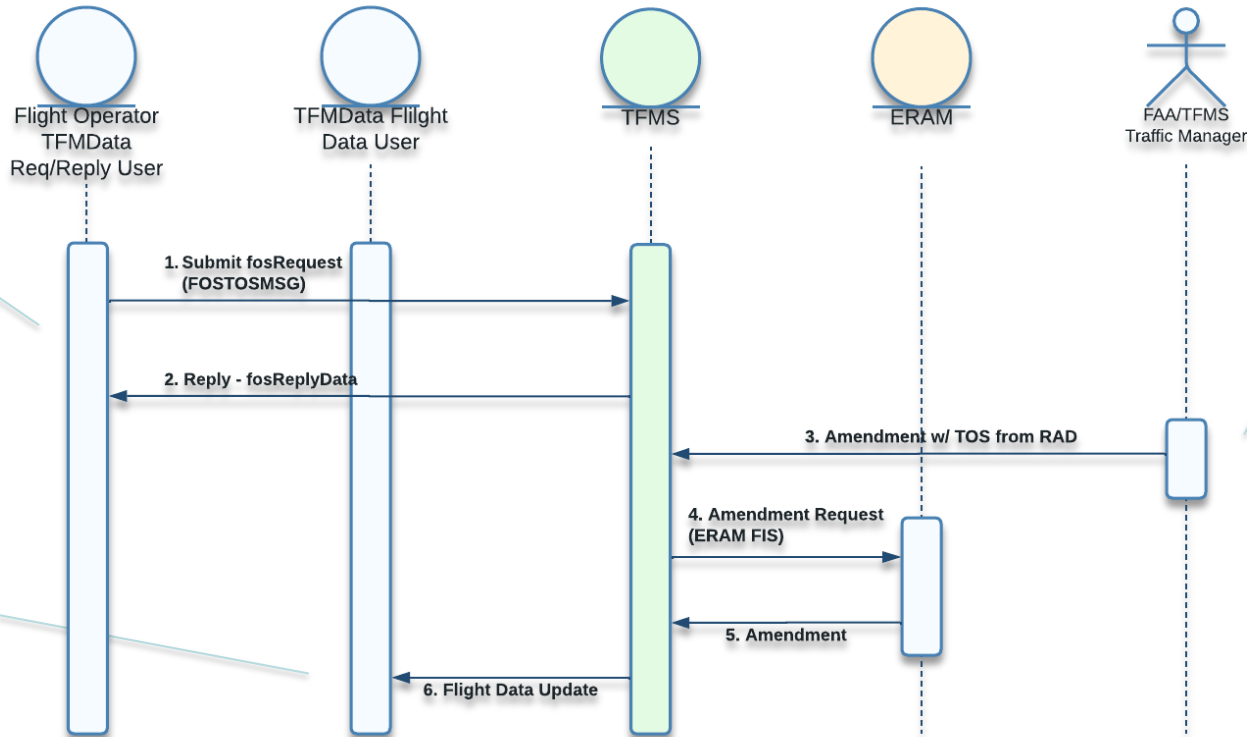
<route>REBLL4 OTTTO Q176 COLNS Q176 HNN DCT FLM
DCT PXV J78 FAM J98 SGF DCT ICT J28 GCK J110 RSK J64
TBC DCT JASSE Q90 DNERO ANJLL4</route>

<alt>F340</alt>

<speed>N0470</speed>

</trajOption>

Multiple Trajectory Options Detail



Submit 3 Options,
TFMS accepts
and models on
TOS-1

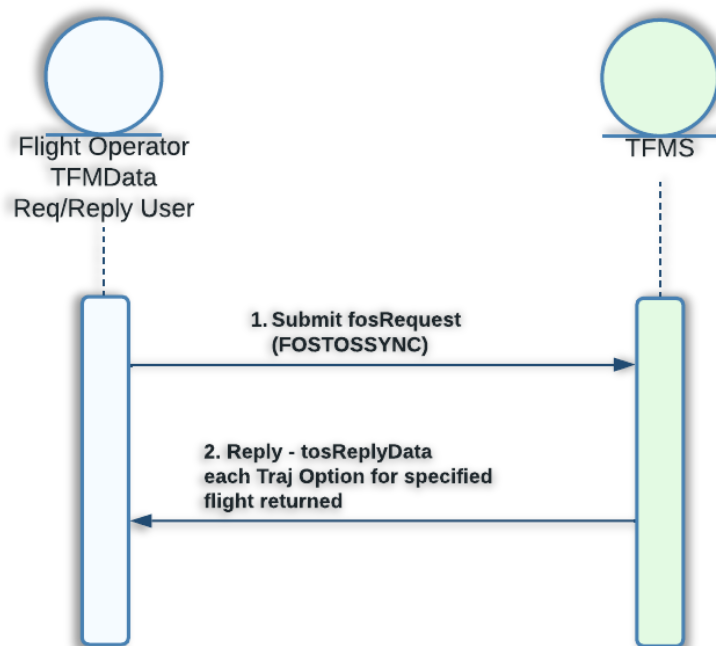
After amendment
accepted by
ERAM new flight
plan published to
TFMData user

Flight Requires
new route,
controller selects
TOS-2, 2nd ranked
option

Viewing Trajectory Options for a flight

- **STEP 1: Retrieve list of desired flights if needed**
 - Airport flight list, TMI flight list, monitor flight/flow Info, ...
- **STEP 2: Use TFMDData req/reply fosRequest TOS_REQ request to retrieve current trajectory options**
 - One request per flight, FOSTOSSYNC service code

Retrieve Trajectory Options Detail



```
<trr:fosRequest>
  <trr:TOS_REQ>
    <ACID>DAL342</ACID>
    <orig>KDCA</orig>
    <dest>KLAX</dest>
    <IGTD>2022-08-15T23:00:00Z</IGTD>
  </trr:TOS_REQ>
</trr:fosRequest>
```

```
<ns11:trajOption>
  <ns11:trajIndex>2</ns11:trajIndex>
  <ns11:relTrajCost>12</ns11:relTrajCost>
  <ns11:route cdrCode="DCALAX61">DCT REBLL4 OTTTO Q80 FAREV DCT
  BWG DCT ARG DCT FSM DCT IRW DCT PNH J6 DRK J231 HIPPI DCT GABBL
  HLYWD1</ns11:route>
  <ns11:alt>F340</ns11:alt>
  <ns11:speed>N0470</ns11:speed>
</ns11:trajOption>
```

Vignettes #2 and #3

- **What**

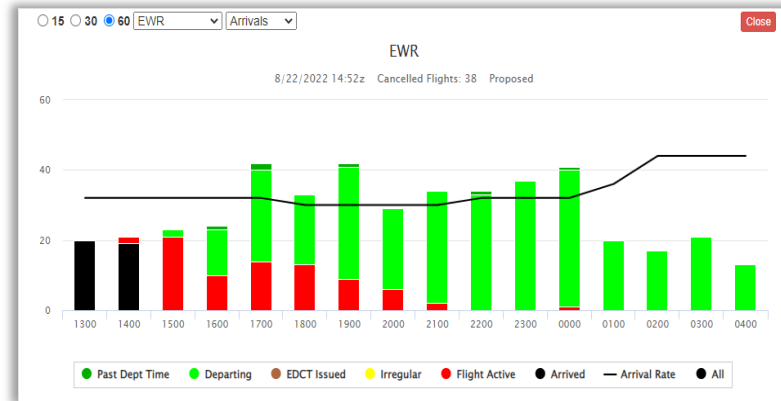
- User monitors Airport or Public TMI to view demand, active program data, and dynamic flight lists

- **Why**

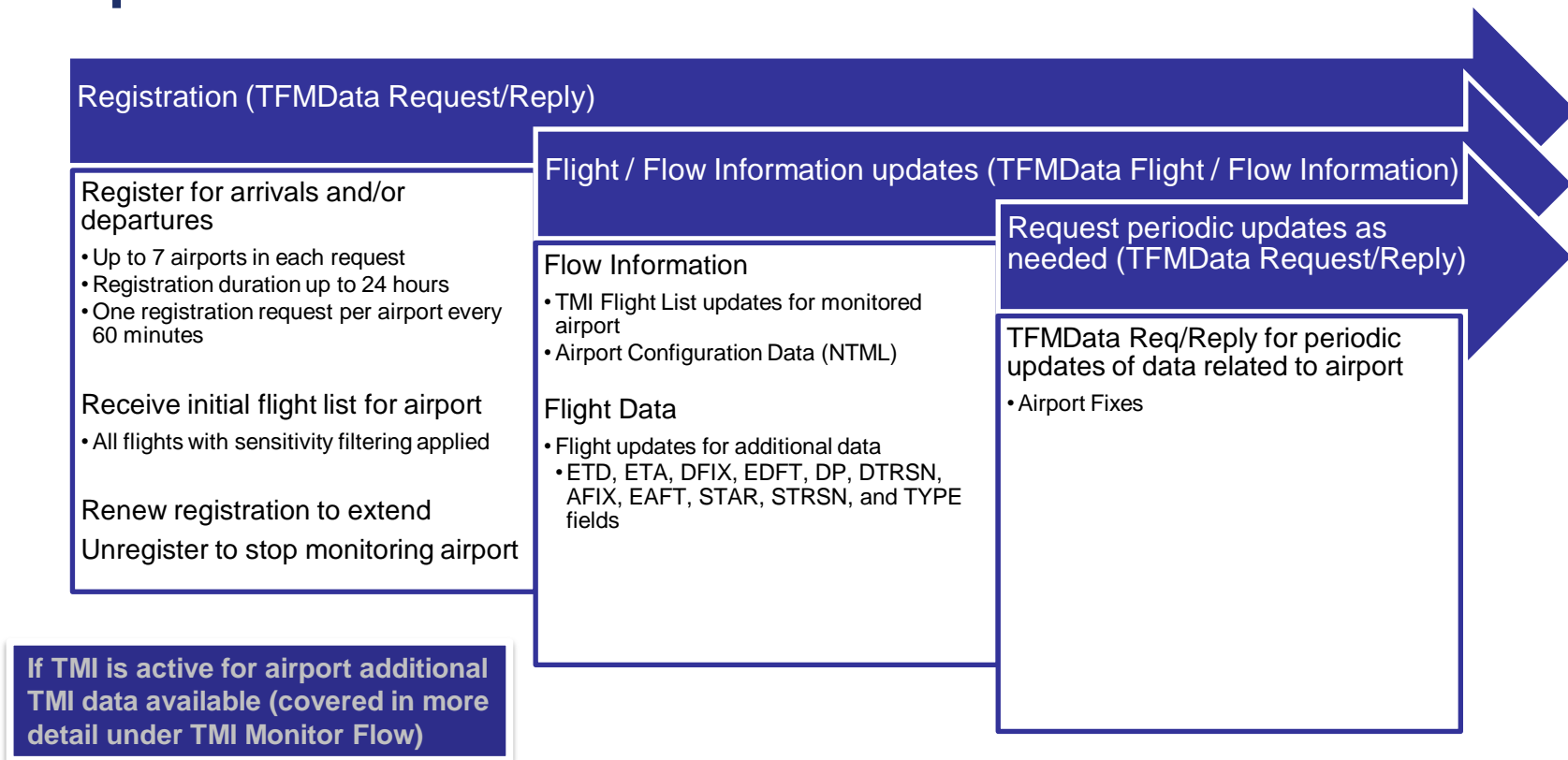
- Ability to integrate data into existing / new automation tools
- Improved situation awareness with dynamic updates
 - Updates published as data changes versus 5-min snapshots in legacy tools
 - User can capture snap-shots if needed at intervals meaningful to user

Scenario Overview

- **Register for airport(s) to monitor demand and flight lists using TFMDData Req/Reply**
 - Can monitor all flights with sensitive flight filtering applied as appropriate for user
- **Resync Public TMIs to monitor demand and flight lists using TFMDData Req/Reply**
 - Can monitor all flights with sensitive flight filtering applied **OR** flights for airline and flights airline is the major for
 - FAA determination made for each TFMDdata user
- **Maintain current demand and flight list using Flow Information and Flight Data publications**
 - TMI Flight List and Flight Data message publications
- **Supporting TFMDData Req/Reply functions**
 - Airport Arrival/Departure Rates, Historical Popups, EDCT List/Show, ...

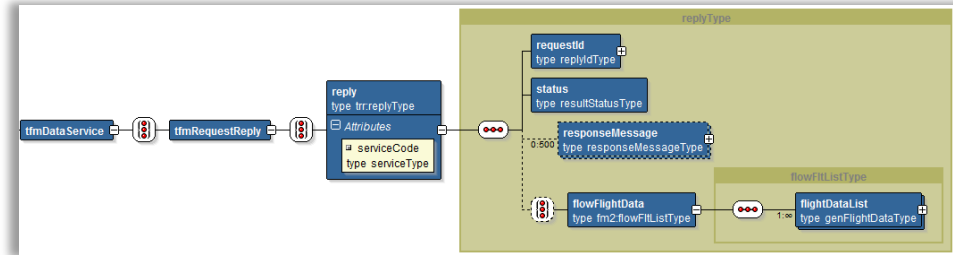
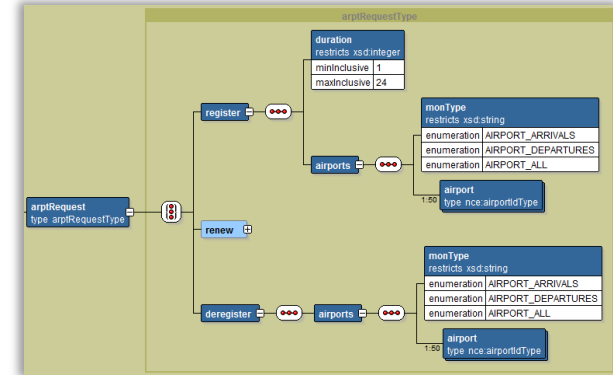


Airport Monitor Flow



Airport Monitor Registration

- **Request (arptRequest – ARPTM)**
 - Register/renew/deregister
- **Reply (arptResponse)**
 - TMI Flight List returned
 - Status
 - “ERROR” if invalid request
 - “PROCESSING” indicates more response messages will be provided with initial flight list
 - “SUCCESS” when complete



Airport Monitor Flow Information Updates

- **TMI Flight Data List updates start during registration**
 - Issued when flight changes occur
 - Flight Plan Update, TMI update, Flight activation
 - TMI Flight updates received for flights that:
 - Meet registration criteria (airport, departure/arrival)
 - Eligible for user to receive (sensitivity filtering)
- **TMI Flight List Updates have two “flavors”**
 1. TMI Flight List update for Airport Monitor
 2. TMI Flight List update for Public TMIs



Airport Monitor Flow Information Updates (cont.)

- **TMI Flight List update for Airport Monitor**
 - Flight info including AID, Departure/Arrival, flightReference, ...
 - Flight related data
 - Times - IGTA, ARTD, PGDT, CTD, ...
 - Control Program Type / Element
 - Flight route
- **TMI Flight List update for Public TMIs (optional for Airport Monitor)**
 - Flight info including AID, Departure/Arrival, flightReference, ...
 - Flight related data
 - 1 or more tmiFlightInfoList items for TMI updates
 - Slot data
 - FCA entry/exit times, ...

TMI Flight List Airport Monitor Example

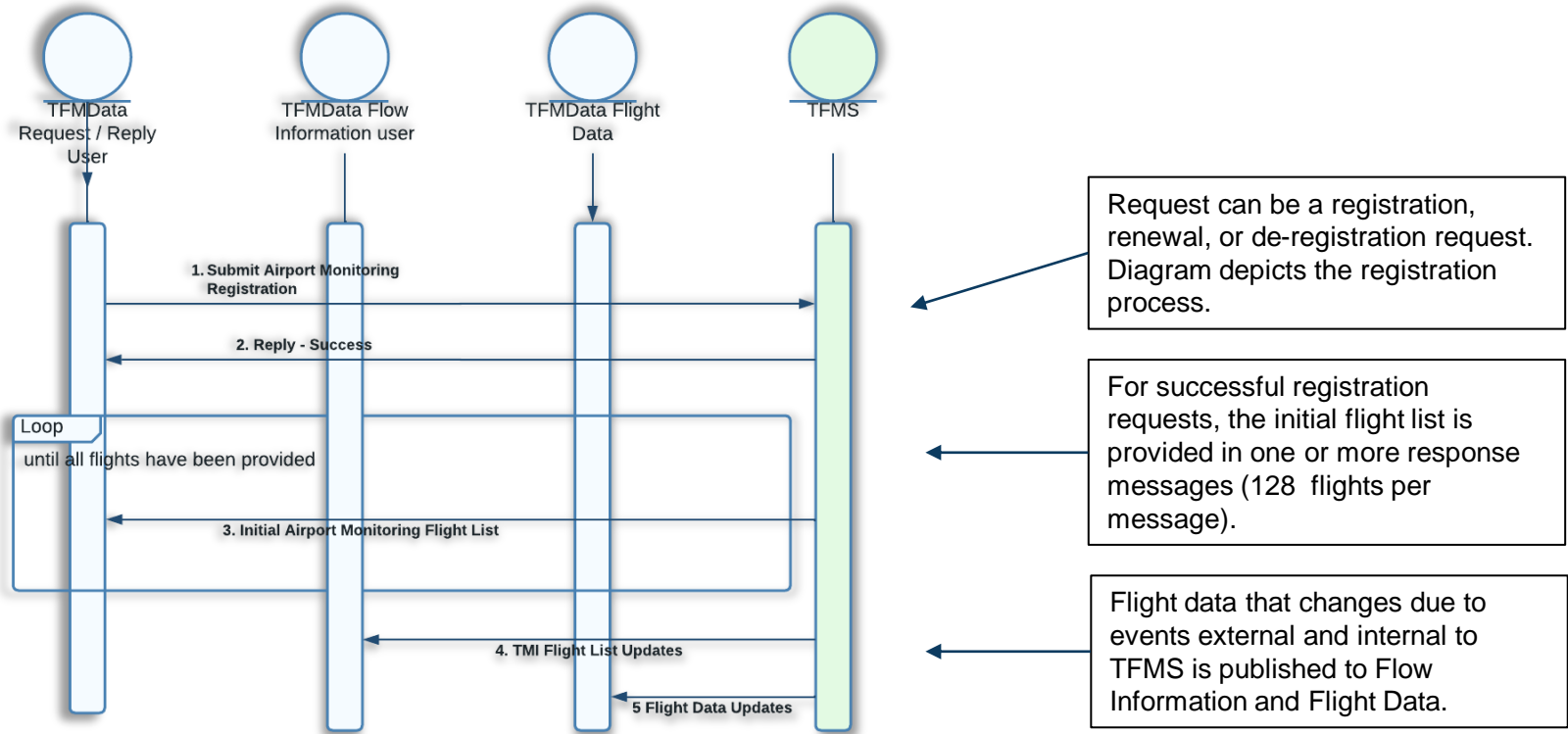
```
<ns12:tmiFlightDataList>
  <ns12:flightData>
    <ns9:flight>
      <ns7:aircraftId>AAL2357</ns7:aircraftId>
      <ns7:gufi>KF45344401</ns7:gufi>
      <ns7:igtd>2022-07-20T13:21:00Z</ns7:igtd>
      <ns7:departurePoint>
        <ns7:airport>DFW</ns7:airport>
      </ns7:departurePoint>
      <ns7:arrivalPoint>
        <ns7:airport>DEN</ns7:airport>
      </ns7:arrivalPoint>
    </ns9:flight>
    <ns9:flightReference>18231345</ns9:flightReference>
    <ns9:status>ACTIVE</ns9:status>
    <ns9:engineClass>JET</ns9:engineClass>
    <ns9:weightClass>LARGE</ns9:weightClass>
    <ns9:aircraftCategory>CIVILIAN_JET</ns9:aircraftCategory>
    <ns9:userCategory>COMMERCIAL</ns9:userCategory>
    <ns9:hasMonitoredDepApt>true</ns9:hasMonitoredDepApt>
    <ns9:IGTA>2022-07-20T15:25:00Z</ns9:IGTA>
    <ns9:ARTD>2022-07-20T14:00:00Z</ns9:ARTD>
    <ns9:SGTD>2022-07-20T13:21:00Z</ns9:SGTD>
    <ns9:SGTA>2022-07-20T15:25:00Z</ns9:SGTA>
    <ns9:PGTD>2022-07-20T13:50:00Z</ns9:PGTD>
    <ns9:PGTA>2022-07-20T15:34:00Z</ns9:PGTA>
    <ns9:LGTD>2022-07-20T13:47:00Z</ns9:LGTD>
    <ns9:LGTA>2022-07-20T15:41:00Z</ns9:LGTA>
```

```
<ns9:LRTD>2022-07-20T14:02:00Z</ns9:LRTD>
...
<ns9:CTD>2022-07-20T14:08:00Z</ns9:CTD>
<ns9:CTA>2022-07-20T15:31:00Z</ns9:CTA>
<ns9:CTL_ELEMENT>DEN</ns9:CTL_ELEMENT>
<ns9:CTL_PROGRAM>DEN</ns9:CTL_PROGRAM>
<ns9:CTL_TYPE>GDP</ns9:CTL_TYPE>
<ns9:CTD_COMPLIANCE>false</ns9:CTD_COMPLIANCE>
<ns9:ETE_COMPLIANCE>false</ns9:ETE_COMPLIANCE>
<ns9:CANCELLED_BUT_FLEW>false</ns9:CANCELLED_BUT_FLEW>
<ns9:SPURIOUS_FLT>false</ns9:SPURIOUS_FLT>
<ns9:CDM_MBR>true</ns9:CDM_MBR>
<ns9:MAJOR>AAL</ns9:MAJOR>
<ns9:GDC>556</ns9:GDC>
<ns9:fltTraversals>
  <ns7:fix sequenceNumber="1" elapsedTime="142">BPARK</ns7:fix>
  <ns7:fix sequenceNumber="2" elapsedTime="189">YAMEL</ns7:fix>
  <ns7:fix sequenceNumber="3" elapsedTime="260">FIRMN</ns7:fix>
  ...
  <ns7:sector sequenceNumber="9" elapsedEntryTime="4479">ZDV27</ns7:sector>
  <ns7:sector sequenceNumber="10"
elapsedEntryTime="4808">ZDVDEN</ns7:sector>
</ns9:fltTraversals>
  <ns9:rvmData equipped="true" currentCompliance="true"
futureCompliance="true"/>
</ns12:flightData>
</ns12:tmiFlightDataList>
```

Airport Monitor Flight Data Updates

- **Additional flight data available via Flight Data Publications**
 - Published as flight data changes
 - ETD, ETA, DFIX, EDFT, DP, DTRSN, AFIX, EAFT, STAR, STRSN, and TYPE fields
- **Reconstitution of flight data available to FAA users**
 - Non-FAA users must monitor Flight Data publications continually to ensure up to date data

Airport Monitor Flow Detail



Airport Monitor Periodic Updates

- **Based on user needs additional airport related data can be retrieved**
 - Request/Reply
 - Airport fixes via (APTFIX)
 - Flow Information
 - NTML Airport Configuration Data (APTC) – includes AARs/ADRs

Public TMI Monitor Flow

Resync (TFMData Req/Reply)

TMI List Request for list of current public TMIs

TMI Resync request to receive initial TMI flight list

- Based on user receive all flights (with sensitivity filtering) or receive airline's flights and flights airline is major for

No register / unregister process, public TMI data always published

Flight / Flow Information updates (TFMData Flight / Flow Information)

Flow Information

- TMI Flight List updates for TMIs
- Data filtered based on user
- TMI Messages (GDPs/GSs definitions, parameters ...)
- Program Rates

Flight Data

- Flight updates
- ETD, ETA, DFIX, EDFT, DP, DTRSN, AFIX, EAFT, STAR, STRSN, and TYPE fields

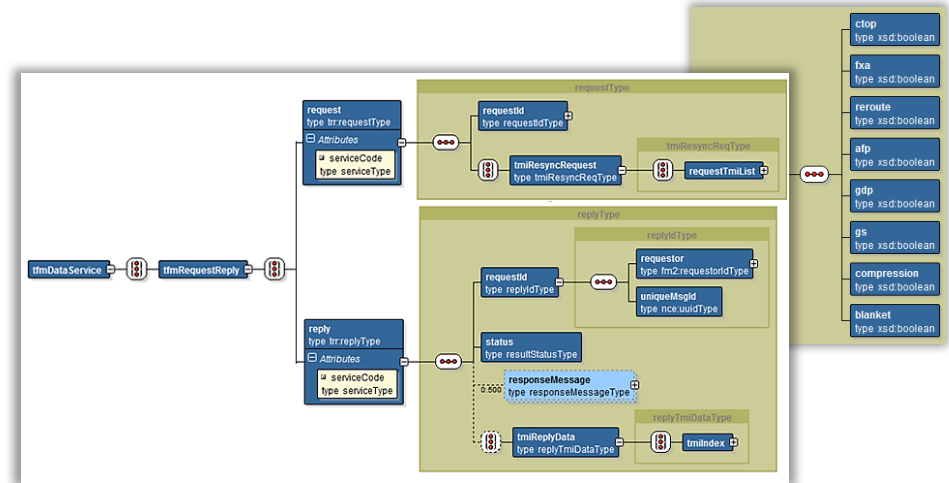
Request periodic updates as needed (TFMData Req/Reply)

TFMData Req/Reply for periodic updates related to airport

- Historical Popups
- EDCT Lists/Subshow/Unassigned Slots

TMI Resync Process – Step 1

- **Retrieve current list of TMIs via TMI List Request**
 - Can specify type of TMIs in request or all

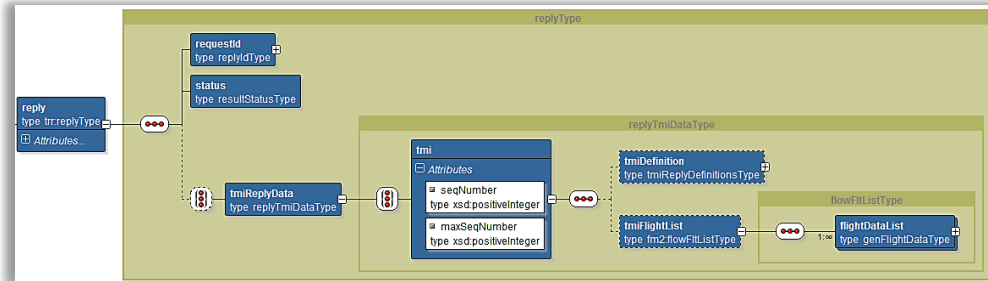
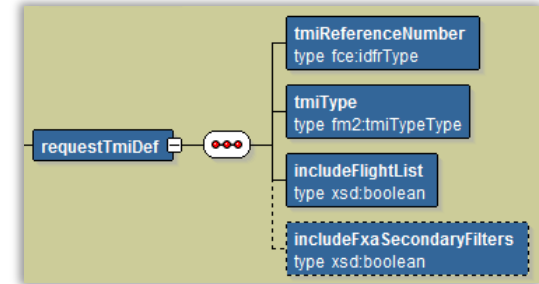


TMI Resync Process – Step 2

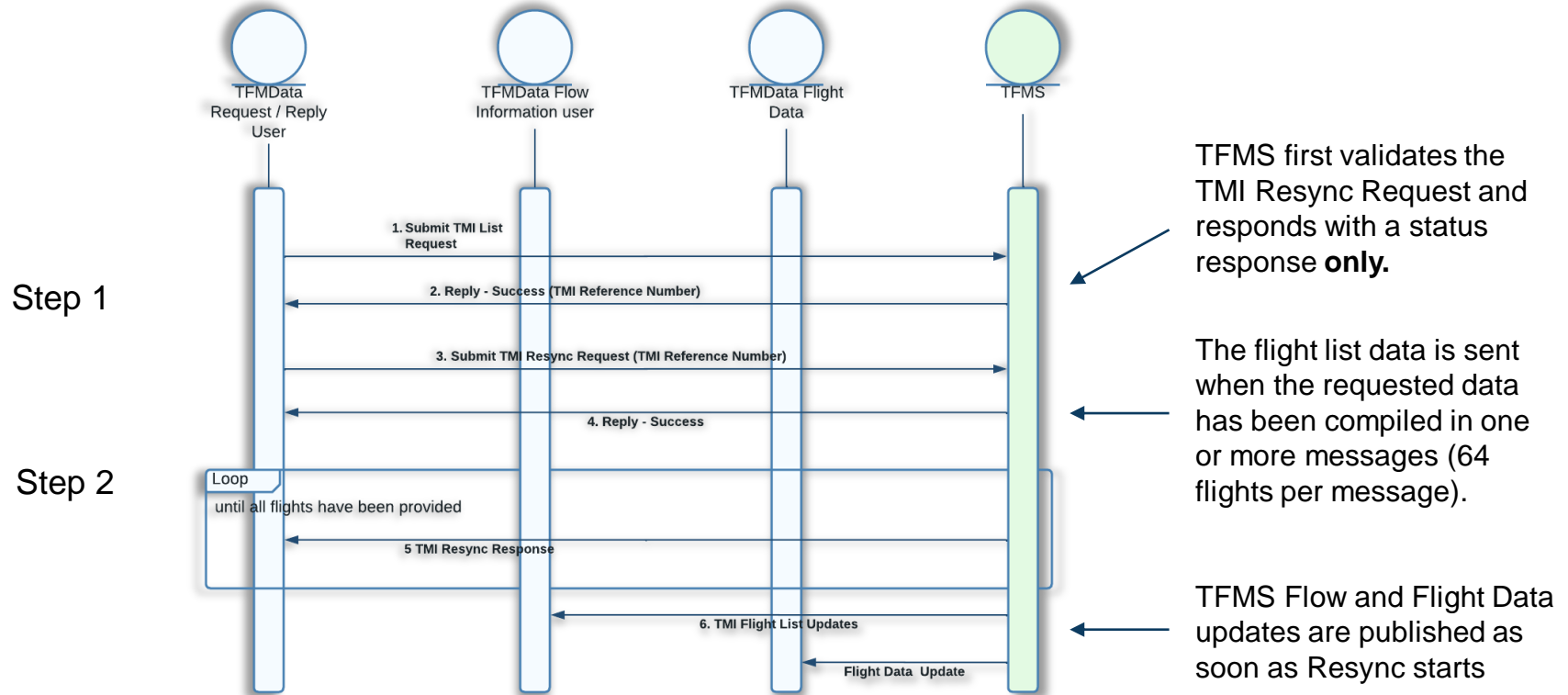
- **Retrieve TMI definition and flight list**
 - 1st reply contains Status
 - Error / Success
 - Can be multiple replies containing TMI definition and up to 64 flights per response message

NOTE:

- User can issue TMI Resync Request for a TMI every 60 minutes



TMI List/Resync Flow Detail



TMI Monitor Information Updates

- **TMI Flight List updates**

- Published when TMI data changes for a flight
 - FEA/FCA, GDP, GS, AFP, CTOP, Reroute
- Must start processing before or during TMI Resync
- Received for flights user is authorized to view
- Flight info including AID, Dept / Arrival Airport, flightReference, times, ...
- TMI Flight Info includes:
 - 1 or more tmiFlightInfoList items for TMI update
 - Slot data
 - FCA entry/exit ...

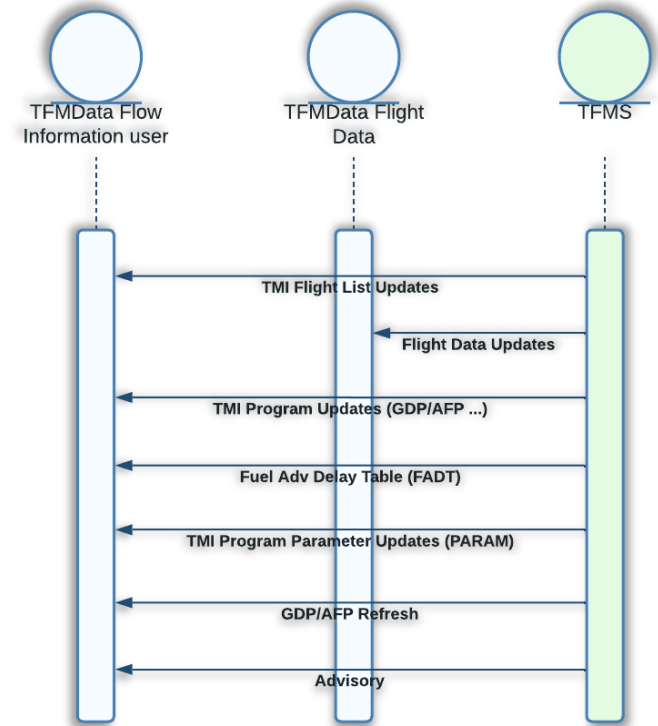
```
<ns9:tmiFlightInfoList>
  <ns9:tmi updateType="UPDATE" lastUpdateTime="2022-07-
20T14:56:55Z">
    <ns9:flowProgramId>DEN</ns9:flowProgramId>
  </ns9:tmi>
  <ns9:flowProgramFlightData>
    <ns9:slotData>
      <ns9:CR_TIME>2022-07-19T13:25:32Z</ns9:CR_TIME>
      <ns9:assignedArrivalSlot>
        <ns4:controlledElement>DEN</ns4:controlledElement>
        <ns4:slotTime>2022-07-20T15:39:00Z</ns4:slotTime>
        <ns4:uniqueLetter>A</ns4:uniqueLetter>
      </ns9:assignedArrivalSlot>
      <ns9:CTL_EXEMPT>Y</ns9:CTL_EXEMPT>
      <ns9:delayStatus>
        <ns9:ALD>true</ns9:ALD>
        <ns9:GDP>true</ns9:GDP>
      ...
    </ns9:slotData>
    <ns9:SL_HOLD></ns9:SL_HOLD>
    <ns9:earliestRunwayArrivalTime>2022-07-
20T15:32:00Z</ns9:earliestRunwayArrivalTime>
  </ns9:flowProgramFlightData>
</ns9:tmiFlightInfoList>
</ns12:flightData>
</ns12:tmiFlightDataList>
```

TMI Monitor Flight Data Updates

- **Additional flight data available via Flight Data Publications**
 - Published as flight data changes
 - ETD, ETA, DFIX, EDFT, DP, DTRSN, AFIX, EAFT, STAR, STRSN, and TYPE fields
- **Reconstitution of flight data available to FAA users**
 - Non-FAA users must monitor Flight Data publications continually to ensure up to date data

TMI Related Periodic Updates

- **Based on user needs additional TMI related data can be retrieved**
 - Request/Reply
 - Historical Popups (HSTPOPOPUP)
 - EDCT List (EDCTLIST), Show (EDCTSHOW), Unassigned Slots (EDCTUNSLT)
 - Flow Information
 - FSM Program Rates (PARAM)
 - Program Updates GDP/GS/ ... (advisories, definitions, ..)
 - TMI definition data for GDP/AFP/... periodically “refreshed” (15-min)



Questions / Comments



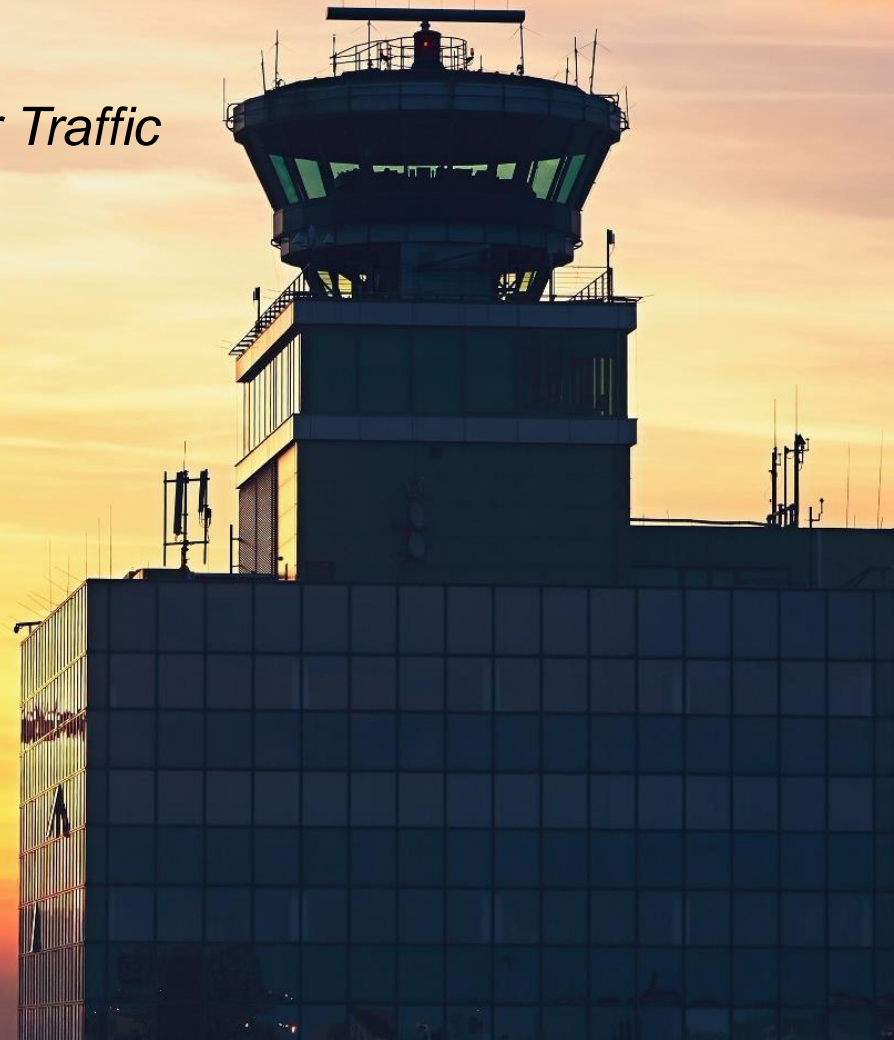
Early Planning for Disruptions:

Density Prediction Model for Departure Air Traffic

SWIFT 19 Update

Presenter: Chris Gottlieb – JetBlue
Xavier Pratt – LS Technologies
Nguyen “Dao” Vu – LS Technologies

Date: August 31, 2022



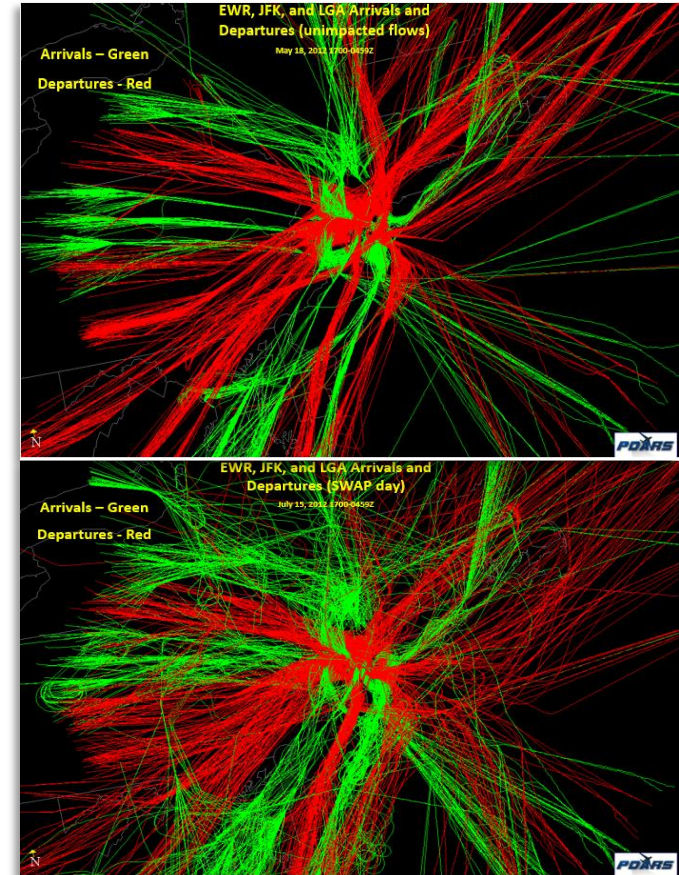
Case Study Executive Summary

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*

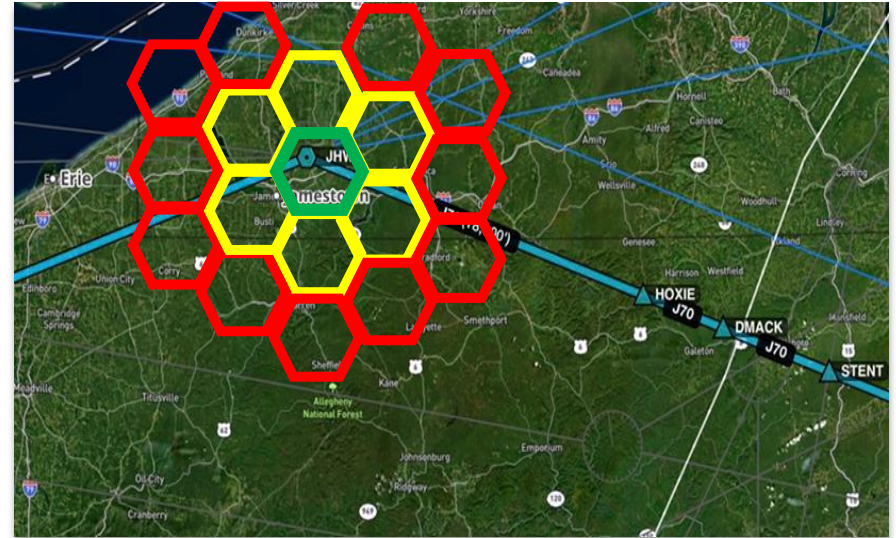
Operational Environment

- New York and Cleveland Center: ZNY and ZOB
- North Texas Region and Adjacent Centers: ZFW, ZHU, ZAB
- Airports: JFK and DFW
- Airways and jet routes impacted by Traffic Management Initiatives (TMI) events or closures



New York Perspective – 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.*

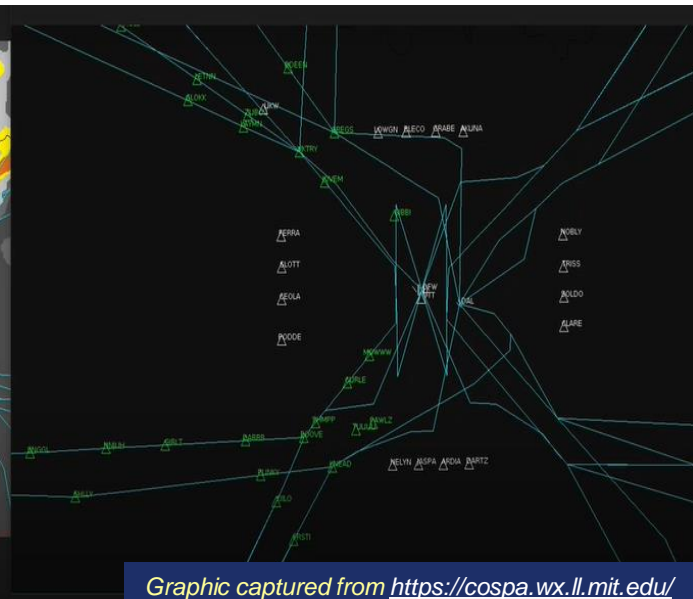
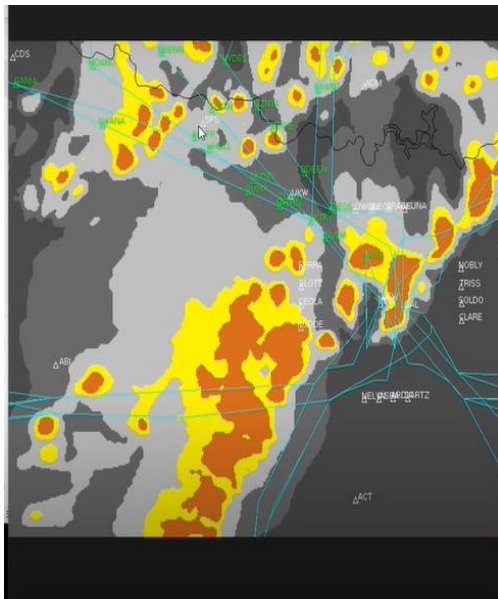


Note: Radius centered at JHW (not to scale)

Capturing 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.

North Texas Perspective - Analyzing Trajectory Deviation


- From June 21, 2021, convective weather has severely limited DFW available runway resources for arrivals
 - *In this scenario, arrivals must be funneled in at Wichita Falls (SPS) to mitigate disruptions in operations*
 - *Convective Weather around DFW impacts westbound departures (e.g., FERRA fix open)*
- We want to indicate the likelihood of needing to swap gates out and restrict westbound DFW departures to accommodate heavy arrival streams, due to deviation.



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


Capturing deviations from planned trajectory: Typically, controllers will align inbounds at FL240 near Wichita Falls Navaid (SPS). This gives D10 controllers the spacing needed to manage flights for RWY 13R - leaving remaining runways of other corners. Depending on DFW configuration, controllers will seek gaps in the convective weather and coordinate north/west departures to mitigate impacts to arrivals.

Understanding the Problem Space – Ops SME Perspective




Identifying Information Gaps – Center Perspective

- Planning for Convective Weather against Traffic Demand
- Managing Disruptions through TMI initiatives



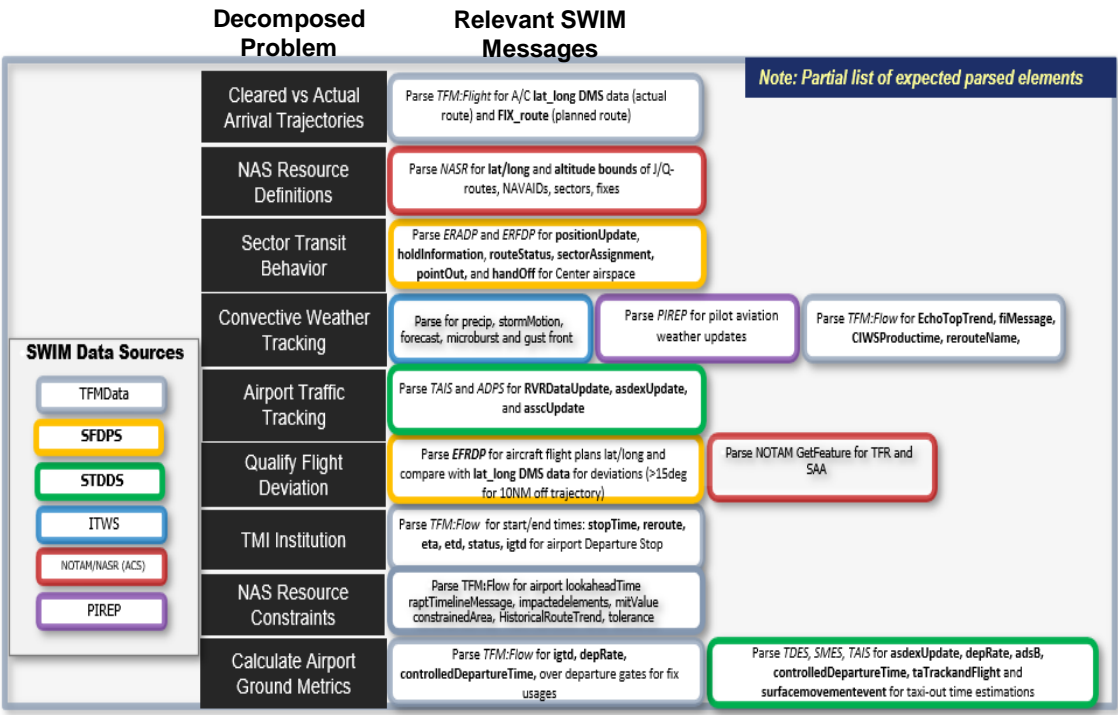
Identifying Information Gaps – Sector TMU / TRACON Perspective

- Speed Restrictions from ARTCC
- General Fix Availability
- Managing Deviations beyond TRACON Boundary
- Partial Airspace Restrictions



Identifying Information Gaps – Pilot / Airline Perspective

- Anticipated Airport DEP Fix Loads
- En Route Flight Track Changes (e.g. Reroutes)



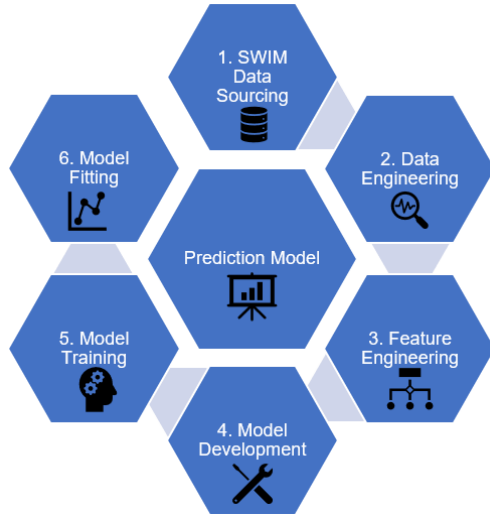
Understanding the Problem Space - Modeling Perspective



Data Visualization

Identifying Information Gaps – Data Scientist Perspective

- ARR/DEP Flight Tracks
- Taxi-Out Time Changes
- ARR Flight Deviation Identification
- Airspace Geometry Definition
- Fix / Resource Allocation



General Modeling Steps

- **SWIM Data Sourcing**
 - ❑ Data Subscription and Data Storage
- **Data Engineering**
 - ❑ Data Parsing and Data Cleanup
- **Feature Engineering**
 - ❑ Model Input Data, Model Correlation Behavior, Model Output Metrics
- **Model Development**
 - ❑ Model Type Selection for Analysis
- **Model Training**
 - ❑ Sample Dates Worth of Data for Model Algorithm Refinement
- **Model Fitting**
 - ❑ ML, Training and Validation

Prediction Model Update

General Modeling Approach

- **Defined Goal and Requirements**

- Using the density of Arrival flights in the airspace surrounding Dallas within a predetermined time window, the ML model predicts the departure density in the coming hour(s).

- **Regression Prediction**

- Calculated density of departure flights for hexagonal cells in the interested airspace

- **Input Features**

- Though brainstorming, and consultation with available operation subject matter experts, data elements that may be relevant to predict aerial flight density were identified and utilized to compute relevant input features

- **Data Construction**

- An ETL pipeline was established to calculate and translate data elements extracted from the XML files into a tensorized object that can be ingested by the machine learning algorithms

- **Machine Learning**

- Various Neural Network topologies were experimented with in training the regression model. Deep learning was selected to take advantage of:
 - ❑ *Its capability to model latent relationships in this complicated dataset with minimal feature engineering necessary*
 - ❑ *Its scalability as a large amount of TFM Data becomes available and its relatively quick test time to accommodate live streaming data in the future*

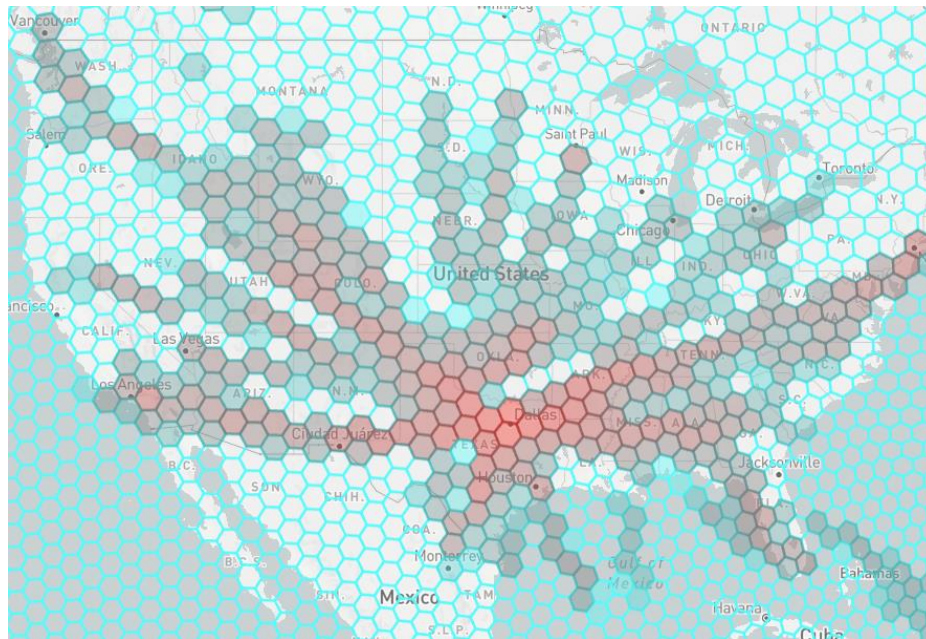
Features: TFMData-Flight[f1tdMessage] Data Elements

acid	Unique ID
flightRef	Unique ID
sourceTimeStamp	Message Time Stamp
routeOfFlight	File Flight Plan,
longitudeDMS	Longitudinal Coordinate*
latitudeDMS	Longitudinal Coordinate*
waypoint	Sequence order and Corresponding Coordinates*
fix	List of Fix names on Route and Sequence Order*
speed	Current Aircraft speed*
center	List of Center on Route**
eta	Anticipated time of Arrival*
depArpt	Departure Airport
arrArpt	Arrival Airport

Note: Data Elements are not consistently found in every message

Visualizing the Model Input Feature Data

- Consumed June 21, 2021, SWIM Data
- Overlaid the contiguous U.S. airspace with H3 Hexagons at a set resolution
 - Cell edge length ~32.2 nautical miles at current resolution
- Flight density for each hexagon is calculated at 1-hour intervals.
 - Density is calculated relative to the maximum resource in the corresponding airspace.
 - Density is transformed and scaled to density scores
 - The color code is corresponding to the magnitude of the density score

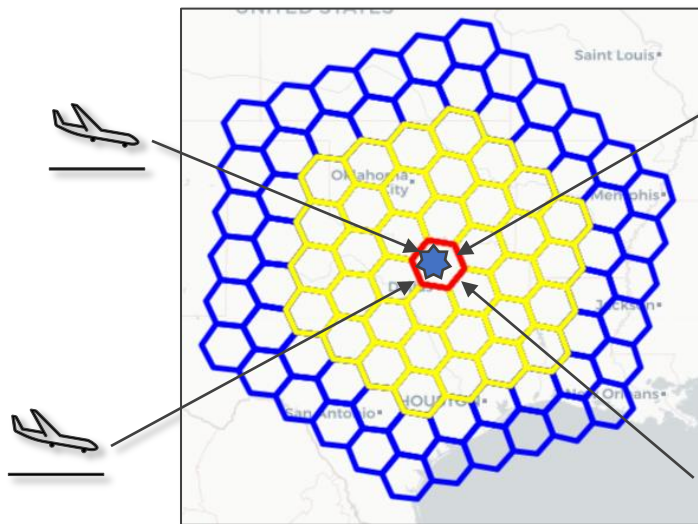


•Arrival Flight Density on June 21, 2021, at 1800 ZULU

Input Features and Predictor H3 Hexagons Visualization

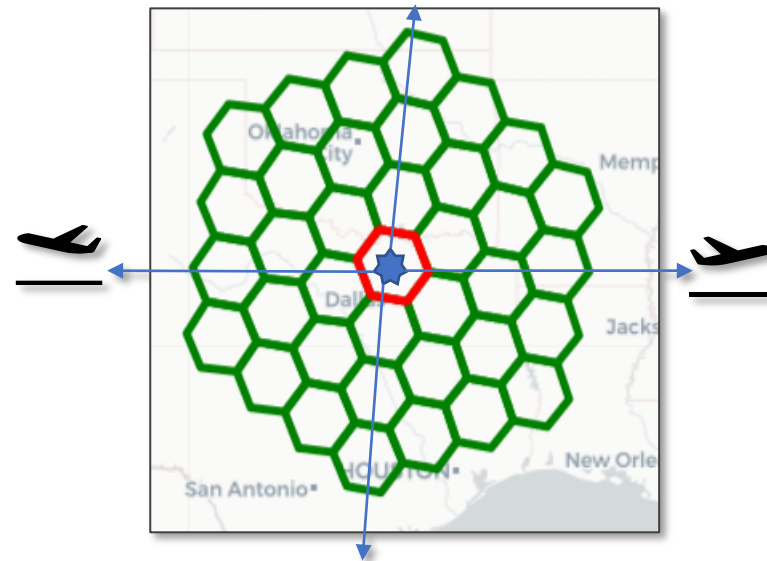
Input Features:

- *Arrival Flights Density to Dallas*



Predictor:

- *Departure Flights Density From Dallas*

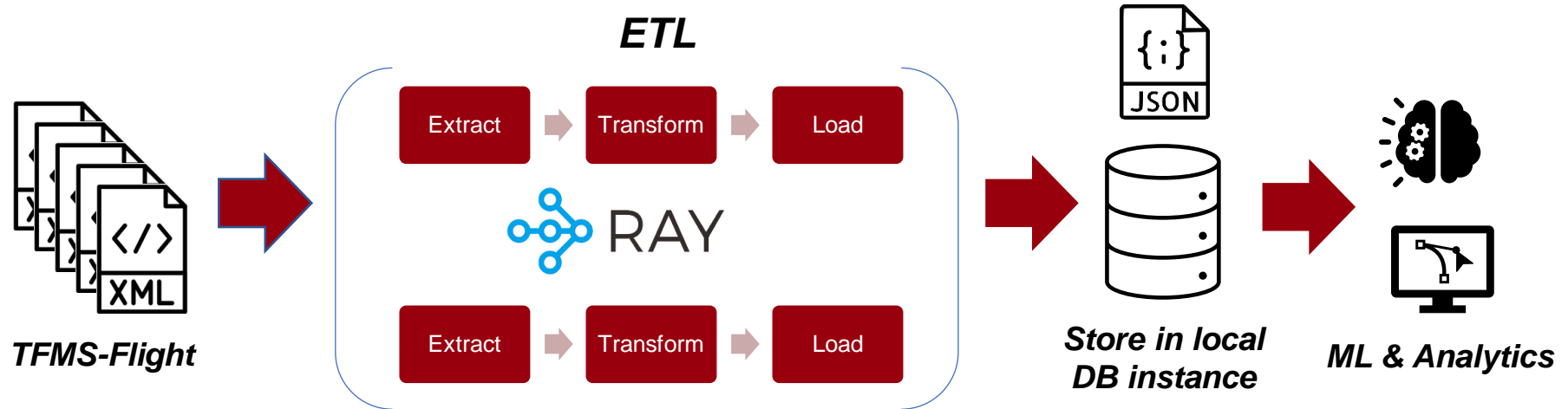


Prediction Model Design Rationale

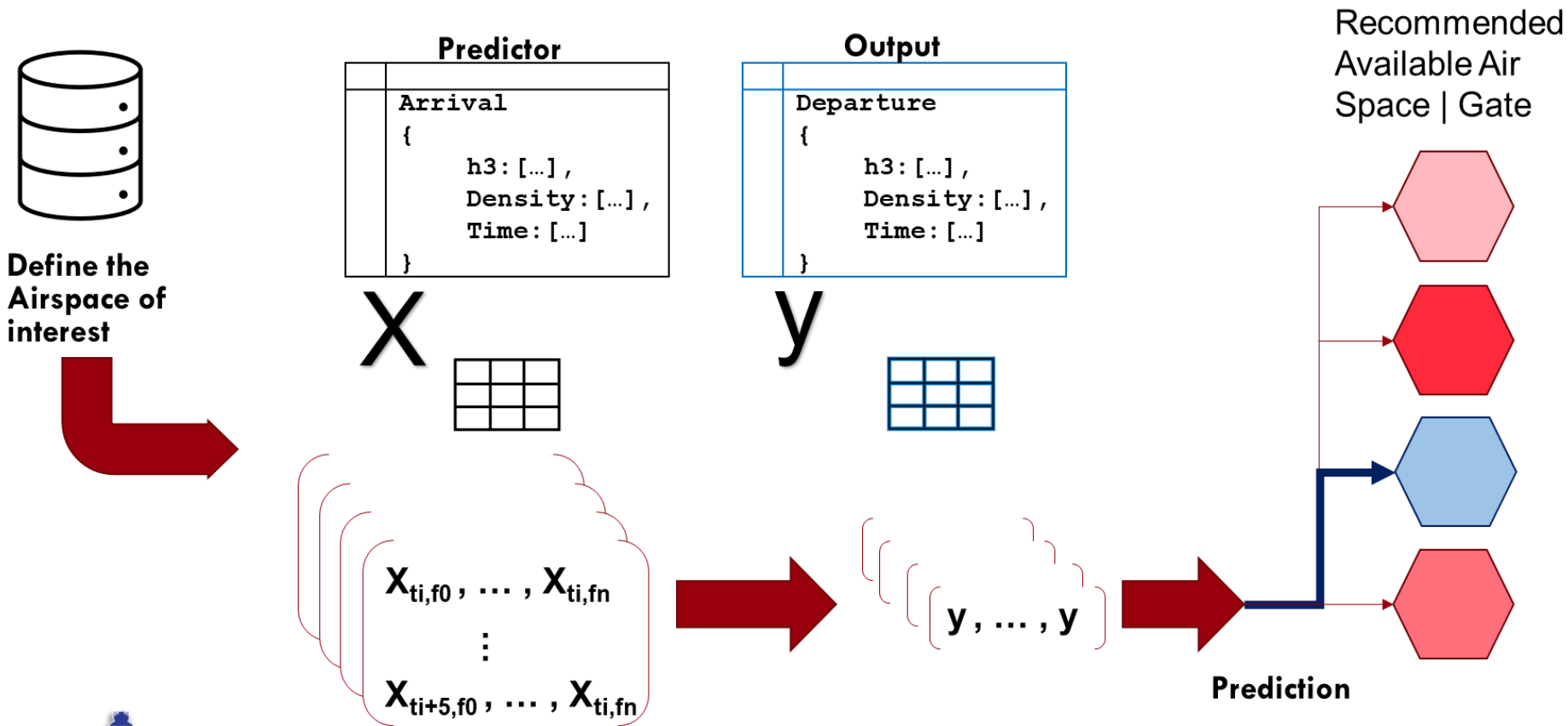
- **Motivation for Prediction Model:** *Support operations flexibility to alleviate air traffic congestion*
- **The Model is designed to predict traffic density in designated airspace**
 - Provides advanced warning of potential departure traffic disruptions by analyzing arrival traffic deviations.
 - Assumptions
 - Arrival traffic flow deviations should directly correlate to departure flow changes of rate and path
 - Irrespective of weather or other factors driving traffic deviation, the model can holistically capture all changes in traffic density over time in the airspace of interest
- **In practice, the current model will make predictions if given the current trend of arrivals. This informs which departure cell might incur a mitigation strategy to manage volume.**
 - An adjustable forward looking demand data chart, gathered from SWIM data, that could be viewed up to 3 hours out
 - By predicting departure airspace density increases that are a result of the arrival patterns changing, the operators can begin to make decisions about ground operations
 - Based on ATC management actions in response to saturated departure airspace density, stakeholder reactions will become a pattern the model recognizes
- **Once this prediction is available, planners (e.g., dispatch and possibly even ATC) become aware that a mitigation initiative is warranted.**

Feature Engineering Data from TFMDData

- Stream and parallelize data processing to extract data elements from XML messages
 - *Saved extracted elements into an indexed JSON file*
 - *48GB of potentially relevant flight information from 1-day worth of data*
 - *Parallelize Extract Transform Load (ETL) Operation*



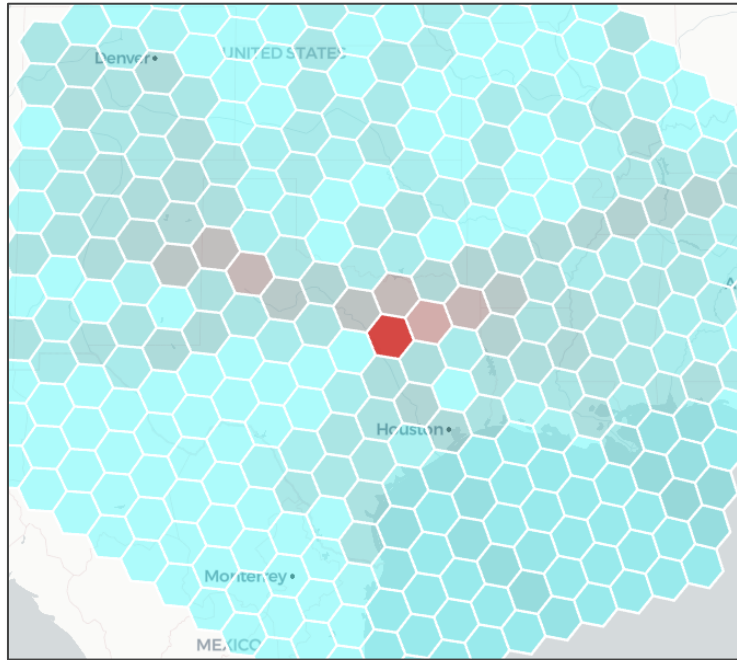
Feature Engineering and Deep Learning Architecture



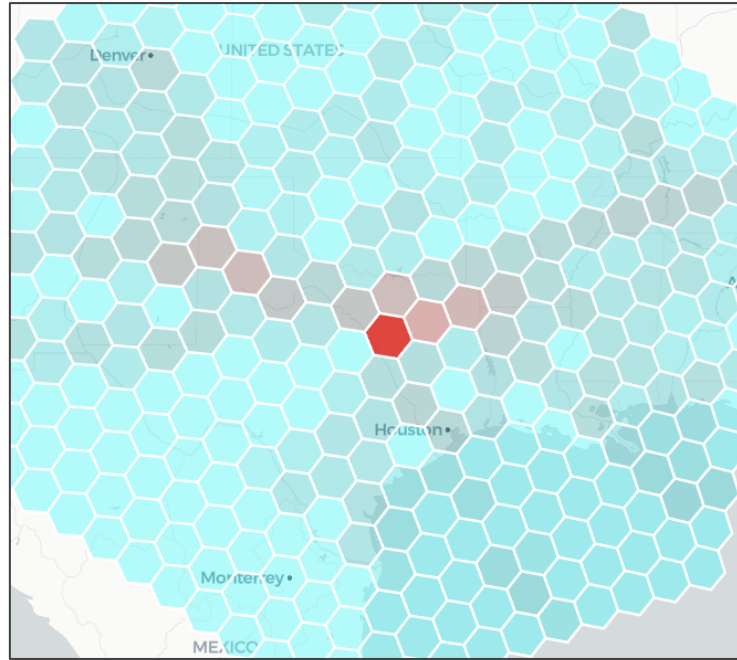
Example Departure Density Prediction at 1500 ZULU

- 2 hours ahead

Actual

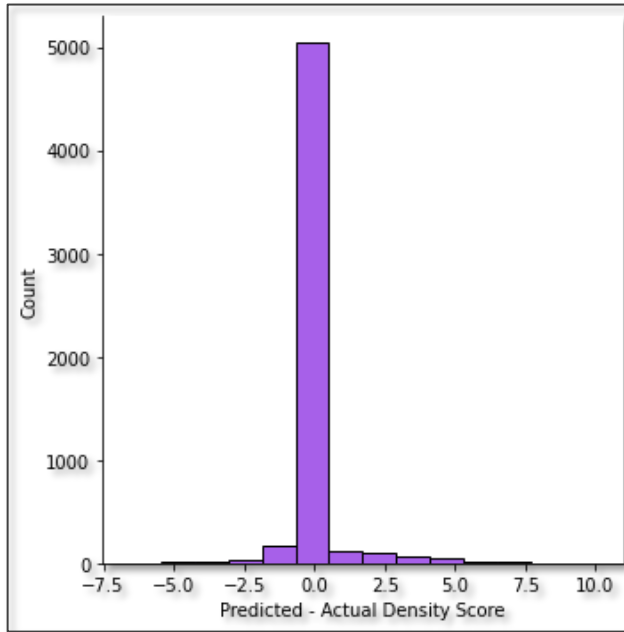


Predicted

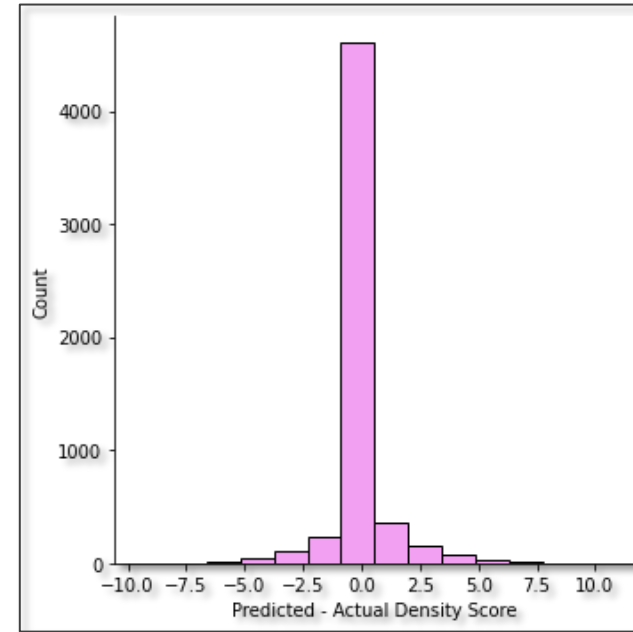


Prediction deviation Looking forward 2 hours at 1500 ZULU

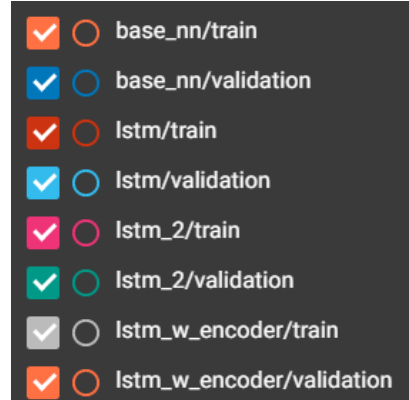
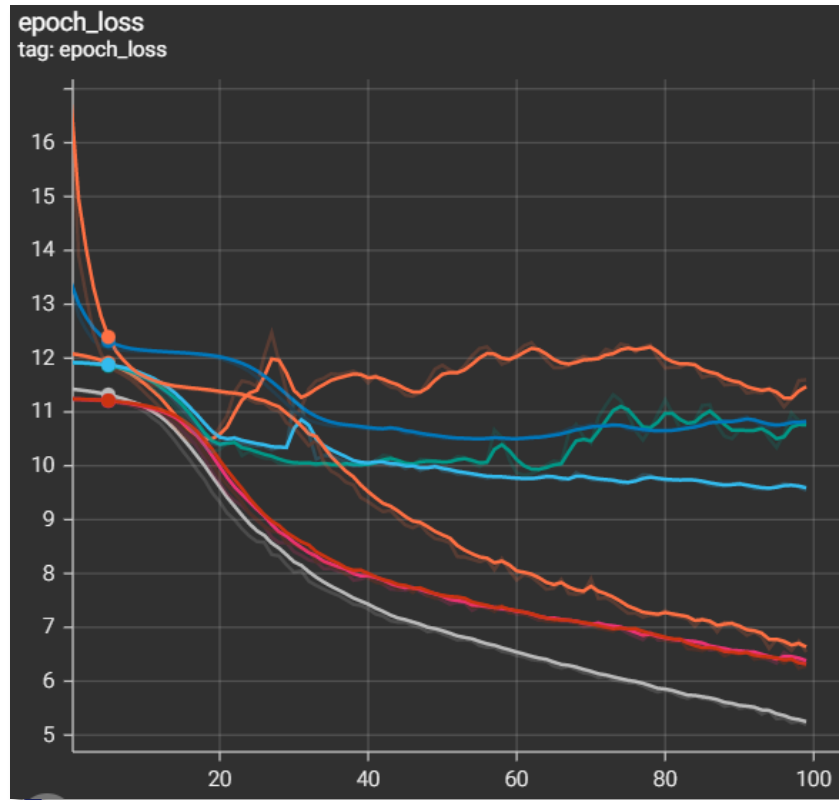
DNN Model



LSTM Model



Neural Network Learning Curves



- Long Short-Term Memory (LSTM) model with encoding performs the best during training as well as validation when compared to Deep Neural Network (DNN) baseline
- Validation loss indicates overfitting training data and may point to lack of data
- Fluctuation in training and validation can indicate underrepresentation

Discussions and Potential Next Steps

- Obtain historical data to improve model training and validation
- Record and store SWIM data to test and monitor model performance
- Collaborate with Ops SME and stake holders to obtain and identify additional features
- Experiment with different network topologies and hyperparameter tuning to improve performance
- Scale model to multiple areas simultaneously for a more holistic look at the entire US airspace

Weather Data on SWIM

Existing and Upcoming Weather Services

Presented to: SWIFT 19

By: FAA NextGen Wx Program Office

Date: August 31, 2022



**Federal Aviation
Administration**

Purpose

- **Provide overview and status of NextGen Weather Systems**
 - Common Support Services – Weather (CSS-Wx)
 - NextGen Weather Processor (NWP) and Aviation Weather Display
- **Describe NextGen Weather Data Services**
- **Share NextGen Weather schedule**
- **Describe legacy weather on SWIM**

CSS-Wx Program Overview

Common Support Services – Weather (CSS-Wx)



- Improves weather information management and user access; provide new interface standards and formats
- Reduces FAA cost by enabling decommissioning of legacy weather dissemination systems (e.g., WARP WINS, FBWTG, CDDS)



Capabilities	Benefits	Timeline
<ul style="list-style-type: none"> ➤ Single provider of weather data products within the NAS, using standards-based weather dissemination ➤ Makes weather products available from NOAA, NWP and other data sources for integration to air traffic systems ➤ Provides weather products via a set of common Web Services for weather, using international data access and data format standards 	<ul style="list-style-type: none"> ➤ Reduces FAA costs <ul style="list-style-type: none"> ➤ Reduces infrastructure/bandwidth costs by optimizing weather dissemination ➤ Reduces interface development costs by eliminating custom point-to-point interfaces ➤ Improves NAS information <ul style="list-style-type: none"> ➤ Facilitates consistent weather information using standard formats ➤ Increases NAS access to common weather information 	<ul style="list-style-type: none"> ➤ Incremental Agile Software design/development/test in progress ➤ Key Site Initial Operational Capability in 2024

NWP Program Overview

NextGen Weather Processor (NWP)

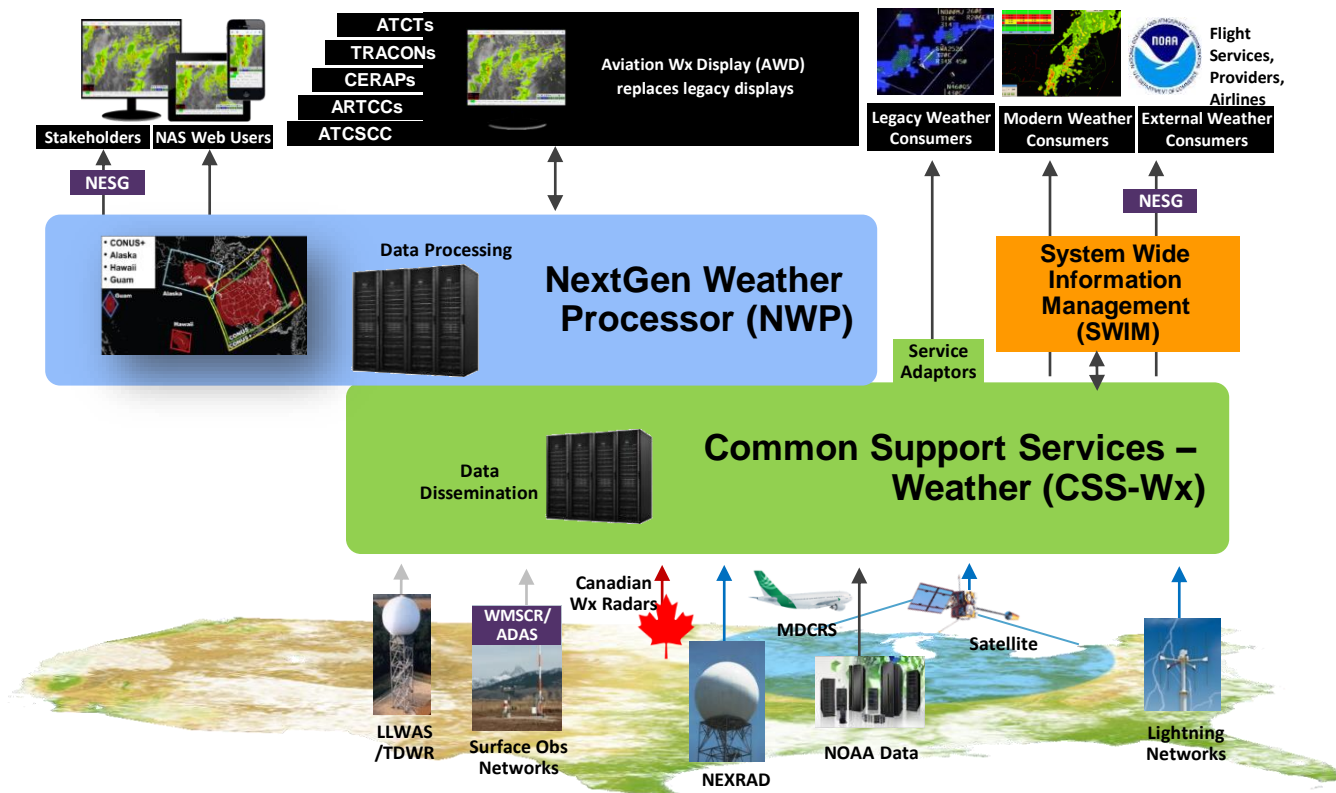


- Increases NAS efficiency and safety by improving weather product generation, translation, and display for aviation weather users
- Reduces FAA costs by enabling decommissioning of legacy weather processor systems (e.g., WARP, CIWS)

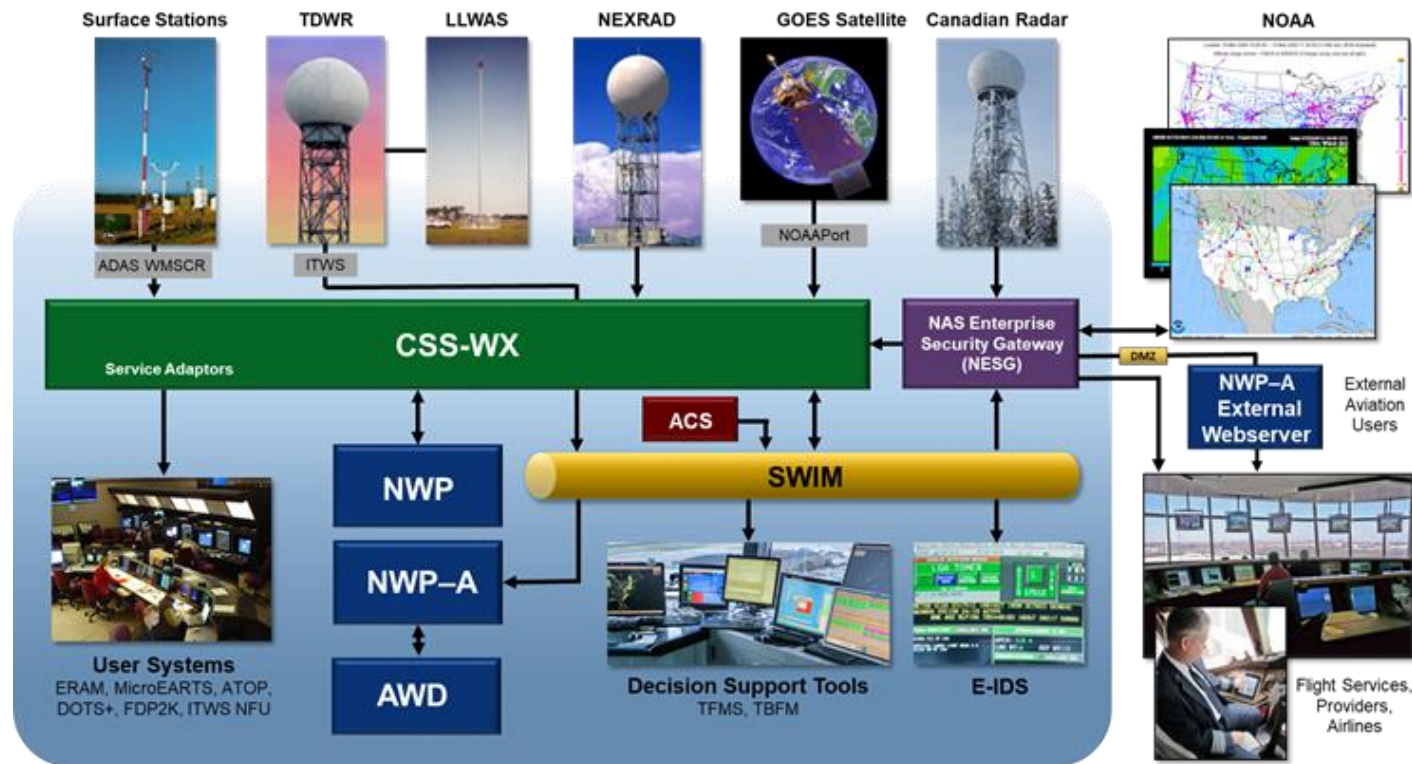


Capabilities	Benefits	Timeline
<ul style="list-style-type: none">➤ Produces advanced aviation specific weather products, e.g.,<ul style="list-style-type: none">• Real-time weather radar information (e.g., ERAM)• 0 to 8 hour aviation weather products• Convective Weather Avoidance Fields➤ Translates weather information into weather avoidance areas for integration into decision support tools (e.g., TFMS, TBFM)➤ Provides Aviation Weather Display (AWD) of NextGen weather information for AT users	<ul style="list-style-type: none">➤ Reduces operational costs<ul style="list-style-type: none">• Establishes weather processing platform• Consolidates legacy processors➤ Reduces air traffic delays<ul style="list-style-type: none">• Maximizes airspace usage• Improves accuracy, timeliness and look ahead (0-8 hour) of aviation-specific weather information to air traffic• Enhances weather algorithms	<ul style="list-style-type: none">➤ Incremental Agile Software design/development/test in progress➤ Key Site Initial Operational Capability in 2024

NextGen Weather Systems



NextGen Weather Providers/Consumers



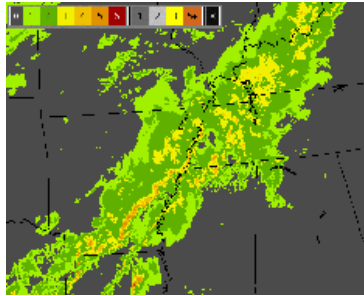
Aviation Weather Display (AWD)

- **AWD provides users with access to aviation specific weather information from CSS-Wx generated by NWP, NOAA, other sources**
 - AWD Servers obtain information from CSS-Wx published on SWIM
 - AWD will be used in designated Air Traffic (AT) facilities by users such as AT specialists, Center Weather Service Units (CWSU) meteorologists
 - Authorized users internal and external to the FAA will have access to the AWD via the internet through the AWD website
- **Replaces legacy weather displays, e.g., WARP Briefing Terminals, CIWS Situation Displays and Website**

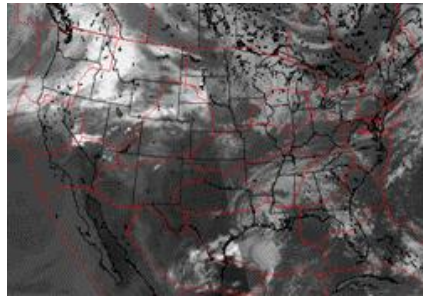


Types of Data Products: Gridded Data

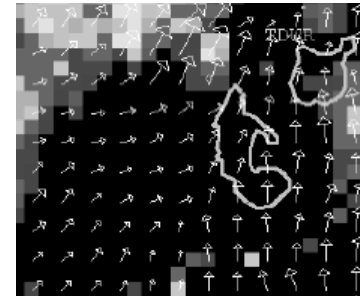
- Gridded products represented as uniformly spaced observations or computed values on rectangular arrays



Precipitation (VIL) Mosaic



Satellite Mosaic

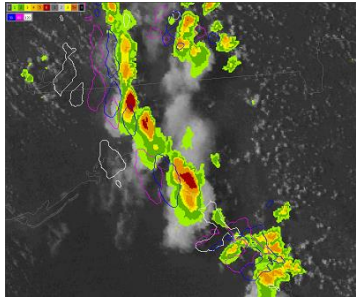


Terminal Winds

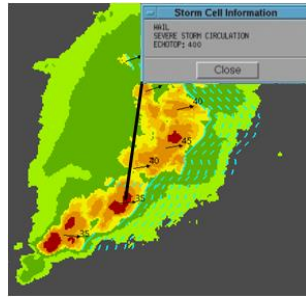
- Mapping projection needed to map data grid to earth's surface
 - Examples: Lambert Conformal, Lambert Azimuthal Equal Area
- Network Common Data format (NetCDF4) used to model gridded data products

Types of Data Products: Non-Gridded Data

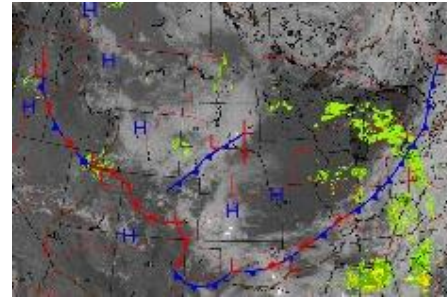
- **Non-gridded products express singular or sparsely distributed geospatial sets of observations or forecasts**
 - Contours, point products, text products



Precipitation Contours



Storm Motion Vectors,
Extrapolated Positions,
Hazard Text



Fronts and Fronts Forecast

- **XML format and extensions used to represent non-gridded data**
 - Geography Markup Language (GML), ICAO Weather Exchange Model (IWXXM), etc.
- **Geo-reference coordinates (latitude, longitude) used to represent data locations.**

NextGen Weather Products – Gridded

Gridded Weather Data

- Precipitation (VIL)
- Precipitation (VIL) with Mask
- Precipitation (VIL) Forecast
- Precipitation (VIL) Forecast with Mask
- Echo Tops
- Echo Tops Forecast
- Precipitation (Base Reflectivity)
- Precipitation (Composite Reflectivity)
- Precipitation (Composite Reflectivity) with Mask
- Surface Precipitation Phase
- Surface Precipitation Phase Forecast
- Icing Layer
- Composite Icing
- Icing Layer Forecast
- Composite Icing Forecast
- Turbulence Layer
- Turbulence Layer Forecast
- Composite Turbulence
- Composite Turbulence Forecast
- Convective Weather Avoidance Fields
- Convective Weather Avoidance Field Forecast
- Satellite
- Terminal Winds
- *NOAA Model Data (RAP, HRRR, GFS, NAM)**

*NOAA Produced**



NextGen Weather Products – Non-Gridded

Non-Gridded Weather Data

- Precipitation (VIL) Forecast Accuracy
- Precipitation (VIL) Forecast Contours
- Echo Tops Forecast Accuracy
- Echo Tops Forecast Contours
- Lightning
- Storm Information Hazard Text
- Storm Information Leading Edges
- Storm Information Motion Vectors
- Fronts Forecast
- Growth Trends
- Decay Trends
- Forecast Confidence
- Convective Weather Avoidance Polygons / CWAP Forecast
- Wind Profiles
- Tornado Detections
- Icing Layer Contours
- Composite Icing Contours
- Turbulence Layer Contours
- Composite Turbulence Contours
- Pilot Report (PIREP)
- Urgent Pilot Report (PIREP)
- ICAO Aircraft Report (AIREP)*
- Significant Meteorological* Information (SIGMET)*
- Convective Significant Meteorological Information (Convective SIGMET)*
- TFM Convective Forecast (TCF)*
- *Airmen's Meteorological Information Advisories (AIRMET)**
- *Graphical AIRMET (G-AIRMET)**
- *Winds Aloft Forecast**
- *Surface Weather Observations*
- *Aviation Watch Notification**
- *Tornado Warnings**
- *Severe Thunderstorm Warnings**
- *Public Severe Weather Watch Notification (SEL)**
- *Volcanic Ash Advisory Statement (VAAS)**
- *Terminal Area Forecast (TAF)**
- *Center Weather Advisories**
- *Meteorological Impact Statements**
- *Severe Weather Statements (SVS)**

NOAA Produced*

CSS-Wx Data Access Services

- Ingests weather sensor, NWP data and NOAA data (e.g., satellite, models, alphanumeric)
- Makes weather data available through Web Services/JMS
- Adheres to international standards for handling and representing geospatial data
- Consumers subscribe to CSS-Wx products through SWIM



Java Message Service

- Queue(s) configured to consumer's specific data needs
- Notifies as new data is published

Web Coverage Service

- Filters and transforms large gridded dataset
- NetCDF format

Web Feature Service

- Filters and transforms non-gridded data sets
- XML format

Web Map Service

- Renders weather data as single large image or sets of tiled images for display
- JPEG, PNG, GIF format

NextGen Weather Data Services

- **Available Products will be listed in NAS Service Registry Repository (NSRR) <https://nsrr.faa.gov>**
 - Documentation that provides product details and information on how to acquire
- **Sample products could be made available upon request (outside NSRR)**
- **Users outside the FAA obtain products through Subscription Service**
 - Data available to consumers via SWIM
 - JMS destination is configured specifically for subscriber
 - Products distributed to subscriber as received
- **Designated users will have access to products via website (requires registration)**

NextGen Weather Consumers

- **Legacy users via SWIM**
 - TBFM and TFMS
 - Transition CIWS ATOM users
- **New investments**
 - Terminal Precip on Glass (TPoG) – mosaics to be converted and provided to STARS
 - ATOP – automation of SIGMETs
 - E-IDS – suite of aviation products from NWS and NWP mosaics
 - Modernization of TFMS TSDs to overlay weather data
- **Users outside NAS (e.g., NAVCANADA, DoD, airlines)**
 - AWD Web to registered users
 - Subscription-based service via SWIM

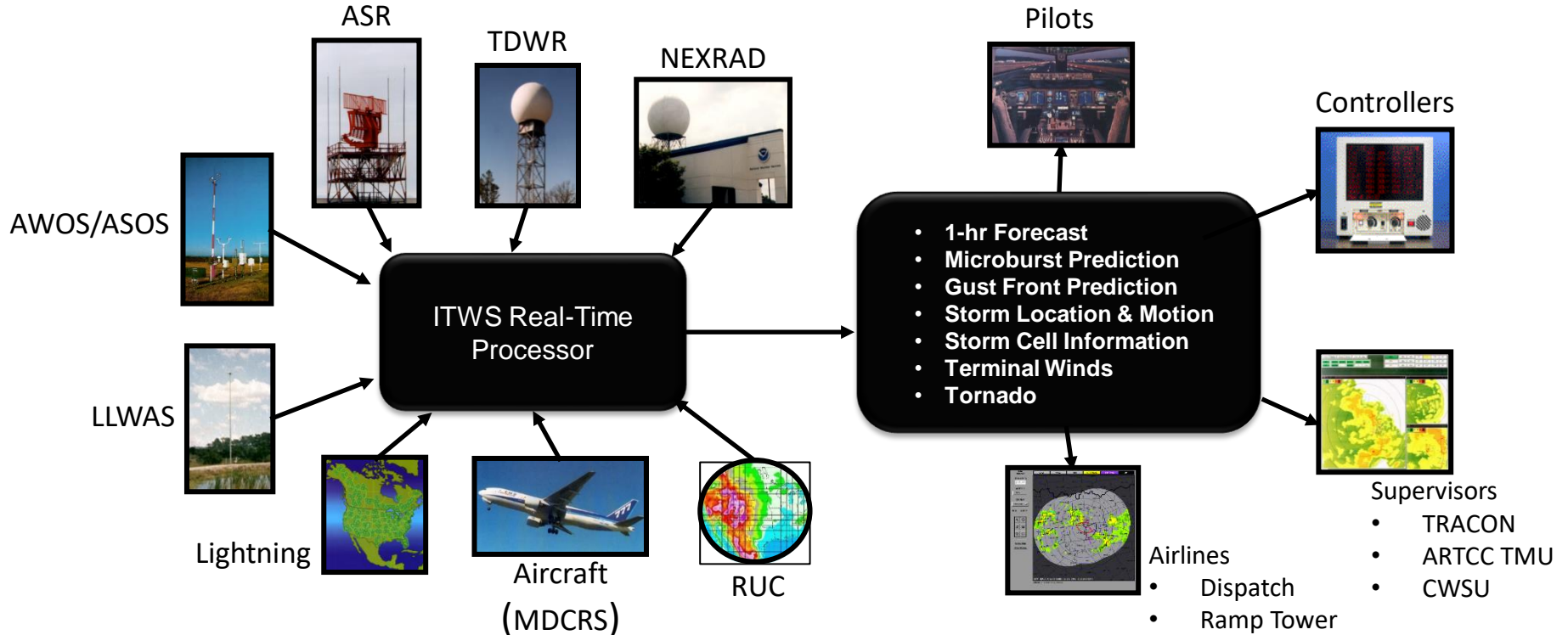
CSS-Wx and NWP Program Status

- **Currently in Solution Implementation phase**
 - NWP Prime Contractor Raytheon completed software development and working towards system testing
 - CSS-Wx Prime Contractor L3Harris continuing with software development and incremental testing
- **Continue with informal integration testing at WJHTC to reduce risks**
 - CSS-Wx and NWP interoperability
 - Data providers, e.g., NOAA NGITWS
 - End user systems, e.g., ERAM, ATOP, and Air Traffic and Tech Ops users
 - Enterprise, e.g., security, SWIM, system monitoring & control
- **CSS-Wx and NWP upcoming working milestones**
 - Key-site system installation and Site Acceptance Test (SAT) in late 2023
 - Operational Test (OT) and Key-site Initial Operational Capability (IOC) in early 2024
 - In-Service Decision (ISD) in 2024
 - Continue deployment in 2025

ITWS Overview

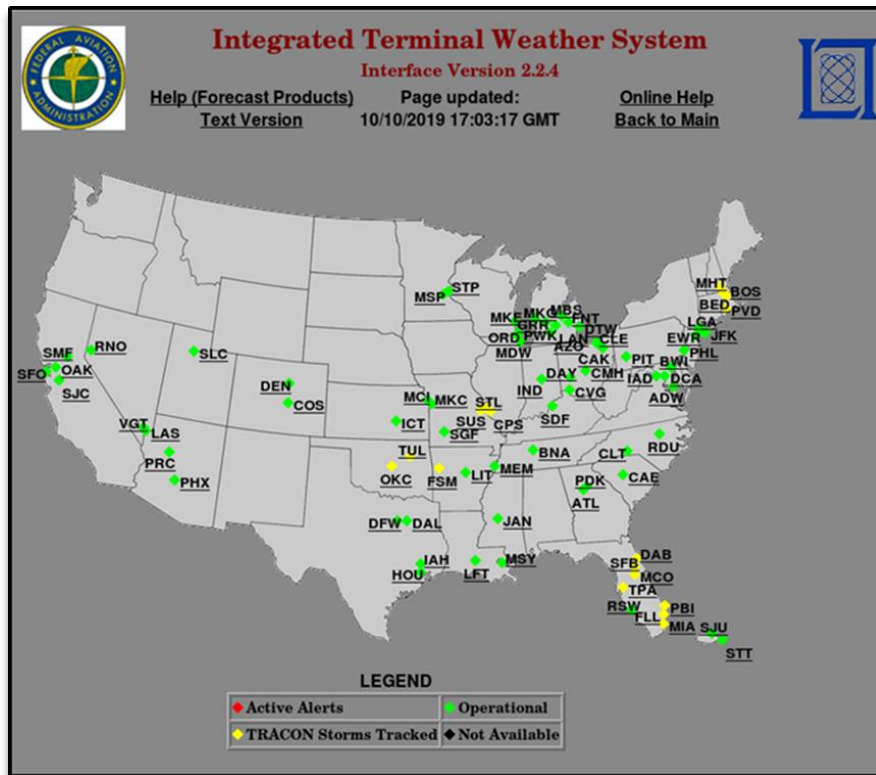
- **ITWS is an automated weather information system that integrates weather data from multiple National Weather Service sensors and systems, as well as aircraft in flight.**
- **ITWS products include microburst prediction, gust front prediction, storm location, storm cell information, terminal winds, and tornado data. (approx. 30 products)**
- **FAA Air Traffic Management facilities and commercial air carriers can use this data to make operational decisions.**
- **Volpe Center connects to all 34 Product Generators (coverage for 80 airports)**
- **Volpe Center provides ITWS data in 2 formats:**
 - Graphical Images via Legacy ITWS Web
 - XML via SWIM

ITWS Overview: Data Sources and User Types



ITWS Overview: Coverage Area

- 34 ITWS Sites
- 80 Airports



WMSCR – Submit PIREP Service

- **SWIM service for entering PIREPs into dissemination flow**
 - Allows users to submit PIREPs in prescribed XML format
 - WMSCR converts XML input into legacy text encoded format
 - Distributes through existing circuits to PIREP data users both inside and outside NAS
- **Currently in development stage**
 - Target deployment is end of 2023
- **Future plans to transition to CSS-Wx**
 - Will facilitate end-to-end submission/dissemination in XML

Terminal Flight Data Manager (TFDM)

Program Status

Presented to: SWIFT 19

By: Doug Swol, Lidiya Gavrilenko

Date: August 31, 2022



**Federal Aviation
Administration**

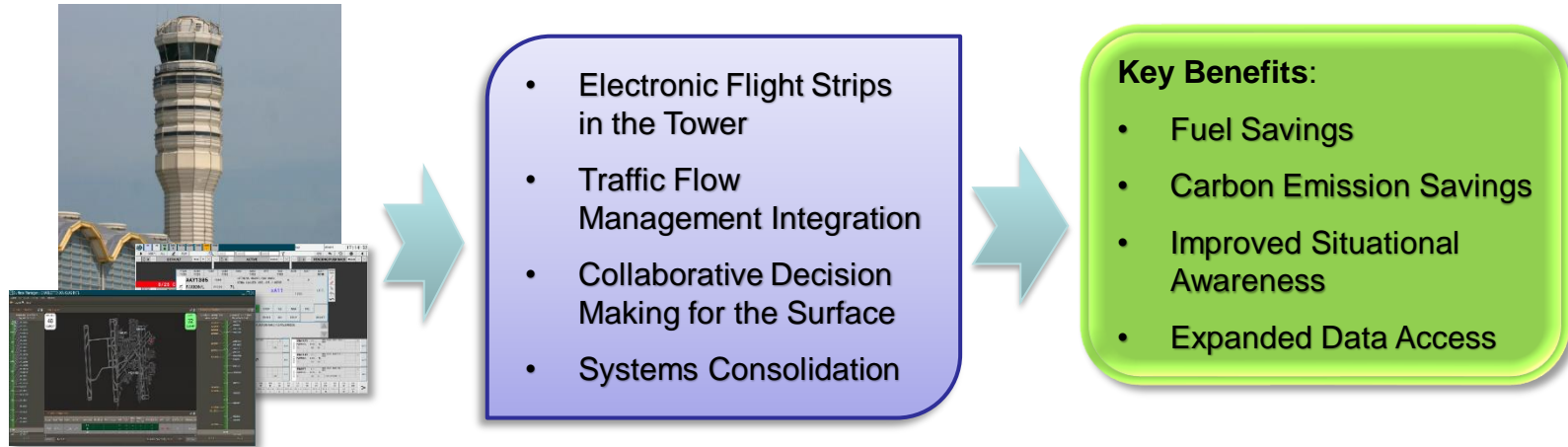


TFDM Program Overview

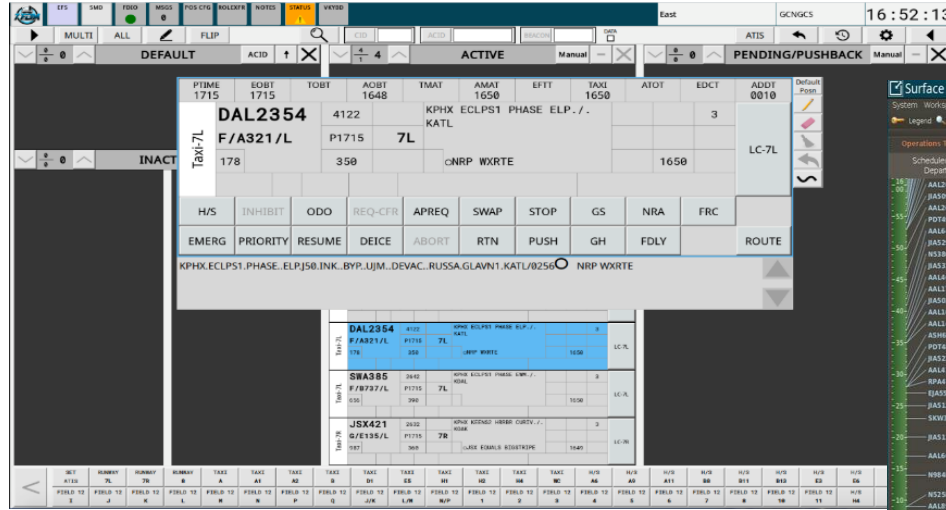
- TFDM is the **surface management solution** for NextGen and TBO.

https://www.faa.gov/air_traffic/technology/tfdm/

- **TFDM** will provide an integrated tower flight data automation system, which **will improve controllers' common situational awareness**.
- **TFDM will improve efficiencies** on the airport surface and terminal airspace by providing:

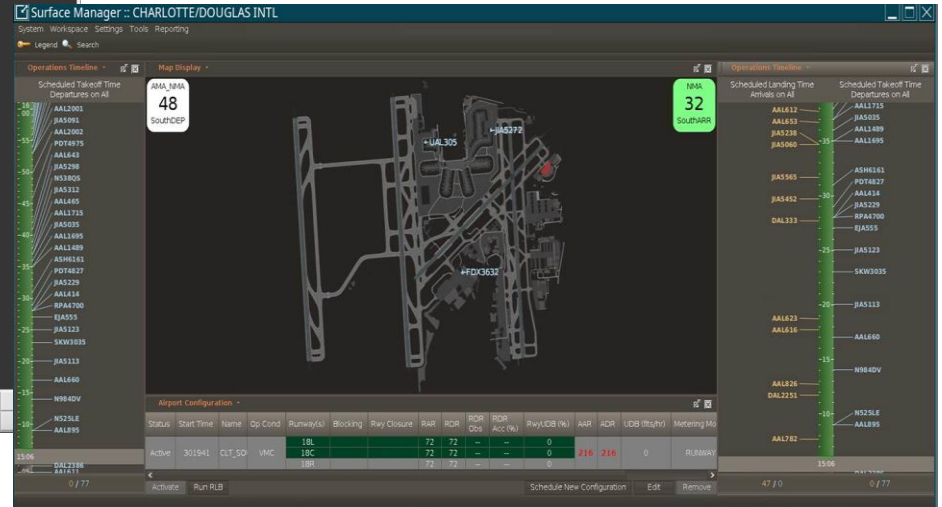


TFDM System Displays



Electronic Flight Strip Display

Surface Management Display



TFDM Interfaces

<i>Internal Interfaces</i>	<i>Facilities Affected</i>
<p>Two-Way Interfaces</p> <ul style="list-style-type: none">• TFMS (via SWIM)• TBFM (via SWIM)• FDIO• RMLS (via SWIM)• STDDS (via SWIM) <p>One-Way Interfaces</p> <ul style="list-style-type: none">• ASDE-X/ASSC• STARS• TDLS	<ul style="list-style-type: none">• Towers (93 at 89 airports)• TRACONs (58 via TFMS Surface Viewer)• ARTCCs (18 via TFMS Surface Viewer)• ATCSCC (via TFMS Surface Viewer)• WJHTC (Test and 2nd Level Engineering)• MMAC (Academy and Depot)
<i>External Interfaces (via SWIM)</i>	
<ul style="list-style-type: none">• TFDM Terminal Publication (TTP) – for flight operators, airports, 3rd parties• TFDM FOS Collaboration Service (TFCS) – for flight operators, airports, 3rd parties	

TFDM Program Roll-Out Overview

Build 1

Key Site – Cleveland, Ohio (CLE)

- Full hardware development to support the deployment of Build 1 & 2
- Improved Electronic Flight Data Exchange and Electronic Flight Strips
- Runway Assignment Predictions
- Maintenance tools for life cycle support
- B1 TTP Service Offered

- ❖ Initial Operating Capability: Fall 2022
- ❖ In-Service Decision: Spring 2023

Build 2

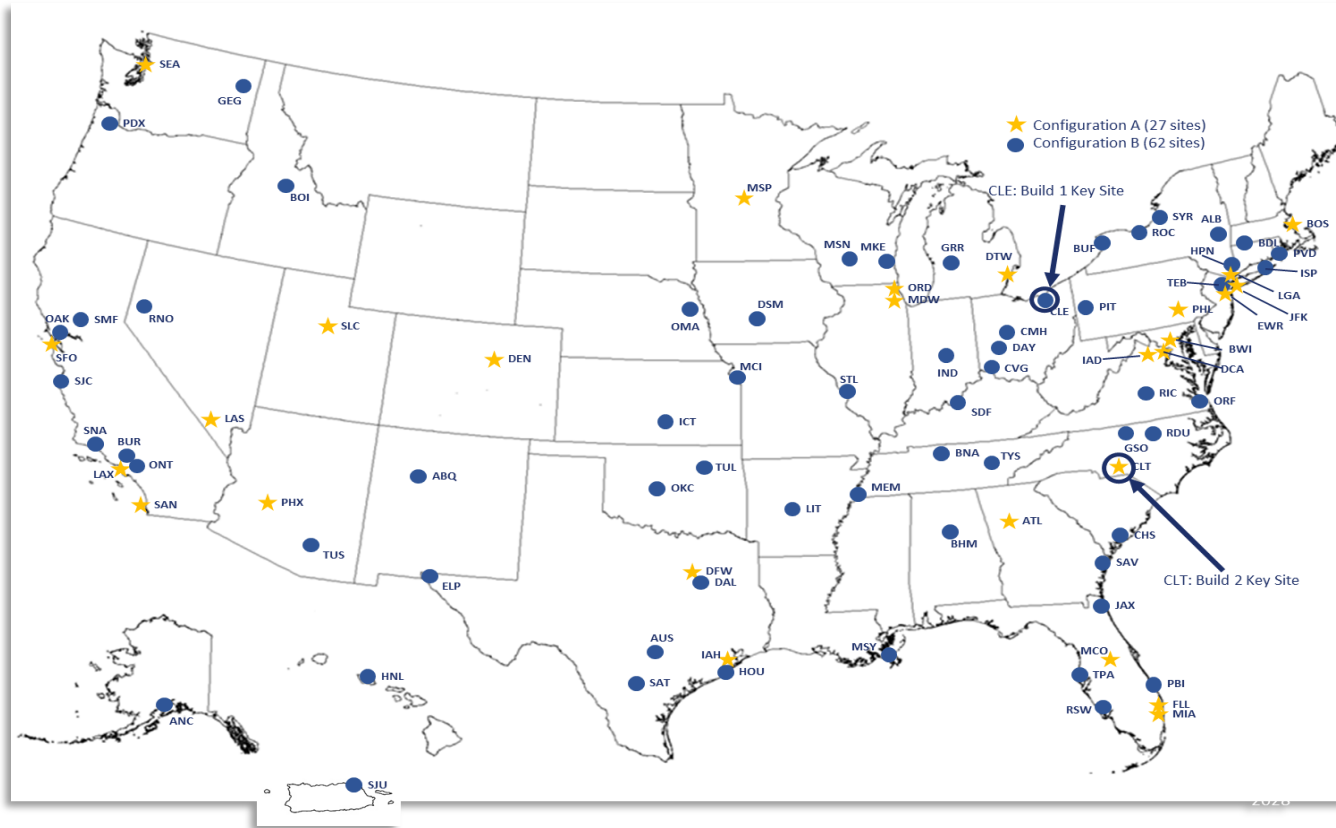
Key Site – Charlotte, North Carolina (CLT)

In addition to the Build 1 capabilities:

- Surface Scheduling
- Surface Metering
- Runway Load Balancing
- Metric Reporting & Analysis (MRA)
- B2 TTP and TFCS Services Offered

- ❖ Initial Operating Capability: Spring 2024
- ❖ In-Service Decision: Summer 2024

Planned TFDM Sites



Program Status

- TFDM Program is full speed ahead!
- TFDM Build 1 IOC coming this Fall for CLE
 - Final Operational Testing in CLE (in progress)
 - Training for Tech Ops already started, ATC starts next week
- TFDM Build 2 Software Testing in Progress
- New TFDM Waterfall will be released this month!
- Collaboration with Industry Continues
 - TFDM Testbed – Provides Early Testing for TTP/TFCS
 - Surface CDM Working Group
 - Surface and Data Sharing NAC Workgroup



FOS Testbed Demo



- Attendees were able to come and get hands-on time with TFDM
- Opportunity to see the interfaces and tools used to communicate with the test bed from both the FAA side and a simulation of data exchange from the industry side



- Demo of the TFDM Test bed in action.
- Follow up with a Q & A session with TFDM Program Office and key participants.

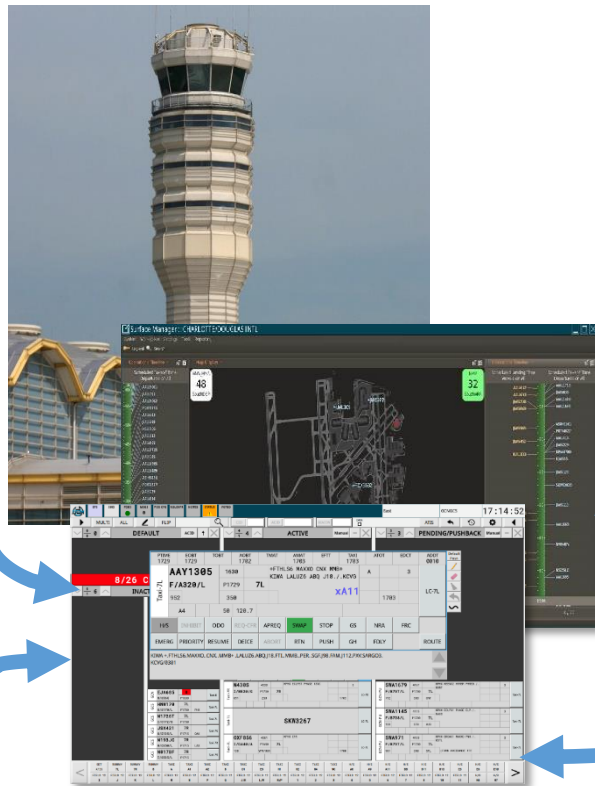
Data Exchange: At the Core of TFDM

New Surface Data Elements from Industry
(11+ elements via TFMS)

FAA Systems
(via SWIM)
TFMS
TBFM



FAA Systems
(direct interface)
ERAM via FDIO,
ASDE-X/ASSC,
STARS, TDLS



TFDM Data
(via TTP SWIM Service)



Flight Data

08L-26R
Airport
Information



Flight Delay



Operational
Metrics



Traffic Mgmt
Restrictions



Surface Mgmt
Programs

Flight
Operators /
Airports /
Vendors

TFDM Flight
Operator
Collaboration
(via SWIM)

Substitution
Requests /
Ramp
Closures

External Consumers: TFDM Terminal Publication (TTP)

TFDM Terminal Publication Service is a collection of TFDM related SWIM Services (pub/sub)

- **Airport Information**
 - Active Runway Configuration, Rates, Airport Delays, Runway Closures
- **Flight Data**
 - Block Times, Takeoff Times, ATC Flight State, Runway Assignments
- **Flight Delay**
 - Flight ID info, delay duration, reason
- **Operational Metrics**
 - Data Quality, Off Block Accuracy, TMAT Compliance, Emissions
- **Traffic Management Restrictions**
 - MIT, MINIT, Departure Stop
- **Surface Management Programs**
 - SMP information (e.g. start/stop time), lists of impacted flights

08L·26R

•Airport
Information



•Flight Data



•Flight Delay



•Operational
Metrics



•Traffic
Management
Restrictions



•Surface
Management
Programs

External Consumers: TFDM FOS Collaboration Service (TFCS)

- The TFDM FOS Collaboration Services handles requests submitted by the Flight Operator System group of users. Functionality categorized into Airport Data requests and Surface Metering Program (SMP) Flight Substitution Requests
- Flight Substitution
 - Substitution requests / responses
- Airport Data
 - Ramp closure(s), Gridlock status
- Data Exchange (Request/Reply)



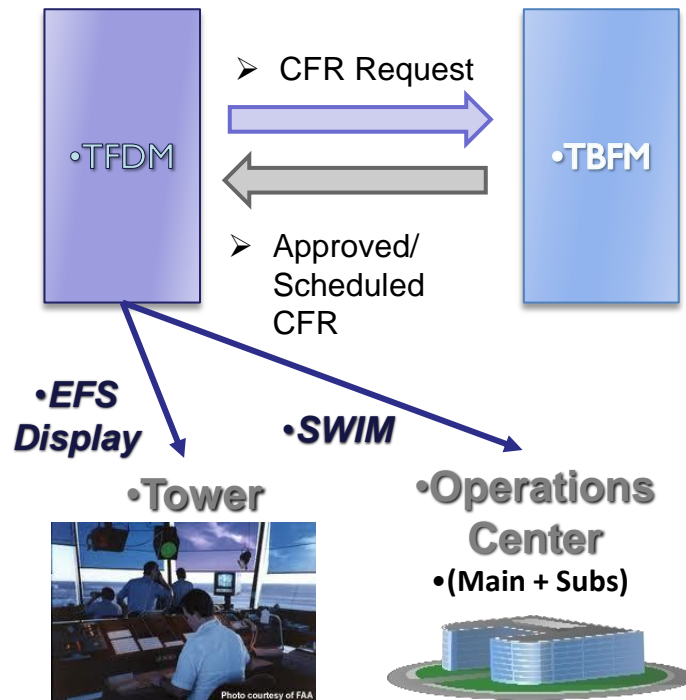
Internal consumer: TFMS Surface viewer

- Will be available at FAA facilities with a full TFMS workstation starting in 2023 following TFDM waterfall deployment
- Leverages TFDM airport data source - TTP Flight Data and Airport Information
 - Airport Configuration
 - Airport Arrival Rate
 - Airport Departure Rate
 - ACID
 - Assigned Stand
- Data Exchange via SWIM
- Allows TRACONs and Centers to have better situational awareness



Internal Consumers: TBFM Departure Scheduling

- **TFDM provides ATCT the ability to electronically request and receive TBFM CFR times**
- **Automatic updates ensure scheduling increases efficiency of local departure operations**
- **Improved collaboration via electronic data exchange**
- **Allows the earlier request and receipt of release times – operators will have release times before pushing back**
- **Release times published via SWIM service**



Next steps/opportunities

- **Collaborative Site Implementation Team (CSIT)**
- **SWIM on-boarding**
- **FOS testbed**



Questions?

- **Doug Swol – TFDM Deputy PM**
Christopher.D.Swol@faa.gov
- **Lidiya Gavrilenko – TFDM SE**
Lidiya.Gavrilenko@faa.gov

SWIFT Portal Update

V3.1 New Features Released

Presented to:

SWIFT 19

By:

Waldo Ford

FAA SWIM Program Office

SWIFT Portal Project Lead

Date:

August 31, 2022



Federal Aviation
Administration



SWIFT Portal: New Features

CONFIGURABLE HOMEPAGE

- Users can choose from 4 homepage tile layouts
- Content options for tiles include: News, Service Status, Subscriptions, Community, and Maintenance

SERVICE STATUS

- Includes data feeds with regular updates about SWIM's status
- Gives an aggregate view of SWIM's daily status



(SWIM Industry-FAA Team) portal.swim.faa.gov

SWIFT Portal: New Features

CONFIGURABLE ALERTS

- Users can create queue length and status change alerts
- The alerts will generate when a service's status meets the criteria defined in the alert

SUBSCRIPTION AUDITING

- User access agreements must be signed within 30 days of new subscription requests
- Unused subscriptions for 60 days will be disabled; deleted after 90 days



(SWIM Industry-FAA Team) portal.swim.faa.gov

TFMS R14 Data Feed Now Available

- **TFMData R13 is retiring in March 2023**
- R14 feed is now available to all SWIM users
- Changing to R14 will require a user client update to the new schema version
- All R13 queues not updated by March 2023 will be converted automatically



Contact

✉ **Waldo E. Ford**
SWIFT Portal Project Lead
SWIM@faa.gov



Final Announcements

SWIFT ✈️ ***#20 General Session***

SWIFT 20:

Location/Date - TBD

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

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Stefanie Calabrese, SWIFT Chair & FAA Lead

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

David Almeida, SWIFT Community Moderator

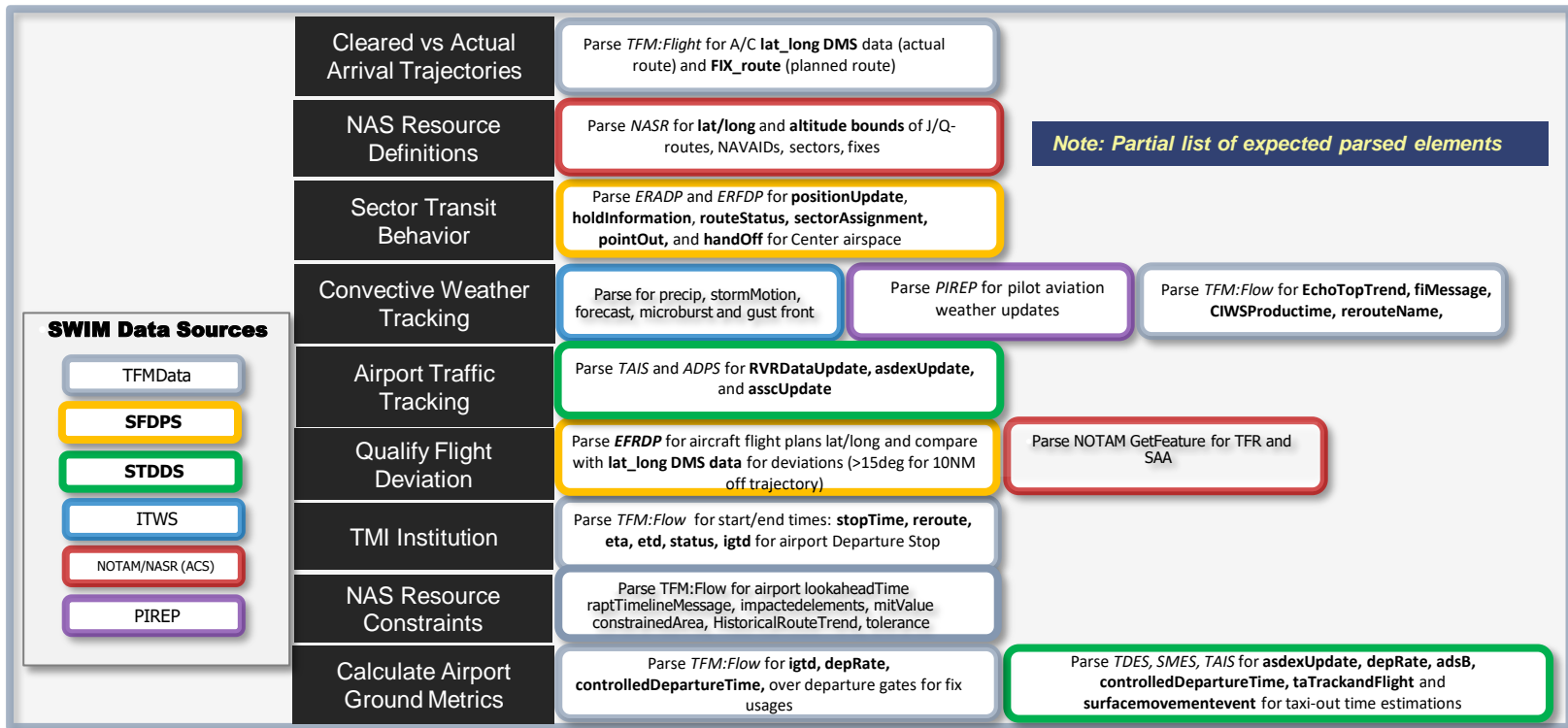
- Phone: (321) 735-2774
- Email: David.Almeida@LSTechLLC.com

SCAN ME



Back Up Slides

Understanding the Problem Space



Data Analyst

Handling the Data

- Jumpstart Kit consumes SWIM data from SWIM service subscriptions
- Containerize software for rapid deployment needs



Data Visualization

Visualizing the Data

- View data in the database
- Use dashboards to query database and visualize data

