



**Federal Aviation
Administration**

Flight Object - A Component of Global Air Traffic Management

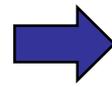
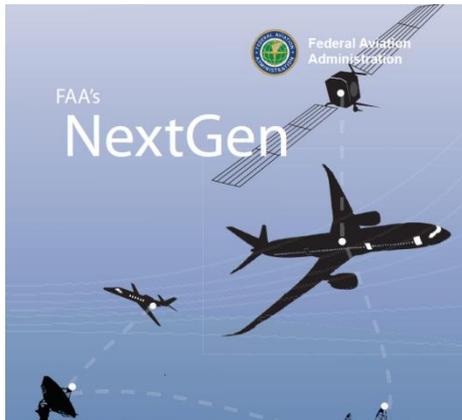
ENRI Int. Workshop on ATM/CNS

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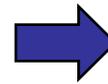
November 11, 2010



Future Needs (NextGen / ICAO)

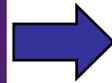
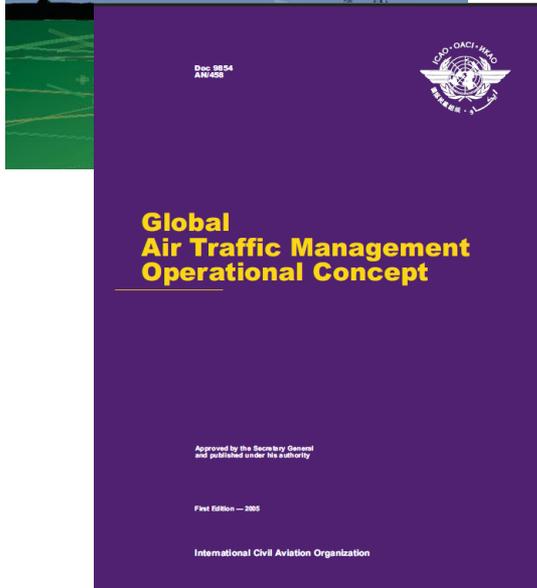


Operational Improvement Flight Information Needs

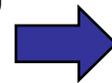


- **Increases in volume and dynamism of information**
- **Cross-domain sharing and consistency**
- **Increased levels of integration across domains**
- **Increased flexibility**

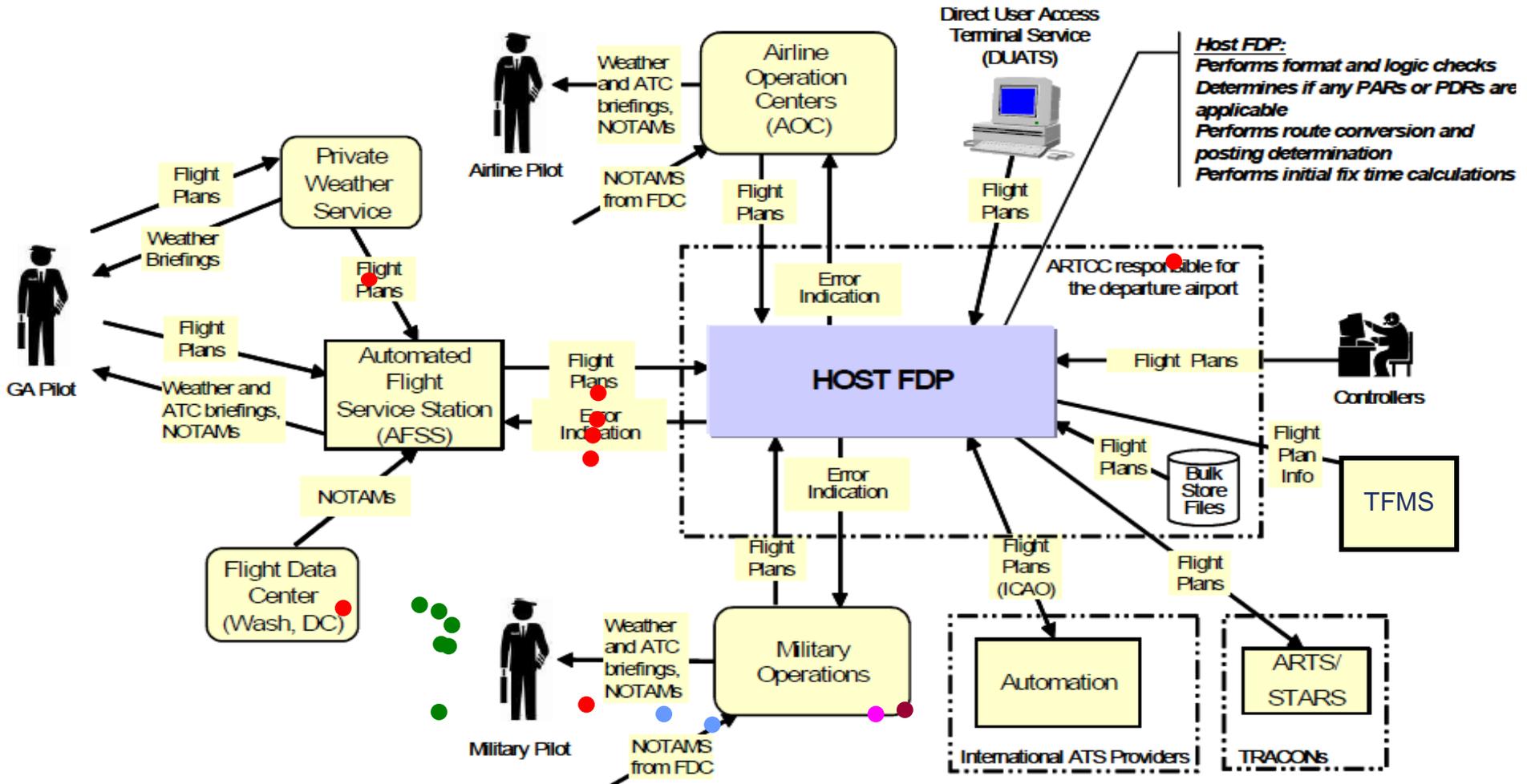
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- **Multi-party info sharing**
 - **Advanced Notification**
 - **Information Consistency**
 - **Information Security**
 - **Flexible Information**



ICAO flight planning provisions do not enable concept

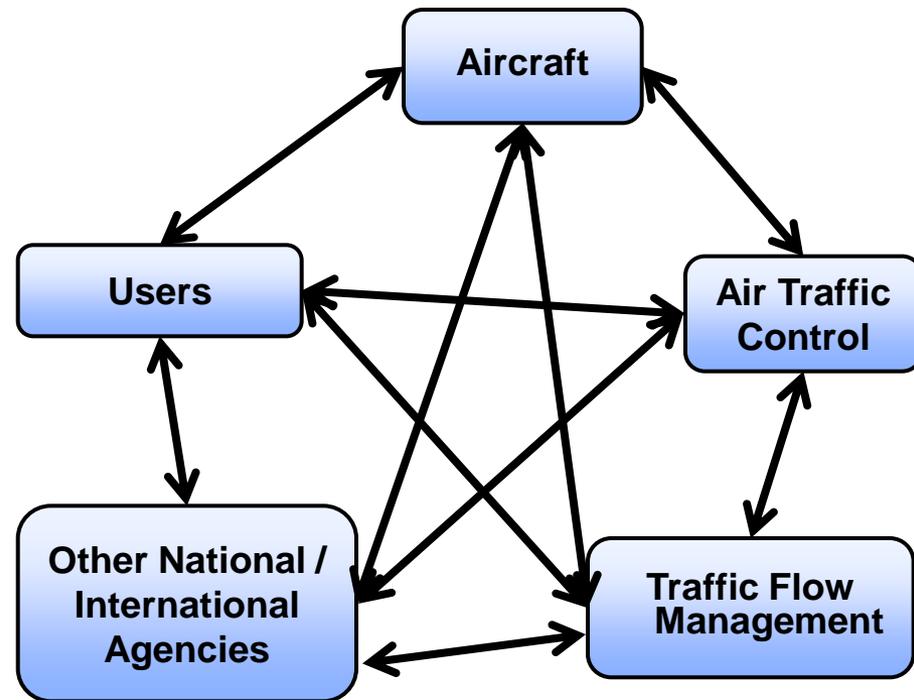


NAS Flight Data Flow – Systems & Actors Example



Today's Flight Data exchanges are not consistent across aviation-related systems

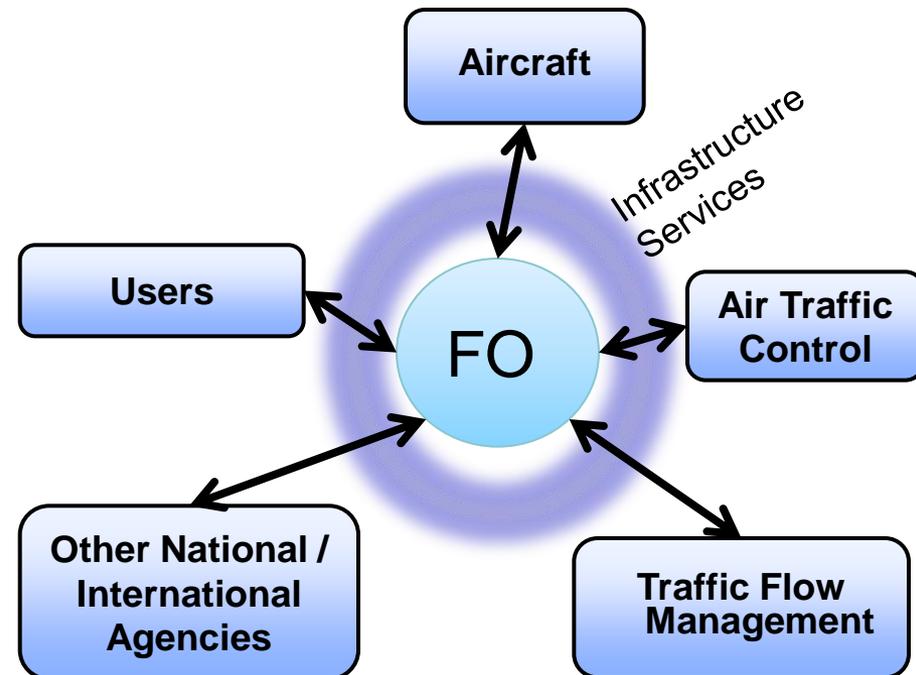
- Systems currently operate as **separate entities** servicing **different flight domains**
- Communication between systems is **point-to-point**
- Systems maintain **different data** about the same flight
- Current information exchanges **do not reliably support** coordination, situational awareness, and collaborative decision making across ANSPs



The Flight Object (FO) facilitates capturing and sharing the most up-to-date information on any flight

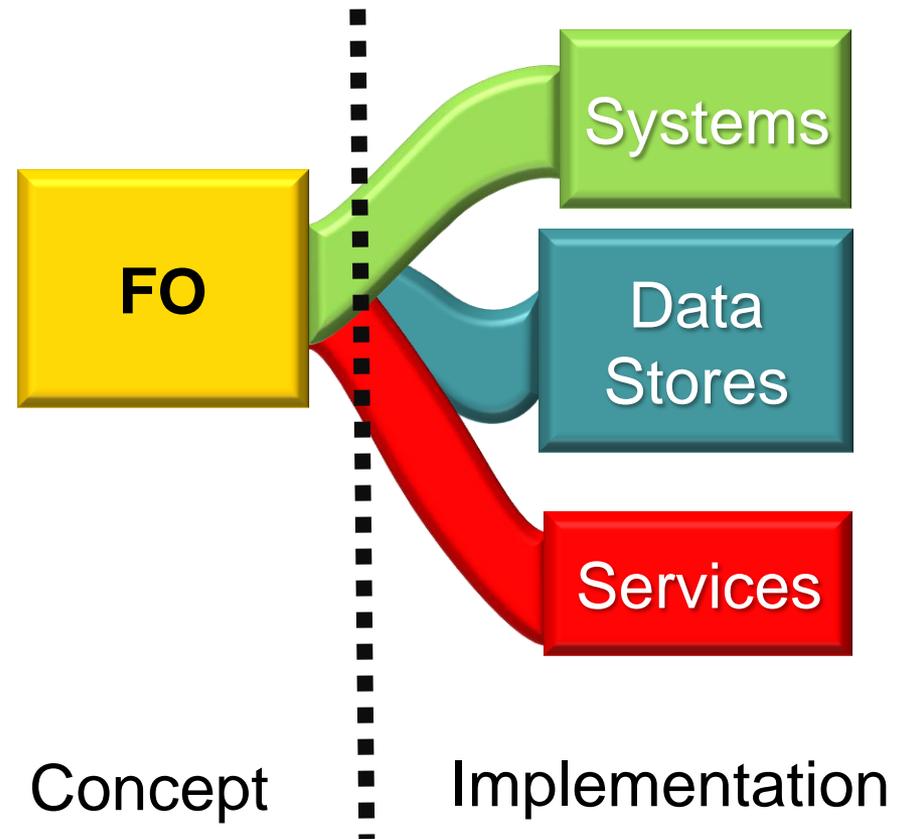
The Flight Object is:

- a collection of **common flight information elements available electronically** for use by system stakeholders
- medium for sharing common flight information elements among **new and existing capabilities**, as systems evolve
- **enabler, harmonizer, and data management** provider
- **universal, flexible, dynamic discoverable**
- concept with **global appeal**



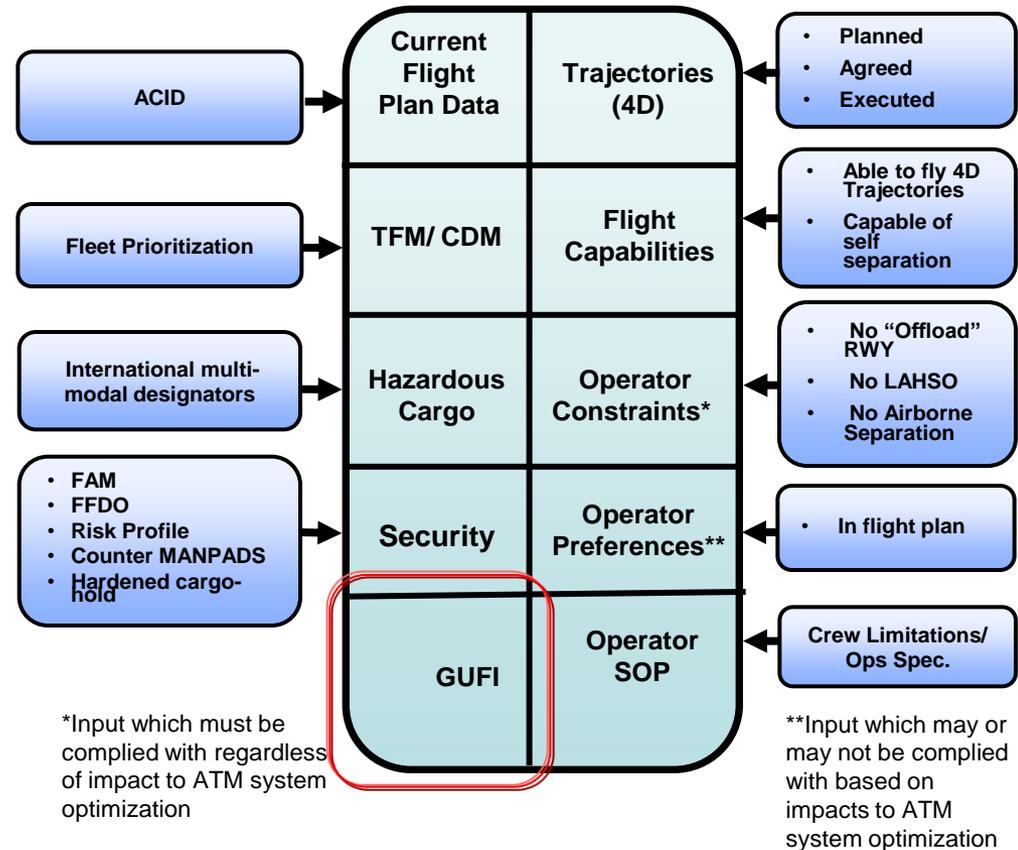
The Flight Object is data

- The FO is the **aggregated collection of flight data** and related information which supports the goal of improving system-to-system interoperability within the NAS and beyond
- The FO is **not a system** although its operation will be facilitated by systems
- The FO is **not a specific database**, although parts of it will reside in various databases



The Flight Object collects, manages and provides a large and diverse set of flight-related data

- **Aircraft identifiers and parameters**
- **Current Flight Plan information (filed, cleared, flown)**
- **Operator preferences, constraints (limitations), SOPs**
- **Flight capabilities, preferences, constraints**
- **Security information**

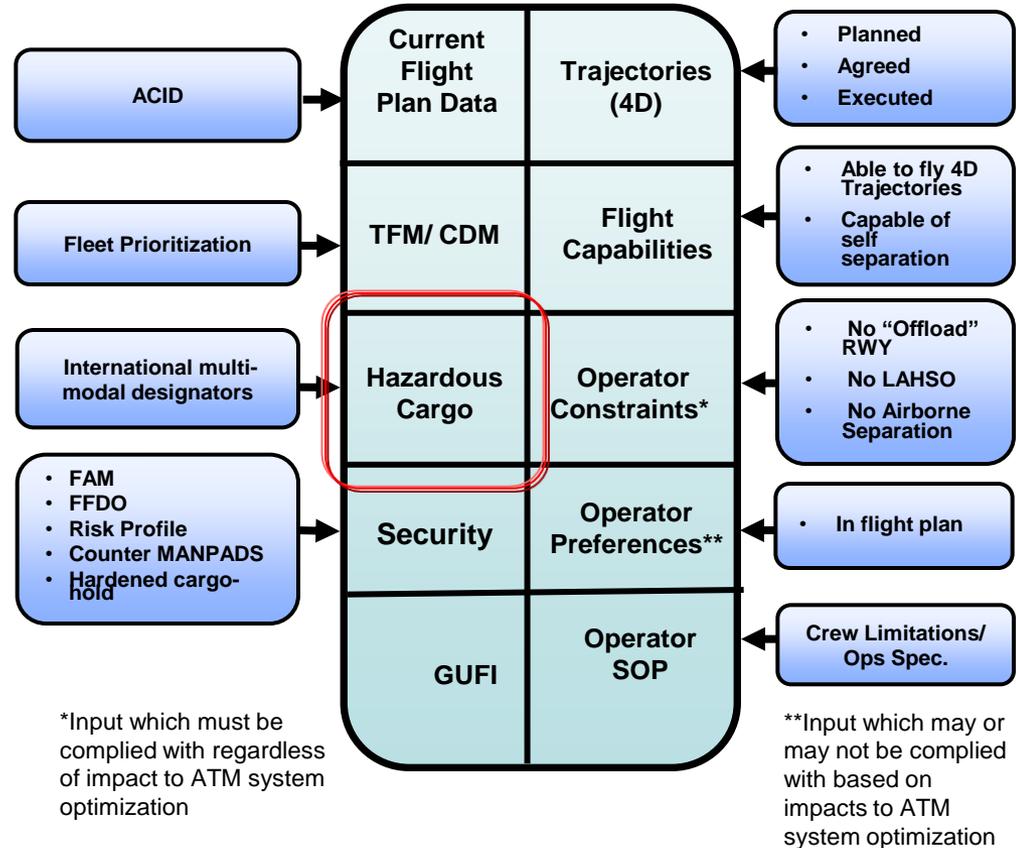


A Critical Piece - Globally Unique Flight Identifier (GUFI)

- **Situation:**
 - Multiple and International aviation-related systems
Create/Update/Access flight related data
 - Each system that exchange flight related data must correlate incoming data messages with stored flight data
 - Today's systems correlate flight related data in a variety of ways
- **Problem:**
 - Each system “tries” to correlate flight related data in a consistent and unambiguous manner
- **What We Need:**
 - Solution to the data correlation problem that can be applied internationally

The Flight Object collects, manages and provides a large and diverse set of flight-related data

- **Aircraft identifiers and parameters**
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As an example, the Transportation Data Exchange can facilitate hazardous cargo monitoring

Planning:

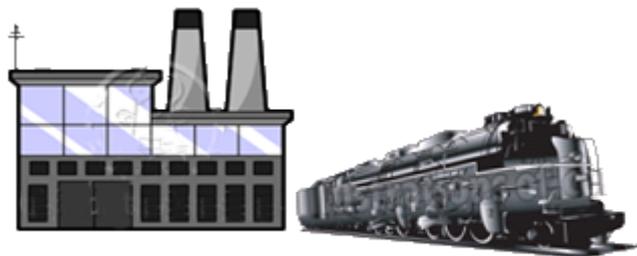
- Verifying carrier certification and preparedness (periodic training)
- Ensuring presence of trained personnel where they are required
- Security deconfliction (trajectory, crew, passengers, aircraft/ship/vehicle)

Monitoring:

- Identifying location of hazardous cargo at all times
- Periodically monitoring cargo status (e.g., temperature, pressure, tamper sensor readings)

Analysis:

- Retrieve all relevant historical information in case of an incident
- System-wide optimization through data mining



The Flight Object provides tangible benefits to the community of interest

Interoperability

- Mediates interaction between systems, agencies, countries
 - Common Situational Awareness
 - Incident Management
- Facilitates use of future transportation and security data, whenever it becomes available
- Simplifies global data exchange

Harmonization

- Provides standardization of transportation and security data
- Incorporates semantic context for transportation and security data
- Exposes institutional knowledge about how transportation information is used across systems, agencies, countries

Data Management

- Provides consistent data lifecycle management
- Provides data mining opportunities for retroactive performance evaluation and predictive modeling

The FO development is supported by two different tracks

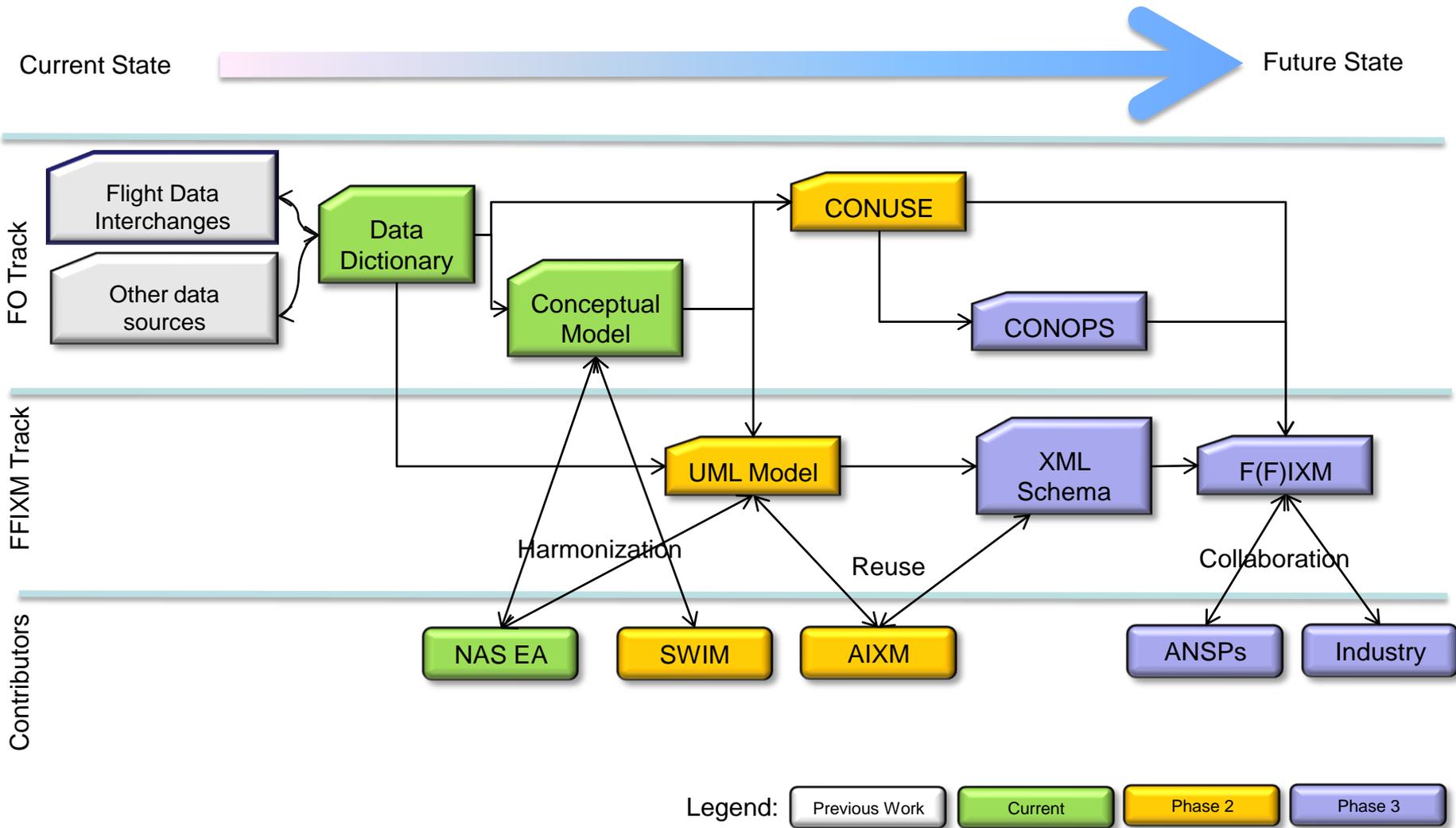
Data Standards Development

- The FAA is working on developing a flight data standard similar to AIXM
- SESAR is undergoing a similar effort
- FAA and SESAR are collaborating in converging their efforts
- The goal of this effort is to define an international standard for flight data interchange

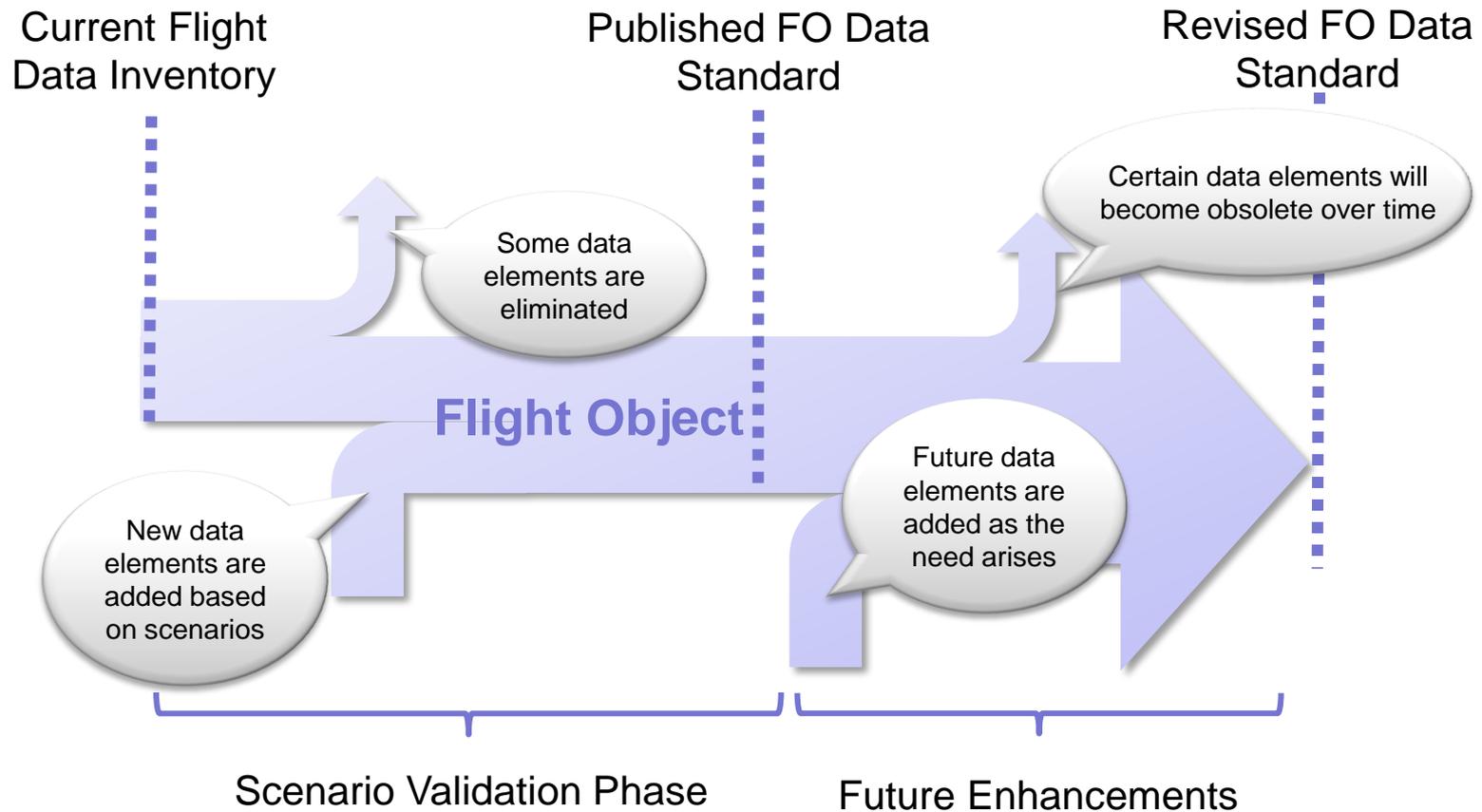
Engineering Prototypes / Demonstrations

- Several prototypes / demonstrations have been created which use a FO-like construct called the Flight Data Object (FDO)
- The FDO
 - enables verifying engineering alternatives
 - Provides opportunities to present practical ways in which the FO can solve interoperability problems and create new efficiencies
 - Creates a framework for international collaboration

The Data Standard Development Process is in its first phase



The FO is dynamic; the iterative approach can be used to manage the FO's evolution over time



On the Engineering Prototype side, there are a few, limited implementations of the FO

Flight Data Models have been developed for specific uses (e.g., Lockheed Martin, ICAO, MITRE, EUROCONTROL)

Some initial Flight Object Data Elements are being defined but there is not formal agreement on them at this point

The Data Models have been used for limited (point to point) interoperability within the same operating system (e.g. ERAM)

http://www.eurocontrol.int/aim/public/standard_page/foips.html

Two demonstrations have been conducted so far, and more are scheduled

March 2009

Exchange of flight information using Flight Data Objects (FDOs) between international air traffic control systems

November 2009

Demonstrate potential benefits from enabling FDO exchanges between airport surface stakeholders and ANSPs and flight operators

Analyze FDO to recommend new surface operations related content to support collaborative air traffic management

International Flight Data Object (IFDO) Demonstration Overview (March 2009)

▪ Objective

- Develop a FDO to support information sharing between NAS domestic and international stakeholders

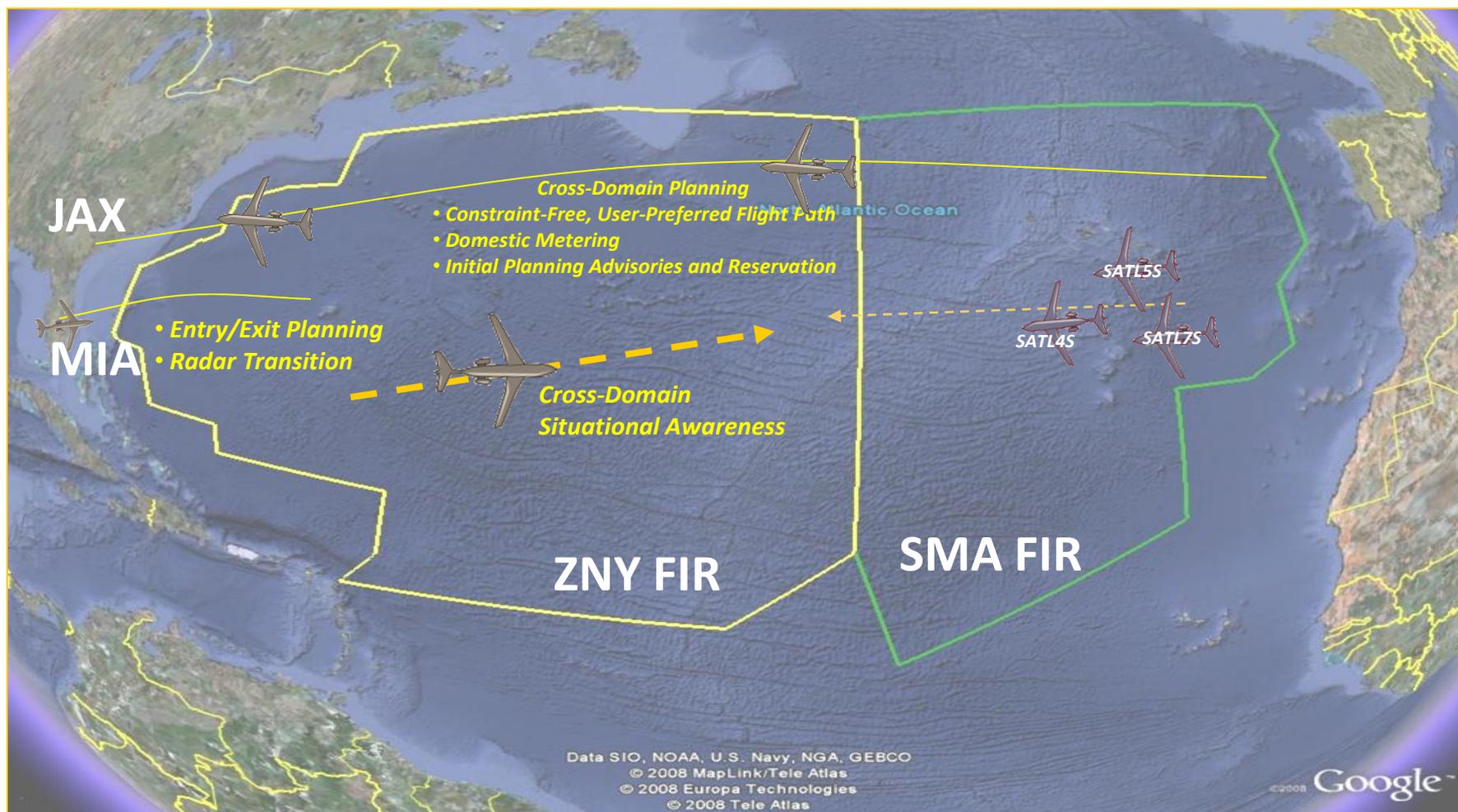
▪ Benefits

- Facilitate better coordination, situational awareness and collaborative decision making

▪ Description

- Atlantic-based demonstration in the Florida NextGen Test Bed (FNTB)
- FAA's ATOP, FAA's ERAM and NAV Portugal's SATL systems were adapted in the lab to exchange FDO

IFDO: ERAM, ATOP, and SATL Are FDO-Enabled



Surface Exchange Flight Data Object (SEFDO) Demonstration Overview (November 2009)

■ Objective

- Analyze FDO to recommend new content related to surface operations that supports collaborative ATM

■ Benefits

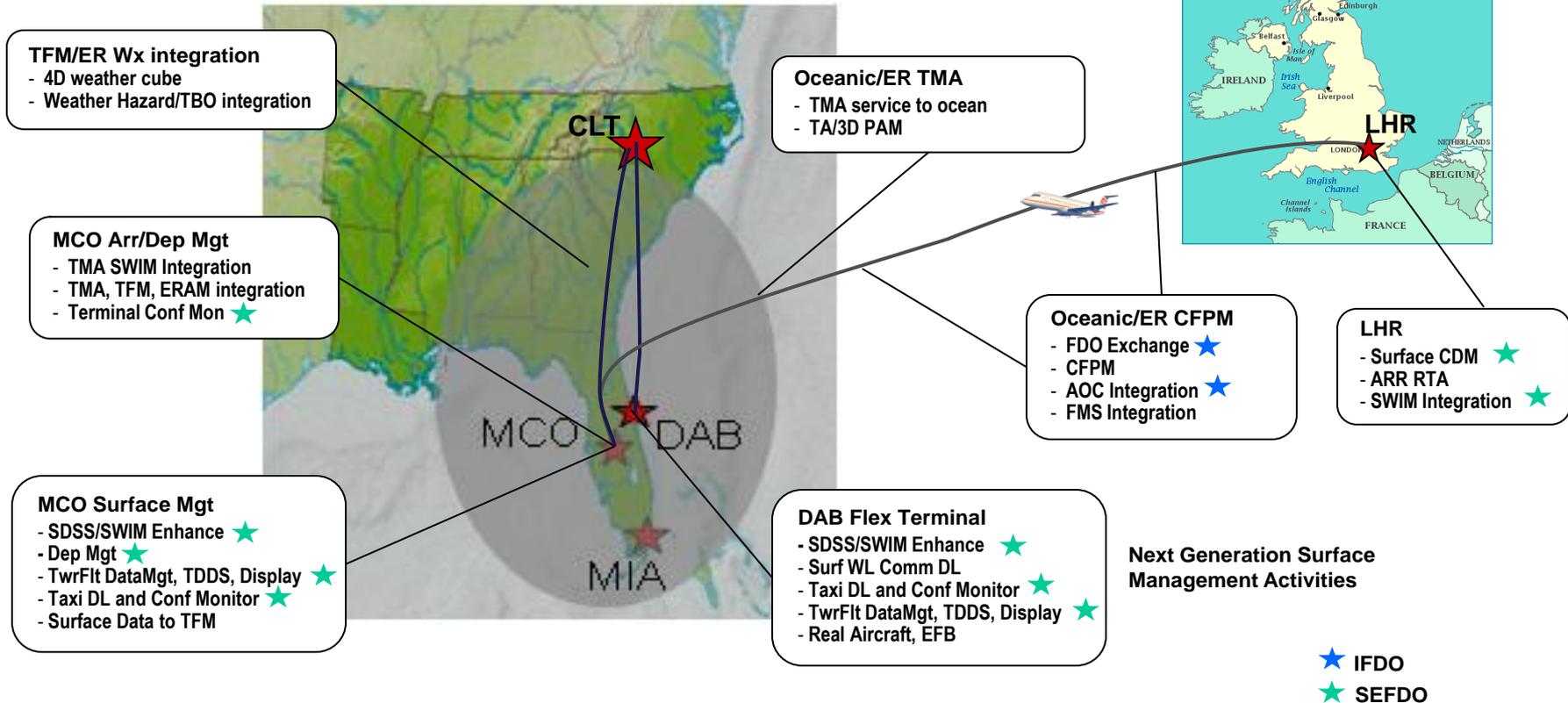
- Integrate, via FDO, awareness of surface operational status into NAS for effective collaborative ATM

■ Description

- Enable FDO exchange between airport surface stakeholders and collaborating ANSP entities and flight operators

SEFDO Demonstration Concepts

Regional Departure Scenario: MCO/DAB to CLT
 Regional ARR Scenario: CLT to MCO
 International Scenario: LHR to MCO



Goals for Future Asia/Pacific FDO Demonstration

- Leverage previous demonstration capabilities and infrastructure
- Demonstrate the benefits of exchanging FDOs via SWIM-like core services between ANSPs over the Pacific
- Demonstrate the feasibility of communication using multiple international SWIM (or SWIM-like) data transport systems
- Define common FDO data structure
- Jointly collaborate on appropriate FDO governance

Pacific FDO – Notional Capabilities

- Tokyo**
- Surface CDM
 - SWIM/FDO Integration

- Japan Oceanic**
- FDO Exchange
 - Situational Awareness
 - Collaborative FP

- US Oceanic**
- FDO Exchange (SWIM)
 - Situational Awareness
 - Collaborative FP (OCAT)
 - Airline CDM

- US En Route**
- FDO Exchange (SWIM)
 - Situational Awareness
 - Collaborative FP
 - Tailored Arrivals
 - Airline CDM

- SFO/LAX Surface**
- FDO Exchange
 - Situational Awareness
 - Departure Predictions
 - Tower Surface Mgt
 - Airline CDM

Tokyo

SFO/LAX

Sydney

- Fiji Oceanic**
- FDO Exchange
 - Situational Awareness
 - Collaborative FP

- Sydney**
- Surface CDM
 - SWIM/FDO Integration

- Australia Oceanic**
- FDO Exchange
 - Situational Awareness
 - Collaborative FP

Desired end-state is Gate-to-Gate use of FDO!

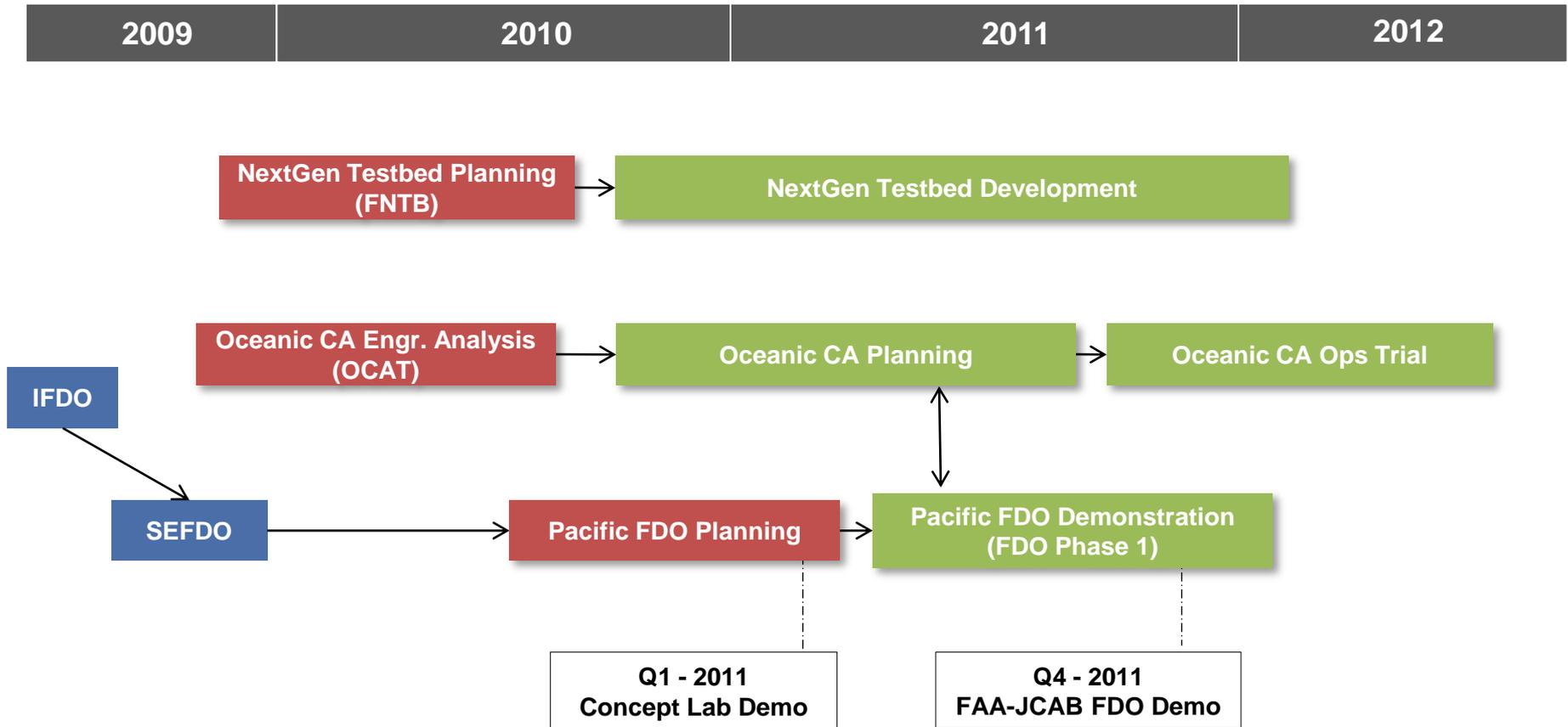
- Future FDO Enabled Applications**
- 3D PAM, OPDs
 - TBFM / TMA
 - Data Link Applications
 - Departure Flow Mgt



Flight Data Object - Next Steps

- **Data Standards Development**
 - Complete Flight Object Data Dictionary Phase 1
 - Collaboration with international ANSPs and users
- **Engineering “Prototypes” / Demonstrations**
 - Transition and expand March 09 lab demonstration (Atlantic region) to Asia/Pacific region
 - Initiate realignment with SWIM (SWIM compliance)
 - Identification of Asia/Pacific FO demonstration partners
 - Establish expectation, roles, and responsibilities of demonstration partners
 - Establish demonstration scenarios and development of simulation environment

Proposed Project Timeline



The Flight Object is an outstanding opportunity for international collaboration

- ANSPs are encouraged to participate in the process of defining and developing the FO through –
 - sharing intellectual capital
 - involvement in demonstration projects
- Early ANSP involvement will be beneficial because it will speed up the development and adoption of an international standard
- Diversity and collaboration will ensure a robust implementation of the FO



Questions?

