

# SWIM Industry Collaboration Workshop #3

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

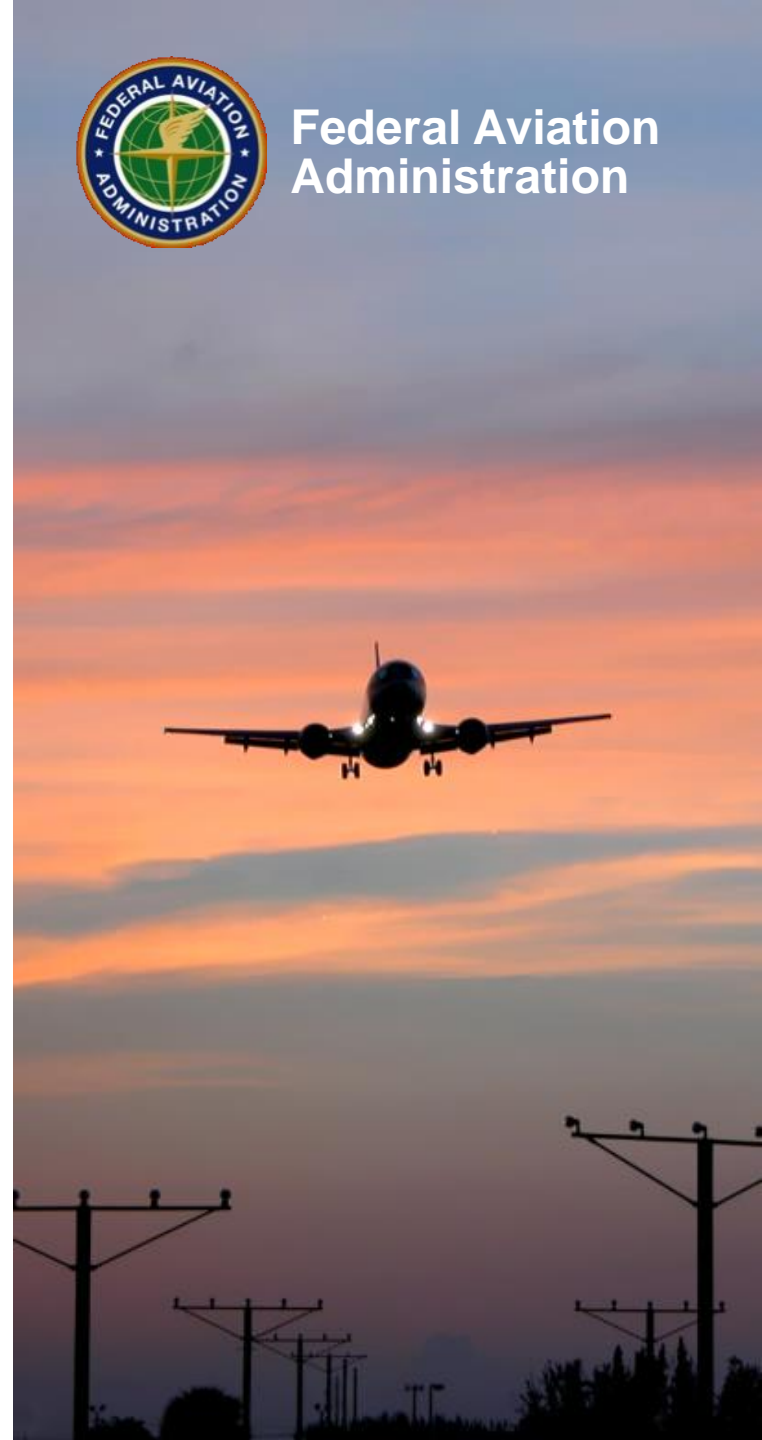
SWIM Stakeholders

FAA SWIM Program

May 10, 2018



Federal Aviation  
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# SWIFT #3 Agenda

- **SWIFT Updates**
  - Updated Information Services Roadmap
  - Operational Context & Use Case Focus Group Report
  - Operational Status Dashboard (OSD) Focus Group Report
- **Special Topics**
  - SWIM Cloud Distribution Service
- **SWIFT Aviation Case Study: “Taxi-out, Return-to-Gate”**
  - Presentation & Open Discussion
- **Break for Lunch (1 hour)**
- **SWIFT Aviation Case Study: “Swaps/Substitutions”**
  - Presentation & Open Discussion
- **Next Steps**

# SWIFT Updates



# SWIM Information Services Roadmap

2018

## AIM FNS

AIM migrates to AIXM as part of FNS 2.0. This release will also resolve message loss issues with FNS 1.0 JMS solution

## AIM S2R3

AIM S2R3 will include Aeronautical Common Services (ACS), Web Services, NOTAMS, Special Activity Airspace (SAA) definitions, SAA schedules, airport & obstacle data, etc.

## DataComm

**DCNS DLD:** Provides Airline Dispatch messages and Air Traffic Service (ATS) Facility Notification (AFN) Controller-Pilot Data Link Communications (CPDLC) and Technical (TECH) Notifications

2019

## STDDS Ph2

**Release 4:** Increases airport surface coverage and filters out unneeded data for bandwidth reduction

## CSS-Wx

Will on-ramp 31 TRACONS acting as Consumers of C-Node data/ Producers of TDWR. Will also publish weather datasets in standardized formats and simplify data exchange

## TFDM

**Build 1:** Release will include TTP and TRP which provide airport and flight information, surface scheduling and metering

## TBFM

MIS Release 1.1.0 is currently planned for next year



# SWIM Information Services Roadmap

2020

## NCR

NCR integrates information such as current and predicted NAS status, with constraint data including: Aeronautical information, Weather and Traffic Management Initiatives.

## AIMM S3

One Stop Shop (OSS) for Aeronautical Information, SOP/LOA Docs, Instrument Flight Procedures, En-Route SAA Data, Terminal SAA Data

## NWP

Combines information from weather radars, environmental satellites, lightning, meteorological observations, and NOAA numerical forecast model output

2021

## TFDM

**Build 2:** Provides Flight Operator Systems (FOS) with capability to request Flight Substitutions via DFSS. Integrates TFDM with TFMS and TBFM to extend Traffic Flow Management to the gate. Other services include ADIS, RTCS, DQAS and FSOMS

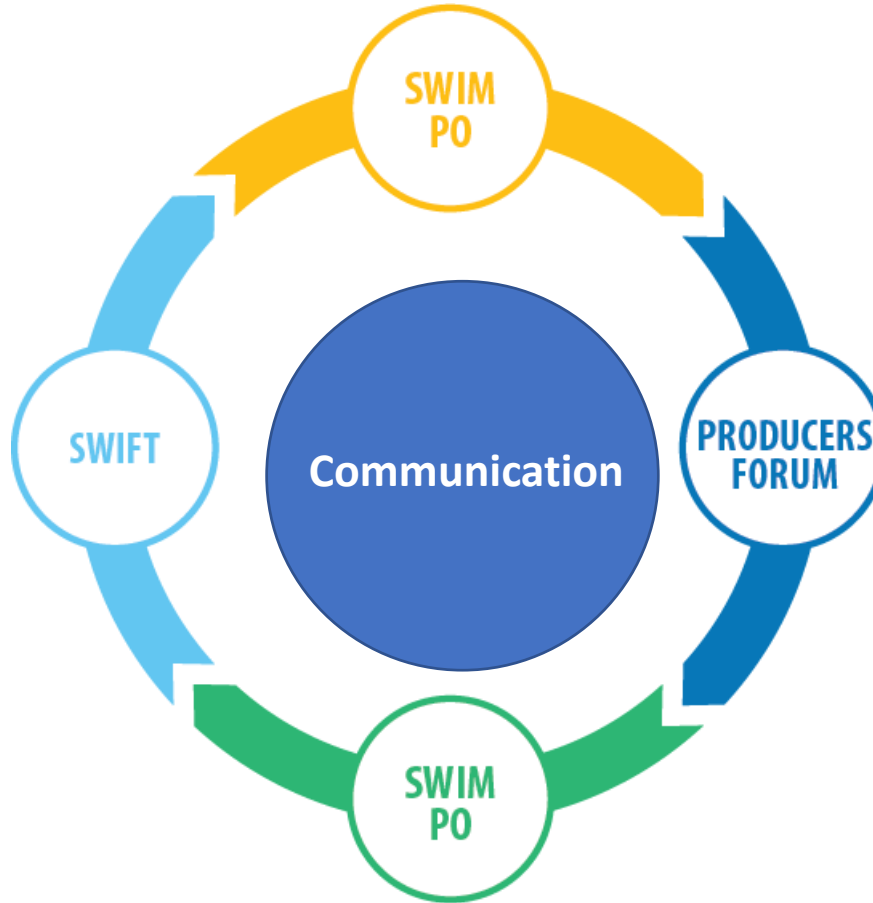
## STDDS Ph2

**Release 6:** New services/messages in R6: New Airport Alert Service (AAS), New Airport Equipment Status Service (AESS), Additional TDES messages, Additional SMES events messages

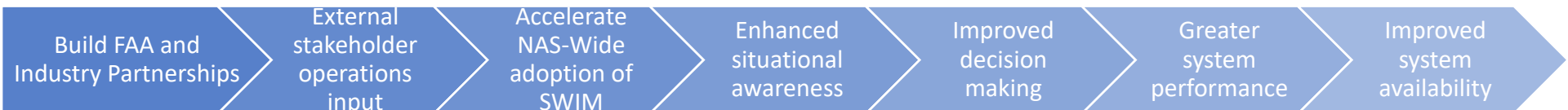


# SWIM Communications Loop

SWIFT is chartered with improving Information exchange among the aviation community stakeholders through the use of SWIM services.



Process and procedure improvements to ensure the SWIM PO and Producers function as One FAA.



# SWIFT Focus Group: Operational Context & Use Case Documents

## *Ops Context & UC Updates*

Kathryn Crispin & Stuart Wilson

American Airlines & SWIM Program

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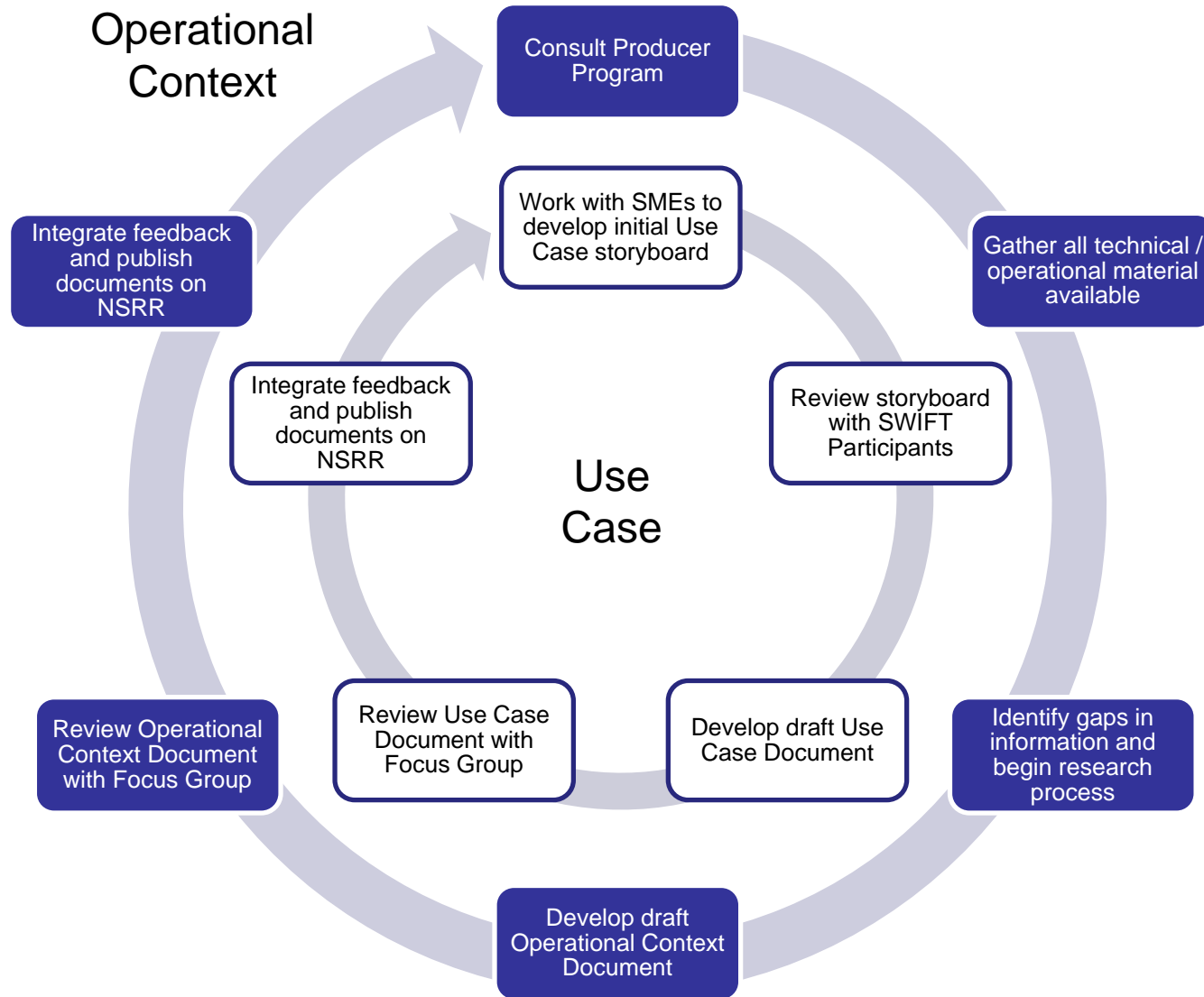


# *Focus Group Purpose*

- **Engage SWIFT Participants in the development of Operational Context and Use Case Documents**
  - Presentation of SWIFT deliverables
  - SWIFT Participant feedback on Operational Context and Use Case Documents
    - Participants will be provided a comment sheet to input feedback
    - Feedback will be due two weeks prior to next Focus Group meeting
    - Structure of feedback and nature of questions to be answered in this presentation
  - Input from Participants on future Information Services to be covered:
    - The type of additional information is needed
    - Specific questions on data provided by next service (TFMS Flight Information Service)

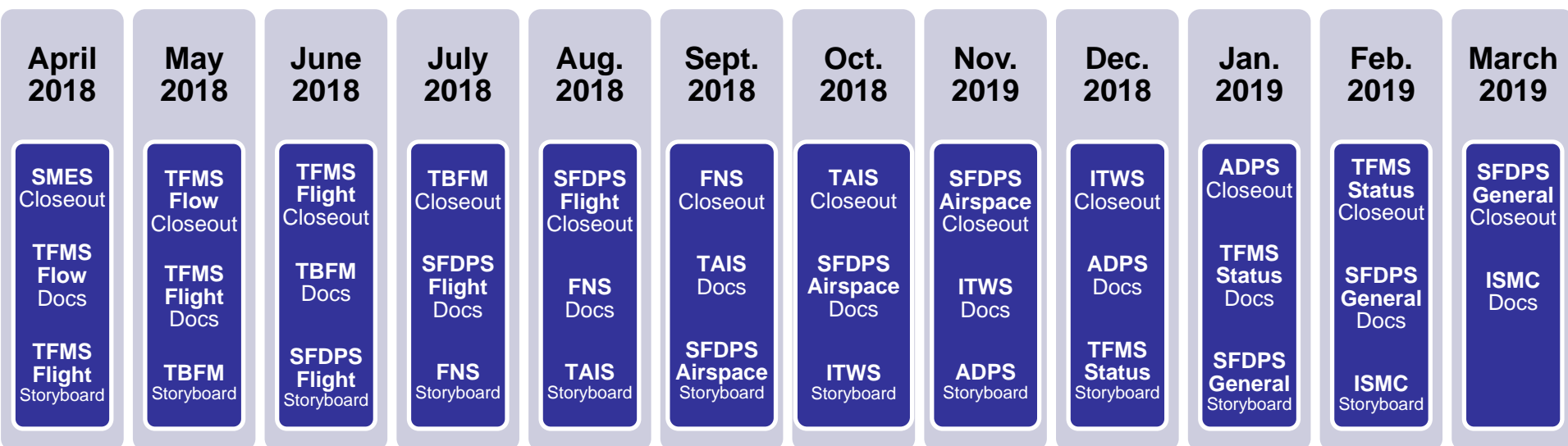


# Document Development Process



# Approach / Schedule

- **Focus Group cadence for each meeting:**
  1. Review feedback from previous Use Case & Operational Context documents
  2. Overview of current Use Case and Operational Context document
  3. Preview of next Use Case and Operational Context storyboards



# Status / Next Steps

- **Held Kick-Off on April 26<sup>th</sup>**
  - Reviewed SMES Feedback
  - Covered TFMS Flow Operational Context & Use Case Document
  - Introduced TFMS Flight
- **Next Focus Group meeting scheduled for May 31<sup>st</sup>**
  - Review TFMS Flow Feedback
  - Cover TFMS Flight Operational Context & Use Case Document
  - Introduce TBFM
- **Feedback on TFMS Flow due May 11<sup>th</sup>**
  - Comment sheet:
    - <http://connect.lstechllc.com/files/Ops%20Context%20and%20Use%20Case%20Comments%20Sheet.xlsx>
  - Documents:
    - <http://connect.lstechllc.com/index.cfm/main/viewswiffolder?heading=OperationalContext&sub=TFMS%20Flow>
    - <http://connect.lstechllc.com/index.cfm/main/viewswiffolder?heading=UseCase&sub=TFMS%20Flow>

# References

- **SWIFT Focus Group Website**
  - <http://connect.lstechllc.com/index.cfm/main/opconfocusgroup>
- **SMES Operational Context Document**
  - [http://connect.lstechllc.com/files/SMES%20Operational%20Context%20Document\\_Final.docx](http://connect.lstechllc.com/files/SMES%20Operational%20Context%20Document_Final.docx)
- **SMES Use Case Document**
  - <http://connect.lstechllc.com/files/SMES%20Use%20Case%20Document%20Final.docx>
- **TFMS Flow – Operational Context Document**
  - <http://connect.lstechllc.com/files/TFMS%20Flow%20-%20Operational%20Context%20Document%20Final.docx>
- **TFMS Flight – Use Case Document**
  - <http://connect.lstechllc.com/files/TFMS%20Flow%20-%20Use%20Case%20Document%20Final.docx>
- **Presentation / Comment Sheet**
  - <http://connect.lstechllc.com/index.cfm/main/viewswiftfolder?heading=Meeting&sub=Kick%20Off%204%2F26%2F2018>
- **Contacts**
  - Stuart Wilson (stuart.wilson@lstechllc.com)
  - Felisa White (felisa.white@faa.gov)

# SWIFT Focus Group: Operational Status Dashboard (OSD)

## *Updates on OSD*

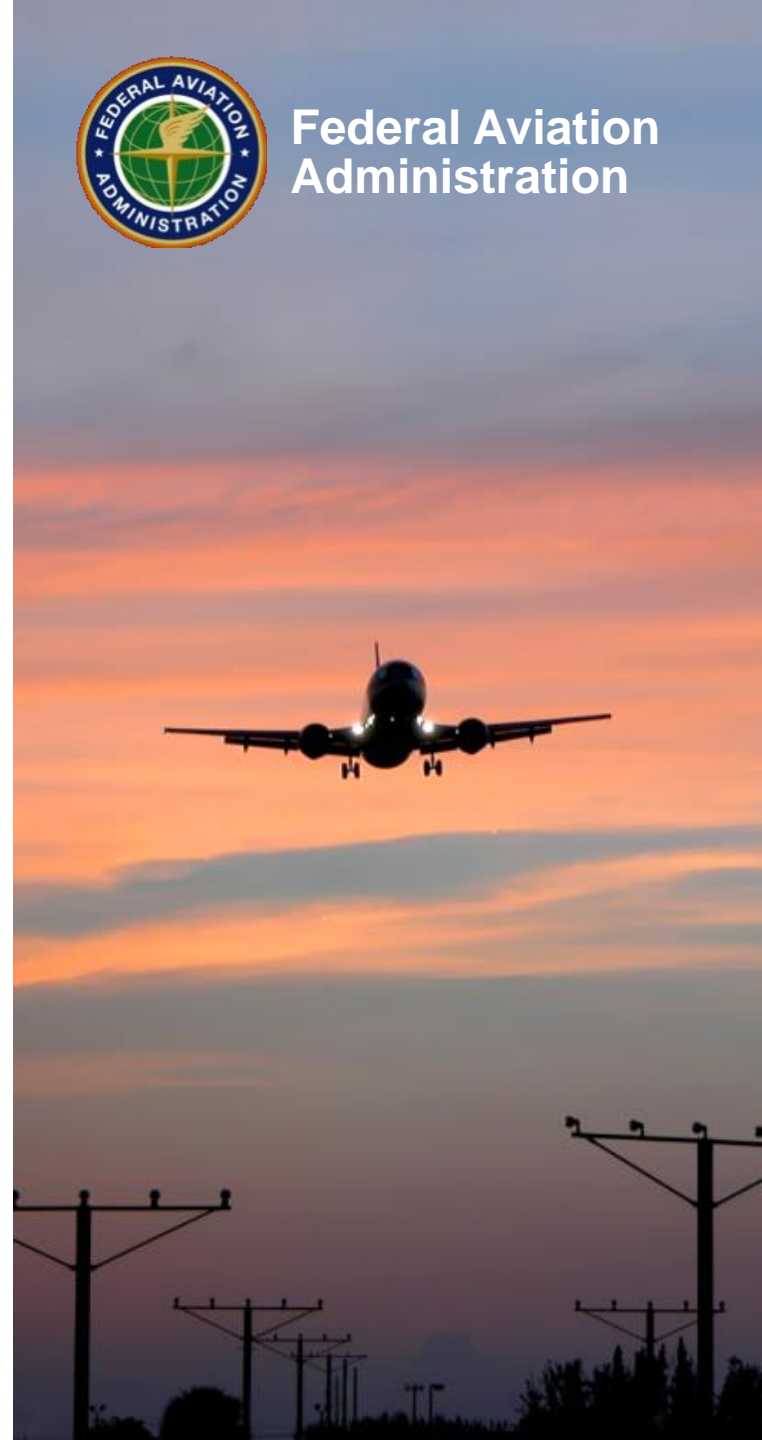
Alex Murray

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# OSD Stakeholder Forum Update

- **Purpose**
  - Provide a collaborative venue for stakeholder feedback on the OSD capability SWIM is currently working to implement.
- **Goal**
  - Ensure OSD design allows users to effectively and efficiently utilize the system to meet their needs for situational awareness of the operational SWIM system and the information services provided through it.
- **First meeting held on 1/18/2018 @ 1pm – 3pm EST**
- **Second meeting held on 03/01/2018 @ 1pm – 3pm EST**
- **Second Meeting Agenda**
  - Introduction
  - Recap of Meeting 1
  - Service Status Deep Dive (STDDS)
  - Action Item Review
  - Concluding Remarks

# *OSD Stakeholder Forum Update cont.*

- **Primary Outcome of Second Meeting**
  - Other concerns raised
    - Message loss
- **Next Meeting**
  - June 2018
    - What we've learned in the Focus Group
    - Identify what's next
- **Contact Info**
  - For additional inquires: [alexander.murray@noblis.org](mailto:alexander.murray@noblis.org)



# SWIFT

## Special Topics





# SWIM Cloud Distribution Service

## *Details on SCDS*



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# SWIM – SCDS Strategy: Leveraging the Cloud



- Address increasing external demand, while reducing bandwidth/impact to NESG, NEMS and Security risk
- Platform for growth in services is scalable
- Limit NESG exposure to external users
- User usage determines method of data access (NESG vs. SCDS)
- Lower cost for service delivery through automation
- Improved user experience

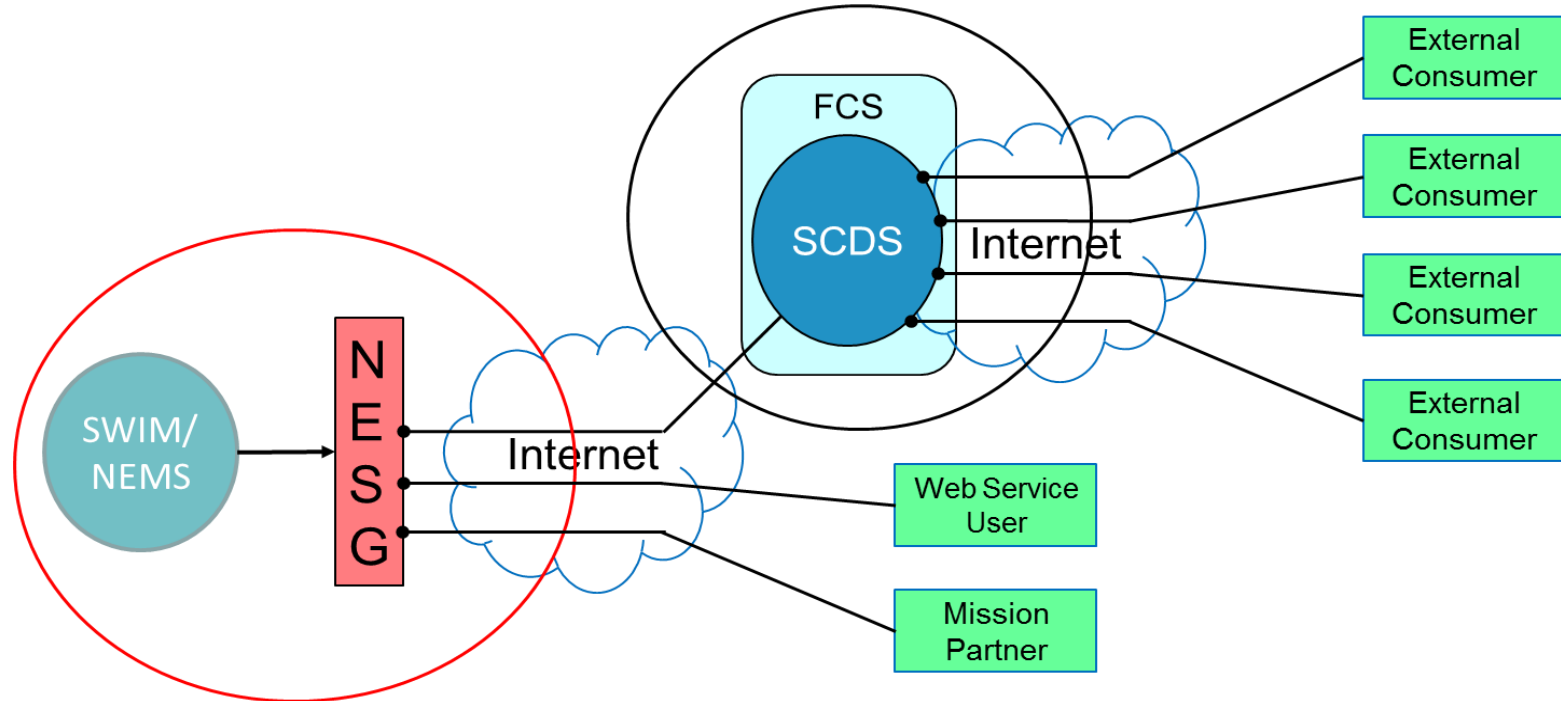
# SWIM Cloud Distribution Service (SCDS)

- **Features**

- Service Management
- Self Service Provisioning
- Service Status
- JMS Messaging Broker
- Service Help Desk

- **Benefits**

- Reduce impact on infrastructure
- Streamlined service delivery through automation
- Improved user experience
- Decreased on-ramping overhead
- Scalable platform for growth in services

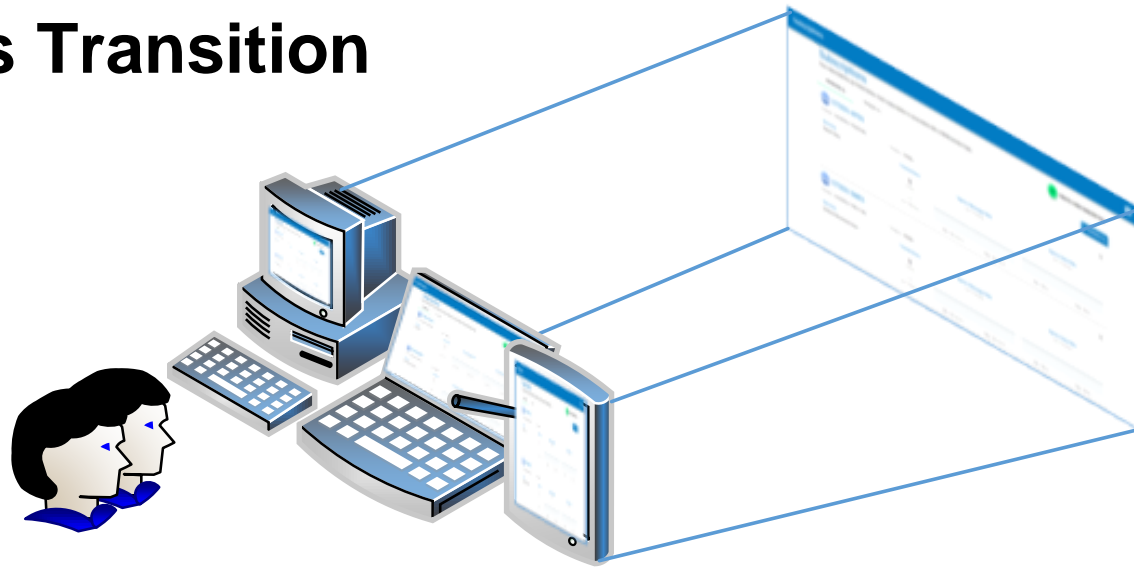


# SWIM Cloud: Initial User Community

- **Consider all external SWIM users and migrate those who can obtain the same service via SCDS:**
  - **NESG Supporting Users Needing:**
    - Two-Way Data Exchange (TFM R/R, Submit PIREPs)
    - Web Service (NOTAMs, FDPS\_Recon)
    - Pub/Sub (JMS) Connectivity
      - Access to Sensitive Data
      - Access to the Mission Support Network
      - Redundant connectivity
      - Access to Non-Sensitive (available to public) data
  - **SCDS Supporting Users Needing:**
    - Pub/Sub (JMS) Connectivity
      - Access to Non-Sensitive (available to public) data
- **We are currently assessing all users connecting to the NESG to determine best fit for initial SWIM Cloud services**

# *SWIM Cloud User Engagement*

- **Automated Provisioning**
- **Subscription Status and Statistics**
- **Integrated Message Viewer**
- **Jumpstart Kit**
- **Seamless Transition**

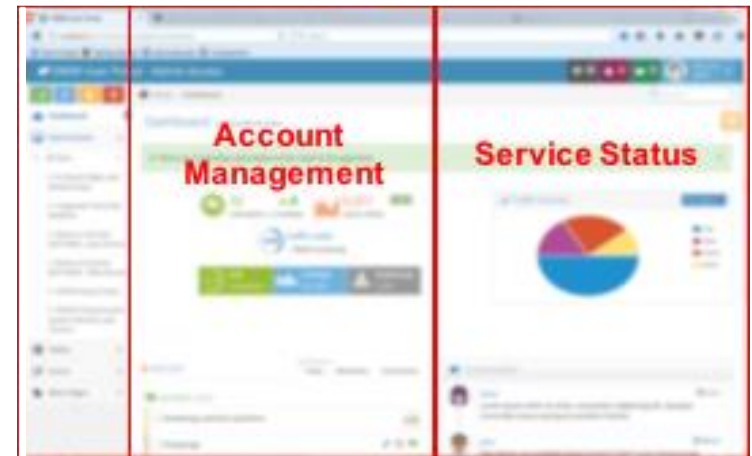


# SCDS Demo



# SWIM User Portal

- **What is it?**
  - Establish Access Point to all things SWIM
  - Connections to key resources:
    - NSRR
    - Services on Information
    - Service Management
    - Service Status
    - Help Desk
  - Advanced Features:
    - SWIM News
    - Community Forum
  - Tailored User Experience
    - Only install applications relevant to user
    - Multiple portal layouts available to users
    - Manage the user experience



# ***SCDS – Summary & Timeframe***

- **Leverages cloud technologies to deliver a scalable information distribution solution for external users**
- **Provides an enhanced user experience**
- **Supports all existing JMS data flows**
- **Service help desk will be available**
- **Staggered User Migration**
- **Communications Package**



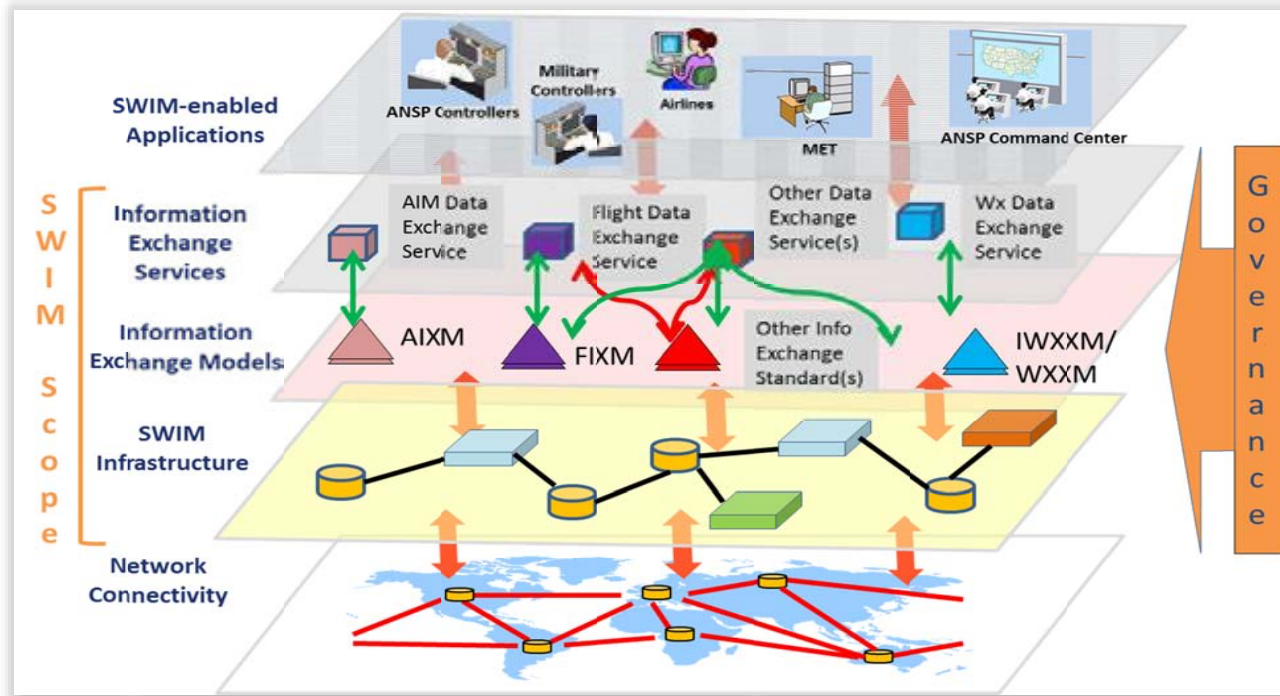
# BREAK



# SWIM Information Services

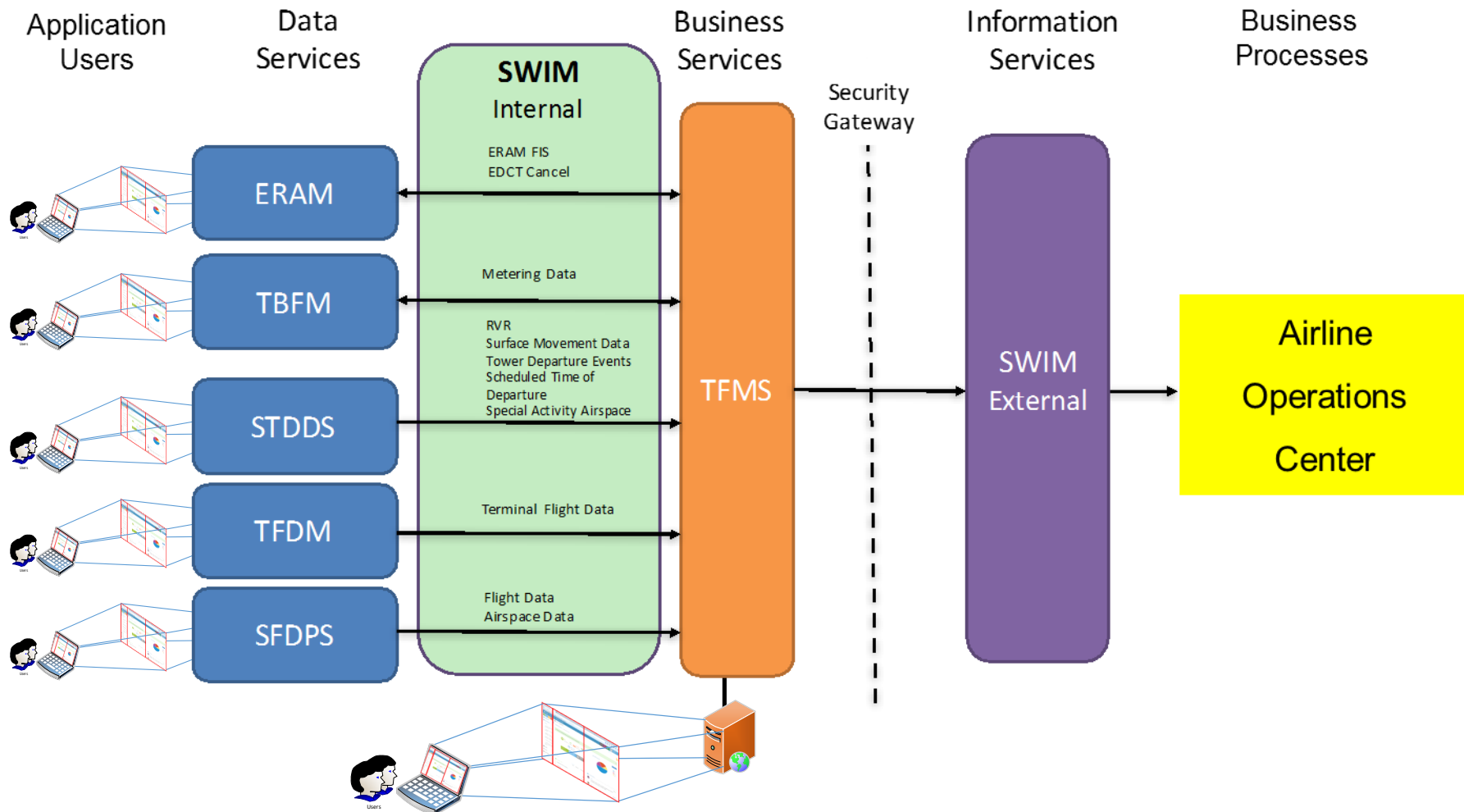


# SWIM in a Nutshell



- SWIM is an information management model that applies service-oriented architecture (SOA) to aviation, releasing data available from ATM systems
- SWIM consists of standards, governance & infrastructure enabling ATM information management between users, using interoperable services.
- Primary service design characteristic of service-orientation is reusability

# Aligning Common Terminology



# SWIFT Aviation Case Study:

## *“Taxi-out, Return-to-Gate”*

*By Bill Tuck @ Delta Airlines*

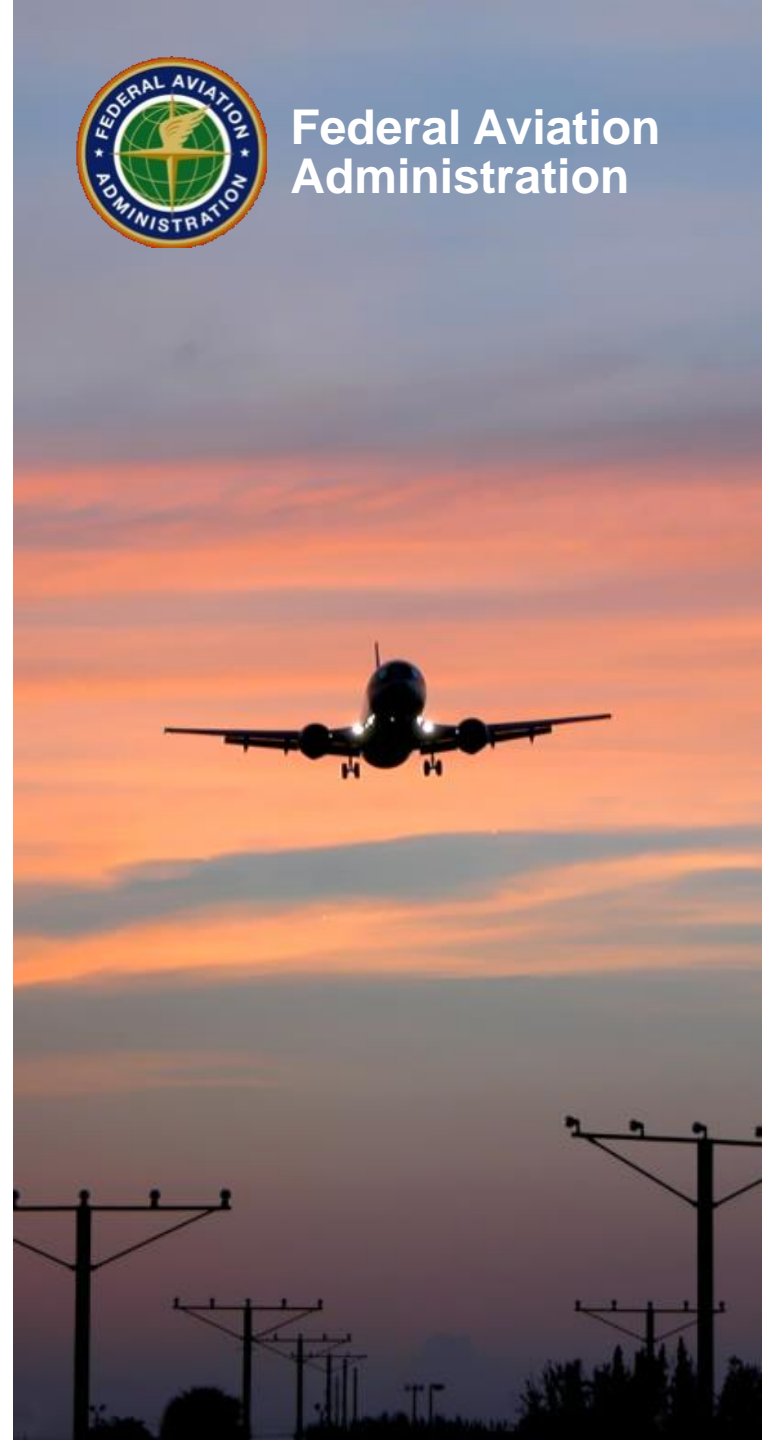
*And*

## *“Swap/Substitutions”*

*By Tim Niznik @ American Airlines*



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# *Airline Case Study*

- **Objective:**
  - Provide a forum to discuss real-world operational problems and work together to identify underlying NAS systems and related SWIM information services that might contribute operational solutions
  - How can we use SWIM Information to better inform operational decisions to work around operational issue before they materialize?
- **Why the template?**
  - Present information related to operational use case in a clear and concise manner, and structure the discussion in a consistent way
- **Focus areas:**
  - Focus on operational issues that might be improved with access to NAS information, and identify ways to access that information
  - In developing content, try to keep the problem definition narrowly focused on the operational improvement sought

# Case Study Layout

## Executive Summary

- **Environment:**
  - Summary of the situation (area within operations affected, etc.)
  - This is intended to help set the stage for the topic to be addressed
- **Problem statement:**
  - Single statement that concisely defines the nature of the problem
  - The goal is to narrow the nature of the problem helping to identify the type of NAS systems and decision-making is involved

## Impact:

- Describe the impact to Ops & how the problem is resolved if situation is corrected
- Intended to help set the stage for the topic to be addressed
- This is intended to help set the stage for the topic to be addressed

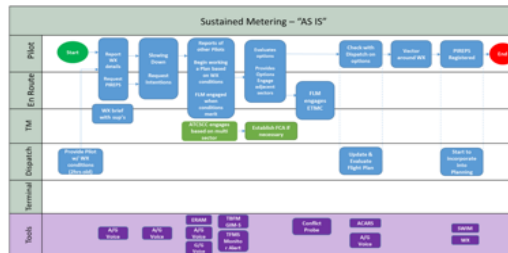
## Case Study Overview

- **Goal:**
  - State the goal of the case study
  - Intended to help set the stage for the topic to be addressed
  - "Intended to help set the stage for the topic to be addressed"
- **Case study overview**
  - Maximum 1 to 2 slides
  - Words that elaborate the problem statement & discussion
  - Discussion points as necessary to describe the problem
  - Information here may include relevant business process references involved in executing the operation
- **Slide that illustrates the environment & operational systems involved in the case study**

- 1 to 2 slides
- Graphics illustrating the environment & operational systems involved in the case study

## Operational Workflow

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



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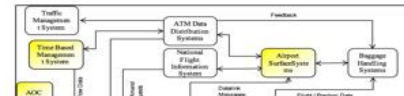


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## Operational Support Systems

### • Identification Systems Involved

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



## Open Discussion Q&A Forum

### • Questions

- These are questions you'd like to ask about the NAS operation
- The goal of this discussion is to:
  - Generate discussion between the operations folks
  - Identifying the underlying NAS system
  - Identify currently available SWIM information services that might help
  - Engage in discussion on context of data, as it relates to the problem

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# ALTERNATIVE VIGNETTES

Enhanced Situational Awareness and CDM Interaction

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# SWIFT Aviation Case Study:

*“Taxi out, Return to Gate”*

Bill Tuck

Delta Airlines

May 10, 2018





# Executive Summary

- **Environment:**

- Delta has an issue with close in traffic destined to LGA from ZDC
- Flow through ZDC is heavy during certain times of the day
- Either MIT (TFMS), or metering (TBFM) can affect availability of overhead stream

- **Problem statement:**

- During the day, there are periods when more than half LGA demand comes over RBV

- **Impact:**

- GDP can be planned around, but not typically assigned a delay for MIT/TBFM EDC due to overhead stream, until after push from gate
- Reduce taxi delay to improve satisfaction of traveling public
- Reduce customer missed connections due to unpredictable delay
- Reduce taxi length to avoid additional crew block time and potential for daily duty max
- Reduced taxi time to result in lower crew block time costs
- Fewer gate returns due to longer reroutes with insufficient fuel
- Reduce fuel and time costs of longer reroutes
- Reduce cascading effects from unpredictable delay (e.g., crew misconnects, a/c swaps, last minute gate changes)

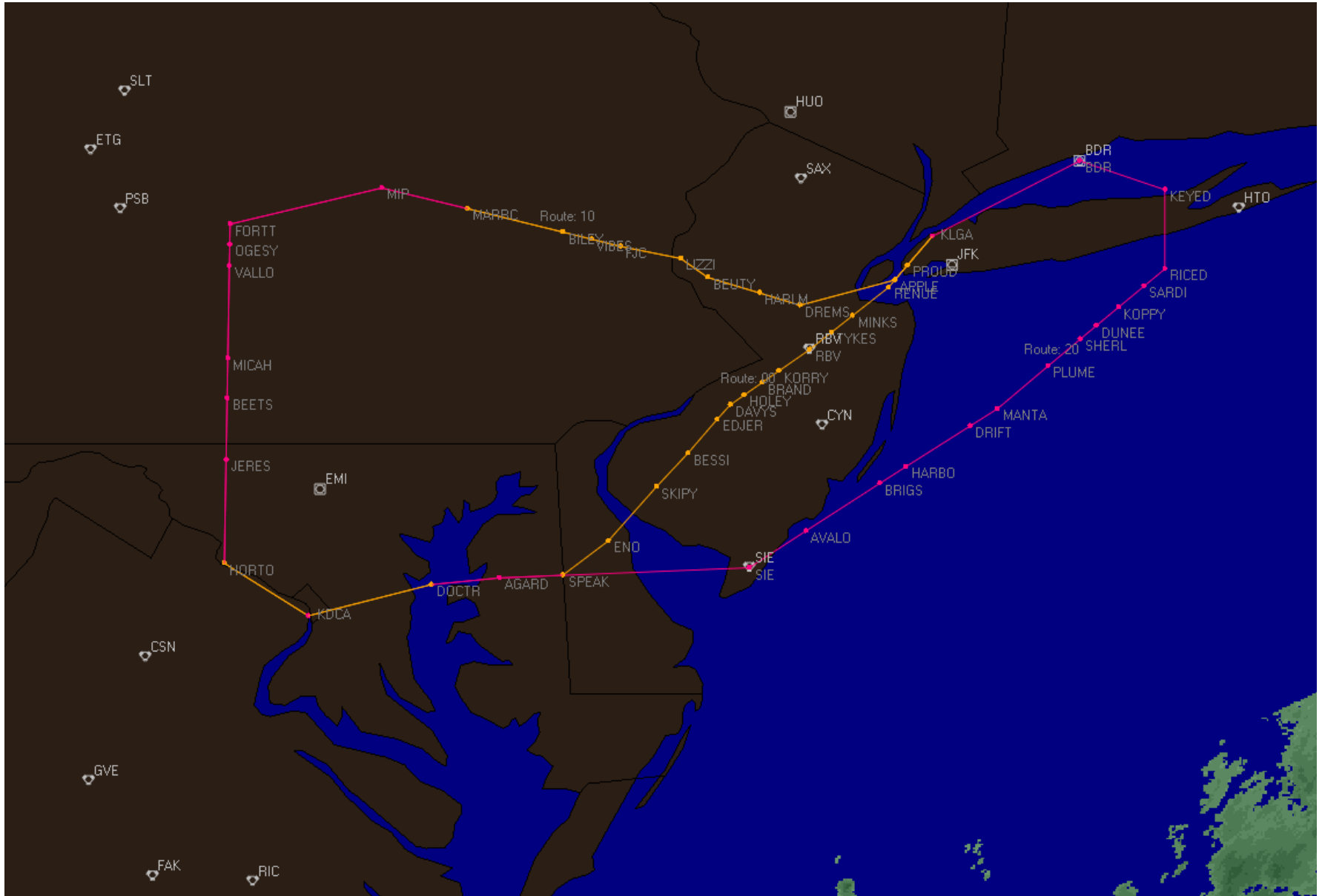
- **Goal:**

- Improve effects of high fix demand by proactive management and wider distribution of negative effects of mitigating reroutes and metering

# Case Study Overview

- Throughout the day, there are periods when more than half the demand on LGA comes over RBV, which can cause:
  - Excessive metering delay (TBFM) on close-in flights filed over RBV relative to other overfly traffic.
  - This may result in under-delivering the airport called rate
  - Potential to create double (layered) delay with GDP in effect
  - To avoid MIT/TBFM EDC delay, reroutes are occasionally offered
    - Requires additional fuel & time, essentially, still results in a delay
    - Re-route option not usually offered until flight has experienced some amount of delay already

# DCA to LGA Route



# Flights over RBV April 11, 2018

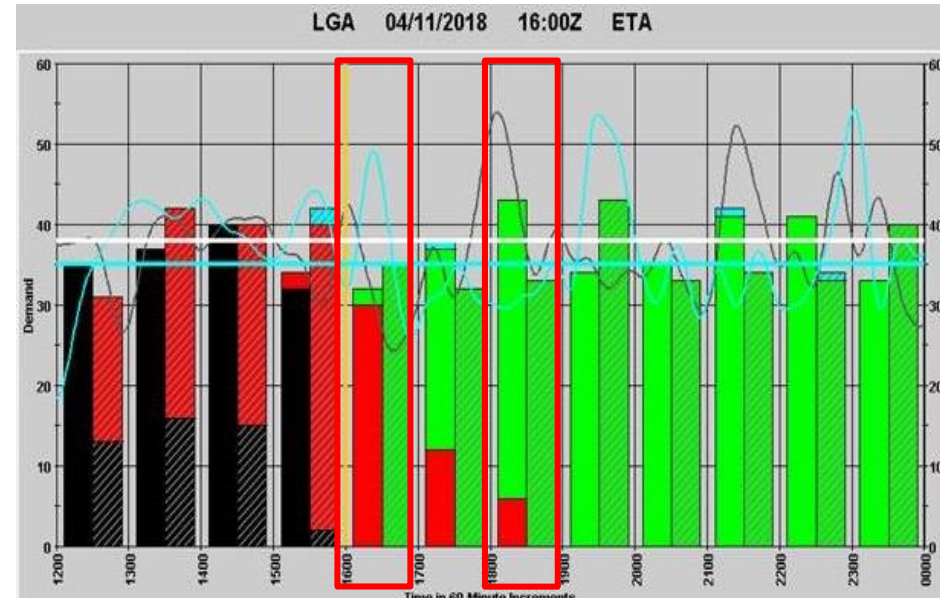
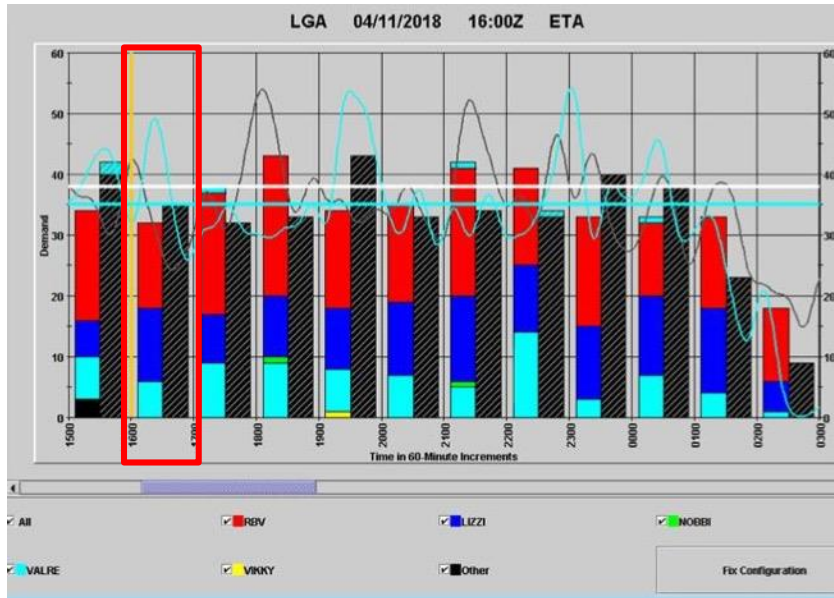
**LGA 04/11/2018 17:00Z**

Current Info  
Data: Arrivals  
Filter(s): RBV AND ETA between 11/1900 and 11/1959

|   | ACID     | TYPE | ORIG | IGTD    | LGTD    | OUT     | ETD      | TMA-RT  | CTD | ETA ▲    | ASLOT | DEST | AbsDelay |
|---|----------|------|------|---------|---------|---------|----------|---------|-----|----------|-------|------|----------|
| 1 | EDV3975  | CRJ2 | ORF  | 11/1650 | 11/1650 | 11/1648 | M11/1744 | 11/1744 | -   | L11/1900 | -     | LGA  | 38       |
| 2 | AAL2066  | A321 | CLT  | 11/1706 | 11/1706 | -       | M11/1732 | 11/1732 | -   | L11/1900 | -     | LGA  | 6        |
| 3 | N300R    | G280 | DAB  | 11/1700 | 11/1655 | -       | L11/1700 | -       | -   | L11/1903 | -     | LGA  | 5        |
| 4 | AAI 1366 | B738 | MIA  | 11/1626 | 11/1622 | 11/1622 | A11/1639 | -       | -   | E11/1905 | -     | LGA  | 0        |
| 5 | RPA6140  | E170 | DCA  | 11/1700 | 11/1700 | 11/1654 | M11/1806 | 11/1806 | -   | L11/1905 | -     | LGA  | 54       |
| 6 | RPA4607  | E75L | ATL  | 11/1655 | 11/1654 | 11/1654 | T11/1719 | -       | -   | L11/1908 | -     | LGA  | 0        |
| 7 | DAL1586  | A320 | ATL  | 11/1730 | 11/1730 | -       | L11/1732 | -       | -   | E11/1910 | -     | LGA  | 0        |

- At 17:00z RPA6140 assigned 54min delay with TBFM (TMA) 18:06z Release Time
- Flight was given reroute, which at this time was unable to fly due to fuel restrictions
- By the time RPA6140 returned to gate and pushed back again, it flew original filed route with the original TMA Release Time.

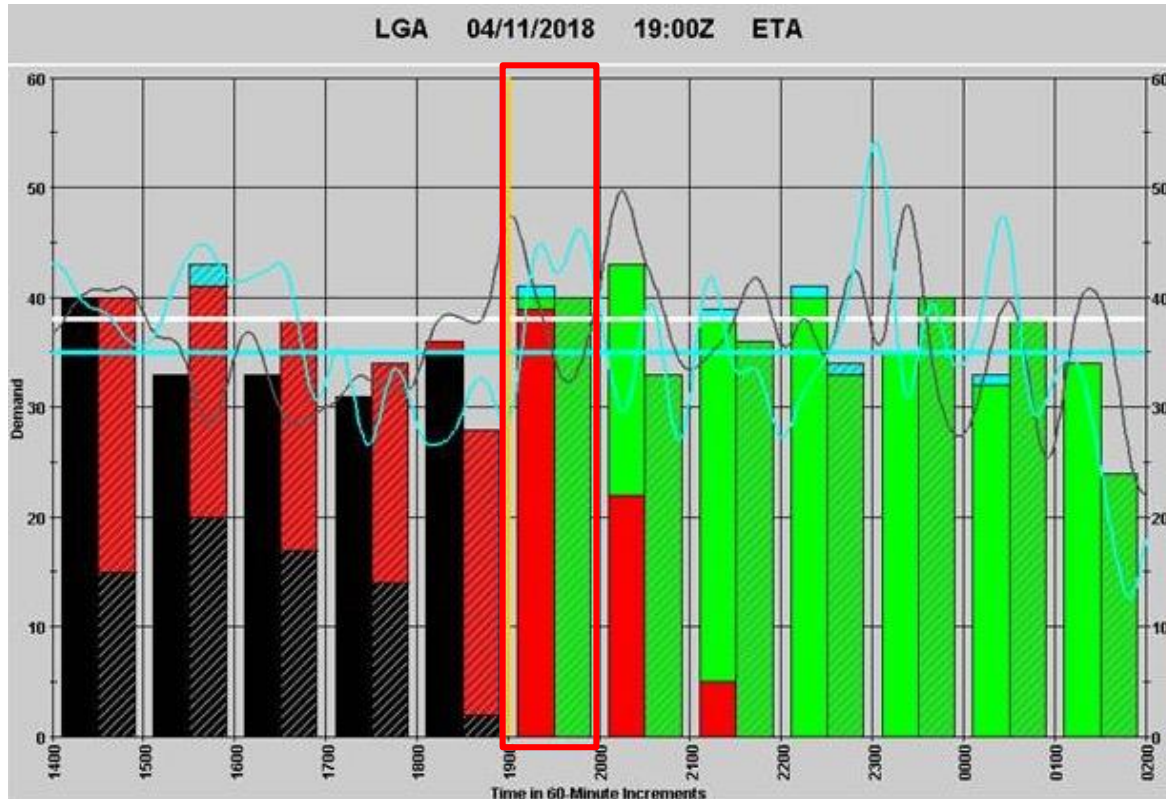
# LGA Arrival Demand at Departure Time 4/11/18



- An hour before RPA6140 departure (16:00z ADL) LGA arrival rate is ~38.
- Overall demand for 18:00z is 43 and 23 are coming over RBV
- RPA6140 was supposed to be in the 17:00z bucket (17:43z) and TMA moved it back to the 19:00z due to demand over RBV

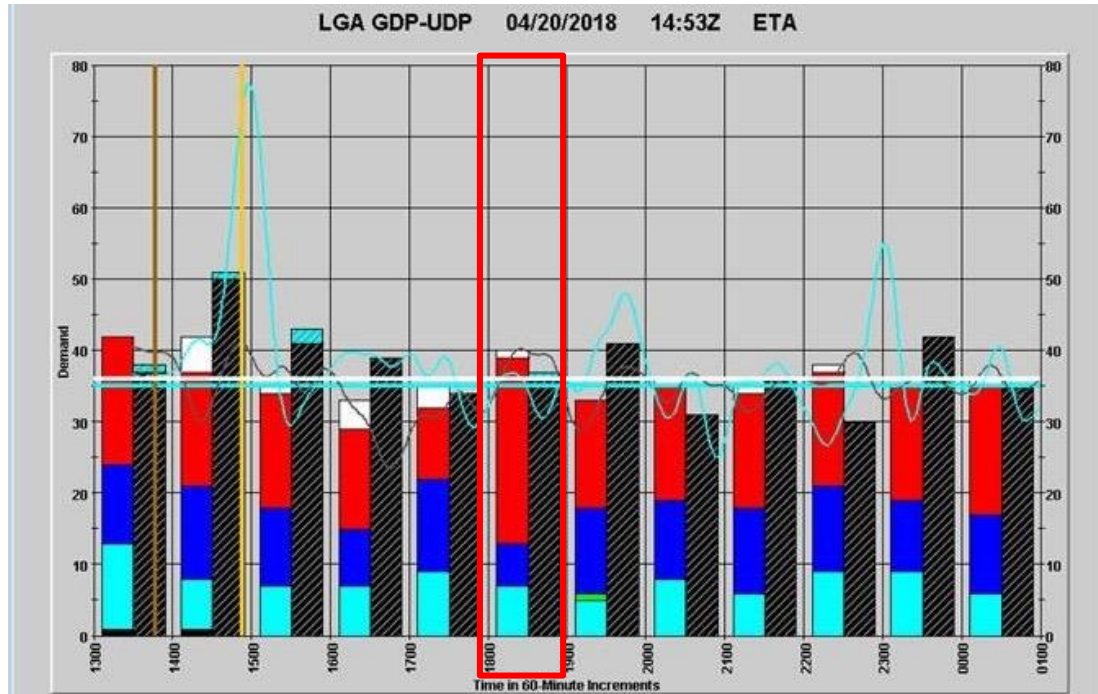
- Appears to be a MIT or TMA restriction at ZDC which affects overall airport landing efficiency
- In overall Status view at 16:00z, there was an arrival spike at 18:00z, over half of which was over RBV

# LGA Arrival Demand Later in Day 4/11/18



- A few hours later, it appears MIT and/or TMA on the heavier south feed may have contributed to LGA landing under the called airport acceptance rate.

# LGA Arrival Demand 4/20/18



- 18:00z – 26 arrivals over RBV (red bars), 13 arrivals to all other fixes with same inbound restrictions.
- Earlier, inbound demand led to a GS and GDP to support runway 4/31 operations
- If TFMS does not create variable MIT restrictions to favor the heaviest feed, likely to have some double penalty on close-in ZDC flights.

| REQUESTING | PROVIDING           | RESTRICTION  | START TIME      | STOP TIME       |
|------------|---------------------|--|-----------------|-----------------|
| N90        | EWR/LGA             | WHITE 5MINIT JETS EXCL: ZDC LTFC 1245-1615 N90:EWR,LGA | 04/20/2018 1245 | 04/20/2018 1615 |
| N90        | HPN/TEB             | WHITE 7MINIT JETS EXCL: ZDC LTFC 1245-1615 N90:TEB,HPN | 04/20/2018 1245 | 04/20/2018 1615 |
| N90        | PHL/ZBW/ZDC/ZNY/ZOB | EWR TBM 4R 1400-0200 N90:ZNY,ZOB,ZDC,ZBW,PHL           | 04/20/2018 1400 | 04/21/2018 0200 |
| N90        | ZBW                 | LGA VALRE,NOBBI 15MIT PER ROUTE 1101-0300 N90:ZBW      | 04/20/2018 1101 | 04/21/2018 0300 |
| N90        | ZDC                 | LGA RBV 15MIT 1101-0300 N90:ZDC                        | 04/20/2018 1101 | 04/21/2018 0300 |
| N90        | ZNY                 | LGA LIZZI 15MIT 1101-0300 N90:ZNY                      | 04/20/2018 1101 | 04/21/2018 0300 |

# Recent DCA to LGA Flight Logs

## Activity Log

| UPCOMING FLIGHTS         |                                      |                                |          |          |
|--------------------------|--------------------------------------|--------------------------------|----------|----------|
| Date                     | Departure                            | Arrival                        | Aircraft | Duration |
| Friday<br>13-Apr-2018    | 01:02PM EDT<br>Reagan National - DCA | 01:44PM EDT<br>LaGuardia - LGA | E170     | 0h 42m   |
| Thursday<br>12-Apr-2018  | 01:00PM EDT<br>Reagan National - DCA | 01:35PM EDT<br>LaGuardia - LGA | E170     | 0h 35m   |
| PAST FLIGHTS             |                                      |                                |          |          |
| Date                     | Departure                            | Arrival                        | Aircraft | Duration |
| Wednesday<br>11-Apr-2018 | 02:05PM EDT<br>Reagan National - DCA | 02:50PM EDT<br>LaGuardia - LGA | E170     | 0h 45m   |
| Tuesday<br>10-Apr-2018   | 01:22PM EDT<br>Reagan National - DCA | 02:02PM EDT<br>LaGuardia - LGA | E170     | 0h 40m   |
| Monday<br>09-Apr-2018    | 01:30PM EDT<br>Reagan National - DCA | 02:14PM EDT<br>LaGuardia - LGA | E170     | 0h 44m   |
| Sunday<br>08-Apr-2018    | 01:36PM EDT<br>Reagan National - DCA | 02:37PM EDT<br>LaGuardia - LGA | E170     | 1h 01m   |
| Saturday<br>07-Apr-2018  | 01:12PM EDT<br>Reagan National - DCA | 01:49PM EDT<br>LaGuardia - LGA | E170     | 0h 37m   |
| Friday<br>06-Apr-2018    | 01:14PM EDT<br>Reagan National - DCA | 01:59PM EDT<br>LaGuardia - LGA | E170     | 0h 45m   |
| Thursday<br>05-Apr-2018  | 01:33PM EDT<br>Reagan National - DCA | 02:23PM EDT<br>LaGuardia - LGA | E170     | 0h 50m   |
| Wednesday<br>04-Apr-2018 | 03:14PM EDT<br>Reagan National - DCA | 03:53PM EDT<br>LaGuardia - LGA | E75S     | 0h 39m   |
| Tuesday<br>03-Apr-2018   | 01:53PM EDT<br>Reagan National - DCA | 02:47PM EDT<br>LaGuardia - LGA | E170     | 0h 54m   |
| Monday<br>02-Apr-2018    | 02:35PM EDT<br>Reagan National - DCA | 03:13PM EDT<br>LaGuardia - LGA | E170     | 0h 38m   |
| Sunday<br>01-Apr-2018    | 11:11AM EDT<br>Reagan National - DCA | 11:55AM EDT<br>LaGuardia - LGA | E75S     | 0h 44m   |

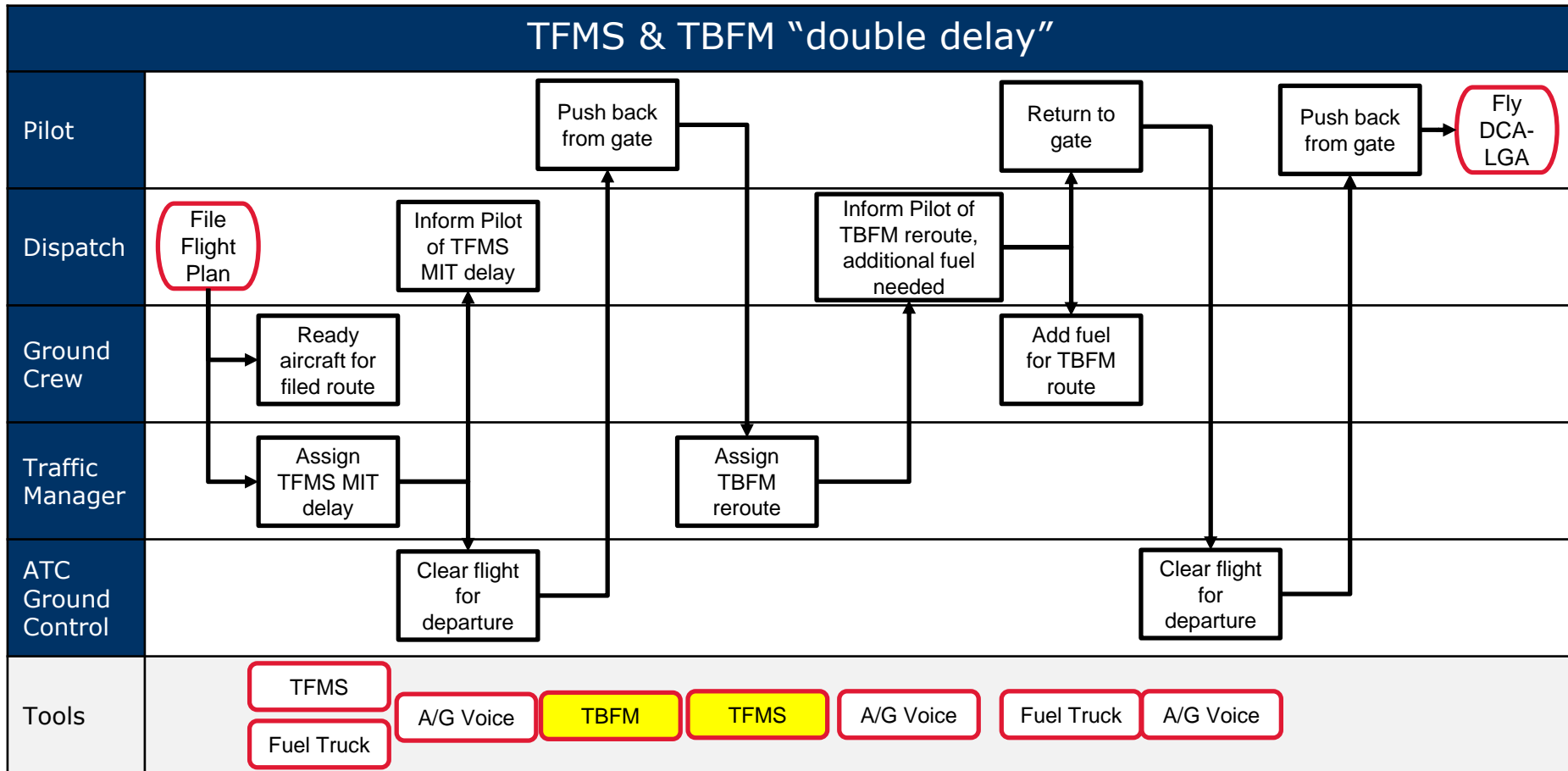
- Recent flying times vary for this flight
- At no time did it fly the RICED route
- The longer duration times were holding or a vector on the normal route.



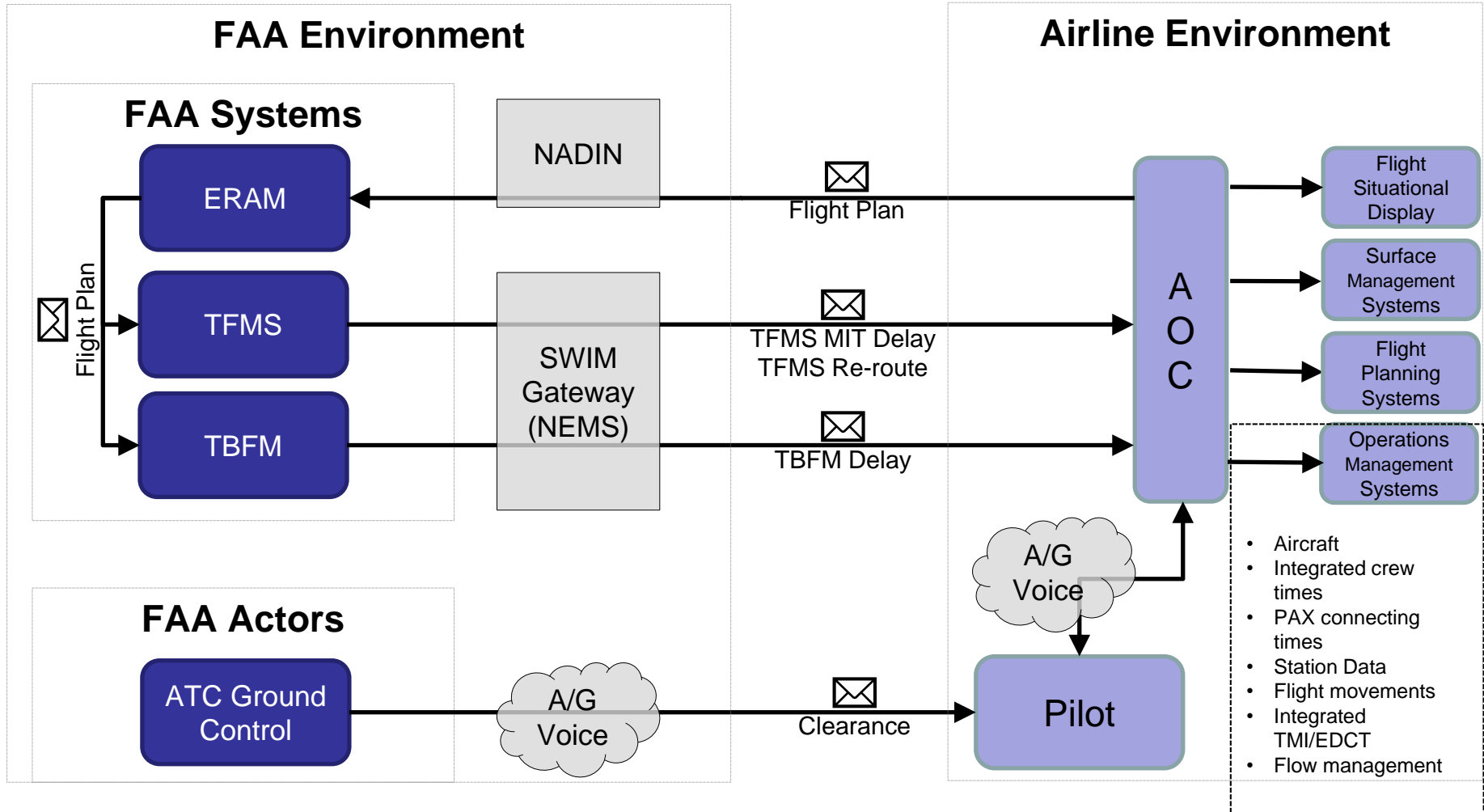
# Operational Workflow

1. RPA Dispatch files flight plan for RPA6140
  - DAL AOC acts as ATC coordinators (as necessary) issuing GDP EDCTs
2. Ground crew readies aircraft
3. General MIT restrictions on ZDC
  - Flight calls for release with ATPT, ATPT APREQ with ZDC
  - ZDC assigns TBFM with EDC function to meet N90 MIT restriction
4. DAL AOC can inform RPA6140 of delay
  - RPA does not get delay today, until they are out in DCA
  - If GDP, they may not get time until active and close to their EDCT, then they're given TBFM EDC which is usually after TFMS wheels up
5. Pilot pushes back from gate
6. TBFM Assigns Y delay
7. RPA Dispatch does not have visibility to TBFM delay (not subscribers)
  - Issue: Not all users sharing the same airspace have the same situational awareness
8. RPA 6140 given an hour EDC from TBFM and offered reroute via RICED
  - Issue: No delay reduction in TBFM, so pilot returns to gate to fuel for the re-route
9. Ground crew mobilizes fuel services
10. Pilot pushes back from gate
11. RPA6140 departs DCA and arrives at LGA with X+Y delay

# Operational Business Process



# Systems View



# *Open Discussion Q&A Forum*

- How best to mitigate issue?
- There doesn't appear to be an alert or consistency in getting RICED. In the heavy RBV 18z hour there were 2 IAH and 4 DAL/DFW flights.
- Should IAH, DAL, DFW flights be moved to ease the burden on ZDC? From past analysis, the delay on a DFW flight is about 5mins.
- Could there be some analysis on when flights are most likely to get hit with RBV restrictions and use CDR in those cases?
- In the past dispatch requests DCA-LGA carry extra fuel in case of reroute. Does that create a payload issue?

# *Open Discussion Q&A Forum (Cont'd)*

## TBFM

- Run some analytics on data that is flowing
- See flights getting scheduled in OH stream
- Analytics used to begin to take the current ops to improve situational awareness to better plan the op
- May be able to predict when your TBFM times will be

# Taxi-out, Return to gate Alternative Vignettes

Two-Part Solution:  
Enhanced Situational Awareness and CDM Interaction

# *Multi-Part Problem Causes*

- Situations resulting in return to gate:
  - “Heavy RBV period”: High demand over RBV due to heavy traffic in northbound overhead stream & other N90 arrivals
  - “Sub-optimal route” – Selecting (and refueling for) alternate route to avoid TBFM delay when not optimal choice
- Problem Mitigations
  - Enhanced situational awareness from SWIM data
    - Early FOC notification of root causes
    - Early planning for flight operations contingencies
  - CDM interaction
    - More opportunity for FOC to obtain best route/delay options

# *Enhanced Situational Awareness*

- SWIM data can alert FOC to when the traffic situation begins to resemble a “heavy RBV period”
  - TBFM-Metering Information Service (MIS):
    - Provides gate acceptance rates and meter fix acceptance rates (manually set by TMC) to alert FOC of when traffic over RBV becomes constrained
  - TFMDData Service:
    - Alerts FOC when a flight is affected by a TMI
    - Alerts FOC when FEA, FCA created to monitor traffic in constrained areas
  - SWIM Flight Data Publication (SFDPS) and SWIM Terminal Data Distribution (STDDS):
    - Provides En-route (SFDPS) and terminal (STDDS) flight tracking allowing for advanced data analytics
    - Vendor tool could monitor traffic counts and alert FOC when gaps are becoming minimized in overhead stream and situation may become progressively worse at RBV in a few hours



# *Enhanced Situational Awareness*

- SWIM data can alert FOC to when choosing reroute over taking TBFM delay would result in extra delay or a “sub-optimal route”
  - TBFM-Metering Information Service (MIS)
    - Provides release time
  - FOC flight planning tools
    - Provide preferred route options with associated flying times & fuel requirements
    - If TBFM departure delay less than additional reroute flying time, decline reroute
    - If TBFM departure delay more than additional flying time of reroute, accept reroute ONLY if flight is properly fueled upon initial pushback
      - Requires system logic to identify when conditions signal a “heavy RBV period”
      - Directs aircraft on affected routes to load additional fuel to allow for reroutes without returning to the gate to refuel

# SWIFT Aviation Case Study:



## *“Swap/Substitutions Operations”*

ORD and ORD Ground Delay Programs

Tim Niznik  
May 10, 2018




# Executive Summary

- **Environment:** ATC programs are initiated by the FAA and managed within an airline at the IOC/AOC
- **Problem:**
  - Airlines are free to reassign/swap flights to slots according to their own economic and operational priorities, but we lack real-time information and tools for informed decision support
  - Often times flights are assigned to slots that are subject to another delay type
- **Impact:** Limited visibility into ATC Programs have downline impacts to crews, curfews and passengers
- **Goal:** Improve decision support related to swaps and substitutions through the use of robust, real-time data

# Case Study Overview

- Reduced airport capacity due to adverse weather results in departure delays that ripple across the NAS
- Airlines are subjected to delays via GDP's - ~1000 annually/ 3-4 each day
- Often times, these same flights are subjected to another type of delay from ATC – complicating an already cumbersome decision making process
- FAA provides access to NAS TMI status at [www.fly.faa.gov](http://www.fly.faa.gov)
  - Also provided via TFMDData Flow



**ATCSCC  
OIS  
SYSTEM**

**7/9/2013**

OIS Main Menu  
[NAS Status](#)  
[Int'l Status](#)  
[East Directory](#)  
[West Directory](#)  
[Airport Layout](#)  
[Severe WX](#)

## NATIONAL AIRSPACE SYSTEM STATUS

(Note: This page will refresh every 5 minutes. Last updated Tue, 09 Jul 2013 18:47:51 UTC. Provided by the FAA's Air Traffic Control System Command Center.)

NATIONAL PROGRAMS [Help](#)

| CONTROL ELEMENT        | START | END  | SCOPE                  | REASON                      | AVG | AAR | PR  | ADVZY               | DA                 |
|------------------------|-------|------|------------------------|-----------------------------|-----|-----|-----|---------------------|--------------------|
| BOS                    | 1700  | 0159 | ALL+CZY_AP             | WEATHER / THUNDERSTORMS     | 26  | 32  | 32  | <a href="#">048</a> | <a href="#">DA</a> |
| EWR                    | 1756  | 0059 | ALL+CZY_AP             | WEATHER / THUNDERSTORMS     | 61  | 36  | 36  | <a href="#">073</a> | <a href="#">DA</a> |
| JFK                    | 1700  | 0159 | ALL+CZY_AP             | WEATHER / THUNDERSTORMS     | 31  | 58  | 58  | <a href="#">042</a> | <a href="#">DA</a> |
| LGA                    | 1700  | 0159 | ALL+CZY_AP             | WEATHER / THUNDERSTORMS     | 31  | 36  | 36  | <a href="#">041</a> | <a href="#">DA</a> |
| ORD                    | 1700  | 0459 | ALL+CZY_AP             | WEATHER / THUNDERSTORMS     | 110 | 72  | 72  | <a href="#">056</a> | <a href="#">DA</a> |
| PHL                    | 1700  | 0059 | ALL+CZY_AP             | WEATHER / THUNDERSTORMS     | 27  | 42  | 42  | <a href="#">047</a> | <a href="#">DA</a> |
| SFO                    | 1600  | 0759 | ALL+CVZ_AP             | WEATHER / LOW CEILINGS      | 155 | 30  | 30  | <a href="#">060</a> | <a href="#">DA</a> |
| SUN                    | 1800  | 0159 | ALL + CZY              | VOLUME / ALLEN FLY-IN EVENT | 145 | 10  | 10  | <a href="#">055</a> | <a href="#">DA</a> |
| <a href="#">FCAA05</a> | 1800  | 0259 | See Control Element... | WEATHER / THUNDERSTORMS     | 29  | --  | 95  | <a href="#">050</a> | <a href="#">DA</a> |
| <a href="#">FCAA08</a> | 1800  | 0259 | See Control Element... | WEATHER / THUNDERSTORMS     | 30  | --  | 110 | <a href="#">051</a> | <a href="#">DA</a> |



# TMI: Ground Delay Program

- A traffic management initiative (TMI) used by FAA to accommodate sustained duration of degraded arrival capacity or increased demand at an airport
- Inbound flights are held on the ground at their up-line station and metered/delayed into the affected airport by assigning them slots
- Airlines are free to reassign/swap flights to slots according to their own economic and operational priorities.

Before GDP



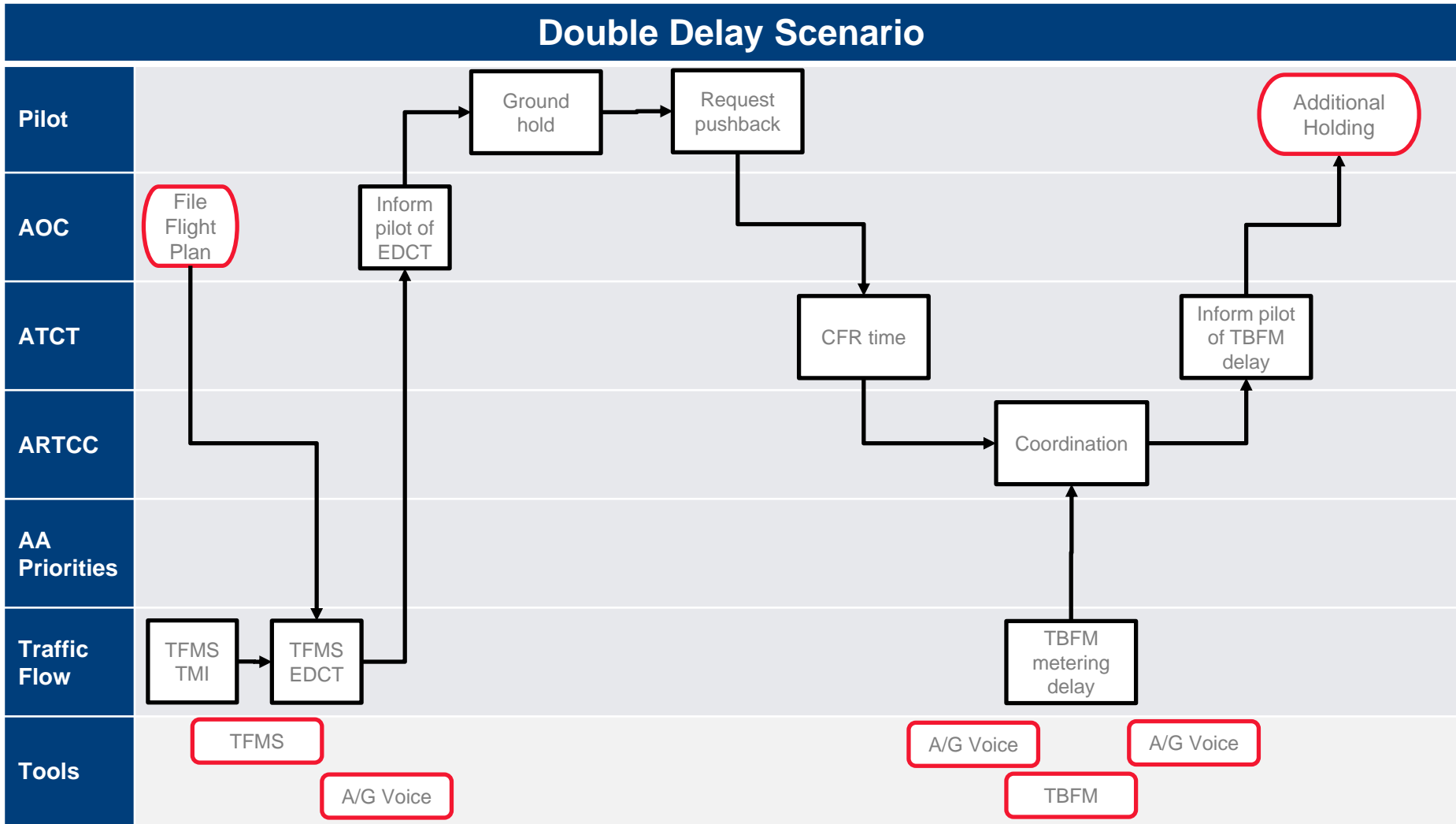
After GDP



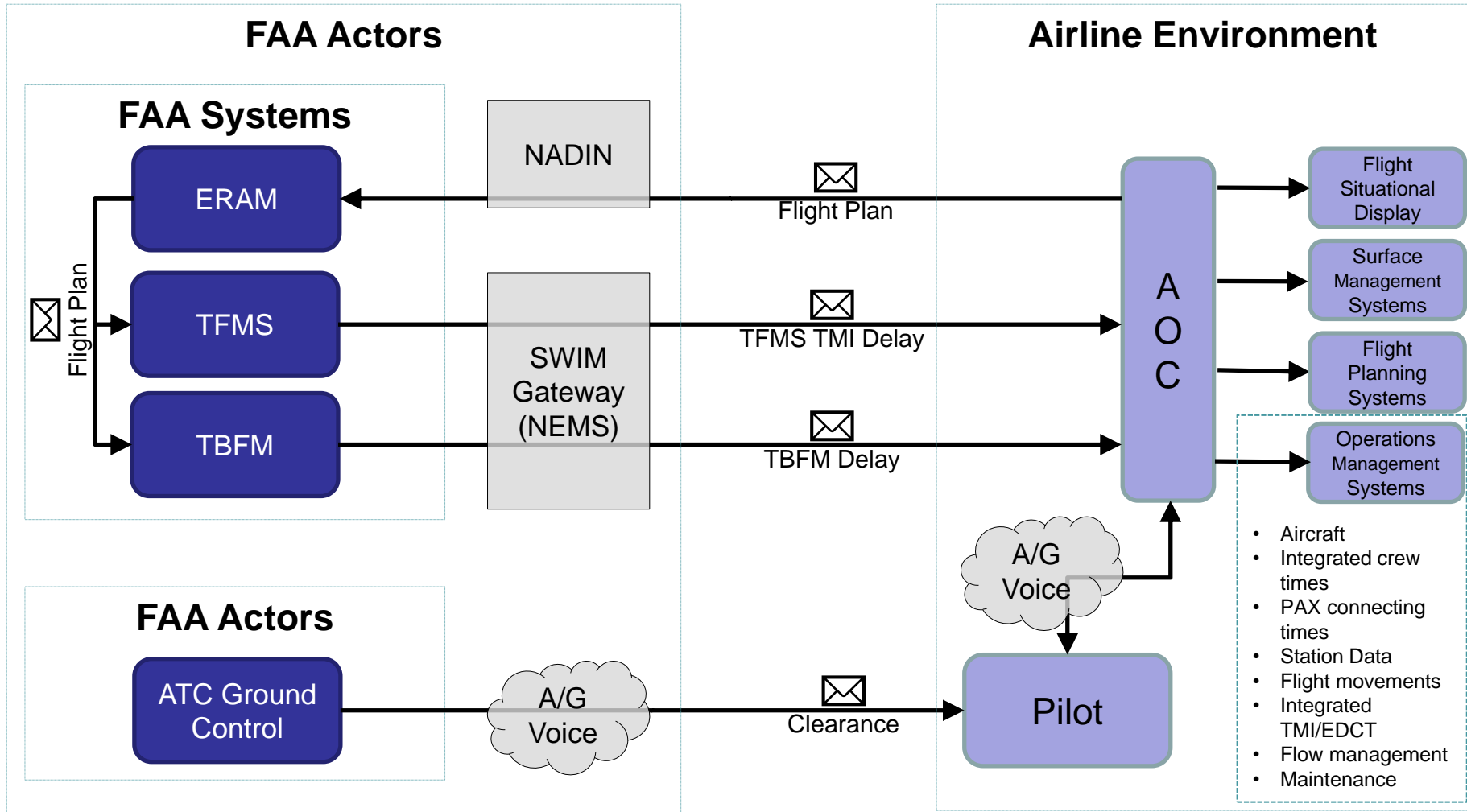
# Operational Workflow

1. AOC files flight plan
2. Due to periods of detected capacity/demand imbalance within the NAS, TMI may be established at departure airport, enroute, or arrival airport
3. TFMS identifies flight as affected by TMI and assigns EDCT
4. AOC informs pilot of EDCT
5. Pilot initiates call for release with ATCT
6. ATCT coordinates with ARTCC
7. TBFM issues additional metering delay upon CFR
  - TBFM does not issue delay until requested by ATC
  - NAS systems generate information on 5 minute cycles from ATC
  - This latency requires airlines to make multiple decisions for same flights and/or making the “wrong” decision based upon value criteria
8. ATCT informs pilot of additional ground hold
9. Additional metering delay is not always communicated back to AOC

# Operational Business Process



# Systems View





# Open Discussion Q&A Forum

- How best to mitigate issue?
- If delay information was available in near real-time, how would decision making improve?
- Is there any other information, besides delay information, that goes into slot swap decisions?
- Could a predicted delay over an affected fix(es) be offered to give airline insight on potential TBFM delays, allowing airlines to request either relief of such delays or request reroutes away from TBFM delays?
- Could this information be utilized to allow downline swaps (subs) for company aircraft that could be delayed to allow “holes” for their close-in departures?
- What other options should be available in order to avoid the double delay?
  - Could GDP delay be coupled with TBFM delay to create a more realistic picture of both airport arrival demand and TBFM demands?



# SWAP/SUBSTITUTION SOLUTIONS ALTERNATIVE VIGNETTES

Solution: Advanced Airline Decision Support Tools



# Multi-Part Problem Causes

- Situations resulting in inefficient slot swaps:
  - “Double Delay”
    - Flight receives departure delay due to TMI then receives additional delay from TBFM
  - Information latency
    - System information on 5 minute cycles from ATC
    - Latency requires airlines to make multiple decisions for same flights and/or making the “wrong” decision based upon value criteria
  - Legacy slot-swapping message protocol can cause large sub packages to time-out and not complete successfully
- Problem Mitigations
  - Enhanced situational awareness from SWIM data
    - Early and accurate FOC notification of flight delays
  - Advanced Decision Support Tools
    - Enables effective slot swapping based on accurate flight delays



# ***Enhanced Situational Awareness***

- SWIM data can alert FOC immediately when flights are affected by delays or flight status changes
  - TFMData Service:
    - Flight information: TMI-affected flights, GDP/AFP delay assignments, EDCT updates, TBFM release time
    - Flow information: TMIs, advisories, required routes
  - TBFM-Metering Information Service (MIS):
    - Release times for flights
    - Approval Request (APREQ) information for flights



# *Enhanced Decision Making*

- Migration to SWIM data sources e.g., TFMS, TBFM, would enable AOC to make decisions for a flight once and in real-time, improving swaps & substitution process
- If full delay was known in advance, AOC could have swapped or substituted flights based on analysis of: crew ops, schedule/connections, customer value, etc.
- Decision making around these flights could begin to be made based on customer value
  - Operational KPI's/metrics i.e. “flight value” could change decisions on which flights to place first in queue

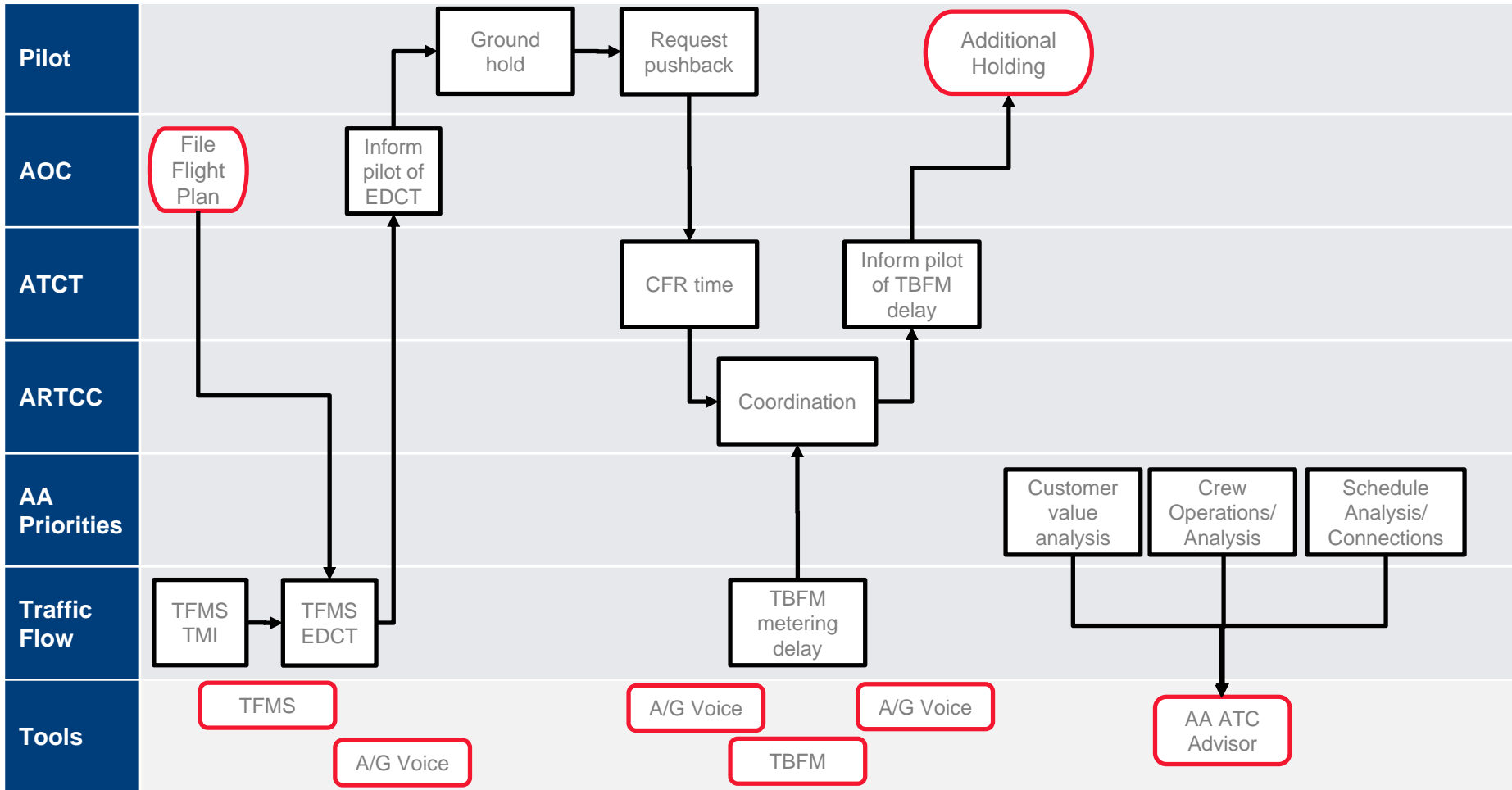
# Predictive Decision Support Tools

- Develop a tool to improve decision support for ATC Programs (GDPs and AFPs) which relies on the legacy ADL feed
- This application could:
  - Project delays to detect crew, curfew, and passenger problems
  - Redistribute delays to minimize impact on operations & customers
    - Crew legalities
    - Passenger impact
    - DOT dependability
- Operational benefits include:
  - Prevented crew legality violations
  - Prevented international misconnects



# Improved Operational Business Process

## Double Delay Scenario



# ***Power of Information***

- *But challenges still exist:*
  - Replacing the current legacy ADL (Aggregate Demand List) with TFMFlow Data will eliminate the 5-minute latency and provide data in real-time
    - Swap/substitution decisions could be made with visibility to all delays a particular flight
  - Access to the TMA-RT (Traffic Management Advisory Release Time) data will allow us to comply and avoid TMA-RT delays
  - Access to the metering data within the TBFM SWIM data
- With these improvements, we can begin deciding swaps/substitutions based upon the “value” of the flight to our operations

***Value-based decision-making by SWIM empowered users***





# Summary & Next Steps

- **Next Steps:**
  - Ops Context & Use Case Focus Group:
    - Disposition of TFM Flow Information Service comments
  - Identify Airline Case Study Volunteers
  - Formalize the agenda for upcoming SWIFT meetings
- **Topics for next meeting:**
  - Airline Case Study
  - Special Topics:
    - Terminal Flight Data Manager (TFDM) Terminal Publication (TTP)
- **Next meeting: Targeting August 2018 in Washington DC**

# Backups



# Decision Support Tools

FILE HISTORICAL SHORT DISPLAY FIND FLIGHT OPT FLAG SET CKL/RD STATUS TOOLS MESSAGES HELP

| STATION/FCA |         | DELAY  |        | AVAILABLE |     | VIOLATIONS/ALERTS |          |         |           | AUTO-MESSAGES |     |      | AUTO-COMPRESS  |                                     |                                     |                                     |     |                                     |                                     |                                     |
|-------------|---------|--------|--------|-----------|-----|-------------------|----------|---------|-----------|---------------|-----|------|----------------|-------------------------------------|-------------------------------------|-------------------------------------|-----|-------------------------------------|-------------------------------------|-------------------------------------|
| STA         | AIRLINE | AA AVG | AE AVG | DLY       | CXL | DUTY DAY          | LAY-OVER | CUR-FEW | INTL MISC | STATUS        | BRG | SUBS | ADL TIME STAMP | ETE                                 | MKT                                 | SCS                                 | LOG | AA                                  | AE                                  | JOINT                               |
| DEN         | BOTH    | 0:10   | 0:51   | 0         | 0   | 0                 | 0:00     | 0       | 0         | LIVE          | ON  | ON   | 17APR13/2222Z  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | ... | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| ORD         | BOTH    | 1:45   | 3:30   | 4         | 2   | 8                 | 11:00    | 2       | 158       | LIVE          | ON  | ON   | 17APR13/2223Z  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | ... | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Server: SOCORDS1

ARRIVAL STATISTICS

|        | FLT DLY | PAX DLY   | DOM MISC | INTL MISC | AA AVG | AE AVG | AA A14 | AE A14 | DUTY DAY | LAY-OVER | CUR-FEW | FLT DLY | PAX DLY | DOM MISC | INTL MISC | AA AVG | AE AVG | AA A14 | AE A14 | CDI  |
|--------|---------|-----------|----------|-----------|--------|--------|--------|--------|----------|----------|---------|---------|---------|----------|-----------|--------|--------|--------|--------|------|
| BEFORE | 269:39  | 1,198,049 | 480      | 132       | 1:45   | 3:30   | 10     | 3      | 8        | 11:00    | 2       | 104:09  | 661,829 | 38       | 26        | 2:16   | 0:47   | 1      | 15     | 0.00 |
| AFTER  | 269:39  | 1,198,049 | 480      | 132       | 1:45   | 3:30   | 10     | 3      | 8        | 11:00    | 2       | 104:09  | 661,829 | 38       | 26        | 2:16   | 0:47   | 1      | 15     | 0.00 |
| DIFF   | 0:00    | 0         | 0        | 0         | 0:00   | 0:00   | 0      | 0      | 0        | 0:00     | 0       | 0:00    | 0       | 0        | 0         | 0:00   | 0:00   | 0      | 0      | 0.00 |

DEPARTURE STATISTICS

|        | FLT DLY | PAX DLY   | DOM MISC | INTL MISC | AA AVG | AE AVG | AA A14 | AE A14 | DUTY DAY | LAY-OVER | CUR-FEW | FLT DLY | PAX DLY | DOM MISC | INTL MISC | AA AVG | AE AVG | AA A14 | AE A14 | CDI  |
|--------|---------|-----------|----------|-----------|--------|--------|--------|--------|----------|----------|---------|---------|---------|----------|-----------|--------|--------|--------|--------|------|
| BEFORE | 269:39  | 1,198,049 | 480      | 132       | 1:45   | 3:30   | 10     | 3      | 8        | 11:00    | 2       | 104:09  | 661,829 | 38       | 26        | 2:16   | 0:47   | 1      | 15     | 0.00 |
| AFTER  | 269:39  | 1,198,049 | 480      | 132       | 1:45   | 3:30   | 10     | 3      | 8        | 11:00    | 2       | 104:09  | 661,829 | 38       | 26        | 2:16   | 0:47   | 1      | 15     | 0.00 |
| DIFF   | 0:00    | 0         | 0        | 0         | 0:00   | 0:00   | 0      | 0      | 0        | 0:00     | 0       | 0:00    | 0       | 0        | 0         | 0:00   | 0:00   | 0      | 0      | 0.00 |

MODIFY SLOTS

| O | AC  | AFLT    | IND | DR | STS | EQP  | APAXIC | SGTD | ERTD | CTD  | ERTA | CTA  | CURR | DIFF | DTR     | DFLT    | DEST | LEG | STS | DPAXC | LGTD | PGTD | CURR | DIFF | DTR     |
|---|-----|---------|-----|----|-----|------|--------|------|------|------|------|------|------|------|---------|---------|------|-----|-----|-------|------|------|------|------|---------|
| N | AAL | 1697/17 | ING | DR | ETD | SP80 | 129.   | 2055 | 2235 | 0001 | 2138 | 0043 | 188  | 0    | 00:12C  |         |      |     |     |       |      |      |      |      |         |
| Y | EGF | 3784/17 | SAT | -  | ETD | CR7R | 529    | 1850 | 2243 | 2244 | 0050 | 0051 | 216  | 0    | 01:10C  | 3682/17 | EWR  | -   | ETD | 62.   | 0130 | 0216 | 171  | 0    | 02:24C  |
| N | EGF | 4303/17 | CVG | -  | ETD | E145 | 498    | 1820 | 2231 | 0001 | 2321 | 0051 | 311  | 0    | 00:54C  |         | BMI  | -   | SKD | 42.   | 0000 | 0131 | 91   | 0    | 03:14F  |
| Y | EGF | 3802/17 | XNA | FX | DCN | CR7R | 3/2    | 1225 | 2125 | 2347 | 2104 | 0058 |      |      |         |         |      |     |     |       |      |      |      |      |         |
| N | EGF | 3627/17 | CLE | -  | ETD | CR7R | 55/25  | 1800 | 2343 | 0001 | 0040 | 0058 | 348  | 0    | 07:52C  | 3739/17 | XNA  | -   | SKD | 62.   | 0150 | 0150 | 0    | 0    | 05:35C  |
| Y | AAL | 2366/17 | DFW | -  | ETD | M83N | 131/10 | 2215 | 2324 | 2324 | 0101 | 0101 | 31   | 0    | 02:27C  | 2357/17 | DFW  | -   | SKD | 138/1 | 0125 | 0241 | 76   | 0    | 04:39C  |
| Y | CHQ | 5009/17 | TOL | -  | ETD | EC40 | 26/10  | 2255 | 0000 | 0001 | 0101 | 0102 | 62   | 0    |         | 5098/17 | GRB  | -   | SKD | 31.   | 0140 | 0142 | 2    | 0    |         |
| Y | CHQ | 5038/17 | SDF | -  | ETD | EC40 | 43/5   | 2205 | 2351 | 2351 | 0103 | 0103 | 103  | 0    |         | 5032/17 | SDF  | -   | ETD | 43.   | 0145 | 0145 | 100  | 0    |         |
| Y | EGF | 4261/17 | TUL | -  | ETD | E145 | 8/1    | 2145 | 2343 | 2343 | 0108 | 0108 | 103  | 0    | 08:50F  |         |      |     |     |       |      |      |      |      |         |
| N | EGF | 4385/17 | LUX | -  | DCN | E145 | 38/10  | 1610 | 2213 | 0001 | 2321 | 0109 | 469  | 0    | 01:16F  | 4281/17 | CMJ  | -   | SKD | 48.   | 2330 | 0149 | 139  | 0    | -09:49F |
| N | EGF | 3875/17 | PIT | -  | ETD | CR7R | 45/13  | 1840 | 2342 | 0001 | 0050 | 0109 | 309  | 0    | 08:21C  | 3767/17 | ATL  | -   | SKD | 63.   | 0145 | 0154 | 9    | 0    | 06:01C  |
| Y | EGF | 3786/17 | IAH | -  | ETD | CR7R | 519    | 2030 | 2317 | 2324 | 0110 | 0117 | 137  | 0    | 09:50C  | 3712/17 | XNA  | -   | ETD | 63.   | 0110 | 0202 | 122  | 0    | 07:48C  |
| Y | AAL | 593/17  | MCO | -  | DCN | SP80 | 120/42 | 1910 | 2247 | 2257 | 0111 | 0121 | 196  | 0    | 01:35C  |         |      |     |     |       |      |      |      |      |         |
| Y | EGF | 3706/17 | SJC | -  | DCN | CR7N | 19/10  | 1715 | 2346 | 2259 | 0217 | 0130 | 372  | 0    | 01:40F  |         |      |     |     |       |      |      |      |      |         |
| Y | CHQ | 5070/17 | SDF | -  | SKD | EC40 | 35/8   | 0000 | 0000 | 0021 | 0110 | 0131 | 16   | 0    |         | 5027/17 | DBQ  | -   | SKD | 40.   | 0200 | 0211 | 11   | 0    |         |
| Y | EGF | 4253/17 | PHX | -  | SKD | E145 | 35/14  | 2340 | 2356 | 0000 | 0128 | 0132 | 2    | 0    | 08:33C  | 4271/17 | MSN  | -   | SKD | 39.   | 0345 | 0345 | 0    | 0    | 08:05F  |
| Y | AAL | 510/17  | RHC | -  | ETD | M83N | 140/19 | 2045 | 2232 | 2244 | 0127 | 0139 | 99   | 0    | 01:56F  | 1521/17 | TUS  | -   | DCN | 101.  | 0055 | 0234 | 99   | 0    | 05:36C  |
| R | AAL | 1351/17 | JFK | -  | OUT | 738D | 148/22 | 2110 | 2249 | 2249 | 0139 | 0139 | 94   | 0    | 06:51C  | 2026/17 | DCA  | -   | SKD | 151.  | 0105 | 0324 | 139  | 0    | 01:31C  |
| N | EGF | 3716/17 | ATL | -  | ETD | CR7N | 519    | 1940 | 2217 | 0001 | 2350 | 0134 | 234  | 0    | 00:41C  | 3639/17 | DEN  | -   | SKD | 65.   | 0125 | 0237 | 72   | 0    | 05:08F  |
| N | EGF | 3842/17 | ATL | -  | DCN | CR7N | 430    | 1745 | 2254 | 0001 | 0028 | 0135 | 355  | 0    | 07:00C  | 3729/17 | MSP  | -   | SKD | 66.   | 0340 | 0340 | 0    | 0    | 02:50C  |
| N | EGF | 3873/17 | DCA | -  | DCN | CR7R | 68/15  | 1920 | 2301 | 0001 | 0035 | 0135 | 260  | 0    | -00:45F | 3777/17 | SAT  | -   | ETD | 64.   | 0030 | 0220 | 170  | 0    | -00:25C |
| N | EGF | 3637/17 | YYZ | -  | ETD | CR7R | 62/16  | 2055 | 2321 | 0001 | 0001 | 0136 | 181  | 0    | 07:39F  | 3812/17 | CMH  | -   | SKD | 63.   | 0150 | 0236 | 46   | 0    | 05:39F  |
| Y | CHQ | 5019/17 | CID | -  | SKD | EC40 | 34/21  | 0040 | 0052 | 0052 | 0143 | 0143 | 0    | 0    |         |         |      |     |     |       |      |      |      |      |         |
| N | AAL | 1159/17 | PHL | -  | OUT | M83G | 127/59 | 2110 | 2133 | 0001 | 2317 | 0145 | 130  | 0    | 10:00C  | 344/17  | LGA  | -   | DCN | 136.  | 0035 | 0241 | 126  | 0    | -00:21C |
| N | EGF | 3801/17 | PHL | -  | ETD | CR7R | 44.    | 1845 | 2348 | 0001 | 0132 | 0145 | 295  | 0    | 00:15F  |         |      |     |     |       |      |      |      |      |         |
| N | AAL | 1653/17 | RDU | -  | ETD | M83N | 79/15  | 1825 | 2233 | 0001 | 0020 | 0148 | 323  | 0    | -01:13C | 337/17  | STL  | -   | DCN | 135.  | 0115 | 0243 | 263  | 0    | 03:07C  |
| N | AAL | 2187/17 | DFW | -  | ETD | B738 |        | 2225 | 2326 | 2331 | 0126 | 0149 | 49   | 0    |         |         |      |     |     |       |      |      |      |      |         |
| Y | AAL | 2370/17 | BOS | -  | ETD | M83G | 138/6  | 2310 | 2354 | 2354 | 0152 | 0152 | 32   | 0    | 05:43C  | 1865/17 | STL  | -   | SKD | 123/2 | 0310 | 0418 | 68   | 0    | 03:42C  |
| Y | AAL | 2408/17 | AUS | -  | ETD | SP80 | 76/6   | 2120 | 2332 | 2332 | 0155 | 0155 | 125  | 0    | 05:10C  | 1733/17 | PHX  | -   | SKD | 137.  | 0045 | 0250 | 125  | 0    | 02:05F  |
| Y | EGF | 3688/17 | MSY | -  | ETD | CR7R | 58/16  | 2205 | 0001 | 0001 | 0156 | 0157 | 102  | 0    | 00:00F  | 3776/17 | CLE  | -   | SKD | 53/1  | 0300 | 0300 | 0    | 0    | 03:35C  |
| Y | AAL | 353/17  | LGA | -  | ETD | M83G | 137/13 | 2200 | 0002 | 0002 | 0159 | 0159 | 79   | 0    | 03:55F  | 1960/17 | RDU  | -   | DCN | 129/1 | 0135 | 0254 | 79   | 0    | 01:36F  |
| N | EGF | 3695/17 | EWR | -  | ETD | CR7R | 54/11  | 1955 | 2354 | 0001 | 0151 | 0158 | 233  | 0    | 08:47C  | 3608/17 | PIT  | -   | SKD | 61.   | 0235 | 0243 | 8    | 0    | 05:17F  |
| Y | EGF | 3613/17 | DEN | -  | ETD | CR7R | 49/4   | 1200 | 0028 | 0028 | 0202 | 0202 | 717  | 0    | 00:45F  | 3807/18 | ATL  | -   | SKD | 65.   | 1100 | 1100 | 0    | 0    | 12:55F  |

Current Sort: ASLCT/CTA/ERTA (ASC) ARR flights shown: 281 ARR Eligible CXLs: 176 (AAL: 57, EGF: 119 Slot Create Candidates: 0 Session: 724967 ADL: 2880590 Show All

