SWIM ENABLING AGENT PROTOTYPE
New sources of information offer new opportunities for optimization:

- The ICAO sanctioned System Wide Information Management model consisting of the modernization of the information distribution on the ATM world.
- The new network centric service oriented architecture offers a practical and cost efficient way to exchange information using the mandated standards.
- The FAA and Eurocontrol are leading this global change by offering many real-time and prediction services.
- These services offer a tremendous potential for operational improvements and cost savings to benefit all ATM stakeholders, especially airlines.

The need to easy the transition:

- An airline needs to operate in a very robust way. Staying as predictable as possible to minimize risks.
- Making full use of SWIM could require airlines to modernize most of its new and legacy systems, to support the new data standards and functionality.
- That makes airlines to consider the transition to SWIM as a Risk instead of an opportunity.
CONCEPT: ENABLE AIRLINES TO TAP INTO SWIM EASILY

The SWIM ENABLING AGENT:

- Boeing R&D and Jeppesen have developed a prototype system that brings the benefits of SWIM to the airlines while minimizing the required changes.
- SEA acts as an information broker that connects to the different SWIM regions service providers implementing the new services interfaces required.
- Uses the SWIM mandated data formats (FIXM, AIXM and WXXM) and adapts its content to the legacy formats used by the different systems such as (ACARS, ARINC633, Flight Plan providers APIs, Airline aircraft database).
- Requests, monitors and filters all sources of information, making it available in real-time to all the back-end systems using their native format, making sure that all of them are in sync.
- Information brokered includes: Flight Plans, surveillance, airport and en-route weather, D-NOTAMs, Aeronautical Information, runway configuration, taxi time predictions and flow.
SEA: SWIM ENABLING AGENT
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SWIM@737 FMS

Flight Management Workstation (FMW)

Input/Output (I/O)

Aircraft State
- Position
- Altitude
- Speed/Vertical Speed
- Heading

Flight Control Interface (Auto Flight System)
- Speed/Vertical Speed Target
- Altitude Target
- Thrust Settings

Flight Control Interface (Auto Flight System)
- Engagement (Coupled)/Modes

ARINC 702A-1 Intent Bus

ARINC 429 (Simulated)

Multi-Purpose Control Display Unit (MCDU)

ARINC 739 (Simulated)

Data-Link

ACARS/ADS-C/FANS 1A (Simulated)

Simulated Flight Management System (sFMS)

Operational Flight Program (OFP)
- Based on Boeing 737 (Certified)

Model/Engine Database (MEDB)
- Performance Data
  - Drag
  - Thrust
  - Fuel Flow

Navigation Database (NDB)
- Navigation Data
  - Airports (w/ Runways)
  - Procedures (SIDs/STAs)
  - Airways
  - Navigational Aids (NavAids)
  - Company Routes

Ground to Air: ARINC 702 ACARS interface
- Uplink
  - Flight Plan information
  - Aeronautical Information

Air to Ground: ARINC 702 ACARS interface
- Downlink
  - Position information
  - Trajectory information
Door2Door: supporting the Pilot during all work related tasks. On-Duty & Off-Duty

Communication of Information to an airborne aircraft comes at a high cost.
Compression algorithms used in order to save bandwidth.
Participation in Sesar Global Demonstrations

- In June 2016 SEA participated in the SGD Demonstration representing a fictional SWIM enabled Airline managing a flight from Dubai to Vienna.
- The simulated airline included many systems:
  - A Jeppesen developed EFB prototype.
  - A real 737 next-gen FMS.
  - Jetplan engine for Flight Plan optimization.
  - A Prototype AOC Flight dispatcher and situation awareness Console.

Functionality Demonstrated:

- Flight Plan creation taking into account SWIM provided data.
- Flight Plan filing and updated to take into account a route closure that just happened.
- Airport and en-route weather monitoring in the area of interest. Reaction to new SIGMETs published.
- D-NOTAMS monitoring including one that alerts of a temporal runway closure due to snow.
- The FMS, the EFB and the AOC console are all fully updated during the whole flight, enabling the airline to take informed decisions in real time to optimize its operation.
Having the full picture:

- Receiving all relevant information for every flight, in a smartly filtered way.
- Having access to all predictive information from SWIM such as flow or runway configurations.
- Situation awareness on the AOC and the cockpit: real-time information about any disruption that might affect them.
- Having SEA taking care of all data mediation and synchronization required to communicate the legacy systems with the different regional SWIM implementations.

Making informed decisions with minimal investment:

- Better planning and disruption management opportunities.
- Faster reaction time.
- SEA enables airlines to make full use of the legacy interfaces of their system and start making the transition to a fully SWIM enabled airline starting to reap benefits from the very beginning.