

# What is TBO, FF-ICE, and SWIM ?

FF-ICE and TBO presented by:

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# What is TBO and FF-ICE ?

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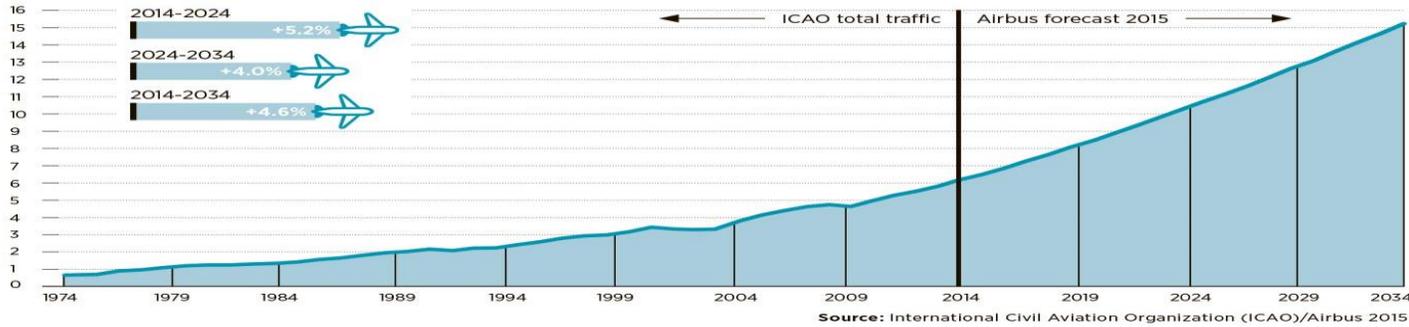
Secretary ICAO  
ATMRPP

4 December 2019

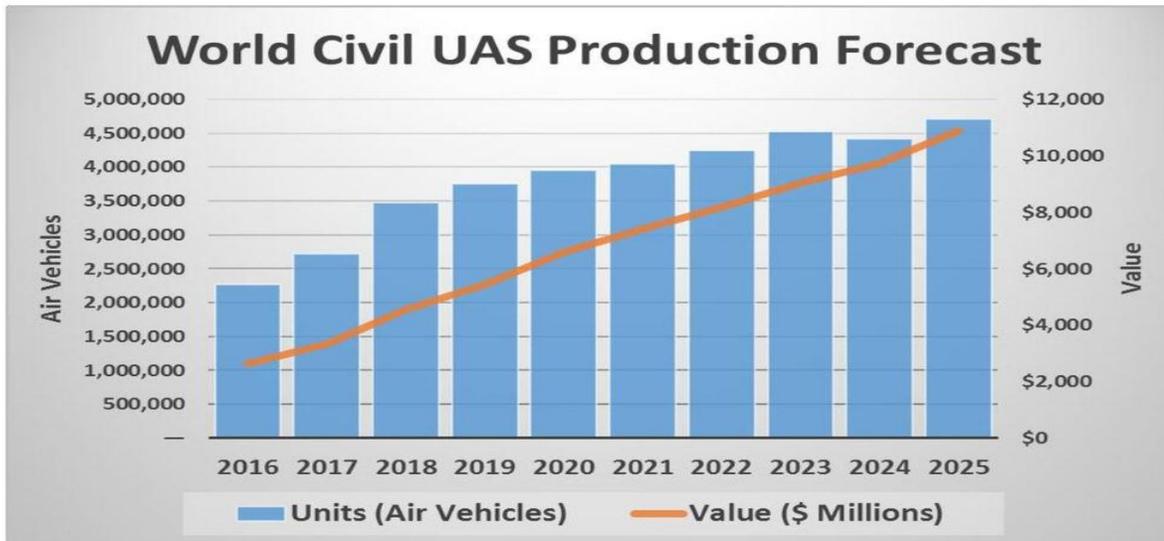


### GLOBAL AIR TRAFFIC (TRILLION REVENUE PASSENGER KILOMETRES)

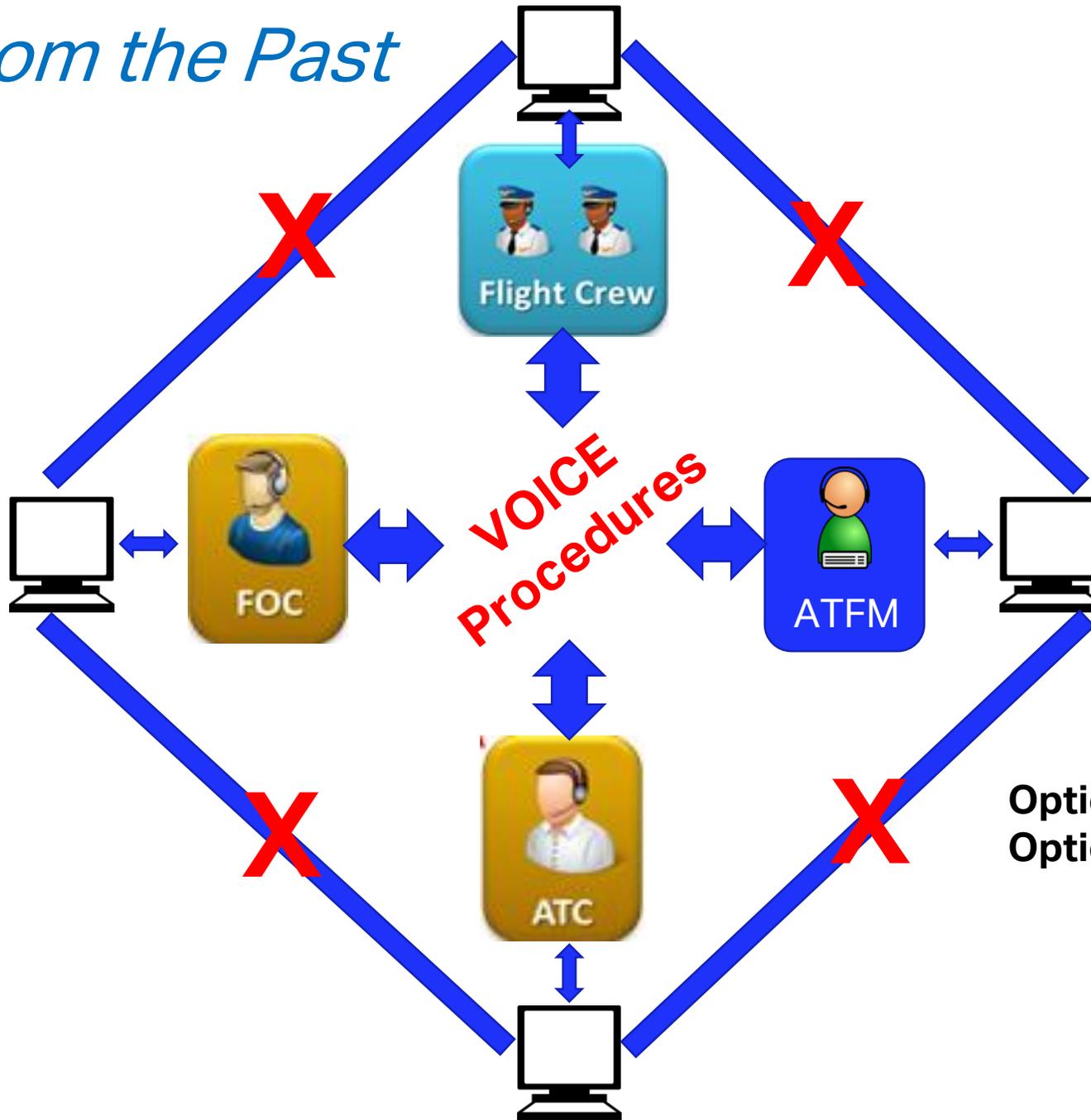
Traffic is expected to double in the next 15 years



# Is today's ATM system scalable to serve tomorrow?



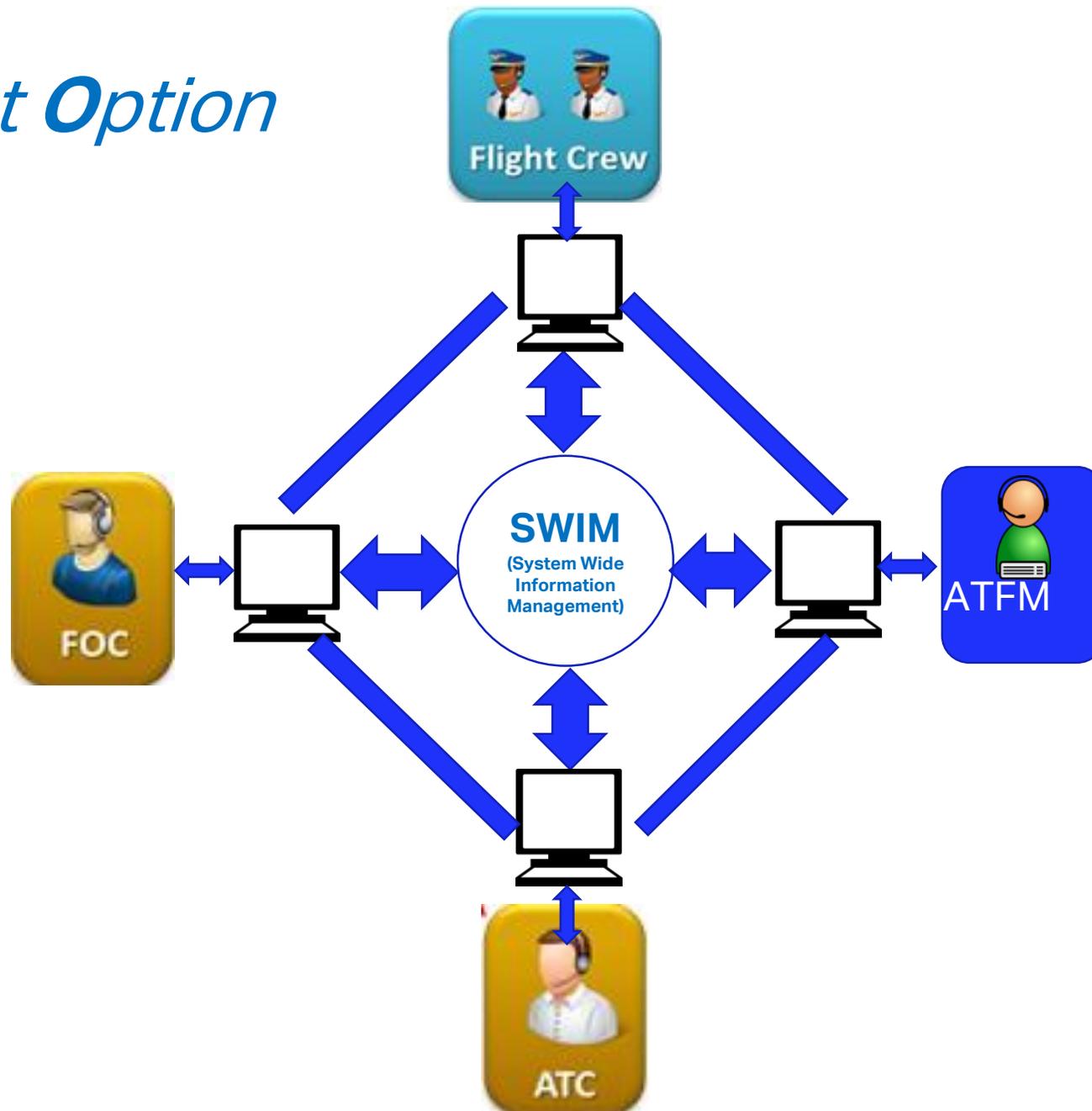
# Today from the Past



- X Disparate plans
- X Uncertainty
- X Plans not followed
- X Not optimum

Option 1: extrapolate the past  
Option 2: transformation of the past

# The Best Option



## Trajectory Based Operations

- Shared Flight Trajectory
- Maintained
- Advanced automation
- Collaboration
- Changing role of the human
- Performance optimisation

## Global Air Navigation Plan (GANP)

- Managing paradigm Change
- Managing changing role of human

# TBO, FF-ICE and SWIM

**Higher Performance is achieved**

Through

**Trajectory Based Operations (TBO)** is the Concept which is implemented through ATM processes

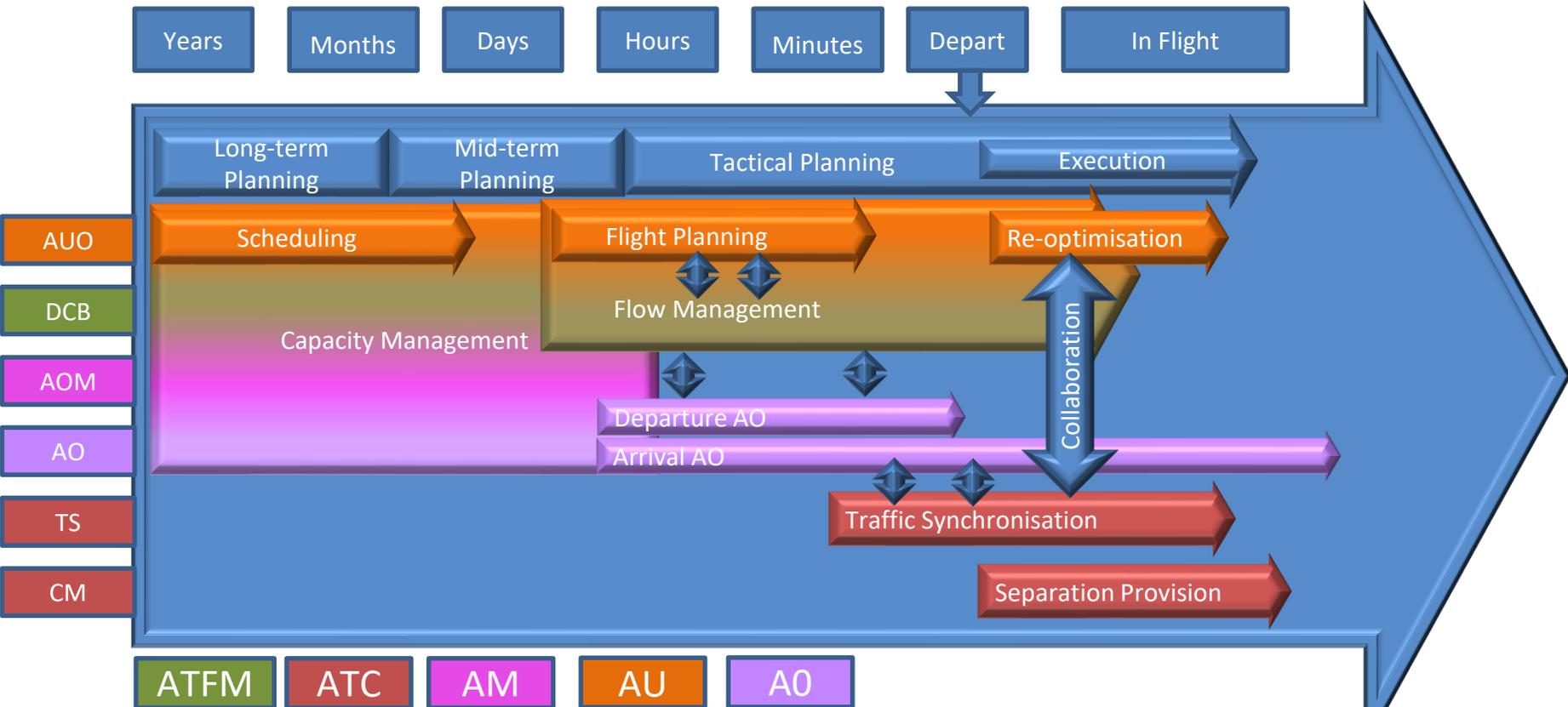
Using

**Flight and Flow Information for a Collaborative Environment (FF-ICE)** which is shared and maintained through FF-ICE processes

Using

**System Wide Information Management (SWIM)** services

# Trajectory based Operations Brings It All Together



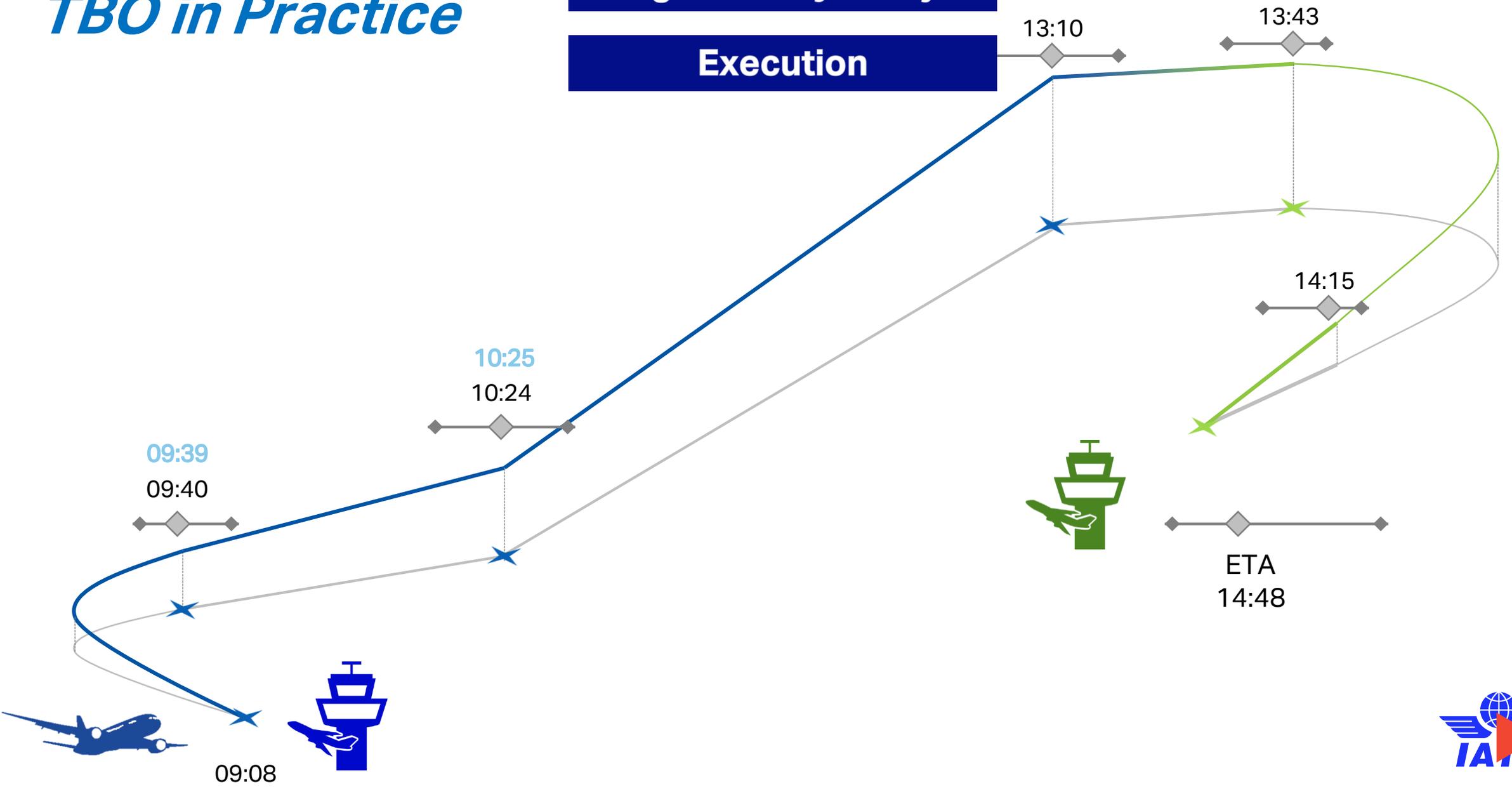
ATFM    ATC    AM    AU    AO

- AM    Airspace Management
- ATFM    Air Traffic Flow Management
- AU    Airspace User
- ATC    Air Traffic Control
- AO    Aerodrome Operator



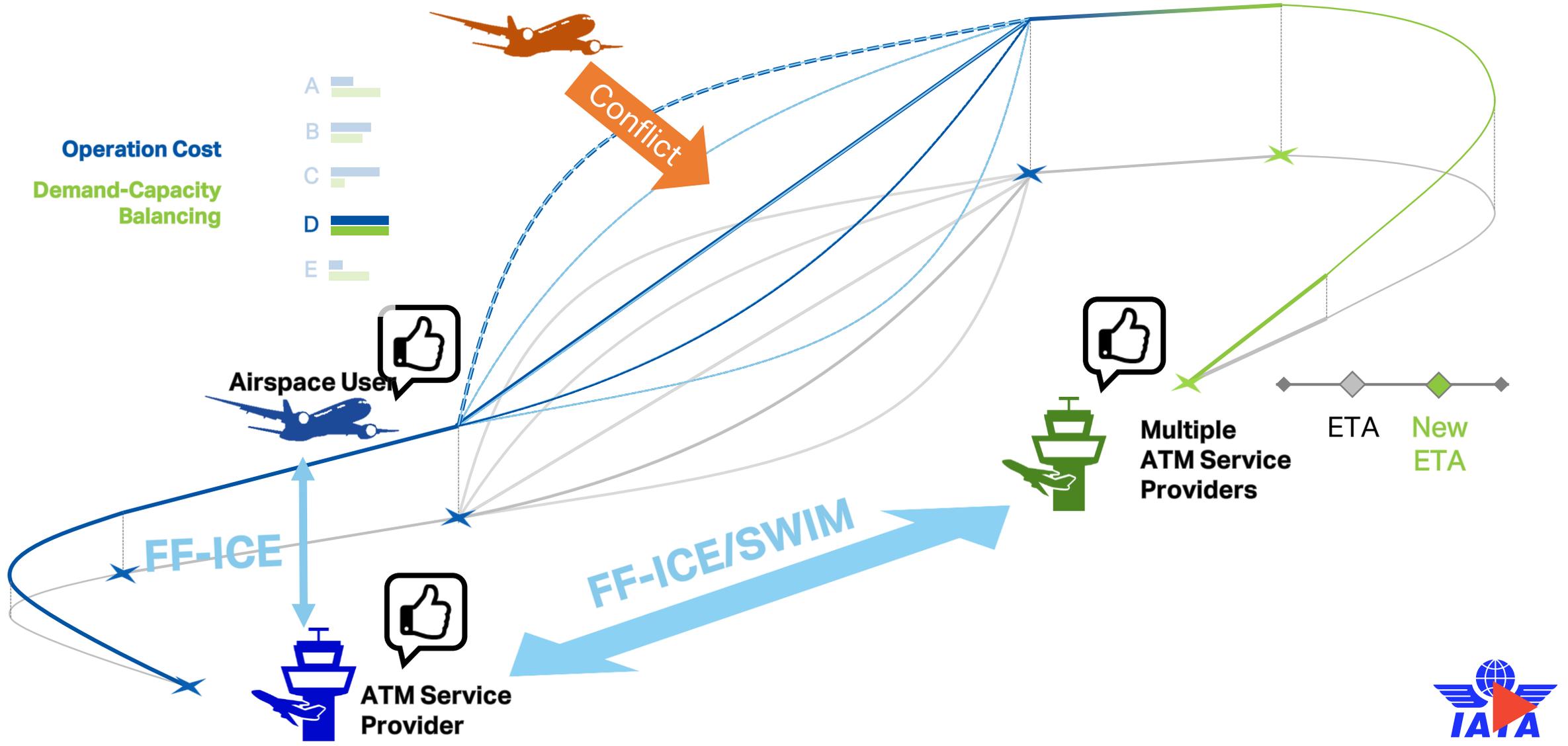
# TBO in Practice

**Agreed Trajectory**  
**Execution**



# TBO in Practice

## Synchronisation



# Key TBO Building Blocks



✓ FF-ICE

✓ SWIM

✓ Enhanced ATFM

✓ Advanced Data link

✓ .....

# Why FF-ICE ?

Address limitations and constraints of the current flight planning mechanism



Enable transitioning to a fully collaborative environment where a flight trajectory is shared and optimized during all phases of a flight

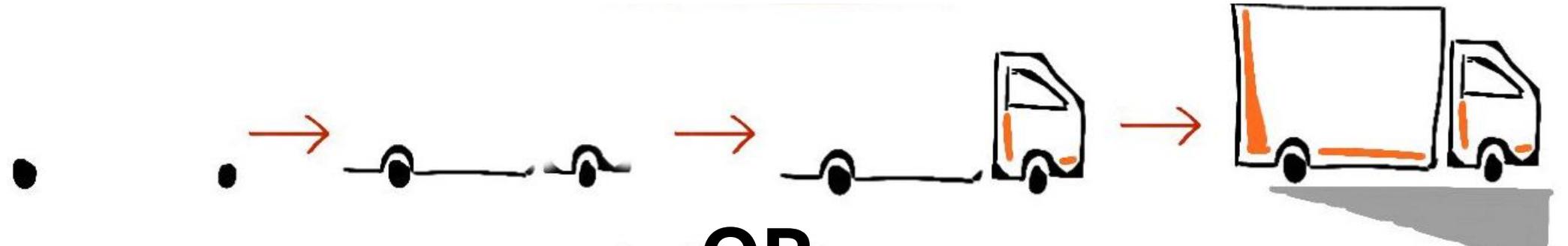
# Why FF-ICE ?



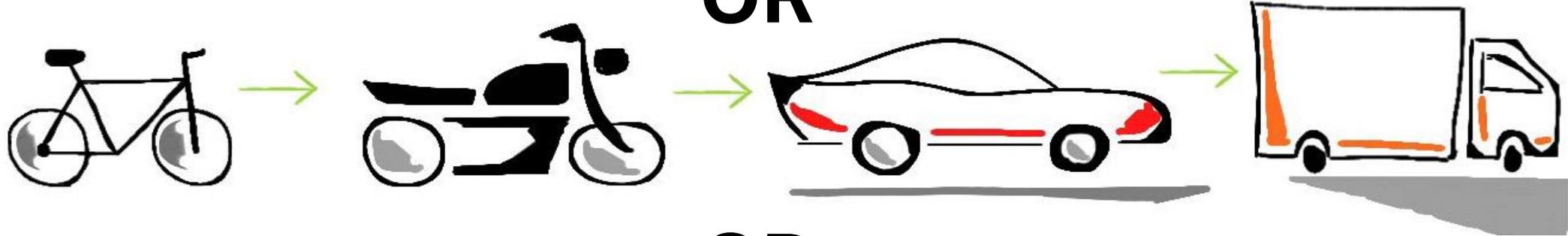
- Information content (additional information)
- Interactions between stakeholders (more coordination/negotiation)
- Scalability of format to easily accommodate future information needs
- Mechanism to exchange information (IP-based, using exchange models, SWIM)



# How to roll-out ?



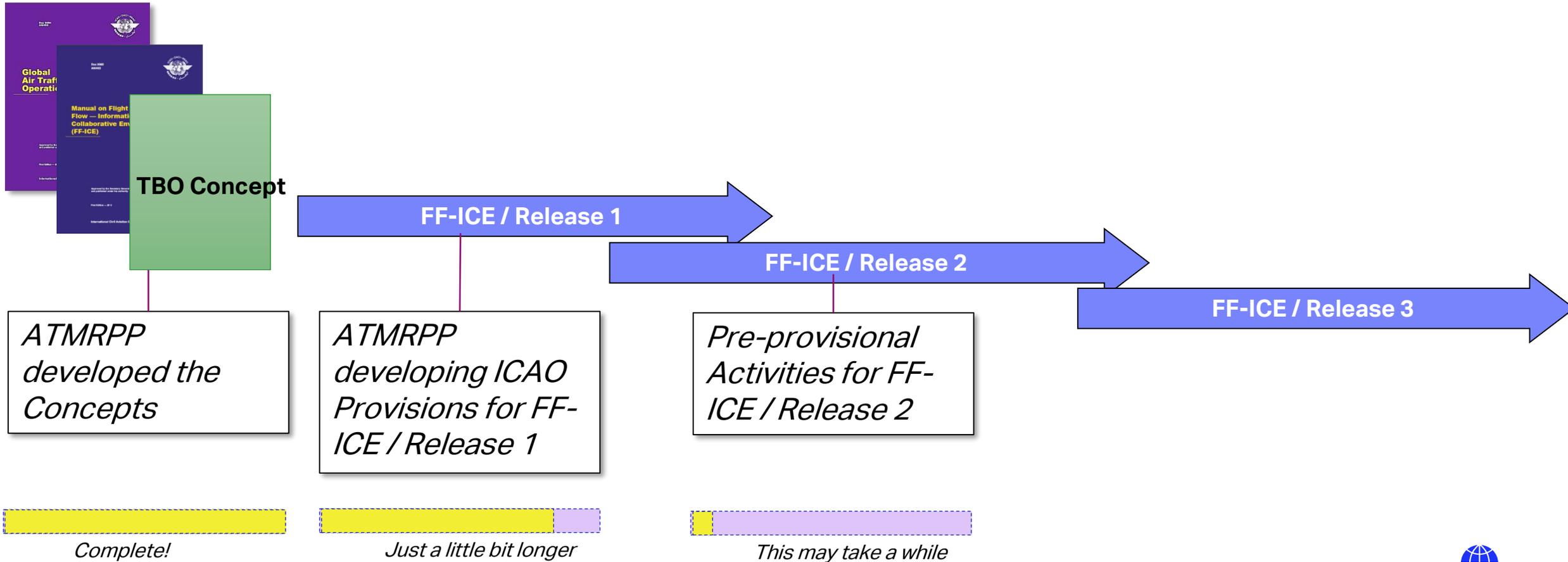
OR



OR



# How to roll-out ?

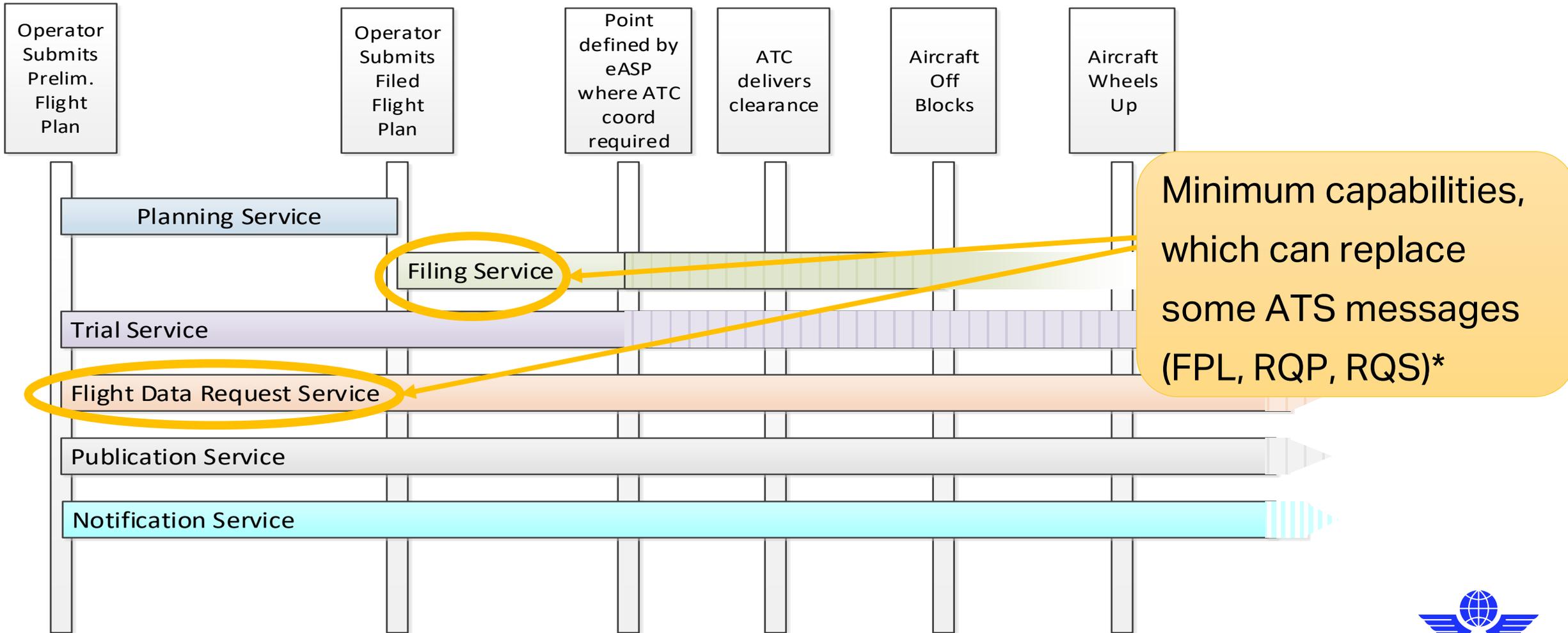


# How to roll-out ?

- Primarily **focus on interactions prior to departure**, allowing for successive increments required for the evolution of FF-ICE
- Introduce FF-ICE implementation **on a voluntary basis**, but in a **standardized manner** and accommodate **the co-existence** of FPL2012 and FF-ICE
- **Sunset FPL2012** when sufficient experience with FF-ICE/1 is gained and all necessary tools for deployment of full FF-ICE/1 are in place



# FF-ICE Services



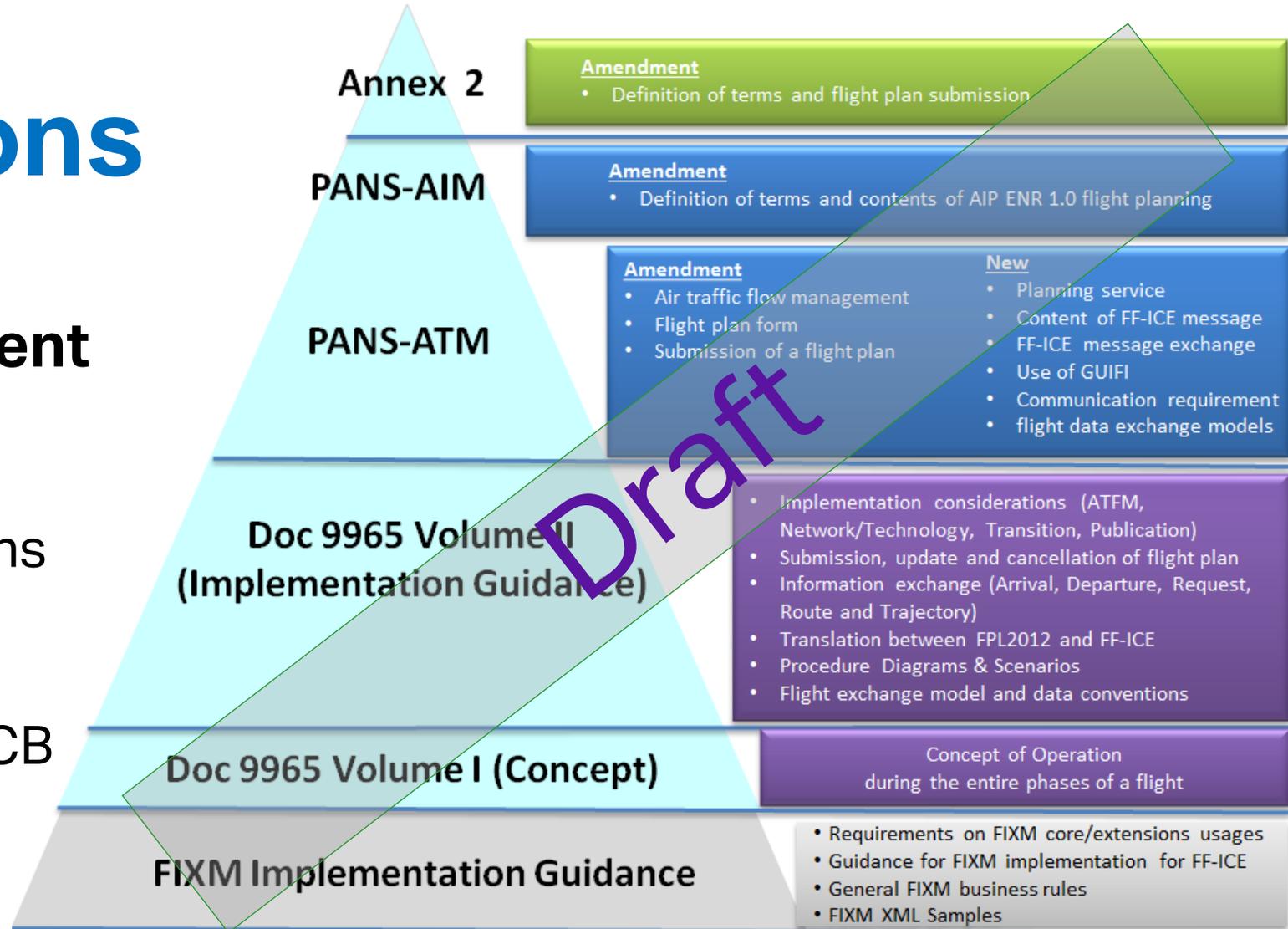
\* FPL (Filed Flight Plan), RQP (Request Flight Plan), RQS (Request Supplementary Flight Plan)



# ICAO Provisions

## ➤ Continuous Improvement

- Tabletop exercises
- Local or regional validations
- Inter-panel coordination
- Coordination with FIXM CCB



# Transition

How to accommodate additional information needs ?

Will FPL2012 be sun-setting eventually, if so when ?

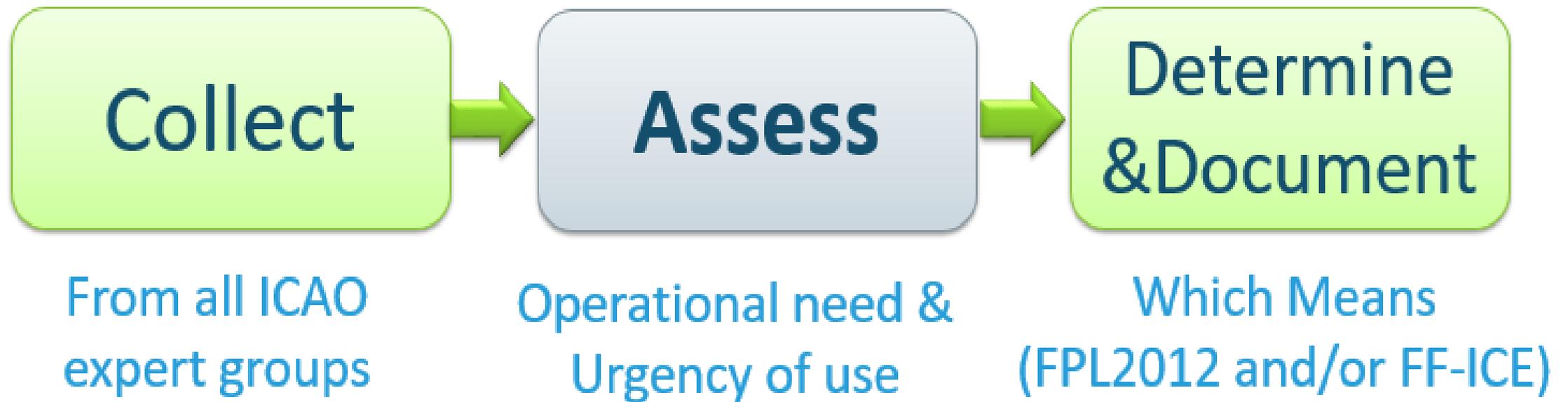


# Additional Information Needs



FPL2012 format will be not changed, unless there is critical safety issues

# Additional Information Needs



# Approaches to Sunsetting FPL2012



Global  
Regional  
Local/national



# SWIM Basics

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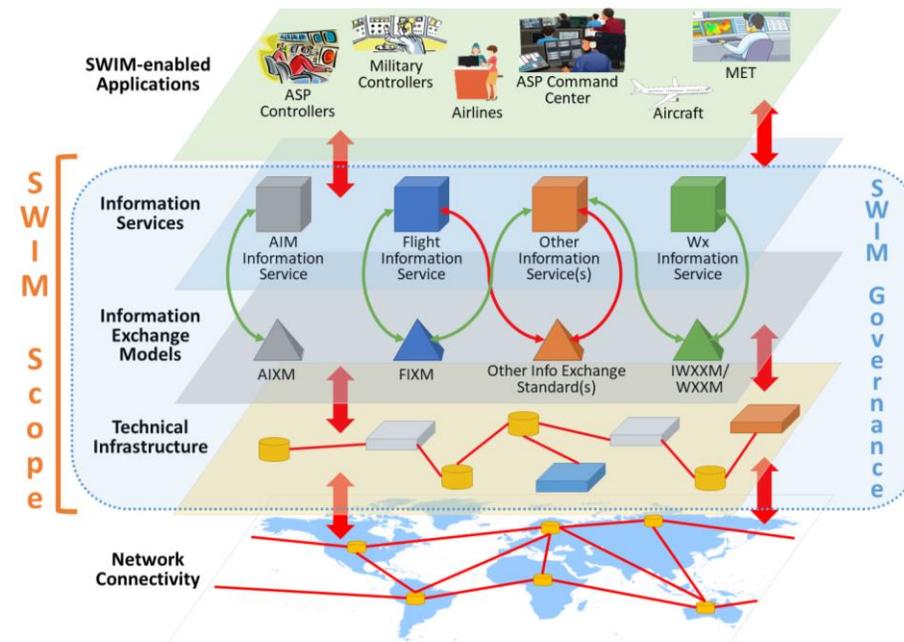
4 December 2019



# SWIM Definition

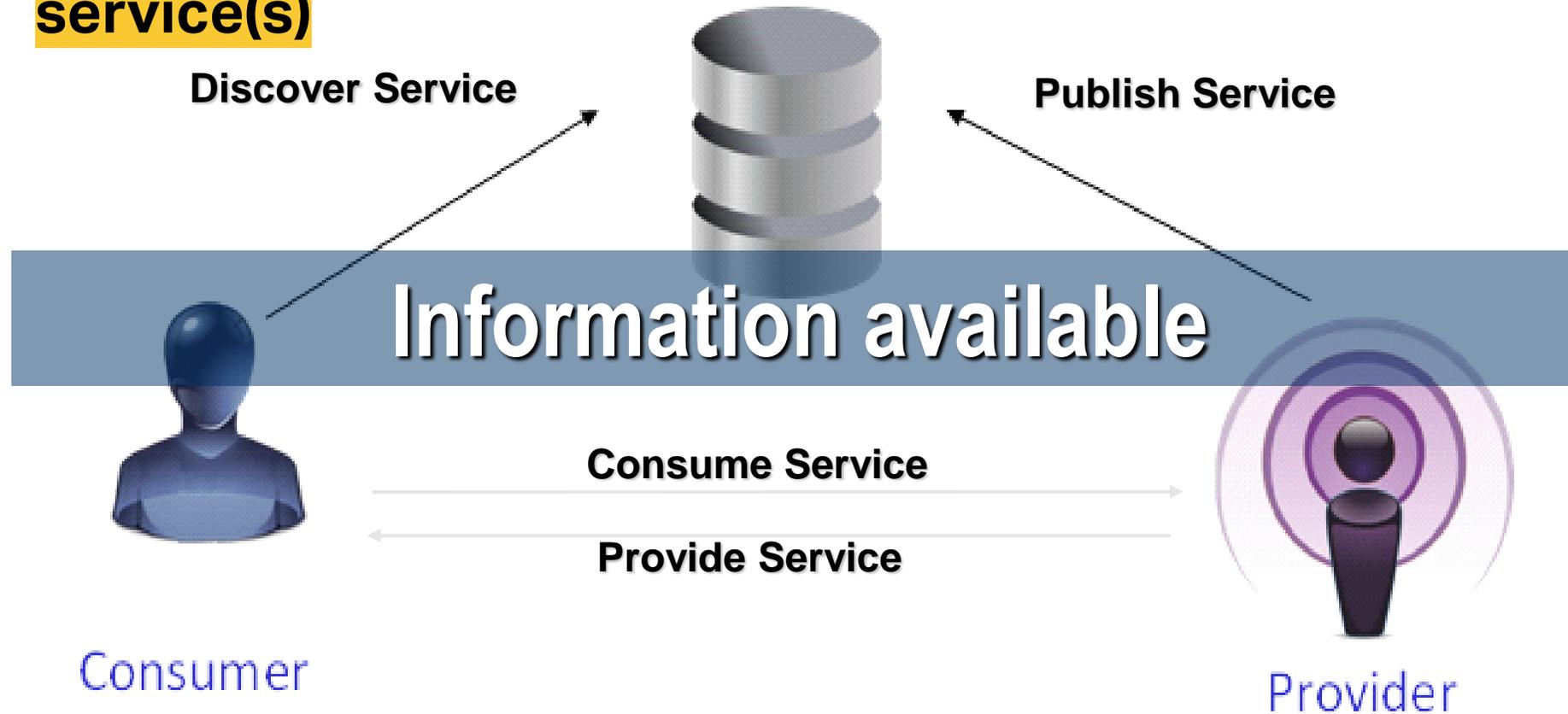
- SWIM consists of **standards, infrastructure & governance** enabling the management of ATM information and its exchange between qualified parties via interoperable **services.**"

- It will support **Shared Situation Awareness, Collaborative Decision Making and Trajectory Based Operations**

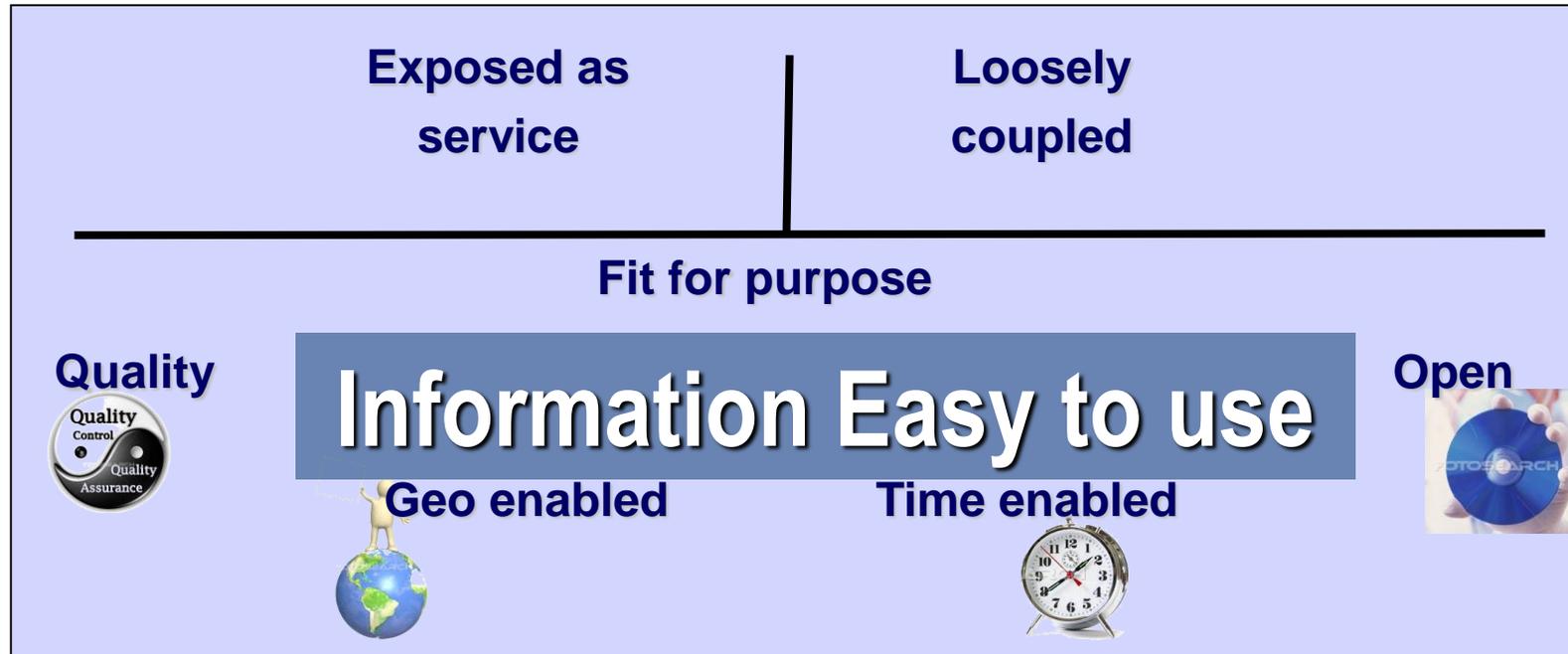


# SWIM is Service Oriented Architecture

**Sharing information via Providing / Consuming service(s)**



# SWIM is Open & Standard

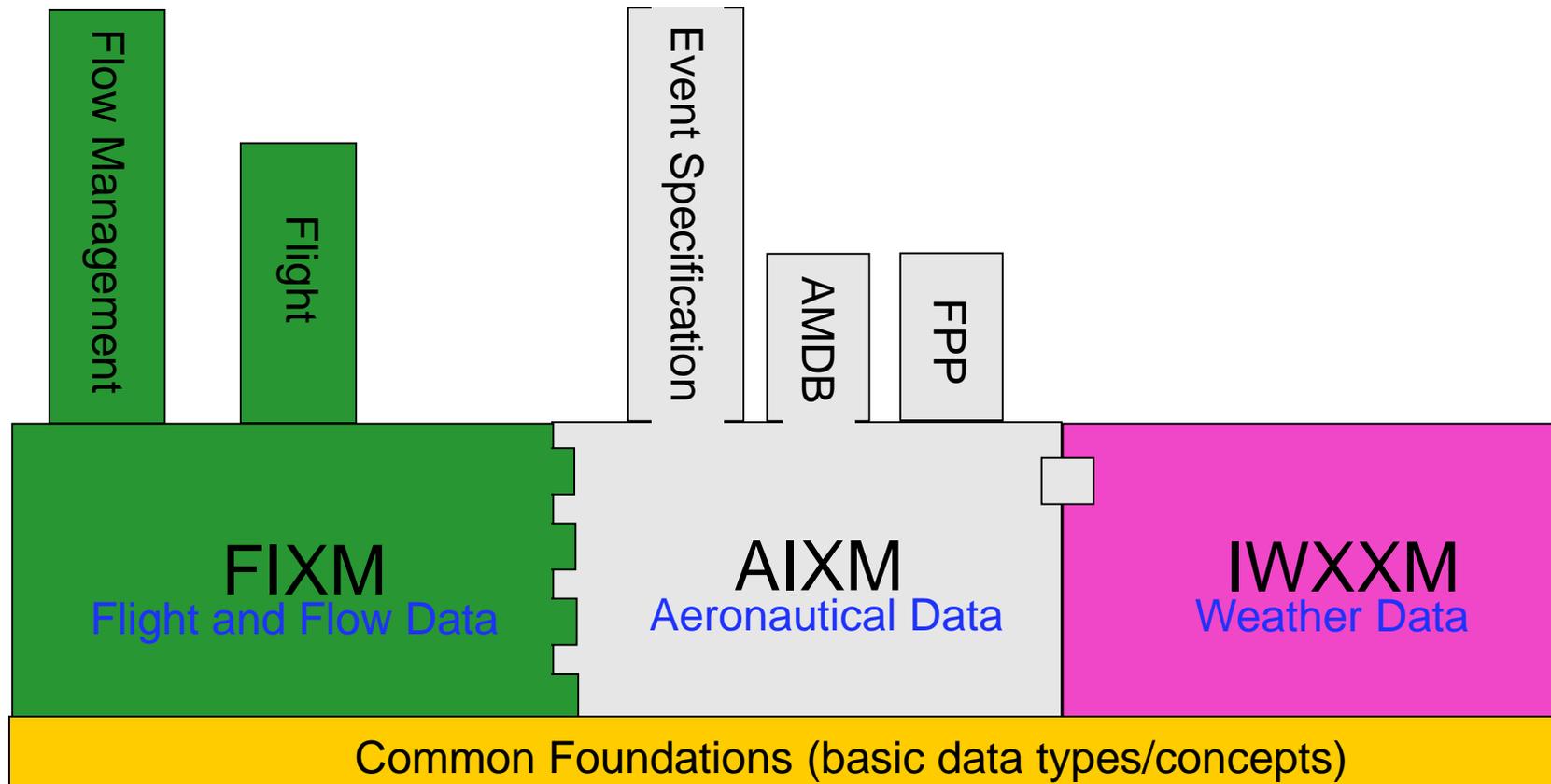


- **Interoperability**
- **Secured Seamless** access & exchange thanks to a trust framework environment

# SWIM is Information Services

- Information services will replace point-to-point message exchange:
- Makes available rich information content to a variety of ATM users.
- An information service is described in the SWIM Manual (Doc 10039) as providing consumers access to information delivered by one or more applications or systems:
- Support the exchange of flight, flow, aeronautical, and meteorological information.

# The Air Traffic Management eXchange Models



# Potential Information Services

- Navaids information service
  - Give in a single service all information on a navaid and impacts of an outage.
- De-icing, Terminal Weather MET Information service
  - Provide Met information according to selection criteria.