Logistics and Introductions

Presented by: Shawn Engelland

NASA ATD Project Manager

September 22-23, 2021

TIM Video Streaming Platform

We are broadcasting the ATD TIM via YouTube Live Stream

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ATD Project Overview

Presented by: Shawn Engelland

NASA ATD Project Manager

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NASA Aeronautics
Vision for Aviation in the 21st Century

ARMD continues to evolve and execute the Aeronautics Strategy *https://www.nasa.gov/aeroresearch/strategy*

6 Strategic Thrusts

- Safe, Efficient Growth in Global Operations
- Safe, Quiet, and Affordable Vertical Lift Air Vehicles
- Innovation in Commercial Supersonic Aircraft
- In-Time System-Wide Safety Assurance
- Ultra-Efficient Subsonic Transports
- Assured Autonomy for Aviation Transformation

ATD delivered capabilities that address NASA Aeronautics Strategic Thrust #1

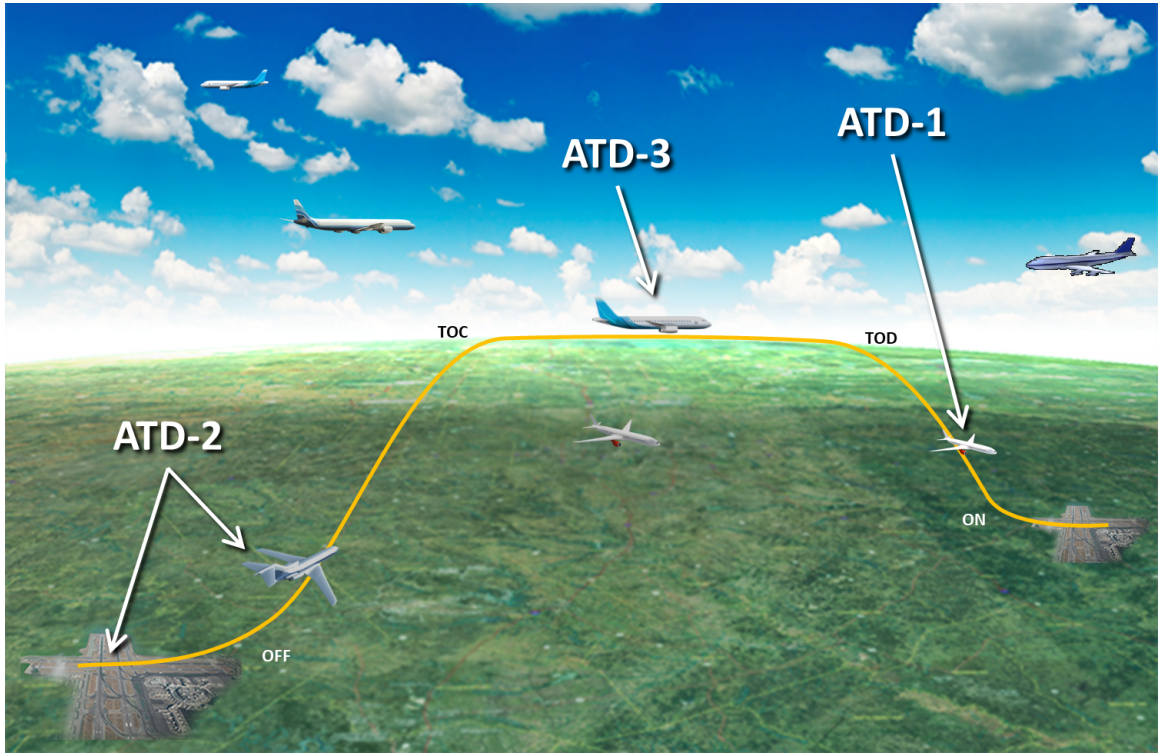
Context – Operational Domains

Every time you fly, NASA's ATD technologies found in cockpit and ground-based systems are guiding you through your flight. We really are "with you when you fly."

ATD-1 Terminal Sequencing and Spacing / Flight Deck Interval Management: *Improve terminal arrival operations efficiency while increasing arrival throughput*

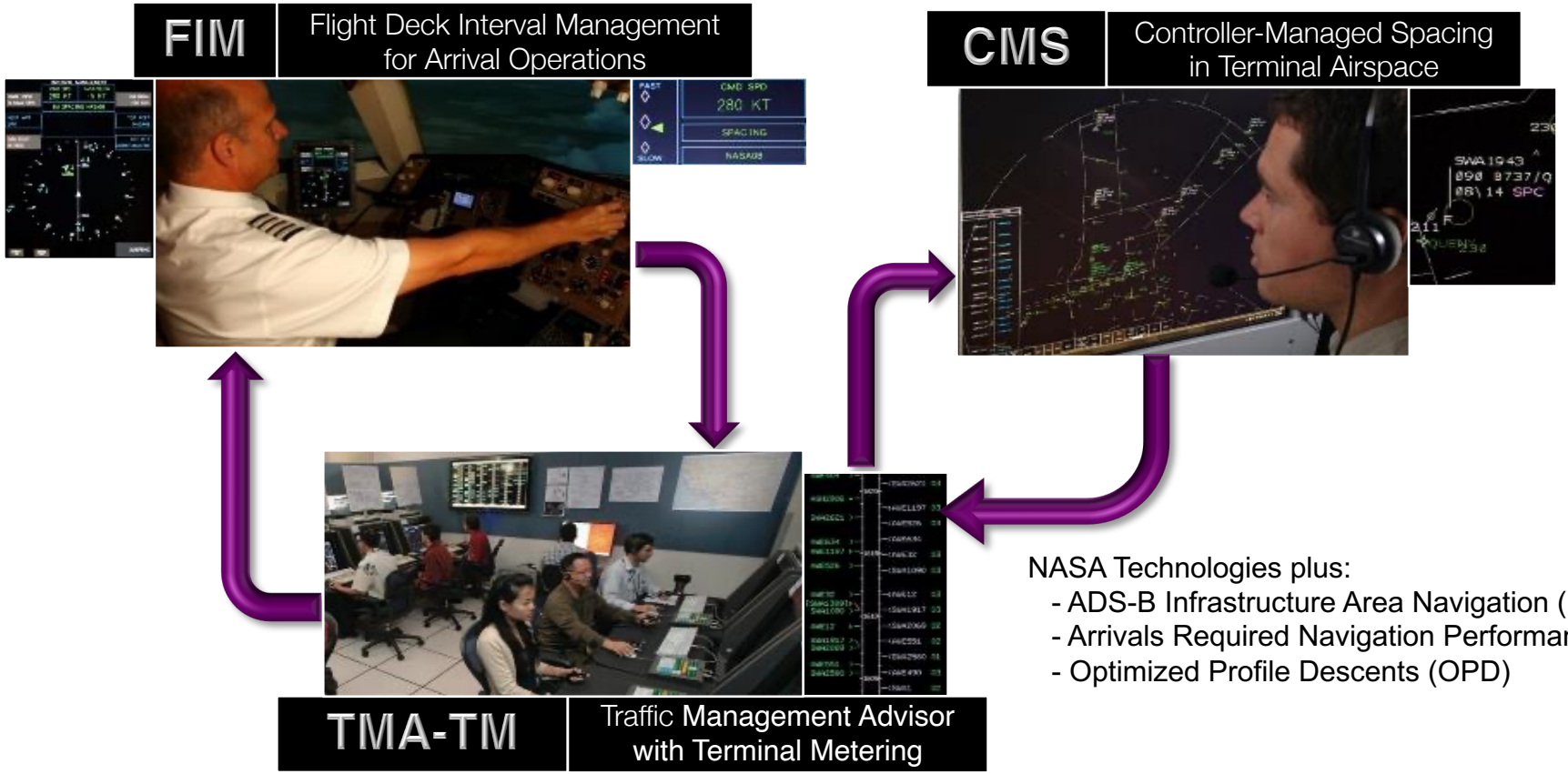
ATD-2 Integrated Arrival/Departure/Surface: *Improve the predictability and efficiency of airport surface and terminal departure operations*

ATD-3 Applied Traffic Flow Management: *Reduce weather-related delays through the integration of weather information with en route traffic flow management tools*



ATD-1 Technical Challenge

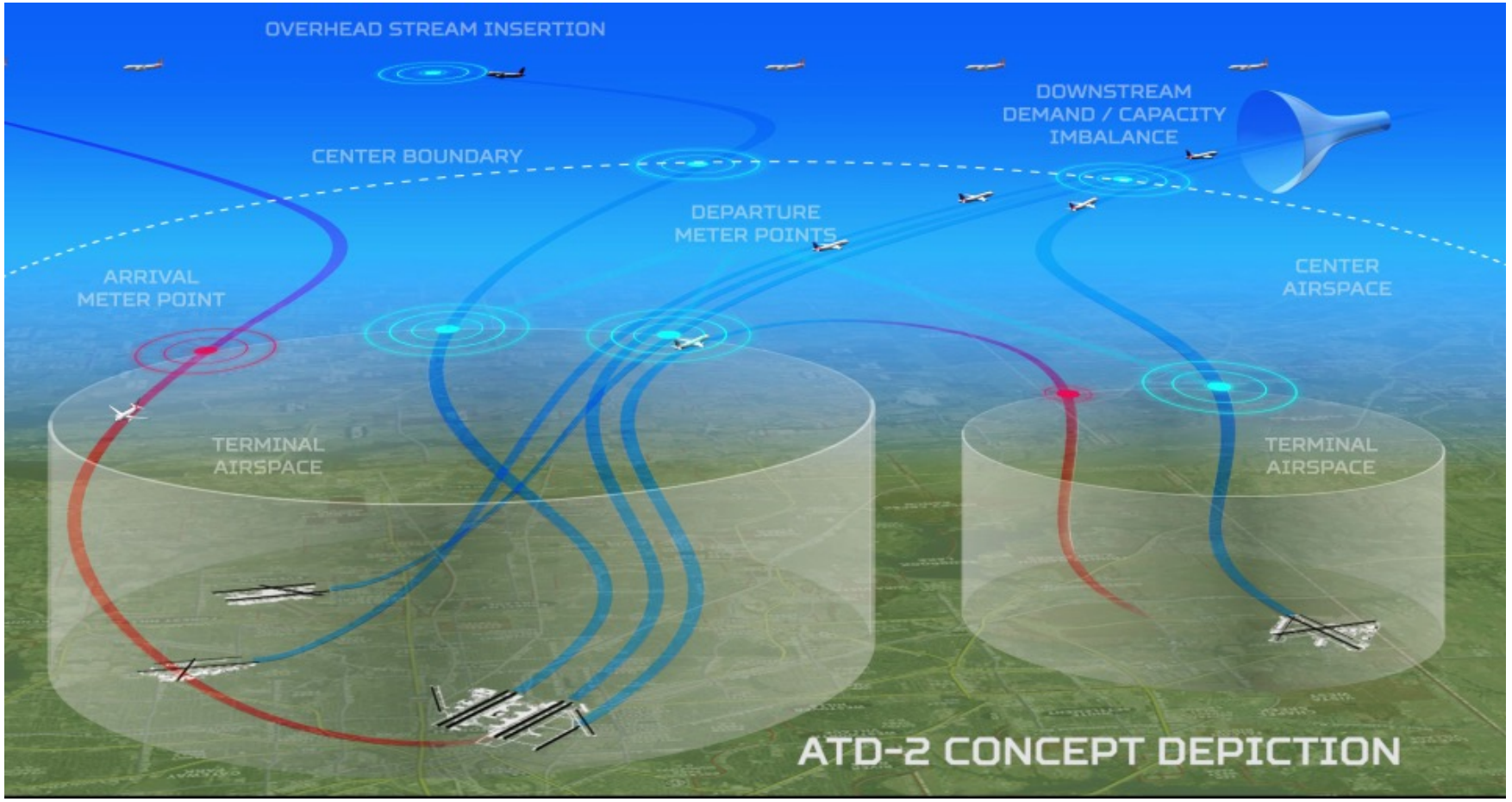
Develop and deliver integrated aircraft-based and ground-based automation technologies to the FAA NextGen and Air Traffic Organizations, the FAA Surveillance Based Systems Program Office, and flight operators, to enable improved arrival operations efficiency while increasing arrival throughput.



NASA Technologies plus:
- ADS-B Infrastructure Area Navigation (RNAV)
- Arrivals Required Navigation Performance (RNP)
- Optimized Profile Descents (OPD)

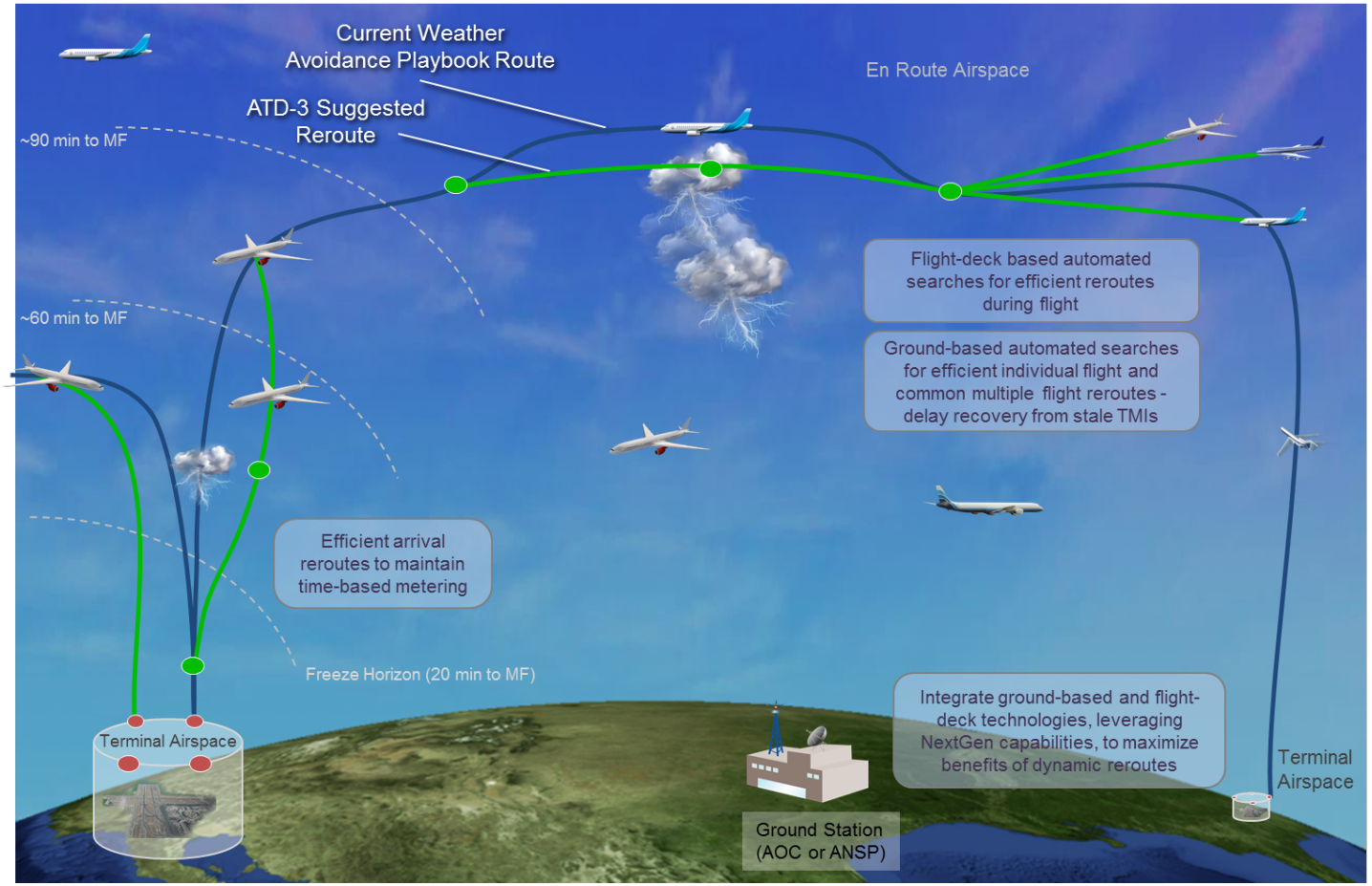
ATD-2 Technical Challenge

Develop and deliver an integrated metroplex traffic manager to the FAA NextGen and Air Traffic Organizations, flight operators, and airport operators, that leverages NASA, FAA and industry technologies to enable simultaneous improvement of the predictability and efficiency of arrival, departure and surface operations.



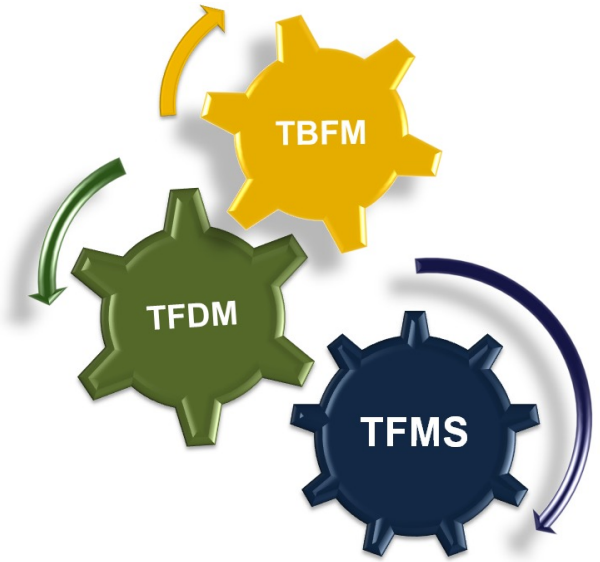
ATD-3 Technical Challenge

Develop and deliver air/ground technologies and procedures to the FAA and flight operators that enable reduced weather-induced delays through the integration of weather information to better manage aircraft, traffic flow, airspace and schedule constraints.



Context – FAA NextGen Systems

Decision Support Systems (a.k.a. 3Ts) are the engines of NextGen and, along with SWIM, form the foundation for the future of air traffic management



Time-Based Flow Management (TBFM)

Decision support system for **metering** based on time to **optimize the flow of aircraft**.

Terminal Flight Data Management (TFDM)

A **new** decision support system for airport **surface management** and ATC tower functions.

Traffic Flow Management System (TFMS)

Decision support system for planning and mitigating **demand-capacity imbalances** in the NAS.

System Wide Information Management (SWIM)

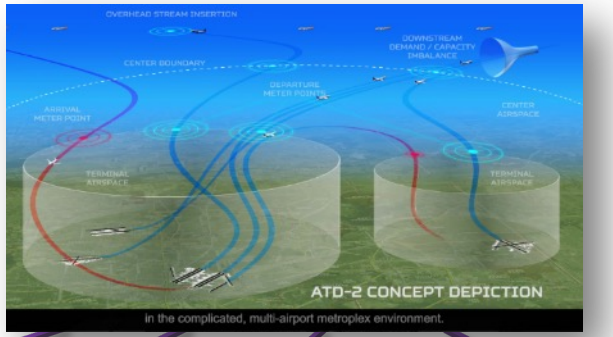
The digital data-sharing **backbone** of NextGen. Deliver the right information to the right people at the right time.

Project Chronology

ARMD Strategic Thrust:
Safe, Efficient Growth in Global Operations

ATD Project Objectives:
Accelerate the maturation of integrated air traffic management concepts and technologies to higher TRL for transition to stakeholders

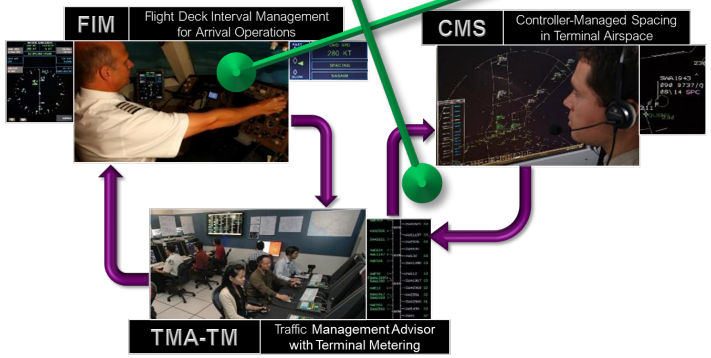
Integrated Arrival/Departure/Surface (IADS) traffic management for metroplex environments **(ATD-2)**



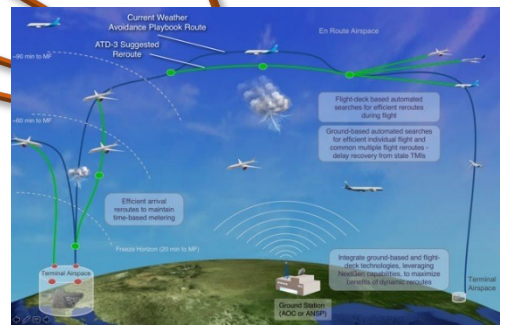
FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21

Begin Execution

Project Closeout

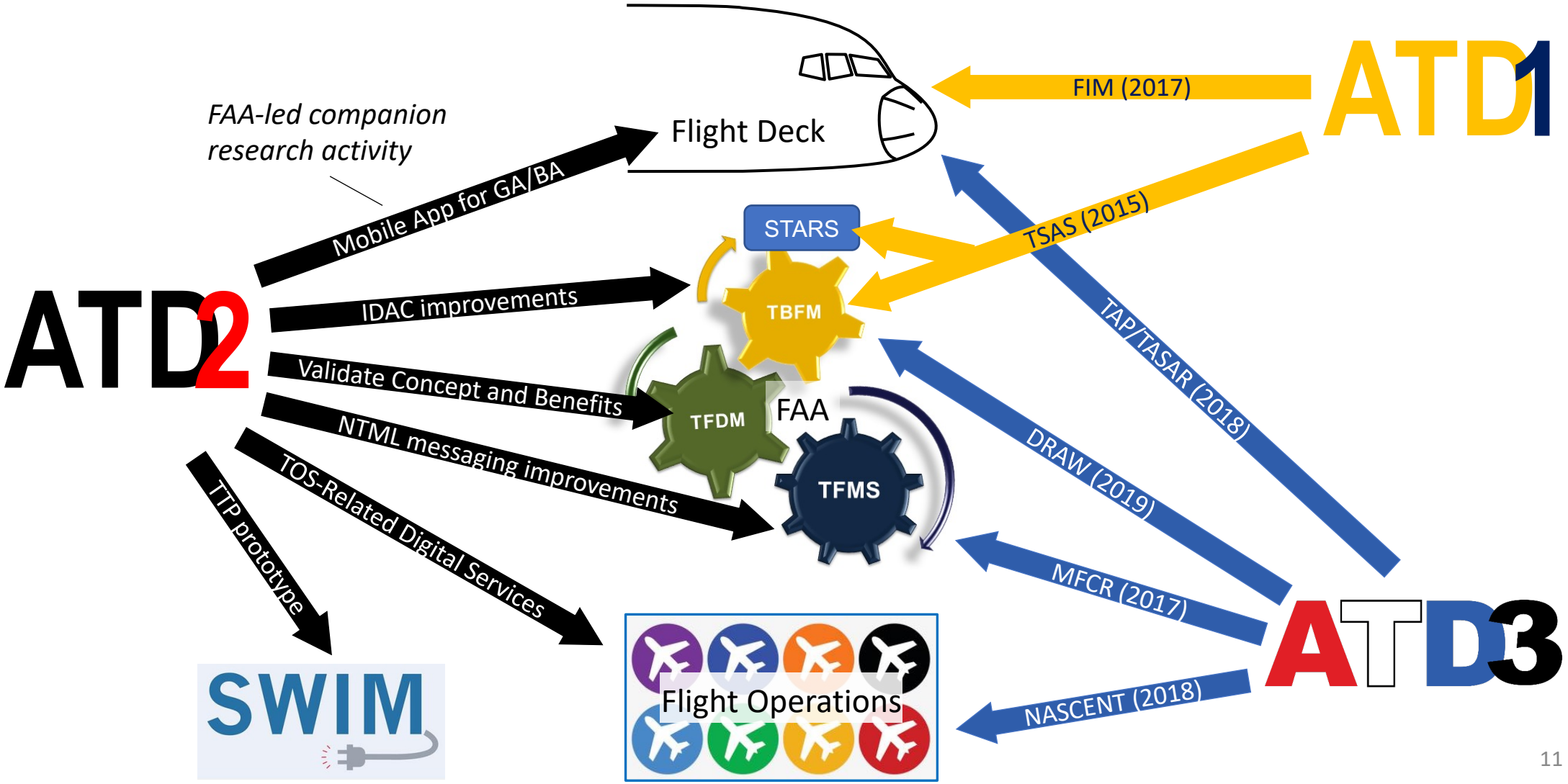


ATM Technology Demonstration **(ATD-1)**

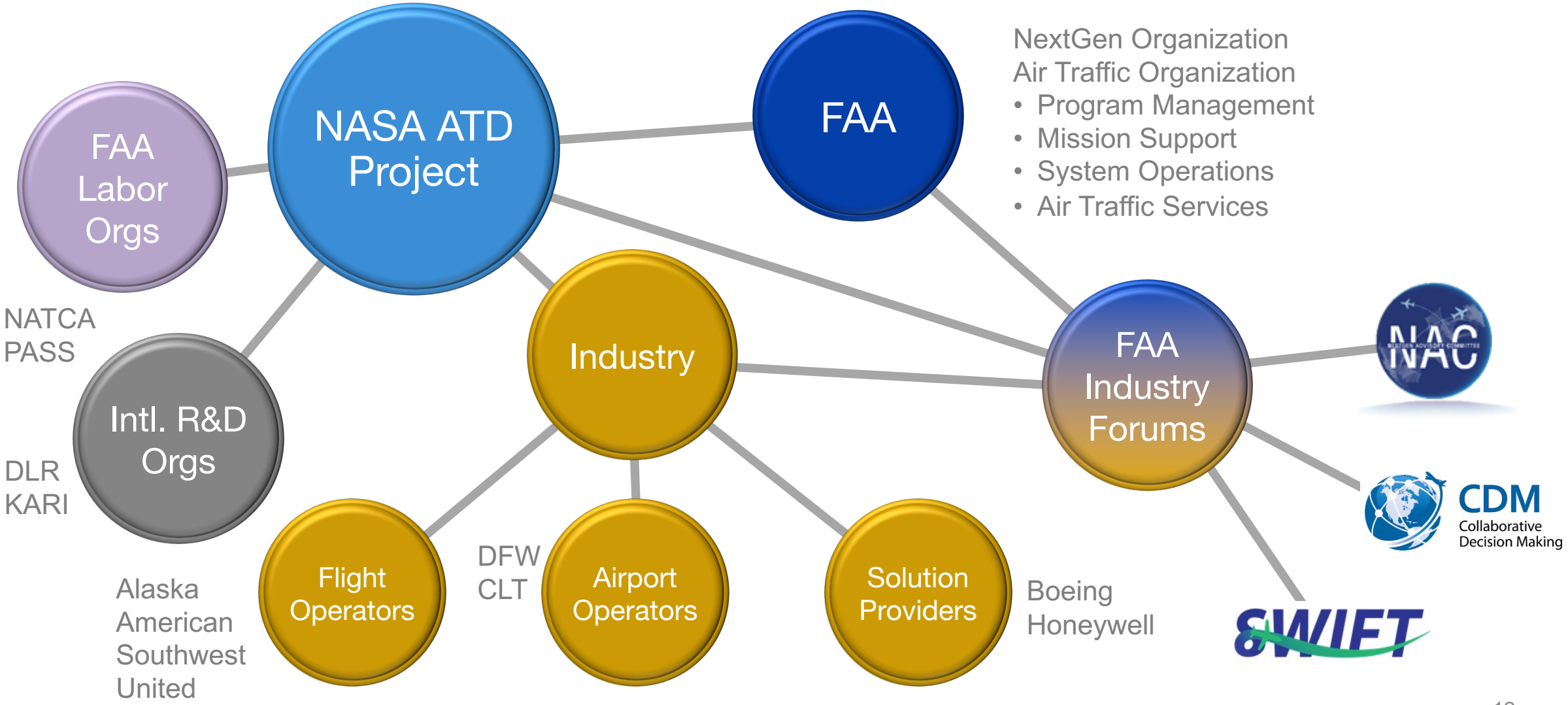


Applied Traffic Flow Management **(ATD-3)**

Technology & Knowledge Transfers to FAA *and* Industry



Partnerships / Stakeholders



Many other contributors. Highlighting direct cost-sharing partners.

TIM Agenda (1 of 4)

AGENDA - Day 1: Wednesday, September 22, 2021		
Session Times (ET)	**Topic**	**Speakers / Session Coordinators / Moderators**
1100 – 1105	**Welcome and Logistics**	Shawn Engelland
1105 – 1130	**Opening Remarks**	Bob Pearce, Associate Administrator, NASA Aeronautics Research Mission Directorate Pamela Whitley, Assistant Administrator, FAA Office of NextGen
1130 – 1200	**ATD Project Overview**	Shawn Engelland, NASA
1200 – 1400	**ATD-1** / Trajectory Based Operations (TBO)	Coordinators: Dr. Ian Levitt, NASA and Mike Prichard, NASA / Cavan Solutions
1400 – 1430	**ATD-1** / Q&A	Moderator: Leighton Quon, NASA

TIM Agenda (2 of 4)

AGENDA - Day 1: Wednesday, September 22, 2021		
Session Times (ET)	**Topic**	**Speakers / Session Coordinators / Moderators**
1430 – 1500	**Break**	
1500 – 1600	**ATD-3** / Traffic Aware Strategic Aircrew Requests (TASAR)	Coordinator: David Wing, NASA
1600 – 1615	**ATD-3** / Q&A	Moderator: Dr. Kapil Sheth, NASA
1615 – 1715	**ATD-3** / Dynamic Routes for Arrivals in Weather (DRAW) and Multi-Flight Common Route (MFCR)	Coordinator: Matt Modderno, FAA
1715 – 1730	**ATD-3** / Q&A	Moderator: Dr. Kapil Sheth, NASA
1730	**Adjourn**	

TIM Agenda (3 of 4)

AGENDA - Day 2: Thursday, September 23, 2021		
Session Times (ET)	**Topic**	**Speakers / Session Coordinators / Moderators**
1100 – 1105	**Welcome and Logistics**	Shawn Engelland, NASA
1105 – 1130	**Opening Remarks**	Akbar Sultan, Director, NASA Airspace Operations and Safety Program Steve Bradford, Chief Scientist for Architecture and NextGen Development, FAA Office of NextGen
1130 – 1300	**ATD-2** / Single-Airport Integrated Arrival Departure Surface (IADS)	Coordinator: Pete Slattery, NASA / Cavan Solutions
1300 – 1315	**ATD-2** / Q&A	Moderator: Al Capps, NASA

TIM Agenda (4 of 4)

AGENDA - Day 2: Thursday, September 23, 2021		
Session Times (ET)	**Topic**	**Speakers / Session Coordinators / Moderators**
1315 – 1445	**ATD-2** / Multi-Airport IADS	Coordinator: Greg Juro, NASA / Cavan Solutions
1445 – 1500	**ATD-2** / Q&A	Moderator: Al Capps, NASA
1500 – 1530	**Break**	
1530 – 1700	**ATD-2** / Digital Services	Coordinator: Dr. Jeremy Coupe, NASA
1700 – 1730	**ATD-2** / Q&A	Moderator: Al Capps, NASA
1730	**Adjourn**	

TIM Question & Answer Platform

- Throughout the event, please enter your questions/comments in the conferences.io platform
- The questions/comments will be addressed (as time permits) during the designated Q&A sessions
- To access conferences.io, enter https://arc.cnf.io/sessions/y61w/ into your browser

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Remedies for Connectivity Issues

Slow, delayed, or poor network connection or video feed:

- Move closer to your WiFi router
- Reduce network load by disconnecting or turning off other devices
- Switch from WiFi to hardwire (i.e. ethernet cable) connection to router

NOTE: *The video feed (i.e., YouTube Live Stream) may perform better if VPN is not used.*

No network connection

- Try restarting your router and/or modem by cycling power
- Contact your internet service provider to see if there is an outage

With You When You Fly

ATD focused on demonstrating NASA technologies in operational environments and transferring them to the FAA and Industry for implementation. ATD technologies **really are** with you when you fly!

Additional Material

ATD-1 Goal, Objectives, & Outcomes

GOAL: ATD-1 will show the sustained use of fuel-efficient procedures throughout the entire arrival phase of flight, and increasing arrival efficiency during periods of high demand at airports.

OBJECTIVES

- Motivate ADS-B implementation by demonstrating throughput and fuel efficiency benefits in high-density airport operations for arrival flows by integrating flight deck interval management (enabled by ADS-B In/Out avionics), controller-managed spacing tools, and terminal metering
- Transfer ATD-1 technologies beyond NASA

OUTCOMES

- Demonstrated the ATD-1 technologies in an operationally relevant environment
- Quantified the benefits, performance, acceptability, and limitations of the ATD-1 technology
- Transfer an integrated set of technology to the FAA, airlines, airports, and suppliers

ATD-1 Online Content

- Air Traffic Management (ATM) Technology Demonstration - 1 (ATD-1): Terminal Sequencing and Spacing (TSAS) and Flight Deck Interval Management (FIM), Technical Project Site, Videos
  - 06.28.2017 **VIDEO** "It's All in the Timing: New Tech to Tighten Aircraft Spacing"
  - 03.31.2015 **VIDEO** "ATD-1 HITL Simulation"
  - 06.29.2015 **VIDEO** "ATD-1 Animation (v4.4, 4/21/15)"
- 10.26.2018 What is Air Traffic Management Technology Demonstration-1? Web Feature
- 10.01.2018 NASA Presents FAA with New Air Traffic Management Technology, Web Feature
- 12.18.2017 Center Snapshot: Kurt Swieringa, Web Feature
- 09.01.2017 Air Traffic "Win-Win" Wins NASA Software of the Year , Web Feature
- 02.26.2017 **VIDEO** "ATD-1 Team Completes Flight Tests" (Repeat, different channel)
- 02.24.2017 Flight Tests of Air Traffic Tool Complete, Image Feature, Video
  - 02.24.2017 **VIDEO** "ATD-1 Team Completes Flight Tests"
- 02.02.2017 Media Invited to See NASA Air Traffic Management Technology in Action, Media Advisory (Mentions ATD-1)
- 01.11.2017 Prototype Air Traffic Tool Ready for Airborne Workout, Web Feature
- 10.31.2016 NASA Aircraft Arrival Technology Gets Big Test in 2017, Web Feature
- 06.23.2015 NASA-Developed Air Traffic Management Tool Flies Into Use , Web Feature
- 07.15.2014 NASA Turns Over Next-Generation Air Traffic Management Tool to Federal Aviation Administration , NASA Press Release
- 07.14.2014 NextGen Technology Transferred from NASA to FAA , FAA Press Release
- 07.13.2014 NASA Delivers New Air Traffic Spacing Tool to FAA , Web Feature

ATD-2 Goal, Objectives, & Outcomes

GOAL: ATD-2 will improve the predictability and the operational efficiency of the air traffic system in metroplex environments through the enhancement, development and integration of the nation's most advanced and sophisticated arrival, departure and surface prediction, scheduling and management systems.

OBJECTIVES

- Demonstrate improved aircraft arrival, departure and surface movement predictability and efficiency by integrating evolving collaborative decision-making capabilities with state-of-the-art air traffic management scheduling technologies
- Enable effective use of collaborative decision making by demonstrating efficiency gains through enhanced two-way sharing of prediction and scheduling information
- Transfer ATD-2 technologies beyond NASA

OUTCOMES

- Demonstrate the ATD-2 technologies in an operationally relevant environment
- Quantify the benefits, performance, acceptability, and limitations of the ATD-2 technology
- Transfer an integrated set of technology to the FAA and airlines, airports, and suppliers

ATD-2 Online Content

- Airspace Technology Demonstration 2 (ATD-2):Integrated Arrival/Departure/Surface (IADS) Traffic Management , Technical Project Site, Videos
  - 04.20.2018 **VIDEO** "ATD-2 Concept Animation V2.1"
  - 12.23.2017 **VIDEO** "NASA Software Helps Speed Air Travelers On Their Way"
  - 12.20.2017 **VIDEO** "New NASA Field Demo Tests Software to Reduce Airport Delays" (Repeat)
- 10.23.2019 NASA Showcases Benefits of Air Traffic Management Tools, Web Feature
- 09.10.2018 Airspace Technology Demonstration 2 (ATD-2) at FutureFlight Central, Image Feature (NASA Administrator visit)
- 06.25.2018 Airspace Technology Demonstration 2 (ATD-2) Assessment of Ramp Times Human-in-the-Loop Simulation Shakedown, News
- 11.01.2017 NASA Air Traffic Management Demonstration Goes Live in Charlotte, Web Feature, Video
  - 11.01.2017 **VIDEO** "NASA Field Demo to Reduce Ground Delays Begins"
- 06.19.2017 Media Invited to Learn about NASA's Project to Streamline Air Travel, Press Release
- 02.28.2017 Airspace Technology Demonstration 2 (ATD-2) Human-In-The-Loop (HITL) shakedown simulation at FutureFlight Central (FFC) and Airspace Operations Laboratory (AOL), News, Video
  - 12.20.2017 **VIDEO** "New NASA Field Demo Tests Software to Reduce Airport Delays" (Repeat)
- 07.01.2016 NASA and Partners Open New Research Lab at Charlotte Airport, Image Feature (READ MORE goes on to "Transportation Department, NASA, Partners Visit Charlotte to Open Test Lab to Streamline Air Travel")
- 06.24.2016 Transportation Department, NASA, Partners Visit Charlotte to Open Test Lab to Streamline Air Travel, Press Release
- 06.23.2016 NASA Launches 5-Year Tech Demo to Improve Air Traffic Flow at Airports, Web Feature

ATD-3 Goal, Objectives, & Outcomes

Goal: Develop and demonstrate, by 2020, advanced integrated air/ground automation technologies and procedures that enable strategic user-preferred routes and tactical route corrections to be identified and executed.

Objectives: Develop integrated air/ground automation tools which:

- Reduce impact of uncertainty in weather in domestic airspace
- Enable automatic continuous searching for more efficient routes for individual flights in domestic airspace
- Enable automatic continuous searching for more efficient routes for groups of flights in domestic airspace
- Efficiently share route correction options between traffic managers, pilots, dispatchers and controllers in domestic airspace

Outcomes:

- Demonstrate ATD-3 technologies in relevant environments
- Quantify benefits, performance, acceptability, and limitations of ATD-3 technologies
- Transfer of ATD-3 technologies to FAA, airlines, and industry

ATD-3 Online Content

- Airspace Technology Demonstration 3 (ATD-3) Applied Traffic Flow Management , Technical Project Site, Videos
  - 11.17.2017 VIDEO "ATD-3 Integrated Concept Animation V1.2"
- 11.04.2019 NASA Langley Technology Selected as R&D 100 Winner , News Item
- 01.28.2019 Dynamic Routes for Arrivals in Weather (DRAW) at SimLabs, "About" Project Page
- 08.30.2018 NASA and Alaska Airlines Test Software that Saves Time, Fuel, Web Feature
- 06.07.2017 **VIDEO** "ATD-3:Busting Bad Weather Flight Delays" (Repeat, different channel)
- 06.06.2017 **VIDEO** **[NASA/YouTube]** "ATD-3:Busting Bad Weather Flight Delays"