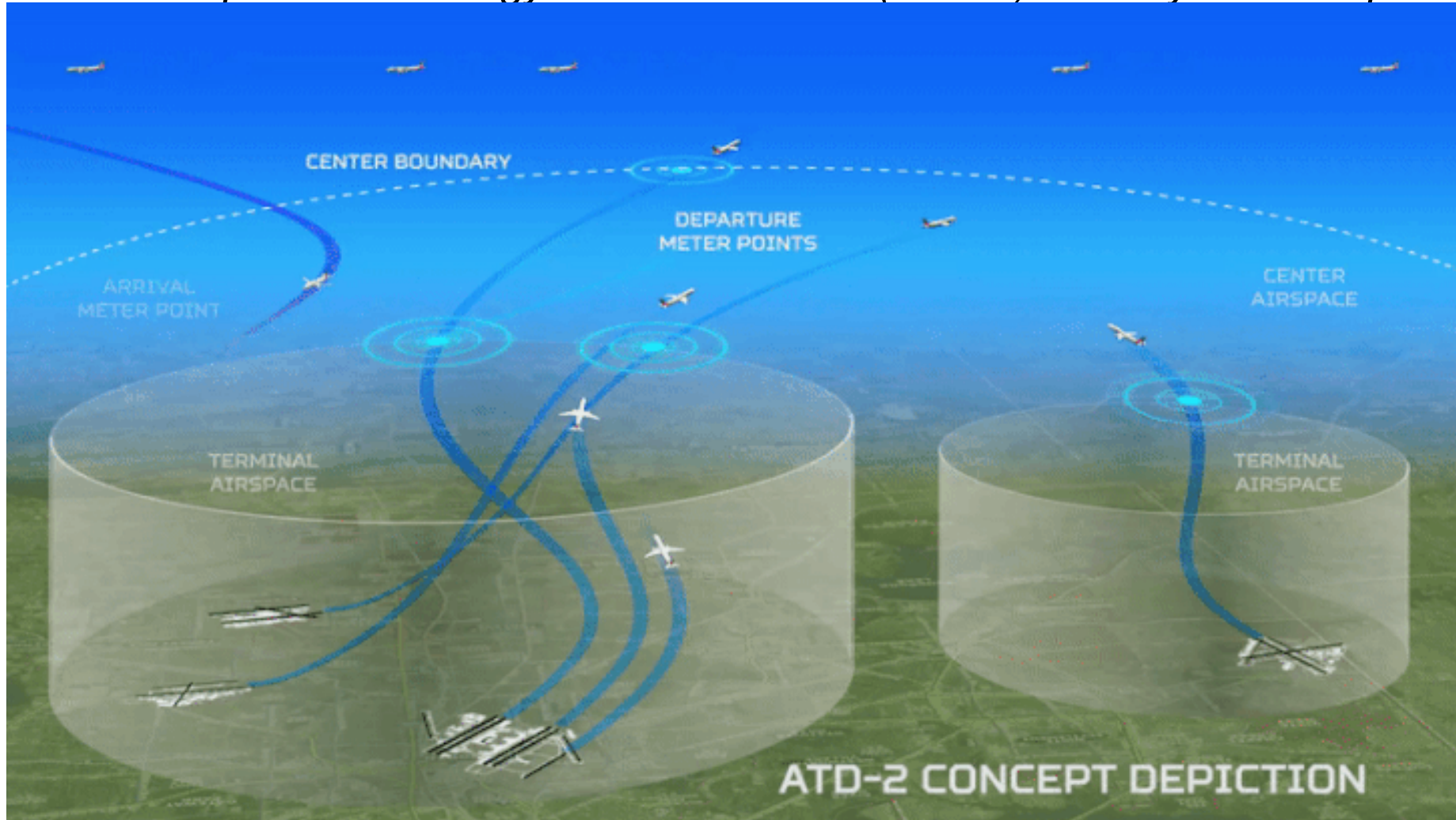


Welcome to the NASA Airspace Technology Demonstration 2 (ATD-2) Industry Workshop!



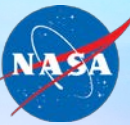


- Omni WIFI Code: atd2rocks (for “Omni Meeting” access)
- Coffee (served all day)
- Restrooms
- Safety Briefing from Omni’s Joseph Schwochert

- Keynote Speaker
 - **Akbar Sultan**
- Current Position
 - Director, NASA Airspace Operations and Safety Program (AOSP) in the Aeronautics Research Mission Directorate (ARMD)
- Among his many accomplishments
 - Directs NASA research portfolio over 4 different research centers
 - Co-lead of NASA/FAA research transition teams
 - NASA liaison to NextGen interagency planning office
 - ...and is the Program Director that supports the ATD-2 work!



Mr. Akbar Sultan, AOSP Director, NASA Aeronautics Research Mission Directorate (ARMD)
Credits: NASA / Maria Werries



EXPLORE FLIGHT

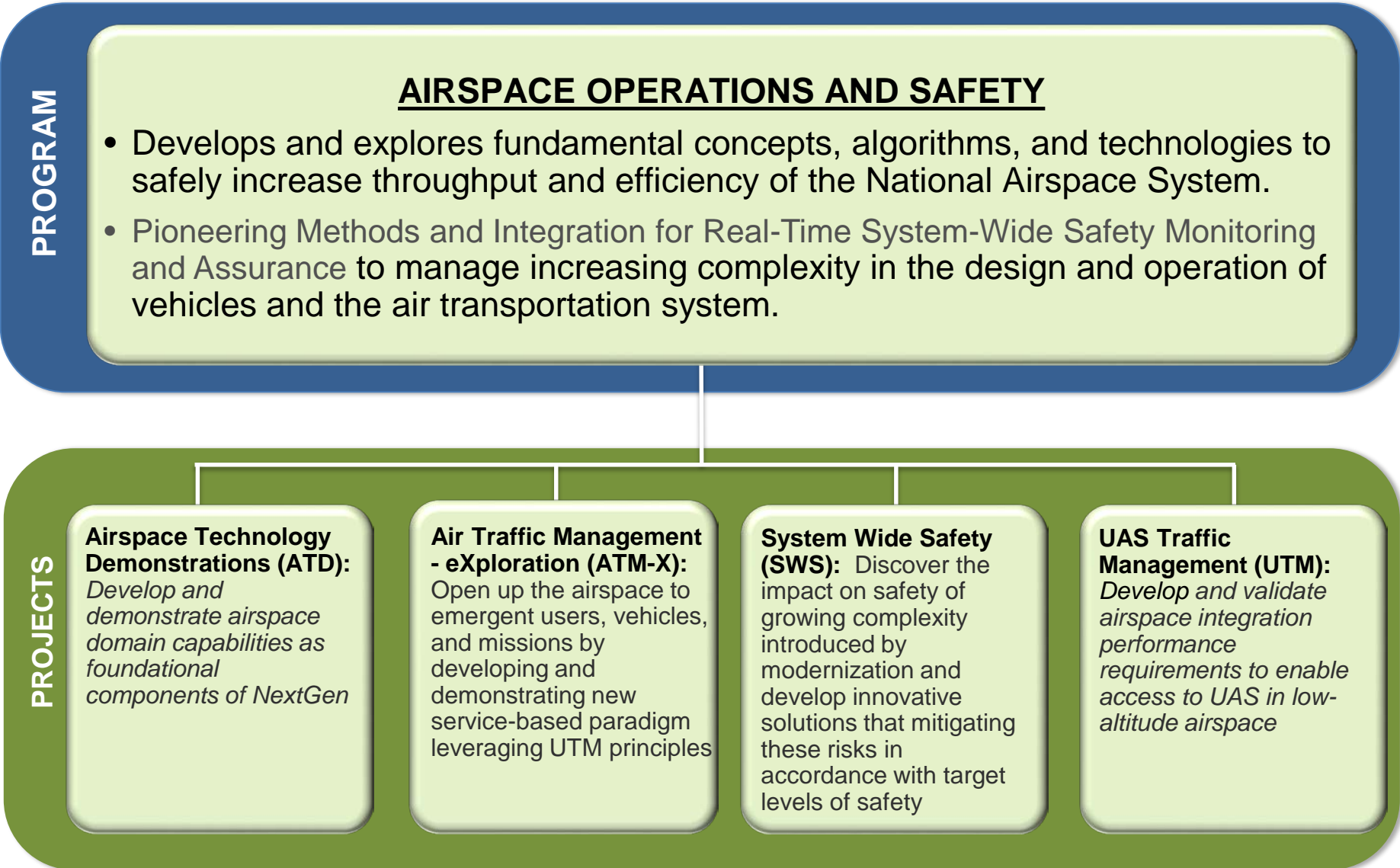
WE'RE WITH YOU WHEN YOU FLY

Airspace Operations and Safety Program

Akbar Sultan
Director, Airspace Operations and Safety Program
September 4, 2019



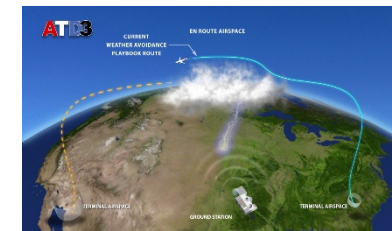
Airspace Operations and Safety Program



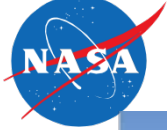
- **Terminal Sequencing and Spacing (TSAS) and Flight Deck Interval Management (FIM)**
 - Forecast \$500 million national fuel savings
 - FAA TSAS national deployment starting with TBFM in Denver in 2020
- **Integrated Arrival, Departure, Surface Operations**
 - 2.8 million pounds of fuel saved and CO₂ emissions reduction equivalent to 63,101 urban trees, 2,122 hours reduced engine runtime (as of July 31, 2019 CLT trials)
 - FAA's \$1B Terminal Flight Data Manager (TFDM) Program will deploy IADS capabilities to 27 airports beginning in 2021
- **Efficient re-routes around weather which are more direct, fuel-efficient, wind optimal, conflict free, and avoid congested airspace**
 - Multi-flight Common Routes and Dynamic Routing Around Weather informing TFMS
- **Low-altitude small UAS operations in dense urban environments**
 - Reno, NV June 17-28, 2019
 - Corpus Christi, TX August 12-23, 2019
 - TCL 4 is a demonstration of how UTM can manage high density, Unmanned Aircraft System (UAS) air traffic in urban areas
 - Enable FAA's UTM Pilot Program and UAS Integration Pilot Program



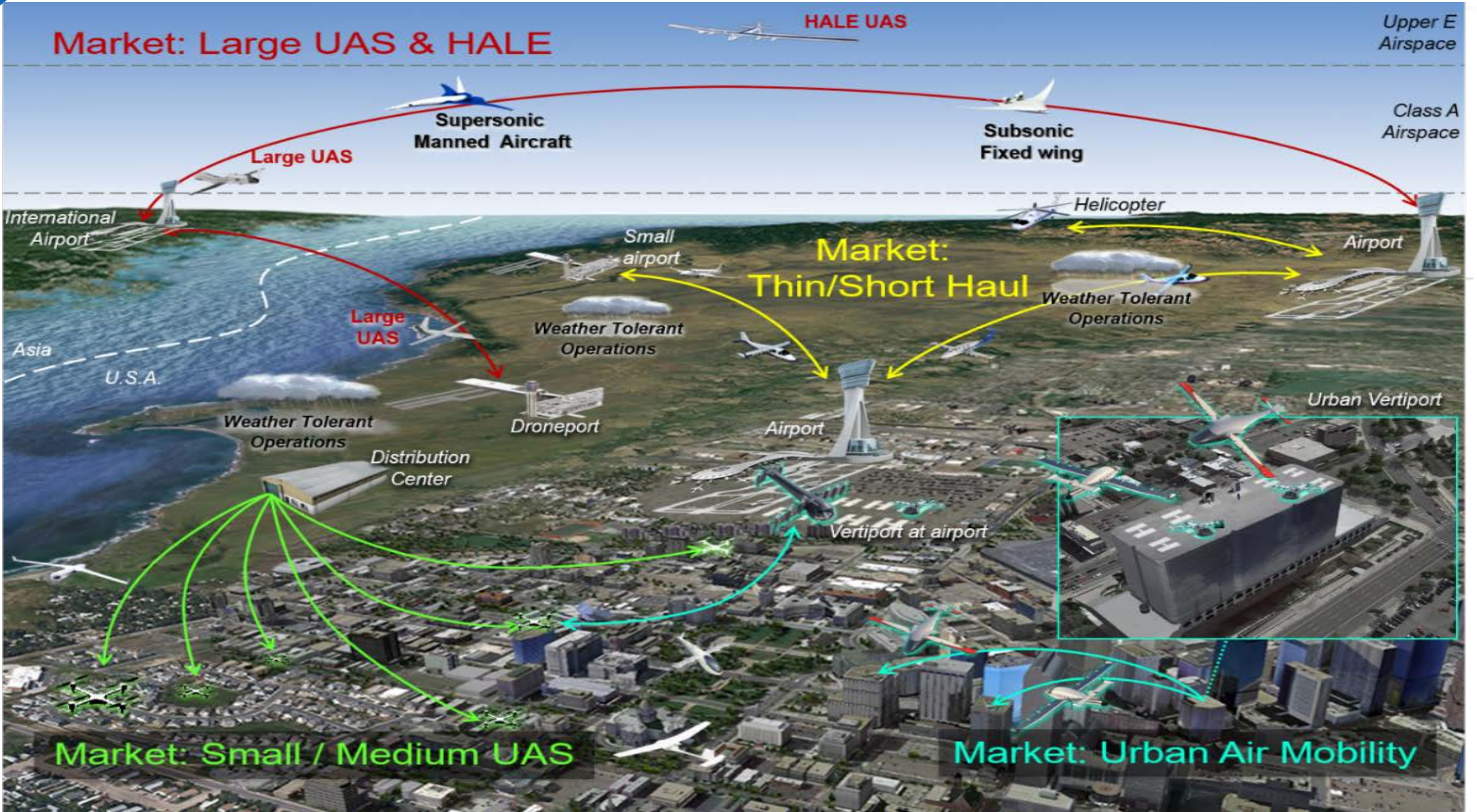
Source: Boeing

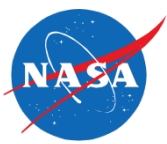


Four UAS autonomously flying over Reno managed by UTM



Future Airspace

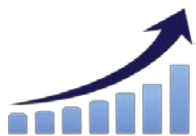




Future Airspace System Vision and Framework



- ARMD will leverage work in NextGen, UAS Traffic Management and Systemwide Safety to enable a range of diverse operations in an increasingly more dynamic and complex airspace system
 - Provide leadership to enable safe, seamless integration of emerging vehicles and operational concepts into the National Airspace.
 - Enable operations which are more diverse, dynamic, complex, and orders of magnitude higher volume.
 - Transform airspace management to a Service-Oriented Architecture that enables scalability for the introduction of diverse new vehicles and operations. Must be collaborative, flexible, and resilient to uncertainty.
 - Enable smart introduction of autonomous systems into air traffic management for both vehicles and air traffic control to achieve expected volume and type of operations.
 - Define minimum data requirements and standards necessary to monitor, assess, and mitigate safety risks for emerging operations.
 - Develop processes for the inclusion of machine-learning enabled components in emerging aerospace systems.
 - Joint requirements development, concept validation, and benefits demonstration with FAA, airlines, airframe manufacturers (emergent and commercial transport), UAS operators and manufacturers, and IT sector.



- Transfer to NAS users the lessons learned from the implementation of NASA's ATD-2 project
- Identify emerging needs for tools, services and platforms for the aviation market
- Provide a deeper understanding of the transformational potential of the future surface system
- Enable industry operators to meet upcoming TFDM requirements for their organization while achieving benefits

- Engage!
 - Ask questions, give feedback, add relevant comments
 - Ensure note takers capture any additional comments
 - Help us keep on schedule (on time performance)
- Help us identify any remaining tech transfer needs
 - Future webinars
 - Additional documentation
 - Software artifacts
- Share the materials with others in your organization
 - All sessions are recorded (audio, video)



NASA National Aeronautics and Space Administration

+ Visit NASA.gov
+ Contact NASA

FIND IT @ NASA: GO

+ ABOUT NASA + LATEST NEWS + MULTIMEDIA + MISSIONS + MY NASA + WORK FOR NASA

OVERHEAD STREAM INSERTION

CENTER BOUNDARY

DEPARTURE INTERCONFLICTS

DOWNSTREAM DEMAND / CAPACITY IMBALANCE

CENTER AIRSPACE

TERMINAL AIRSPACE

TERMINAL AIRSPACE

ATD-2 CONCEPT DEPICTION

NASA Airspace Technology Demonstration 2 (ATD-2) Industry Workshop

September 4-5, 2019
Omni Dallas Hotel at Park West, Dallas, TX

Overview of the Industry Workshop

This informational workshop will provide an in-depth understanding of the transformational capabilities of future air traffic management systems. The ATD-2 project team has developed an Integrated Arrival/Departure/Surface (ADS) technology which has been demonstrated in an operational environment and high-fidelity simulations. This one-time workshop will convey lessons learned and provide the opportunity to engage with the NASA ATD-2 team. Knowledgeable presenters will guide you through the systems and data that will be coming to your favorite airport soon. See the detailed agenda to learn more or register* now to reserve your spot!

* If you previously signed up for the January Workshop, we would appreciate if you would register again.

Workshop Objectives

- Transfer to NAS users the lessons learned from the implementation of NASA's ATD-2 project
- Identify emerging needs for tools, services and platforms for the aviation market
- Provide a deeper understanding of the transformational potential of the future surface system
- Enable industry operators to meet upcoming TFDM requirements for their organization while achieving benefits

Who Should Attend?

- Aircraft operators
- Airport operators
- Vendors who supply tools and/or services to the Aviation Industry
- Aviation focused based Academia

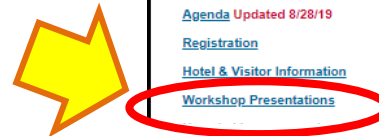
[Agenda Updated 8/28/19](#)

[Registration](#)

[Hotel & Visitor Information](#)

[Workshop Presentations](#)

Presentation materials will be posted on same site you registered for this event!

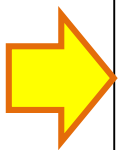


Direct Link:

<https://www.aviationsystemsdivision.arc.nasa.gov/atd2-industry-workshop/presentations.html>



- The main forum and breakout rooms all use a real-time system to allow audience engagement
 - Navigate to the address below on phone or computer
- Main Forum and Topic A (this room)
 - <https://arc.cnf.io/sessions/qznr>
- Topic B (Trinity II room)
 - <https://arc.cnf.io/sessions/zynb>
- Topic C (Park West E/F)
 - <https://arc.cnf.io/sessions/hn3b>



AGENDA			
WEDNESDAY, SEPTEMBER 4, 2019			
TIME	DESCRIPTION	PRESENTER	LOCATION
0730 - 0800	Registration		Fountain View
0800 - 0815	Welcome	Akbar Sultan, NASA	Texas Learning Center
0815 - 0845	Workshop Overview and Perspectives	Al Capps	Texas Learning Center
0845 - 1000	Preparing for the Transition to TFD and a Data-Driven NAS. Perspectives from Industry and FAA leaders	Workshop Panel	Texas Learning Center
1000 - 1015	Break		
1015 - 1130	BREAKOUT 1 – Topic A		Texas Learning Center
	BREAKOUT 1 – Topic B		Trinity II
	BREAKOUT 1 – Topic C		Park West E/F
1130 - 1245	Lunch	Dover's Grille or Morsels (Omni) Shuttle to Salata & nearby eateries	

Color	Workshop Tracks – Descriptions Below	
Yellow	Surface System Capabilities (TFDM pre-cursor lessons learned)	
Orange	Understanding and Quantifying NAS Performance and Benefits (Analytical Focus)	
Grey	Understanding TFD from a multi-system decision support viewpoint	
Green	Future Vision and Needs of the NAS (Enabled by TFD, SWIM and collaboration)	

Table 1- Legend of Available Tracks

Breakout Sessions Overview

Submit your questions online via our NASA Conference I/O tool; see arc.cnf.io links below for each room

Day	Breakout	Time	Topic A - Texas Learning Center //arc.cnf.io/sessions/qznr	Topic B – Trinity II //arc.cnf.io/sessions/zyhb	Topic C - Park West E/F //arc.cnf.io/sessions/hn3b
4-Sep	1	1015 – 1130	'Fuser in the cloud' overview and latest updates/needs	Future surface decision support overview (with ATD-2 demo)	SWIM-Fused data products used by ATD-2 analysts for quantifying NAS performance and benefits (part 1)
4-Sep	2	1245 – 1345	Latest strategic surface metering system and progress status in CLT (extending freeze horizon)	Understanding TMIs in the NAS (Part 1)	SWIM-Fused data products used by ATD-2 analysts for quantifying NAS performance and benefits (part 2)

ATD-2 INDUSTRY WORKSHOP - LUNCH OPTIONS

Wednesday, Sept 4

Shuttle service* from 11:30a-12:45p (Last pickup: 12:30p)
Pick-up/Drop-off location: Salata
7601 N MacArthur Blvd Suite #180, Irving, TX 75063

Nearby restaurants:

Salata (salad)
Jason's Deli (sandwiches, salad)
Chipotle (Mexican)
i Fratelli (pizza)
Firehouse Subs (sandwiches)
Which Wich (sandwiches)
Potbelly (sandwiches, salad)

Additional on-site options - Available both days

Omni Hotel Dover's Grille
American (sit-down restaurant)
Breakfast available 6a-11a, Lunch available 11a-2p

Thursday, Sept 5

Shuttle service* from 12:15p-1:45p (Last pickup 1:30p)
Pick-up/Drop-off location: Torchy's Tacos
7855 Las Colinas Ridge, Irving, TX 75063

Nearby restaurants:

Torchy's Tacos (Mexican)
Cheddar's (American comfort food)
Mi Cocina (Tex-Mex)
Chick-fil-A (fast food)
McDonald's (burgers)
Wendy's (burgers)

Omni Hotel Morsel's
Coffee shop serving grab-n-go cold lunches (sandwiches)
Open 6:30a-2p

* Complimentary
continuous shuttle service
14-seat capacity
first-come, first-served



- Panel Objectives
 - Introduce you to aviation leaders that have helped pave the way for Terminal Flight Data Manager in a 3T (TFDM/TBFM/TFMS) context with System Wide Information Management (SWIM)
 - Share the diverse perspectives that are important to consider when for any NAS-wide solution

- Panelists
 - Mike Huffman (FAA Terminal Flight Data Manager - TFDM)
 - Ernie Stelling (National Business Aviation Association - NBAA)
 - Rick Dalton (Southwest Airlines)
 - Josh Gustin (FAA SWIM Industry/FAA Team - SWIFT)
 - Rob Goldman (Delta Air Lines)
 - Carol Huegel (American Airlines)
 - Paul Sichko (DFW Airport)

- Panel Format
 - Initial round- hear directly from each panelist (40 minutes)
 - Questions from moderator (15 minutes)
 - Questions from audience (20 minutes)

Terminal Flight Data Manager (TFDM)

Presented to: NASA ATD-2 Industry Workshop
By: Michael Huffman, TFDM Program Manager
Date: September 4, 2019



Federal Aviation
Administration



•TFDM Program Overview

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

http://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:

- Collaborative Decision Making for the Surface
- Traffic Flow Management Integration
- Electronic Flight Strips in the Tower
- Systems Consolidation

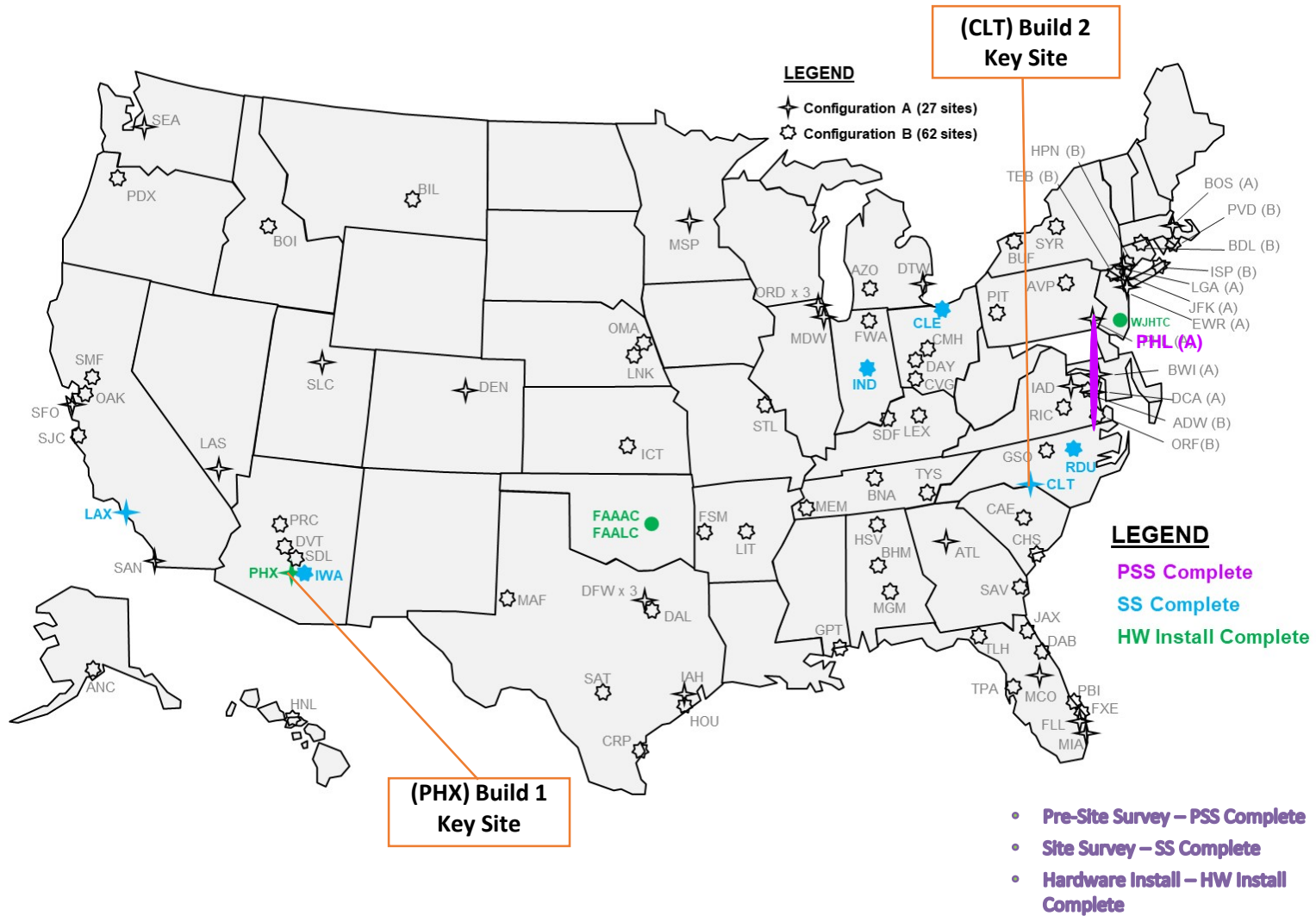


•Key Benefits:

- Fuel Savings: 313M Gal.
- Carbon Emission Savings: 3M Metric Tons



Implementation Sites by Configuration



- Pre-Site Survey – PSS Complete
- Site Survey – SS Complete
- Hardware Install – HW Install Complete



TFDM Waterfall Detail (1 of 4)

Site #	ATCT Name	Tower ID	Config.	Functionality Deployed	Original	Post Furlough
					Risk Adj Dates as of 11/2018	Risk Adj Dates as of 4/2019
1	Phoenix Sky Harbor International Airport (PHX) Build 1 key site	PHX	A	Build 1	20-Jan	May-20
1	Build 1 ISD			Build 1	20-Jul	October-20
2	Cleveland Hopkins International Airport	CLE	B	Build 1	20-Jul	November-20
3	Phoenix–Mesa Gateway Airport	IWA	B	Build 1	20-Aug	December-20
4	Raleigh–Durham International Airport	RDU	B	Build 1	20-Sep	March-21
5	Indianapolis International Airport	IND	B	Build 1	20-Oct	April-21
6	Los Angeles International Airport	LAX	A	Build 1	20-Nov	May-21
7	Philadelphia International Airport	PHL	A	Build 1	21-Apr	May-21
8	Charlotte Douglas International Airport (CLT) Build 2 Key Site	CLT	A	Build 2 SW (incl Build 1 functions)	21-Mar	May-21
9	Phoenix Deer Valley Airport	DVT	B	Build 1	21-Aug	July-21
10	Dayton International Airport	DAY	B	Build 1	21-Sep	August-21
8	Build 2 ISD			Build 2	21-Aug	September-21
1	Phoenix Sky Harbor International Airport (PHX)	PHX	A	Build 2 Retrofit	21-Aug	November-21
11	Newark Liberty International Airport	EWR	A	Full TFDM SW. Adapt Build 1 (+ TFDM/DSP Interface)	21-May	November-21
12	John F. Kennedy International Airport	JFK	A	Full TFDM SW. Adapt Build 1 + temp TFDM/DSP Interface	21-Jun	November-21
13	LaGuardia Airport	LGA	A	Full TFDM SW. Adapt Build 1 + temp TFDM/DSP Interface	21-Jul	November-21
14	Sacramento International Airport	SMF	B	Build 1	21-Oct	March-22
6	Los Angeles International Airport	LAX	A	Build 2	21-Oct	April-22
15	San Francisco International Airport	SFO	A	Build 2	21-Sep	April-22
16	George Bush Intercontinental Airport	IAH	A	Build 2	21-Nov	April-22
17	Hartsfield–Jackson Atlanta International Airport	ATL	A	Build 2	22-Jan	May-22
18	Teterboro Airport	TEB	B	Build 1	22-Feb	May-22
19	San Jose International Airport	SJC	B	Build 1	22-Jun	June-22
20	John Glenn Columbus International Airport	CMH	B	Build 1	22-Jul	July-22
21	William P. Hobby Airport	HOU	B	Full TFDM SW, Adapt Build 1	22-Aug	July-22
22	Scottsdale Airport	SDL	B	Build 1	22-Apr	August-22
7	Philadelphia International Airport	PHL	A	Build 2 + DSP Replacement	22-Apr	October-22
9	Newark Liberty International Airport	EWR	A	DSP Replacement	22-Apr	October-22
10	John F. Kennedy International Airport	JFK	A	DSP Replacement	22-Apr	October-22
11	LaGuardia Airport	LGA	A	DSP Replacement	22-Apr	October-22
18	Teterboro Airport	TEB	B	DSP Replacement	22-Apr	October-22
23	Westchester County Airport	HPN	B	Build 1 + DSP Replacement	22-Apr	October-22
24	Long Island MacArthur Airport	ISP	B	Build 1 Funct + DSP Replacement	22-Apr	October-22



TFDM Waterfall Detail (2 of 4)

Site #	ATCT Name	Tower ID	Config.	Functionality Deployed	Original	Post Furlough
					Risk Adj Dates as of 11/2018	Risk Adj Dates as of 2/2019
25	Prescott Regional Airport	PRC	B	Build 1	Sep-22	February-23
26	McCarran International Airport	LAS	A	Full TFDM SW, Adapt Build 1 and 2	Nov-22	April-23
27	O'Hare International Airport	ORD	A	Full TFDM SW, Adapt Build 1 and 2	Oct-22	May-23
28	Oakland International Airport	OAK	B	Full TFDM SW, Adapt Build 1	Jan-23	May-23
29	Tampa International Airport	TPA	B	Build 1	Feb-23	June-23
30	San Diego International Airport	SAN	A	Full TFDM SW, Adapt Build 1 and 2	Mar-23	July-23
31	Orlando International Airport	MCO	A	Full TFDM SW, Adapt Build 1 and 2	Apr-23	September-23
9	Newark Liberty International Airport	EWR	A	Build 2	Apr-23	October-23
10	John F. Kennedy International Airport	JFK	A	Build 2	Apr-23	October-23
11	LaGuardia Airport	LGA	A	Build 2	Apr-23	October-23
32	Denver International Airport	DEN	A	Full TFDM SW, Adapt Build 1 and 2	May-23	October-23
33	Midway International Airport	MDW	A	Full TFDM SW, Adapt Build 1 and 2	Jun-23	October-23
34	Miami International Airport	MIA	A	Full TFDM SW, Adapt Build 1 and 2	Jul-23	November-23
35	Fort Lauderdale Executive Airport	FXE	B	Full TFDM SW, Adapt Build 1	Oct-23	February-24
36	Dallas Fort Worth International Airport	DFW	A	Full TFDM SW, Adapt Build 1 and 2	Aug-23	March-24
37	Boston Logan International Airport	BOS	A	Full TFDM SW, Adapt Build 1 and 2	Sep-23	March-24
38	Minneapolis–Saint Paul International Airport	MSP	A	Full TFDM SW, Adapt Build 1 and 2	Nov-23	April-24
39	Cincinnati/Northern Kentucky International Airport	CVG	B	Full TFDM SW, Adapt Build 1	Jan-24	April-24
40	Washington Dulles International Airport	IAD	A	Full TFDM SW, Adapt Build 1 and 2	Feb-24	May-24
41	Salt Lake City International Airport	SLC	A	Full TFDM SW, Adapt Build 1 and 2	Mar-24	June-24
42	Fort Lauderdale–Hollywood International Airport	FLL	A	Full TFDM SW, Adapt Build 1 and 2	May-24	September-24
43	Jacksonville International Airport	JAX	B	Full TFDM SW, Adapt Build 1	Jun-24	October-24
44	Detroit Metropolitan Wayne County Airport	DTW	A	Full TFDM SW, Adapt Build 1 and 2	Apr-24	November-24
45	Baltimore/Washington International Thurgood Marshall Airport	BWI	A	Full TFDM SW, Adapt Build 1 and 2	Jul-24	November-24
46	Dallas Love Field	DAL	B	Full TFDM SW, Adapt Build 1	Aug-24	November-24
47	Nashville International Airport	BNA	B	Full TFDM SW, Adapt Build 1	Sep-24	February-25
48	Louisville International Airport	SDF	B	Full TFDM SW, Adapt Build 1	Oct-24	February-25
49	Seattle–Tacoma International Airport	SEA	A	Full TFDM SW, Adapt Build 1 and 2	Oct-24	April-25
50	Ronald Reagan Washington National Airport	DCA	A	Full TFDM SW, Adapt Build 1 and 2	Dec-24	April-25



TFDM Waterfall Detail (3 of 4)

Original Post Furlough

Site #	ATCT Name	Tower ID	Config.	Functionality Deployed	Risk Adj Dates as of 11/2018	Risk Adj Dates as of 4/2019
51	T. F. Green Airport	PVD	B	Full TFDM SW, Adapt Build 1	Jan-25	May-25
52	Charleston International Airport	CHS	B	Full TFDM SW, Adapt Build 1	Feb-25	June-25
53	Eppley Airfield	OMA	B	Full TFDM SW, Adapt Build 1	Mar-25	September-25
54	Memphis International Airport	MEM	B	Full TFDM SW, Adapt Build 1	Apr-25	October-25
55	Richmond International Airport	RIC	B	Full TFDM SW, Adapt Build 1	May-25	October-25
56	San Antonio International Airport	SAT	B	Full TFDM SW, Adapt Build 1	Jun-25	November-25
57	Bradley International Airport	BDL	B	Full TFDM SW, Adapt Build 1	Jul-25	November-25
58	Birmingham-Shuttlesworth International Airport	BHM	B	Full TFDM SW, Adapt Build 1	Aug-25	December-25
59	Lincoln Airport	LNK	B	Full TFDM SW, Adapt Build 1	Sep-25	February-26
60	Joint Base Andrews	ADW	B	Full TFDM SW, Adapt Build 1	Oct-25	March-26
61	Buffalo Niagara International Airport	Buf	B	Full TFDM SW, Adapt Build 1	Dec-25	April-26
62	Palm Beach International Airport	PBI	B	Full TFDM SW, Adapt Build 1	Jan-26	May-26
63	Montgomery Regional Airport	MGM	B	Full TFDM SW, Adapt Build 1	Feb-26	June-26
64	Ted Stevens Anchorage International Airport	ANC	B	Full TFDM SW, Adapt Build 1	Mar-27	June-26
65	Portland International Airport	PDX	B	Full TFDM SW, Adapt Build 1	Mar-26	August-26
66	Pittsburgh International Airport	Pit	B	Full TFDM SW, Adapt Build 1	Apr-26	September-26
67	St. Louis Lambert International Airport	STL	B	Full TFDM SW, Adapt Build 1	May-26	October-26
68	Wilkes-Barre/Scranton International Airport	AVP	B	Full TFDM SW, Adapt Build 1	Jul-26	October-26
69	Piedmont Triad International Airport	GSO	B	Full TFDM SW, Adapt Build 1	Aug-26	November-26
70	Gulfport-Biloxi International Airport	GPT	B	Full TFDM SW, Adapt Build 1	Sep-26	December-26
71	Syracuse Hancock International Airport	SYR	B	Full TFDM SW, Adapt Build 1	Oct-26	March-27
72	Norfolk International Airport	ORF	B	Full TFDM SW, Adapt Build 1	Nov-26	March-27
73	Clinton National Airport	LIT	B	Full TFDM SW, Adapt Build 1	Jan-27	April-27
74	Savannah/Hilton Head International Airport	SAV	B	Full TFDM SW, Adapt Build 1	Feb-27	May-27
75	Boise Airport	BOI	B	Full TFDM SW, Adapt Build 1	Apr-27	July-27
76	McGhee Tyson Airport	TYS	B	Full TFDM SW, Adapt Build 1	May-27	August-27
77	Wichita Dwight D. Eisenhower National Airport	ICT	B	Full TFDM SW, Adapt Build 1	Jun-27	September-27
78	Billings Logan International Airport	BIL	B	Full TFDM SW, Adapt Build 1	Jul-27	October-27
79	Daytona Beach International Airport	DAB	B	Full TFDM SW, Adapt Build 1	Aug-27	November-27
80	Daniel K. Inouye (Honolulu) International Airport	HNL	B	Full TFDM SW, Adapt Build 1	Sep-27	March-28
81	Columbia Metropolitan Airport	CAE	B	Full TFDM SW, Adapt Build 1	Oct-27	March-28



TFDM Waterfall Detail (4 of 4)

Site #	ATCT Name	Tower ID	Config.	Functionality Deployed	Original	Post Furlough
					Risk Adj Dates as of 11/2018	Risk Adj Dates as of 4/2019
82	Midland International Air and Space Port	MAF	B	Full TFDM SW, Adapt Build 1	Dec-27	April-28
83	Huntsville International Airport	HSV	B	Full TFDM SW, Adapt Build 1	Jan-28	April-28
84	Fort Smith Regional Airport	FSM	B	Full TFDM SW, Adapt Build 1	Feb-28	May-28
85	Fort Wayne International Airport	FWA	B	Full TFDM SW, Adapt Build 1	Mar-28	June-28
86	Blue Grass Airport	LEX	B	Full TFDM SW, Adapt Build 1	Apr-28	August-28
87	Kalamazoo/Battle Creek International Airport	AZO	B	Full TFDM SW, Adapt Build 1	May-28	August-28
88	Tallahassee International Airport	TLH	B	Full TFDM SW, Adapt Build 1	Jun-28	September-28
89	Corpus Christi International Airport	CRP	B	Full TFDM SW, Adapt Build 1	Jul-28	October-28



DEDICATED TO HELPING BUSINESS ACHIEVE ITS HIGHEST GOALS.



**ATD2 Industry Panel:
Ernie Stellings
Senior Manager, Air Traffic Svcs
NBAA**

September 4, 2019 | Dallas, TX

Ernie Stellings

My Background



- 15 years with NBAA, overseeing our Air Traffic Services group that resides within the FAA System Command Center. Operations background including fractional jet operations, Part 121, and Part 91 as a pilot/dispatch/Operations Center Manager
- Been involved in Collaborative Decision Making (CDM) since 2002. Participated in multiple Surface CDM team meetings during the ConOps phase.
- Currently serving at Industry Co-Lead for the Flow Evaluation Team (FET). FET has joint tasking with the SCT on ATD2 Phase 3 as this project expands to the Metroplex environment in Dallas.

Our industry Perspective:

- NBAA members vary in size and lack access to pertinent NAS data (OIS, etc.) in a mobile delivery mechanism
- NBAA has been involved in this project several years back in Charlotte in an effort to provide “inclusion” for our members in surface demand prediction models via the development of a mobile app platform
- Working with MITRE, NASA, and the FAA; a prototype application has been developed to allow general/business aviation operators the opportunity to submit and update EOBT times to the ATD2 project.
- With the expansion to Dallas Metroplex, we have engaged locally based DAL NBAA members to assist with the project
- Interest in ensuring that this mobile app research is tech transferred to the vendors who support our members flights.



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

NASA ATD2 Workshop:



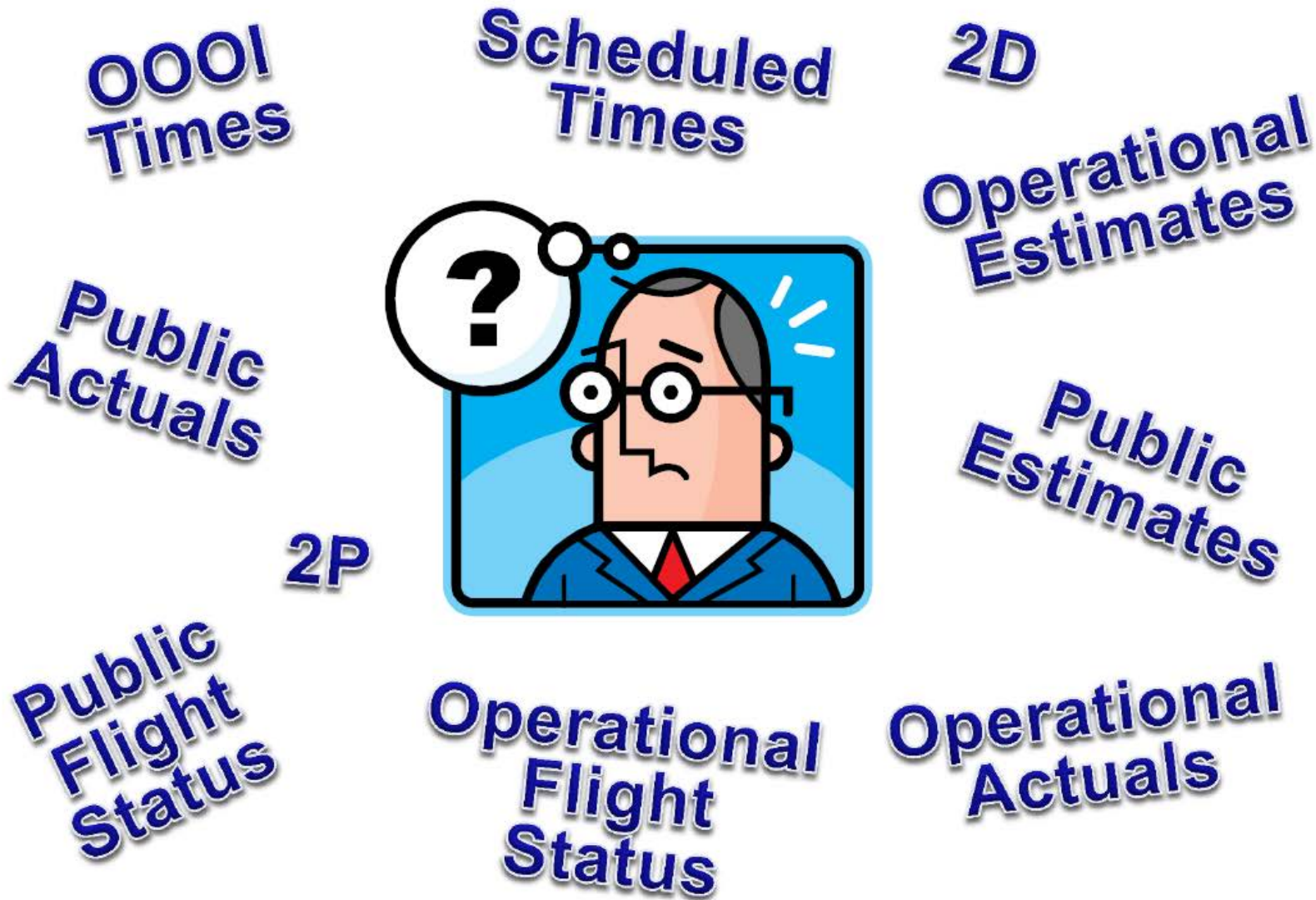
Ops Integrity

Improving the value and timeliness of network decisions

September 04, 2019

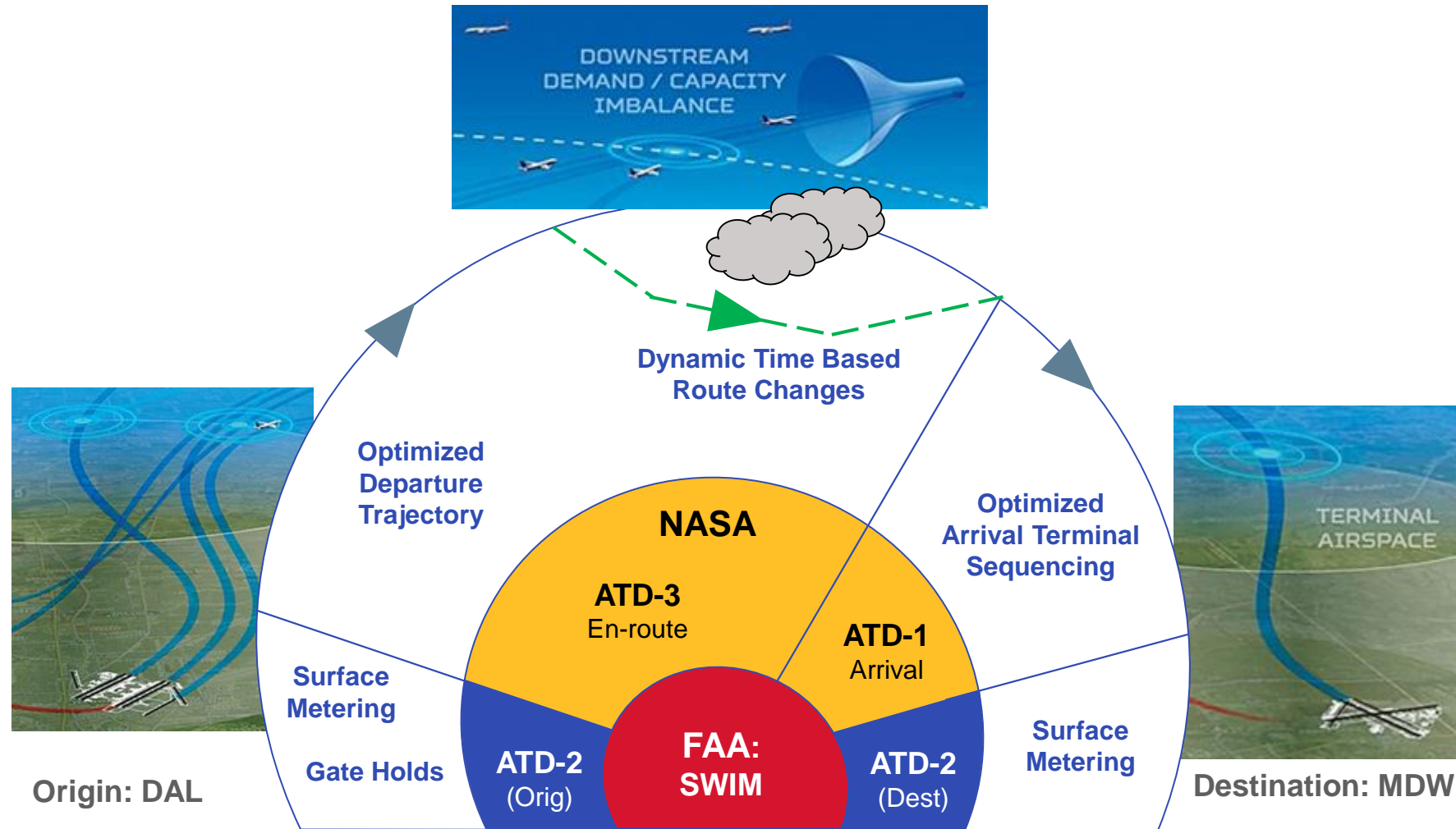
Rick Dalton
Director Airspace and Flow Management

Making time for a good operation?

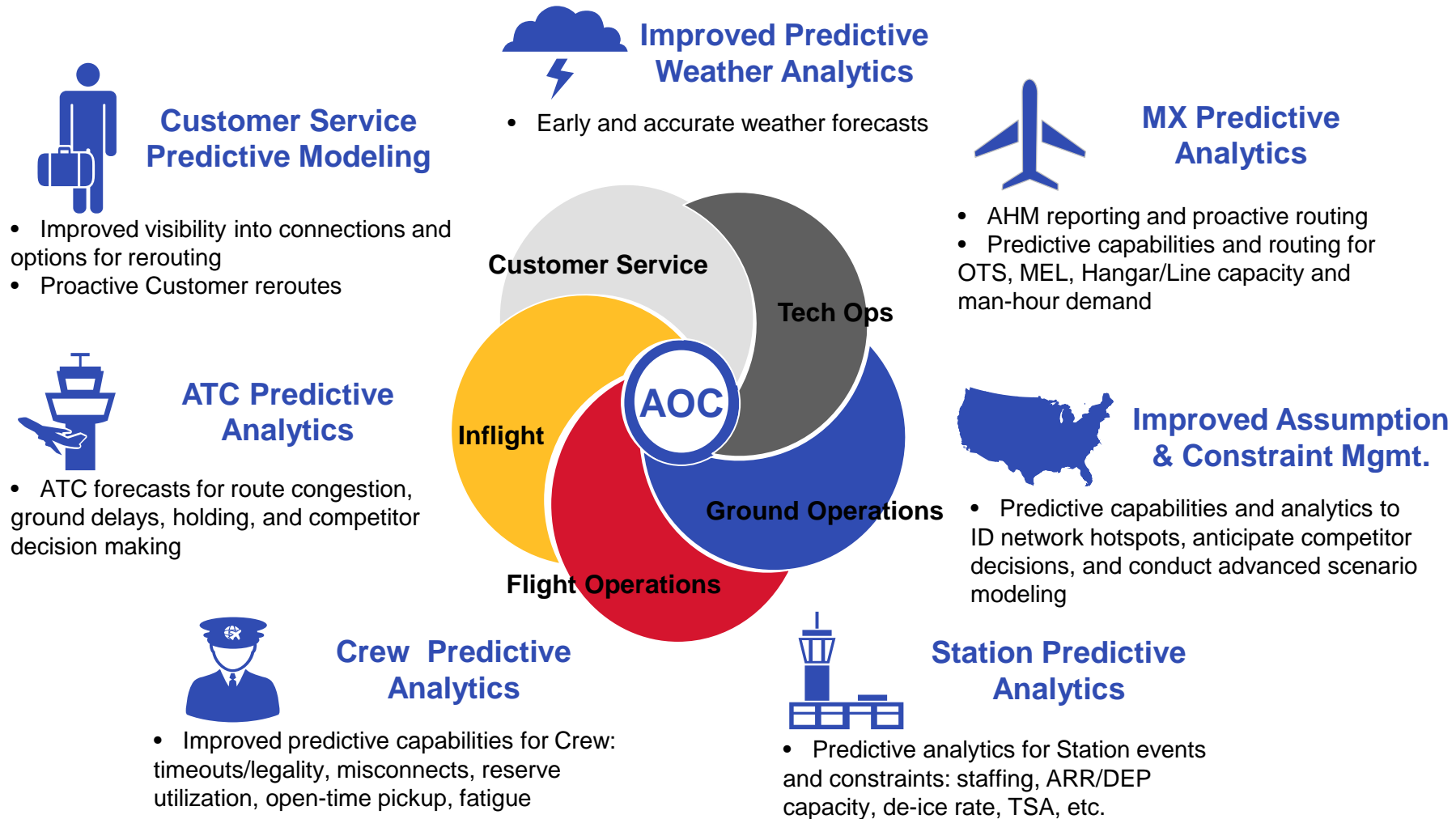


NextGen/ATD optimizes across the flight path

An integrated arrival, departure, and surface system that creates more efficient routes managed by time versus distance



Visualize the pull-through integration across the airline



➤ **Aiming to drive optimal network level solutions with much richer datasets, more robust processing capabilities, and advanced analytics**

Potential information to predict

As part of our future predictive analytics efforts, we could potentially predict or improve our predictions on a range of information elements



Weather

- Hurricane
- Snowstorm
- Thunderstorm
 - Frontal
 - Popcorn
- Icing
- Fog
- Winds
- Windshear
- Hail
- Visibility



ATC

- Congestion
- Airspace constraints
- Ground delay programs
- Ground stops
- Holding patterns
- Anticipated competitor decisions



MX

- OTS
- MEL
- Hangar capacity
- Line capacity
- Manhour demand



Crew

- Timeouts / Legality
- Misconnects
- Sick
- Reserve utilization
- Straight open time pick-up
- Premium open time pick-up
- Fatigue



Station

- Ground staffing levels
- Arrival capacity
- Departure capacity
- De-icing rate
- Temporary runway closures
- Temporary taxiway closures
- Airport congestion
- TSA congestion



Customer

- Load factor
- Connections
- Misconnects
- Disrupted – will not reach destination
- No shows/ last minute changes



Network

- OTP
- Delays
 - A14
 - D0
- Cancellations
- ETA
- Block time
 - In air
 - On ground
- Turn time
- Cost of IROPS
- Fuel
 - Total cost
 - Usage

➤ Improving accuracy, consistency, and predictability of key decisions

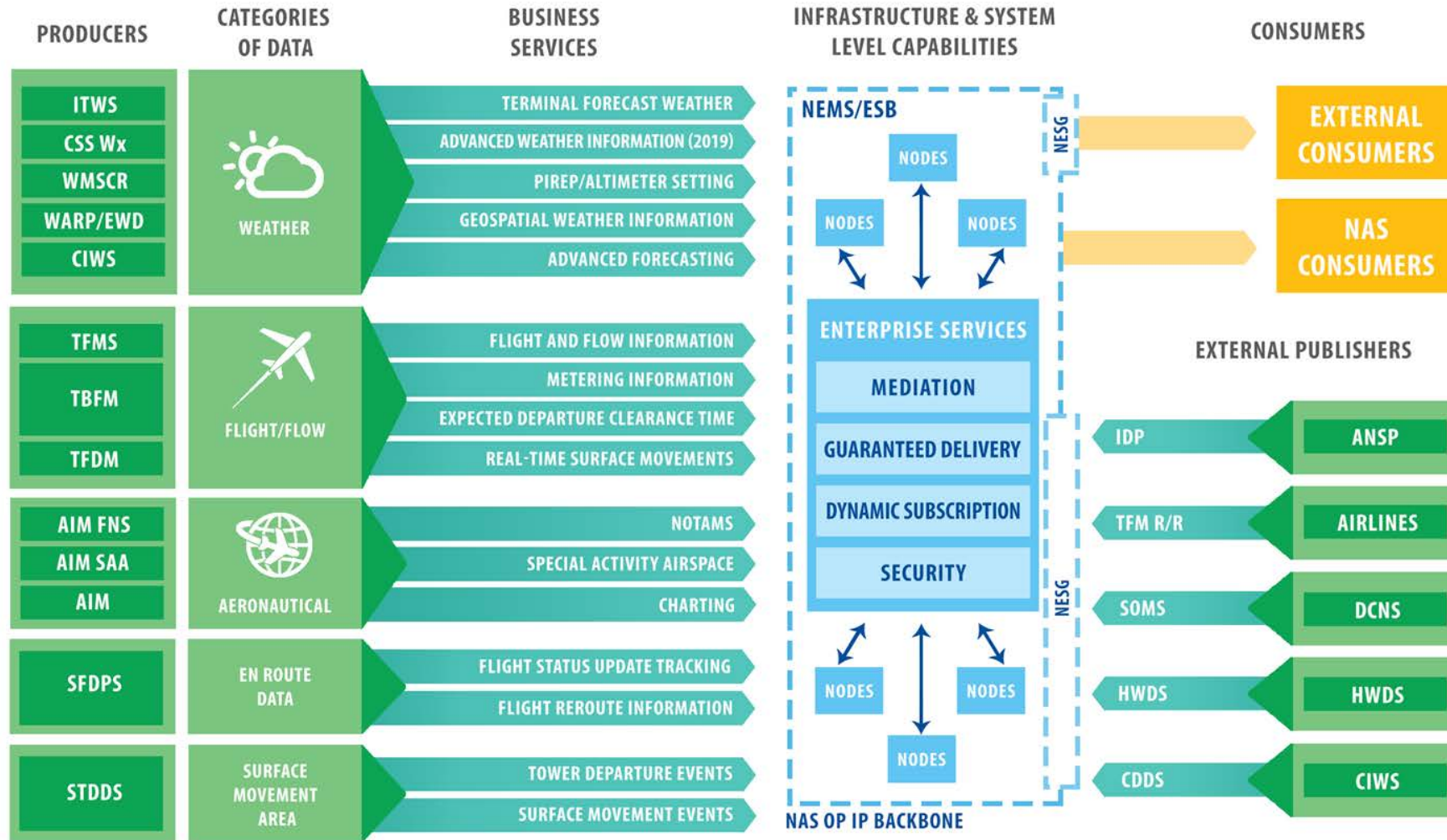
Joshua E. Gustin

*Manager, Communications, Information and
Network Programs*



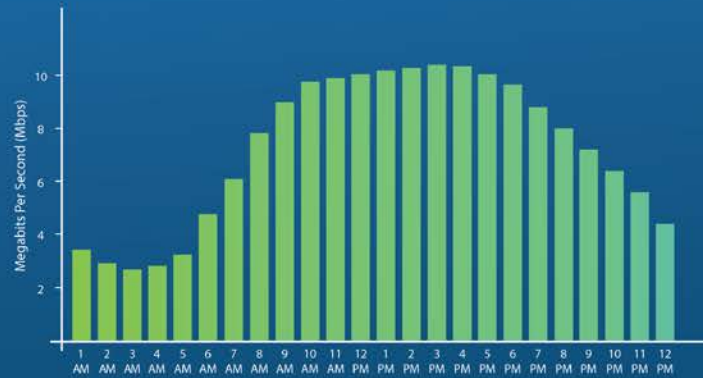
**Federal Aviation
Administration**

System Wide Information Management (SWIM)



CONSUMER BANDWIDTH

Bandwidth for a single consumer receiving all services



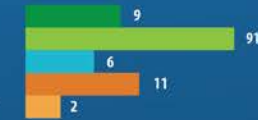
SWIM USERS



WEATHER



FLIGHT/FLOW



AERONAUTICAL



SURVEILLANCE



- AIRLINES
- INDUSTRY
- AIRPORTS, FAA FACILITIES & PROGRAMS
- ACADEMIA & RESEARCH
- OTHER GOVERNMENT ENTITIES

DATA STATISTICS

1.6 Trillion
Messages per Day

568 Trillion
Messages per Year

4.3 TB
Data per Day

1.5 PB
Data per Year

SWIM GROWTH

The impact of increasing consumers on NESG bandwidth over the life of SWIM



SWIFT Stakeholders

Airspace Users



Trade Associations



Vendors to Industry



Support Organizations



Airport Authorities



Standards Bodies



Government





- SWIFT Workshop #8:
 - **Date: November 7, 2019**
 - **Location: Delta Airlines @ Atlanta, GA**
- https://www.faa.gov/air_traffic/technology/swim/swift/

Captain Robert Goldman

Senior Manager, Air Traffic Management
Delta Air Lines



- Industry workgroup involvement and numerous leadership positions
- Emphasis is always on our customers. Period.
- Focus on a data driven, time based, and integrated traffic management paradigm

NASA ATD-2 Industry Workshop

FAA's Terminal Flight Data Manager (TFDM)

Coming Soon to an Airport Near You!

Carol Huegel

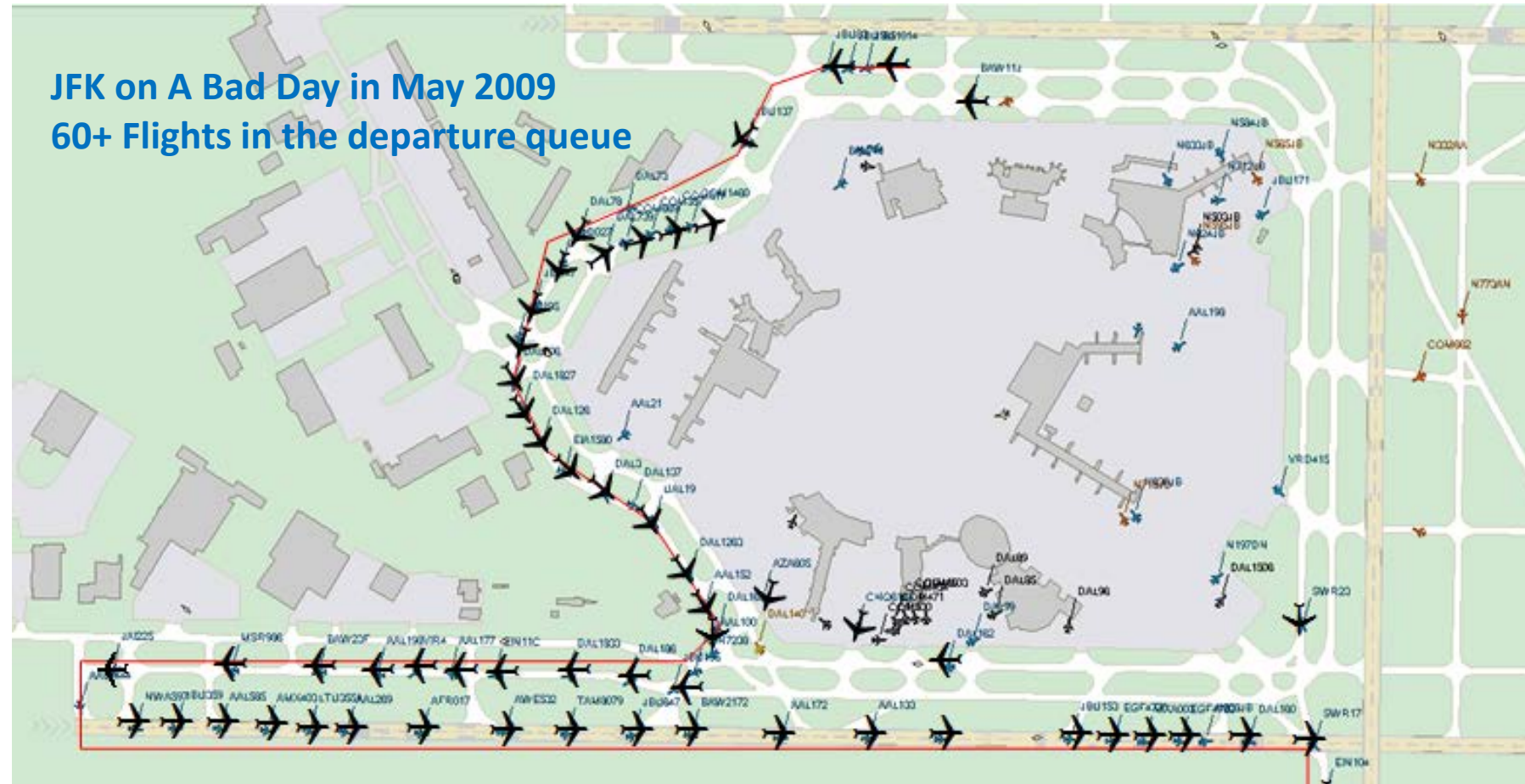
September 4, 2019



- **Managing Director, Integrated Operations Center (IOC)**
- **ATM and Surface Traffic Management / Industry Affairs**
- **Office 1.682.315.7950 | Mobile 1.214.422.6099 | carol.huegel@aa.com**

Once you've seen one airport, you've seen exactly one airport!

The Problem We Are Trying to Solve

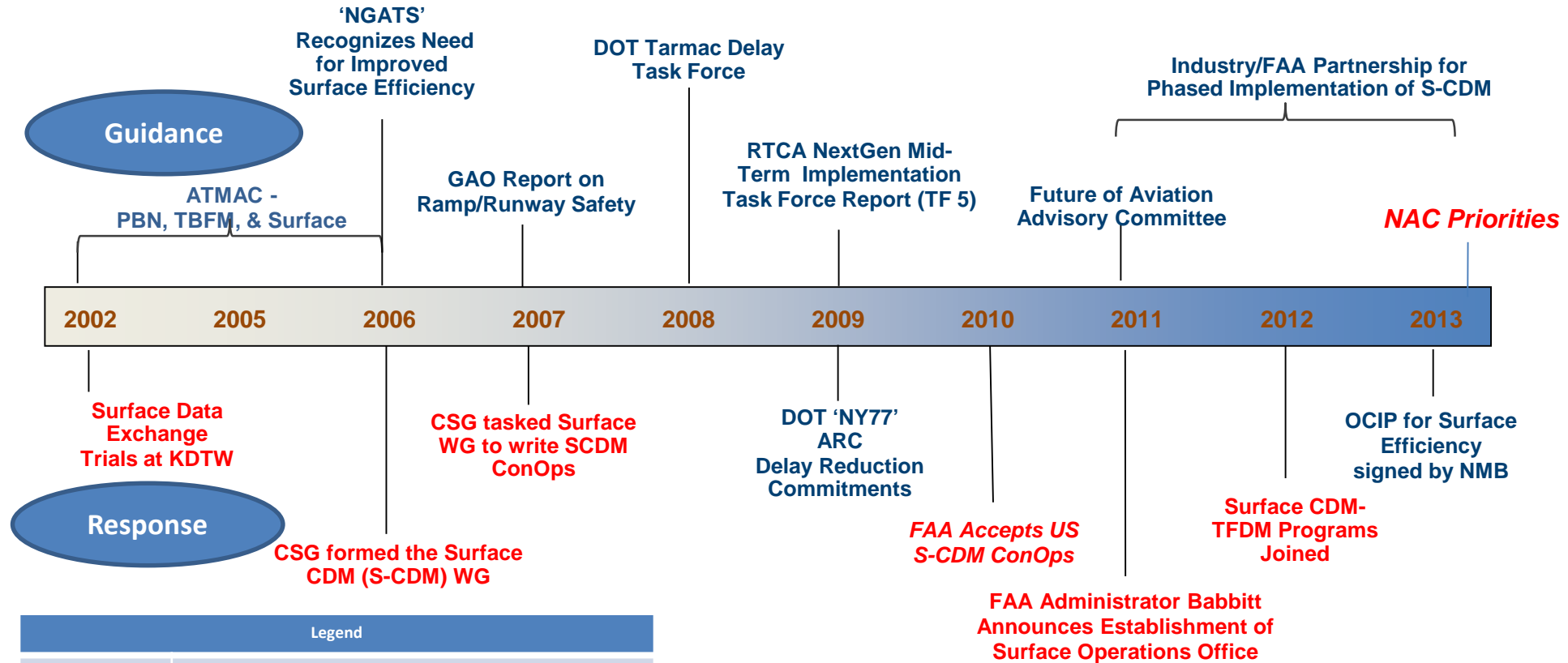


Unpredictable airport surface operations increase costs

- Unnecessary fuel burn / emissions / noise
- Uninformed or under-informed decision making about operations
- Unnecessary block to compensate for lengthy tarmac delays

Evolution of the FAA's Surface CDM Concept

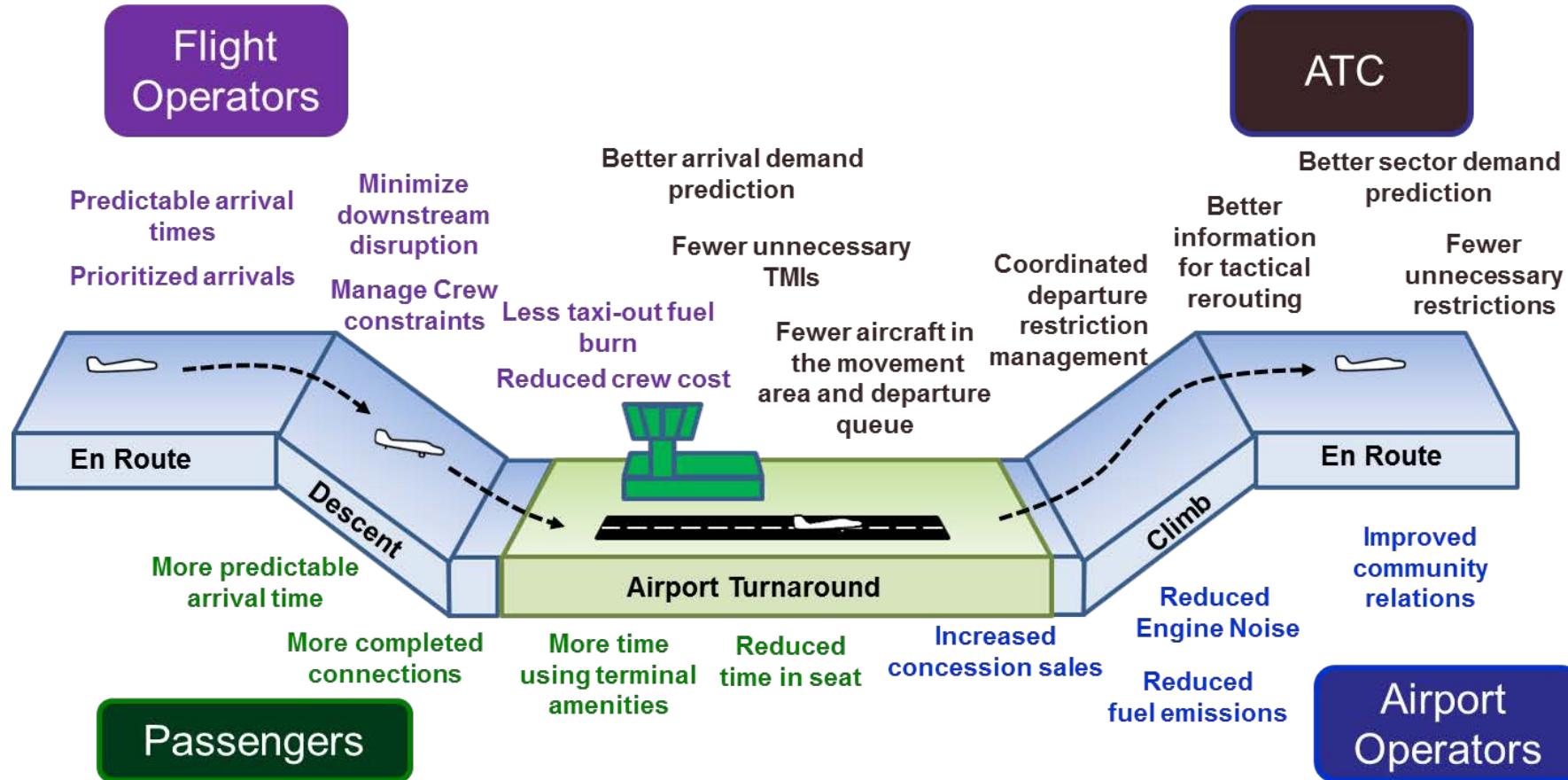
CDM at its finest!



Legend	
NGATS	NextGen Air Traffic System
S-CDM	Surface CDM
SMWG	Surface Management Working Group
SCT	Surface CDM Team
NAC	NextGen Advisory Committee
OCIP	NMB Surface Ops Capability Integration Plan
A4A	Airlines for America

The Turn Process

Central Component to Improving Surface Efficiencies



Collaborative management of airport surface traffic flows via data exchange is pivotal to achieving estimated benefits of TFDM

Intelligent Data Sharing is Key to Efficient Airport Surface Traffic Management

NASA ATD-2 Initiative is the First Step

- **Proof of Concept initiative began at CLT in 2015**
- **AA is the 'lead carrier' in partnership with NASA and the FAA**
- **Model collaboration between AA CLT Hub Control Center, FAA, NASA, CLT Airport**
- **Optimizes at a system level by minimizing overall delay**
- **Plans at a detailed trajectory level for aircraft movement**
- **Considers all facets including gate, ramp, taxiways, and runways**
- **Uses a fast algorithm suited to real-time operations**
- **Accounts for departures and arrivals**
- **Real-time data exchange between AA Hub Control Center, NASA, FAA facilities**

Intelligent Data Sharing is Key to Efficient Airport Surface Traffic Management – Transition to TFDM

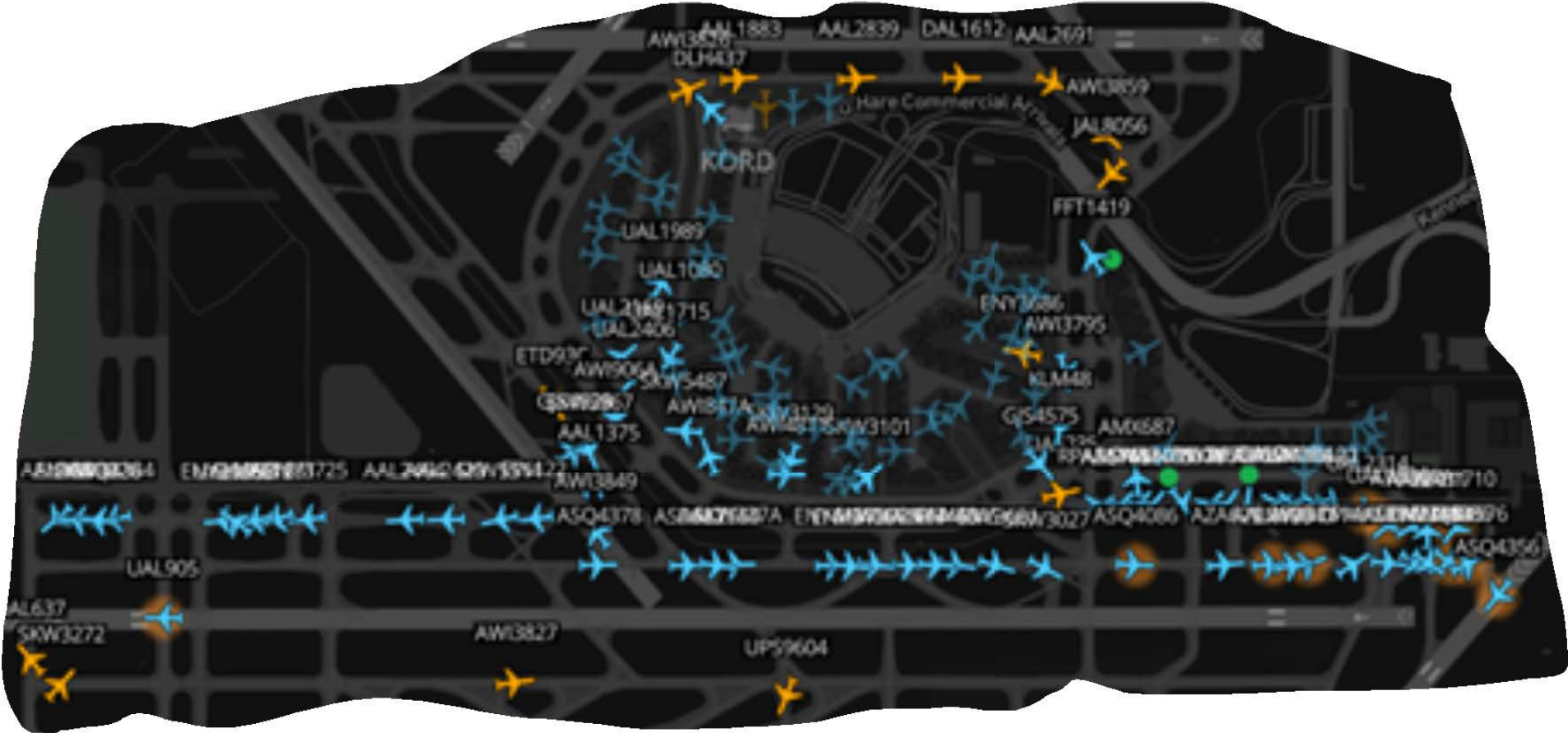
FAA 's TFDM Program is the End State

- *Integration of electronic flight data with automation (surveillance radar and electronic flight strips)*
- *Provision of an infrastructure that supports Decision Support Tools (DSTs) and associated NextGen capabilities*
- *Metering of flights into the departure queues as necessary, in order to reduce airport congestion and permit “overflow” flights to await their turn at the gates (or designate holding areas), with their engines off*
- *Continuous exchange of accurate, timely flight status data to forecast demand/capacity imbalances and need for a TMI*

Surface Metering Program (SMP) – First new TMI since circa 2005!

The Problem We Are *STILL* Trying to Solve

ORD on a Bad Day in 2019
 80+ Flights in the departure queue



NASA / FAA / AA Partnership at CLT

ATD-2 - An Opportunity to Get Ready for TFDM



Paul Sichko

Vice President – Operations

Dallas Fort Worth International Airport

DFW one of four airports participating in FAA A-CDM Pilot Program

Executed Memorandum of Understanding identifying data exchange elements

Two-way exchange of data and information

SWIM data feed capabilities

DFW ITS has configured AODB to support information exchange

SWIM feed access supports multiple internal DFW projects and airport performance metric calculations

Surface CDM Team participant

Support of multiple SCT task assignments

Provided guidance to FAA on airport survey documents and TFDM LOA template

ATD-2
Industry Workshop
September 4-5, 2019



AGENDA			
WEDNESDAY, SEPTEMBER 4, 2019			
TIME	DESCRIPTION	PRESENTER	LOCATION
0730 - 0800	Registration		Fountain View
0800 - 0815	Welcome	Akbar Sultan, NASA	Texas Learning Center
0815 - 0845	Workshop Overview and Perspectives	Al Capps	Texas Learning Center
0845 - 1000	Preparing for the Transition to TFD and a Data-Driven NAS. Perspectives from Industry and FAA leaders	Workshop Panel	Texas Learning Center
1000 - 1015	Break		
1015 - 1130	BREAKOUT 1 – Topic A		Texas Learning Center
	BREAKOUT 1 – Topic B		Trinity II
	BREAKOUT 1 – Topic C		Park West E/F
1130 - 1245	Lunch	Dover's Grille or Morsels (Omni) Shuttle to Salata & nearby eateries	

Color	Workshop Tracks – Descriptions Below	
Yellow	Surface System Capabilities (TFDM pre-cursor lessons learned)	
Orange	Understanding and Quantifying NAS Performance and Benefits (Analytical Focus)	
Grey	Understanding TFD from a multi-system decision support viewpoint	
Green	Future Vision and Needs of the NAS (Enabled by TFD, SWIM and collaboration)	

Table 1- Legend of Available Tracks

Breakout Sessions Overview

Submit your questions online via our NASA Conference I/O tool; see arc.cnf.io links below for each room

Day	Breakout	Time	Topic A - Texas Learning Center //arc.cnf.io/sessions/qznr	Topic B – Trinity II //arc.cnf.io/sessions/zyhb	Topic C - Park West E/F //arc.cnf.io/sessions/hn3b
4-Sep	1	1015 – 1130	'Fuser in the cloud' overview and latest updates/needs	Future surface decision support overview (with ATD-2 demo)	SWIM-Fused data products used by ATD-2 analysts for quantifying NAS performance and benefits (part 1)
4-Sep	2	1245 – 1345	Latest strategic surface metering system and progress status in CLT (extending freeze horizon)	Understanding TMIs in the NAS (Part 1)	SWIM-Fused data products used by ATD-2 analysts for quantifying NAS performance and benefits (part 2)



1620 - 1700	Close/Summary of Day 1 and Preview of Day 2	Al Capps	Texas Learning Center
1700 - 1800	(Optional) Extra-Innings Q/A Session with ATD-2	ATD-2 Technical Lead Representatives	Trinity I (Demo Room)
1800 - 2000	Networking Social Outing	Green Gator Cajun Sports Bar @ Toyota Music Factory	

- Logistical announcements
- High level summary of day 1 feedback thus far



ATD-2 Industry Workshop Networking Social

Wednesday, September 4
6-8 pm

(Happy Hour specials extended until 8 pm!)

Green Gator Cajun Sports Bar
at Toyota Music Factory

340 West Las Colinas Blvd
Suite 100
Irving, TX 75039

Complimentary Continuous Shuttle Service
5-10 pm (last pickup at 9:45 pm)
14-seat capacity; first-come, first-served

AGENDA
THURSDAY, SEPTEMBER 5, 2019

0800 start



TIME	DESCRIPTION	PRESENTER	LOCATION
0715 - 0800	(Optional) Pre-Game Q/A Session with ATD-2	ATD-2 Technical Lead Representatives	Trinity I (Demo Room)
0800 - 0815	Welcome	Lorne Cass, AAL	Texas Learning Center
0815 - 0830	Brief review of day 1 feedback and a preview of day 2 activities	Al Capps	Texas Learning Center
0830 - 0940	Discuss early results of ongoing evaluation of Trajectory Options Set (TOS) with Surface for Metroplex departures	Workshop Panel	Texas Learning Center
0940 - 0950	Break		
0950 - 1050	BREAKOUT 5 – Topic A		Texas Learning Center
	BREAKOUT 5 – Topic B		Trinity II
	BREAKOUT 5 – Topic C		Park West E/F
1050 - 1100	Break		
1100 - 1215	Opportunity for formulation input into NASA's future aviation plans (with NASA ATD and ATM-X projects)	NASA ATD and ATM-X Project Representatives	Texas Learning Center
1215 - 1345	Lunch	Dover's Grille or Morsels (Omni) Shuttle to Torchy's Tacos & nearby eateries	
1345 - 1445	BREAKOUT 7 – Topic A		Texas Learning Center
	BREAKOUT 7 – Topic B		Trinity II
	BREAKOUT 7 – Topic C		Park West E/F
1445 - 1455	Break		
1455 - 1555	BREAKOUT 8 – Topic A		Texas Learning Center
	BREAKOUT 8 – Topic B		Trinity II
	BREAKOUT 8 – Topic C		Park West E/F
1555 - 1605	Break		
1605 - 1705	Workshop wrap-up and discussion on any additional tech transfer needs of the ATD-2 team	Al Capps	Texas Learning Center
1705 - 1800	(Optional) Extra-Innings Q/A Session with ATD-2	ATD-2 Technical Lead Representatives	Trinity I (Demo Room)