What is TBO, FF-ICE, and SWIM?

FF-ICE and TBO presented by:
Henk Hof (ICAO ATMRPP Chair)
Head of ICAO and Concept Unit, EUROCONTROL

SWIM presented by:
Jean-Francois Grout (ICAO IMP Chair)
Assistant Director, ICAO Relations, IATA
What is TBO and FF-ICE?

Henk Hof
EUROCONTROL
Chairman ICAO
ATMRPP

Crystal Kim
ICAO
Secretary ICAO
ATMRPP

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Is today's ATM system scalable to serve tomorrow?
Today from the Past

- Disparate plans
- Uncertainty
- Plans not followed
- 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
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

- **Long-term Planning**
- **Mid-term Planning**
- **Tactical Planning**
- **Execution**

**Components:**
- **Scheduling**
- **Capacity Management**
- **Flight Planning**
- **Flow Management**
- **Departure AO**
- **Arrival AO**
- **Traffic Synchronisation**
- **Separation Provision**

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

**Roles:**
- **AUO**: Airspace User Operator
- **DCB**: Data Communication Bureau
- **AOM**: Airspace Operations Manager
- **AO**: Aerodrome Operator
TBO in Practice

Synchronisation

Operation Cost
Demand-Capacity Balancing

Airspace User

FF-ICE

Multiple ATM Service Providers

ETA
New ETA

Conflicts

FF-ICE/SWIM

ATM Service Provider
Key TBO Building Blocks

- FF-ICE
- SWIM
- Enhanced ATFM
- Advanced Data link

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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?
How to roll-out?

**ATMRPP developed the Concepts**

**ATMRPP developing ICAO Provisions for FF-ICE / Release 1**

**Pre-provisional Activities for FF-ICE / Release 2**

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**TBO Concept**

**FF-ICE / Release 1**

**FF-ICE / Release 2**

**FF-ICE / Release 3**

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Complete!

Just a little bit longer

This may take a while
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

Operator Submits Prelim. Flight Plan
Operator Submits Filed Flight Plan
Point defined by eASP where ATC coord required
ATC delivers clearance
Aircraft Off Blocks
Aircraft Wheels Up
Planning Service
Filing Service
Trial Service
Flight Data Request Service
Publication Service
Notification Service

Minimum capabilities, which can replace some ATS messages (FPL, RQP, RQS)*

* 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

Collect
From all ICAO expert groups

Assess
Operational need & Urgency of use

Determine & Document
Which Means (FPL2012 and/or FF-ICE)
Approaches to Sunsetting FPL2012

Global
Regional
Local/national
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)

Discover Service

Publish Service

Information available

Consumer

Provider

Consume Service

Provide Service
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

- **FIXM**: Flight and Flow Data
- **AIXM**: Aeronautical Data
- **IWXXM**: Weather Data

Common Foundations (basic data types/concepts)
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.