National Aeronautics and Space Administration

Airspace Operations and Safety Program (AOSP)

Leighton Quon
Project Manager
Airspace Technology Demonstrations (ATD) Project

Three mega-drivers have emerged that are shaping the future of aviation

Traditional measures of global demand for mobility—economic development, urbanization—are growing rapidly

Severe energy and climate issues create enormous affordability and sustainability challenges

Revolutions in automation, information and communi-cation technologies enable opportunity for safety critical autonomous systems

NASA Aeronautics Research Six Strategic Thrusts

Safe, Efficient Growth in Global Operations

- Enable full NextGen and develop technologies to substantially reduce aircraft safety risks

Innovation in Commercial Supersonic Aircraft

- Achieve a low-boom standard

Ultra-Efficient Commercial Vehicles

- Pioneer technologies for big leaps in efficiency and environmental performance

Transition to Low-Carbon Propulsion

- Characterize drop-in alternative fuels and pioneer low-carbon propulsion technology

Real-Time System-Wide Safety Assurance

- Develop an integrated prototype of a real-time safety monitoring and assurance system

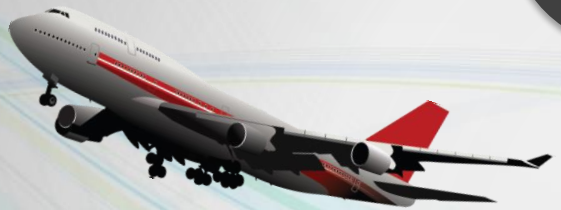
Assured Autonomy for Aviation Transformation

- Develop high impact aviation autonomy applications

What is the Airspace Operations and Safety Program?

This program integrates the Airspace Systems Program and Aviation System-Safety work.

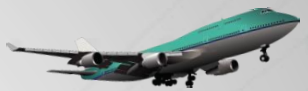
Mission Program



Airspace Operations and Safety Program

Develops and explores fundamental concepts, algorithms, and technologies to increase throughput and efficiency of the National Airspace System safely.

Provides knowledge, concepts, and methods to the aviation community to manage increasing complexity in the design and operation of vehicles and the air transportation system.

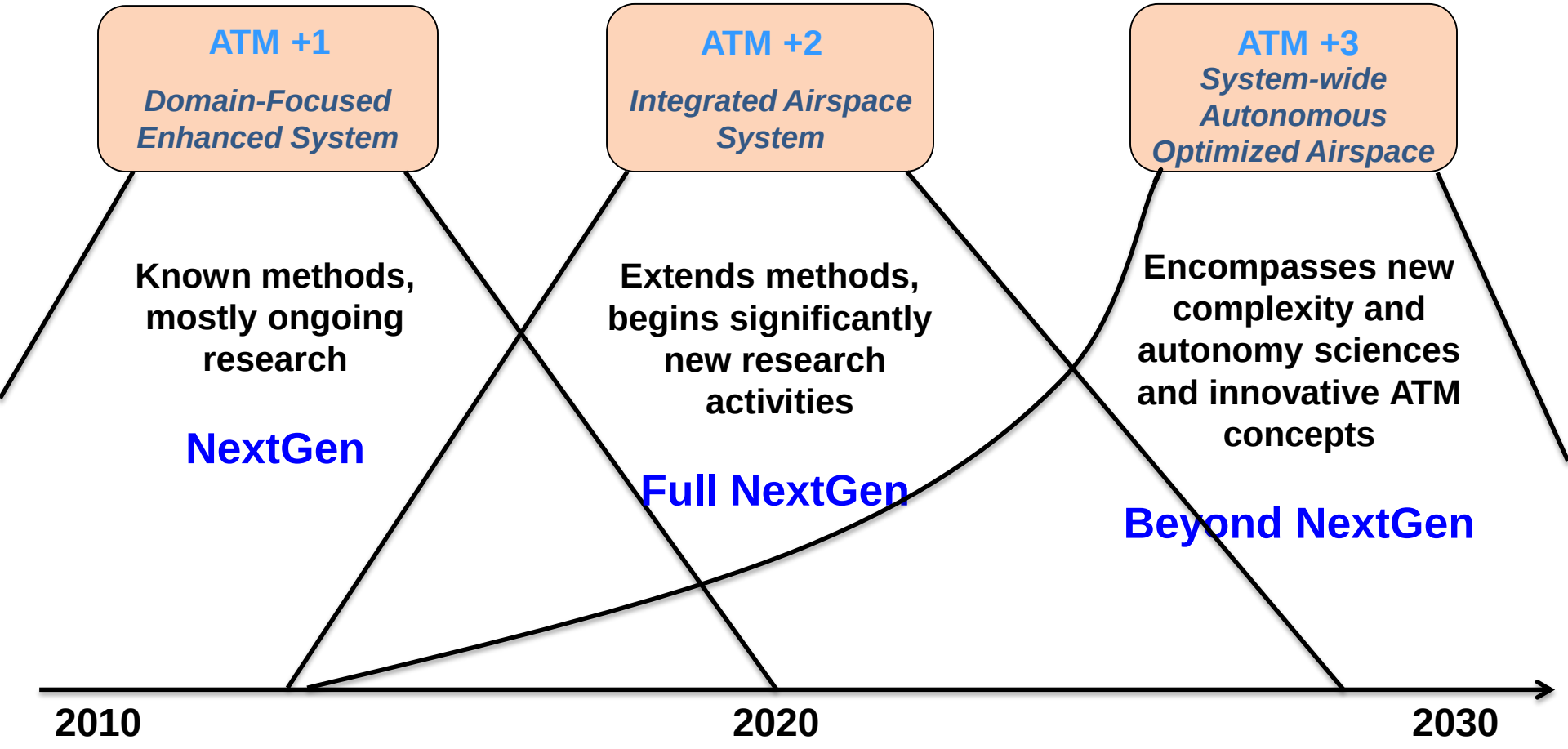


Continues Airspace Systems Program research, and the aircraft state awareness research and system wide safety research that was previously conducted within the Aviation Safety Program.

Projects

- Airspace Technology Demonstrations
- SMART NAS - Testbed for Safe Trajectory-Based Operations
- Safe Autonomous System Operations

ATM Generations Timeline



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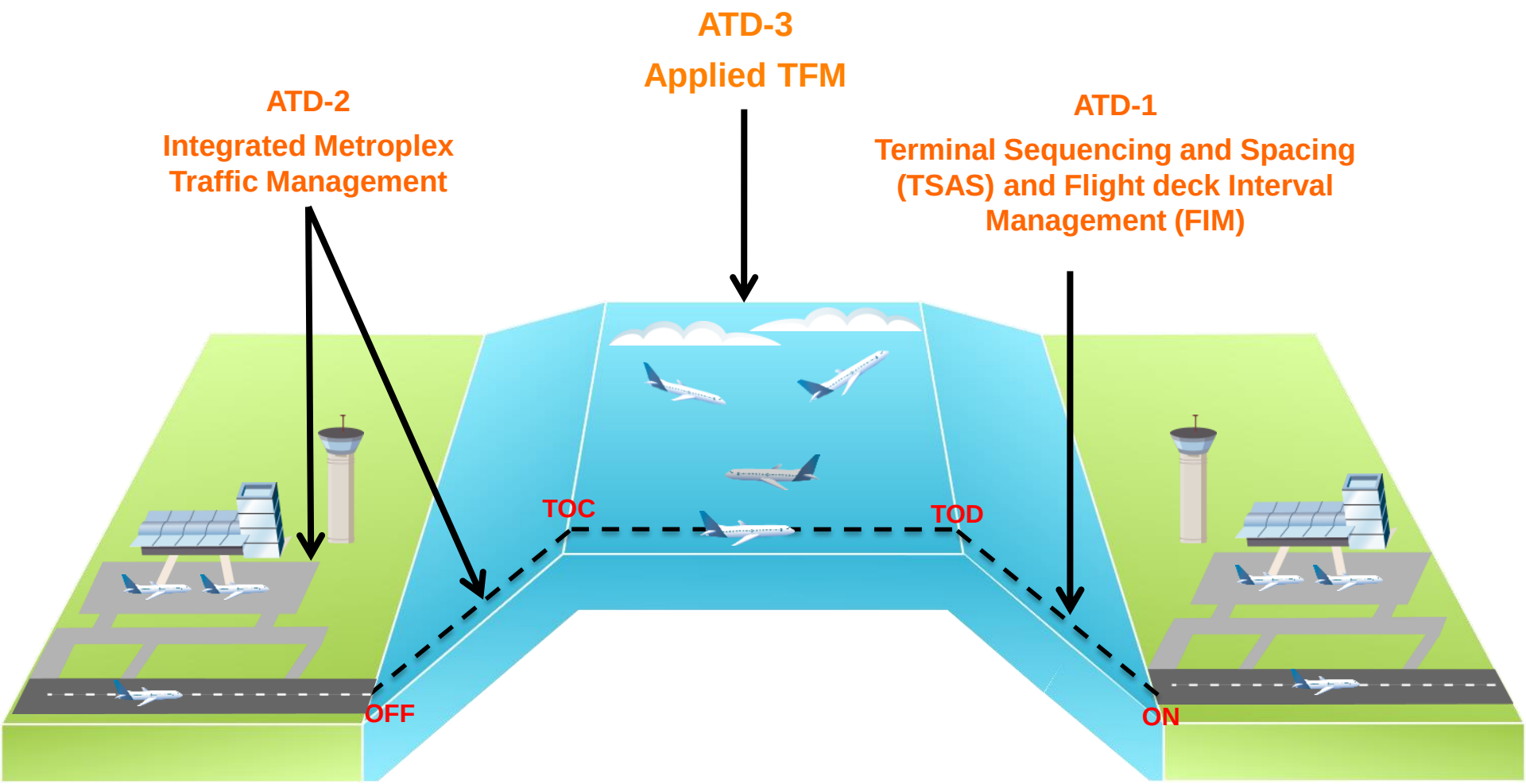
ATD Domains


ATD-3
Applied TFM
ATD-2
Integrated Metroplex Traffic Management
ATD-1
Terminal Sequencing and Spacing (TSAS) and Flight deck Interval Management (FIM)
TOC
TOD
OFF
ON

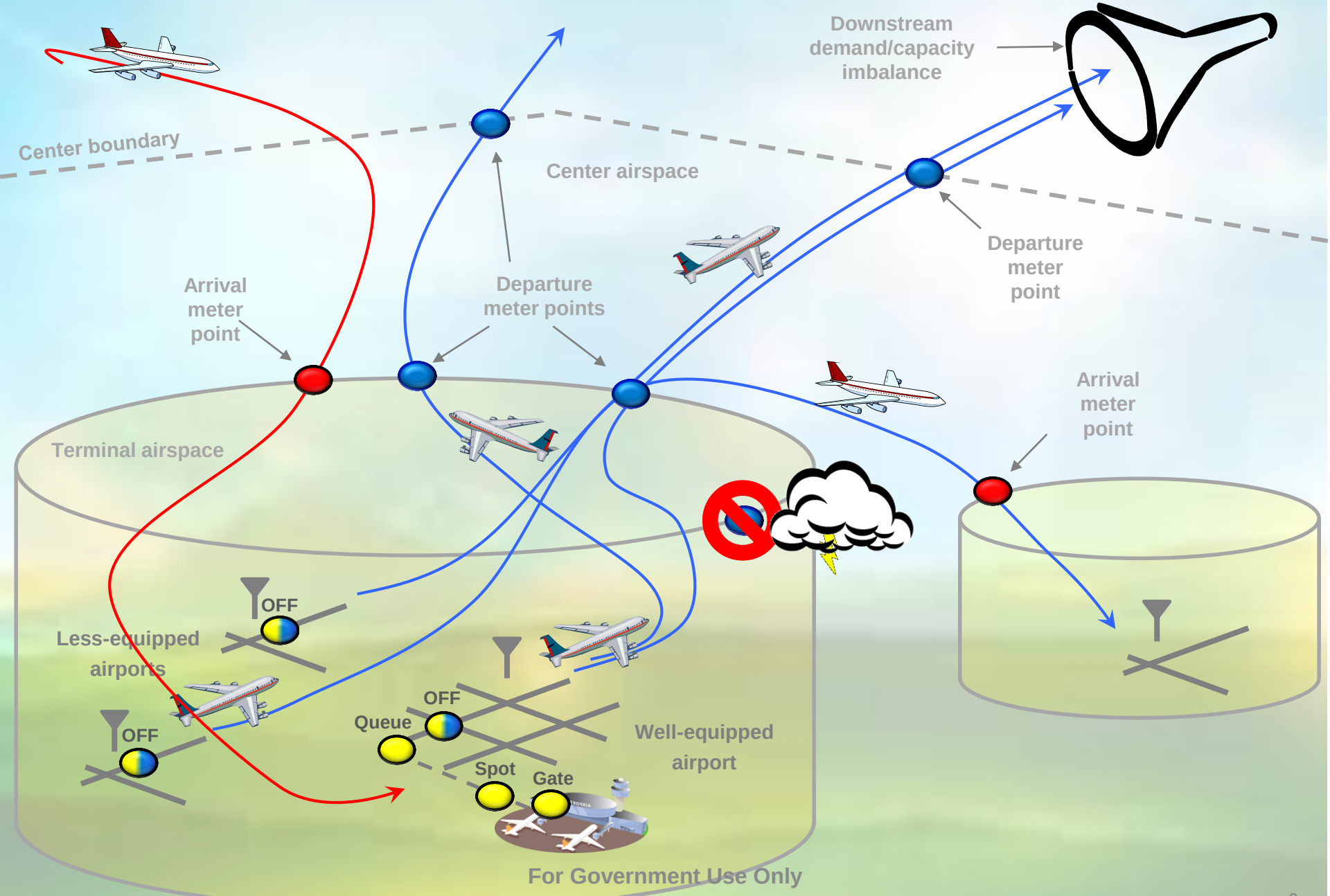
ATD-1 Technologies

FIM Flight Deck Interval Management for Arrival Operations

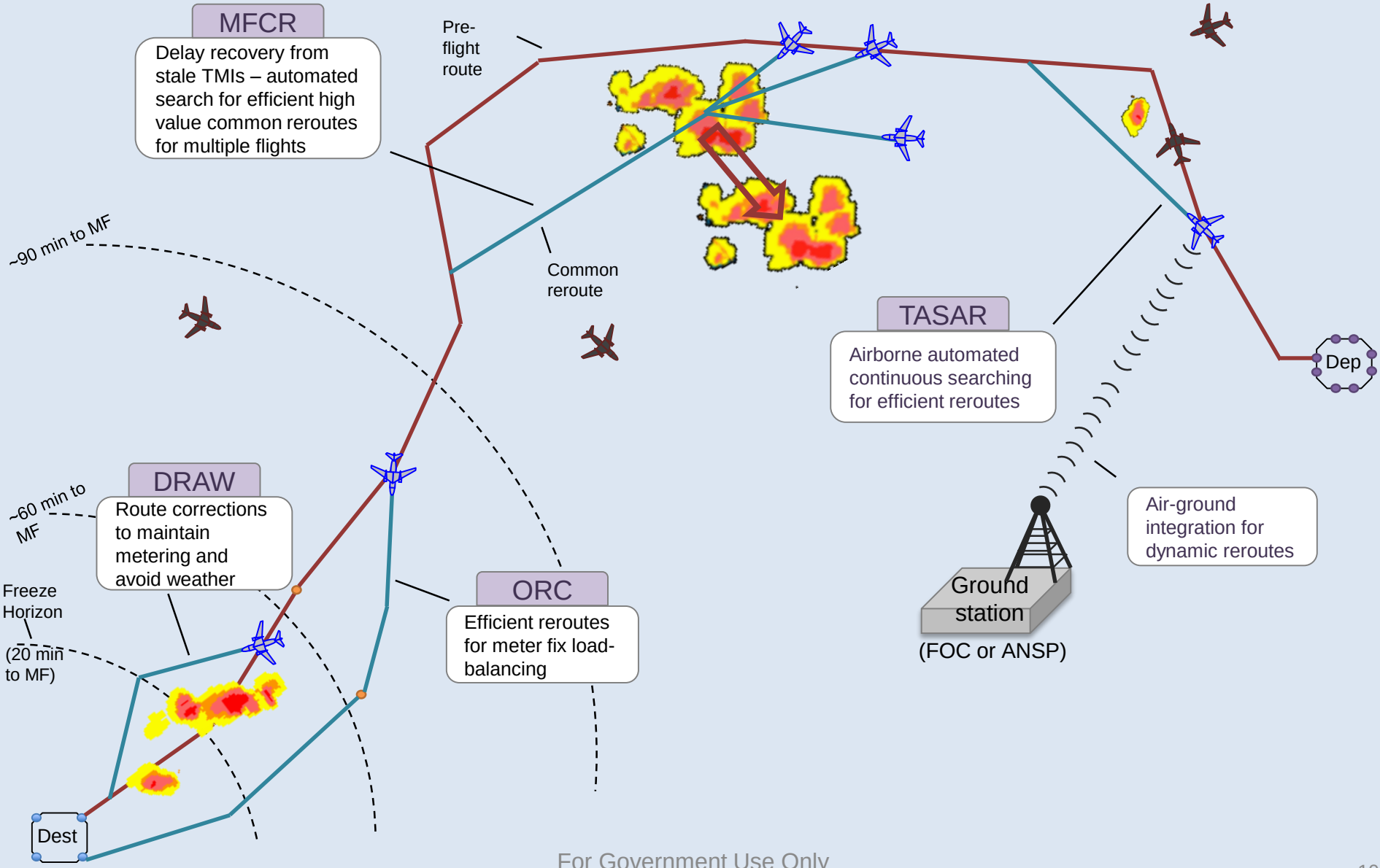
CMS Controller-Managed Spacing in Terminal Airspace

TMA-TM Traffic Management Advisor (TMA) with Terminal Metering

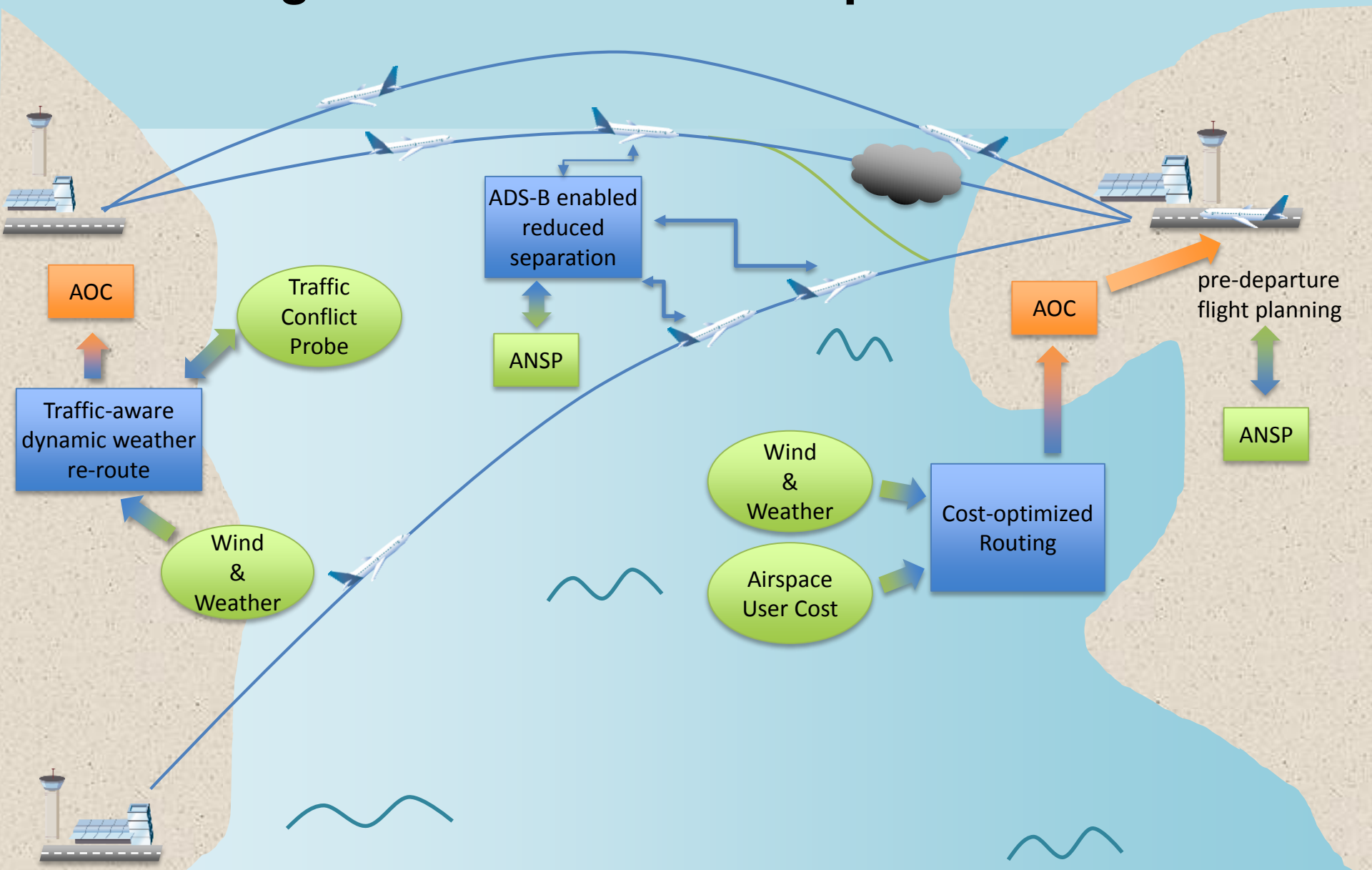
Operational Environment for the ATD-2 Concept



ATD-3 Integrated Domestic Concept



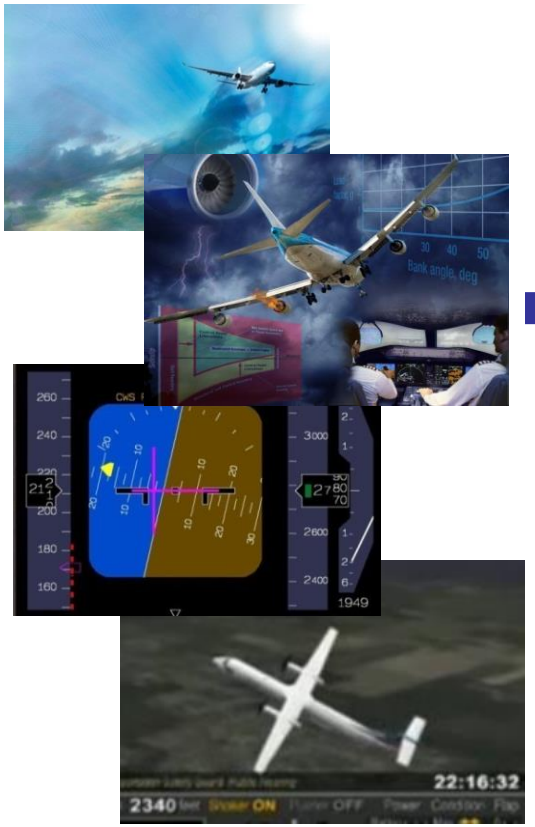
ATD-3 Integrated Oceanic Concept

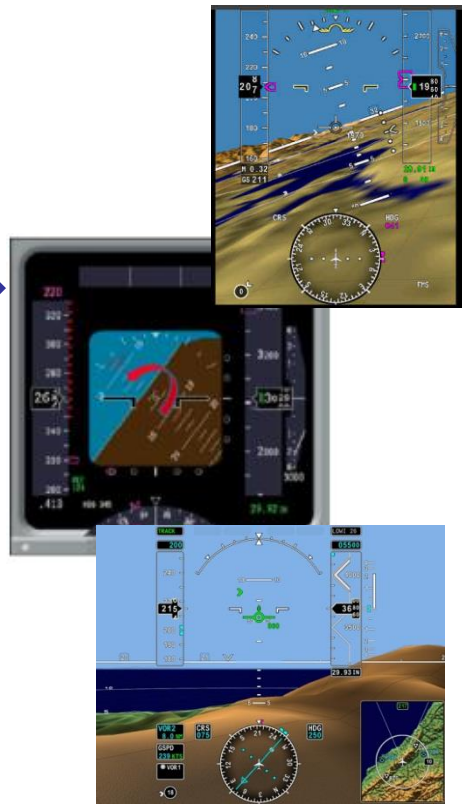


Technologies for Assuring Safe Energy and Attitude State

- CAST's Airplane State Awareness Joint Safety Implementation Team (ASA JSIT) Recommended Research Safety Enhancements (SEs)
- NASA's precursor safety focus to *Increase Pilots' Ability To Avoid, Detect, And Recover From Adverse Events That Could Otherwise Result In Accidents/Incidents*

Cause and Effect → Safety Enhancements





Industry Day Objectives

- Inform
- Engage
- Collaborations
  - Successes from agency collaborations such as ATD-1
  - Opportunities to collaborate in ATD-2 and ATD-3

Partnership Outreach

DELTA

Los Angeles World Airports

United Airlines

BOEING

METRON AVIATION

Virgin america

DFW

U·S AIRWAYS

SFO

Rockwell Collins

SAAB Sensis

THALES

American Airlines

CSC

CCI

Hartsfield-Jackson Atlanta International Airport

THE PORT AUTHORITY OF NEW YORK & NEW JERSEY

NORTHROP GRUMMAN

MOSAIC ATM

FedEx

SOUTHWEST AIRLINES

RAA Regional Airline Association

Honeywell

jetBlue

EXELIS Visual Information Solutions

PASSUR AEROSPACE

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Partners' Opportunities

- Airlines
  - Demonstration metrics
  - Demonstration scenarios
  - Procedure development
  - Participation in tests and studies
  - Training considerations
  - Test Plans
  - Data sharing
  - Demo team participation

Partners' Opportunities

- Manufacturers
  - Participation in tests and studies
  - Standards collaboration
  - Test Plans
  - Configuring NASA or field facilities
  - Equipment loans
  - Demo team participation

Concluding Remarks

- NASA is pursuing partnerships to operationally demonstrate these integrated capabilities:
- NASA has developed several foundational technologies in preparation for a demonstration
- These tools leverage the FAA and Industry investments in NextGen infrastructure: ADS-B, RNAV/RNP routes, and OPD procedures
- These technologies demonstrate the benefits of a critical set of NextGen capabilities for future trajectory based operations

Thank-you