Release 5 SESAR Solution ID #34

Digital integrated briefing

Contextual note – SESAR Solution description form for deployment planning

Purpose:

This contextual note introduces a SESAR Solution (for which maturity has been assessed as sufficient to support a decision for industrialization) with a summary of the results stemming from R&D activities contributing to deliver it. It provides to any interested reader (external and internal to the SESAR programme) an introduction to the SESAR Solution in terms of scope, main operational and performance benefits, relevant system impacts as well as additional activities to be conducted during the industrialization phase or as part of deployment. This contextual note complements the technical data pack comprising the SESAR deliverables required for further industrialization/deployment.

Improvements in Air Traffic Management (ATM)

The SESAR Solution "Digital integrated briefing" consists of an innovative approach to pilot briefing through the use of digital aeronautical data, in particular Digital NOTAM (encoded as "events" in AIXM format), and digital MET data (METAR, TAF, SIGMET in IWXXM format). The AIS and MET information provided to pilots and dispatchers in the form of briefing products and services, will be easier to understand, better prioritised, will reduce the pilot workload and briefing times.

The Digital Integrated Briefing concept is applicable through all phases of flight (planning, pre-flight preparation, in-flight updates). However, only the "ground" phases have been validated at the level of pre-industrial prototypes. The "in-flight" phase has been left open for further validation in SESAR 2020 and it is not formally included in the Solution. Although the validation exercises were limited to civil Airspace Users, it can be safely estimated that the Solution applies identically to military airspace users. The Solution may also have benefits for ATC operators, to the extent that they need to be briefed on the latest status of the airspace/airport environment and on the MET situation.

Traditionally, the pre-flight briefing takes the form of a "Pre-flight Information Bulletin (PIB), which may comprise up to 30-40 pages of NOTAM messages, all in upper case. Filtering and prioritisation are significantly limited by the free text nature of the NOTAM message. MET messages may be embedded in textual format as well, while weather maps are presented separately. Airspace Users are increasingly complaining about the difficulty to understand the NOTAM information and to detect the really relevant events. These may be hidden between many other messages that have no real impact on the flight. Airspace users are also complaining about the growing size of the traditional PIB, due to significant increase in the number of NOTAM messages issued world-wide. This has been multiplied by four between 2000 and 2015!

The Digital Integrated Briefing will solve these issues by introducing the following key changes:

- generation of the briefing products from digital aeronautical data (in particular from Digital NOTAM) instead of providing a list of NOTAM messages;

- extensive graphical presentation of the information that affects elements that are usually displayed on aeronautical maps (taxiway/runway/apron closures, navaids unserviceable, temporary obstacles, airspace restrictions, etc.)
- use of normal sentence case for the textual/tabular part of the briefing
- joint presentation of the aeronautical and MET events that may have a combined effect on the flight trajectory (such as airspace restrictions and significant weather)
- the possibility for interactive briefing, thus allowing the pilot/dispatcher to highlight/prioritise information that is more relevant for each individual flight.

The main benefits are improved human performance for IFR/VFR pilots and dispatchers. In turn, this can bring positive effects in the cost-efficiency of airspace users, in flight predictability and in the fuel efficiency.

The Digital Integrated Briefing will be used both on the ground (FOC/WOC, pre-flight briefing rooms and ARO offices) and in the cockpit, in all phases of flight.

Operational Improvement Steps (OIs) & Enablers

- IS-0205: Digital Integrated Briefing for pre-flight phase is fully covered by this Solution.
- AIMS-07a : Generation of Enhanced Pre-flight Briefing based on digital data
- AIMS-19a: Aeronautical Information system is interfaced to receive and distribute aeronautical information electronically to/from ANSPS systems.
- AIMS-06: Ground-Ground Aeronautical Information Services provision
- SWIM-APS-01a: Provision of Aeronautical Information services for Step 1.
- SWIM-STD-01: ATM Information Reference Model
- SWIM-INFR-01a: High Criticality SWIM Services infrastructure Support and Connectivity
- SWIM-INFR-05a: General SWIM Services infrastructure Support and Connectivity
- SWIM-APS-02a: Consumption of Aeronautical Information services for Step 1
- METEO-04b: Generate and provide MET information services relevant for Airport and final approach related operations, Step 1
- METEO-05b: Generate and provide MET information relevant for TMA and En-route related operations, Step 1

Applicable Integrated Roadmap Dataset is DS14.

Background and validation process

The SESAR Solution has been validated through a series of activities including Real Time Simulations in three different environments: ATS Reporting Office (ARO), Flight Operations Centre (FOC) and on-board environments, all based on the same common operational concept for digital integrated briefing. A high level summary of each validation is presented hereafter:

- An initial verification exercise has focused on the provision of Digital NOTAM in a SWIM compliant manner. This has addressed data origination, collection and provision aspects in the Digital NOTAM data chain, which is a key enabler for Digital Integrated Briefing.
- This was followed by two groups of Real Time Simulations:
    1. First, in an ATS Reporting Office environment (Rome, Fiumicino), supported by an initial Enhanced Pre-flight Briefing (ePIB) prototype
    2. Second, separate validation modules have been executed as part of a larger validation exercise: ePIB in a simulated ARO environment (Frequentis, Vienna) and a digital integrated pilot briefing in a simulated FOC environment (Sabre, Vienna).

Results and performance achievements

The main findings from the overall validation exercises can be summarised as follows:

- From Pilots' point of view:
    - it is agreed that Digital Integrated Briefing offers a complete solution for pre-flight and in-flight, which can solve the growing issues of the current "list of NOTAM" PIB concept;
    - the situational awareness was assessed as being better with the Digital Integrated Briefing concept, mainly due to the graphical presentation of the events, leading to improved human performance;
    - pre-flight workload was reduced (1-2 points from a 10 point scale), digital NOTAM update workload with the system was acceptable and increased insignificantly comparing to usage without system;
    - the in-flight updates are expected to help identifying trajectory tuning opportunities, which may lead to estimated fuel consumption reductions of 3-7% and overall flight time reductions of 1-2%. Although this was not demonstrated yet with a pre-industrial prototype (no "V3" maturity yet), it is mentioned here based on the initial results obtained with a "V2" maturity level validation exercise.

- From FOC operators (dispatcher) point of view
    - it is agreed that Digital Integrated Briefing offers a complete solution for pre-flight preparation, which can solve the growing issues of the current "list of NOTAM" PIB concept;
    - the situational awareness was assessed as being better with the Digital Integrated Briefing concept, mainly due to the graphical presentation of the events, leading to improved human performance.

- From AIS/NOTAM operators point of view:

- it is agreed that the provision of Digital NOTAM can improve the data quality, through automatic data verification and graphical visualisation.

Recommendations and Additional activities

The following activities are relevant once transitioned to industrialization (V4):

- ensure the availability of world-wide Digital NOTAM data and digital MET data;
- develop semantic data filtering rules in order to identify strictly the events that are relevant for each specific flight;
- develop libraries with graphical elements (layout, symbols, colours) that can support customisation of the briefing according to the user preferences
- ensure proper training for the users of the new briefing application, in order to achieve reduced briefing times

Actors impacted by the SESAR Solution

Airspace Users (Pilots) and FOC/WOC operators (dispatchers).

Impact on Aircraft System

There is no direct impact on aircraft systems. However, the applicability of the Solution on board of the aircraft depends on the availability of Electronic Flight Bag (EFB) devices.

Impact on Ground Systems

The provision of Digital Integrated Briefing services requires upgrades in two areas:

- Digital data provision from the authorised sources, in a SWIM compliant manner:
  - Digital NOTAM data from national/regional AIM
  - Digital MET data from the national/regional MET observation and forecasting centres
- Implementation of Digital Integrated Briefing production tools (software)
  - in the ATS Reporting Offices (ARO)
  - in the FOC/WOC, with the possibility to transfer the data or directly a Digital Integrated Briefing product on ePIB devices

Regulatory Framework Considerations

The EASA regulations that are applicable to pre-flight briefing need to be verified and eventually updated in order to make sure that there are no blocking elements. For example, an existing provision for pilots to have “all NOTAM”, may block the removal of the NOTAM messages that are irrelevant for the flight and diminish the benefit brought by the Digital Integrated Briefing Solution.

Standardization Framework Considerations

The provision of Digital NOTAM according to a single globally applied specification (harmonised coding rules) is a pre-requisite. An initial version has been developed in cooperation between Eurocontrol and FAA. This needs to be maintained, expanded and correlated with the further evolution of the Aeronautical Information Exchange Model (AIXM), on which the Digital NOTAM concept is based.

The development of a default style library for the graphical depiction of NOTAM would help standardising the Digital Integrated Briefing implementations and would reduce the re-training needs in case of moving from one to another service/application provider. An initial proposal was developed by SAE International:

- ARP6467 *(Aerospace Recommended Practice)*: Human Factors Minimum Requirements and Recommendations for the Flight Deck Display of Data Linked Notices to Airmen (NOTAMs), Issued 2014-02

Further standardisation in Europe through EUROCAE should be envisaged.

Considerations of Regulatory Oversight and Certification Activities

The provision of Digital NOTAM falls under the same regulatory oversight arrangements as the provision of other digital aeronautical data (ICAO Annex 15 and the European Commission Regulation 73/2010 – Aeronautical Data Quality).

The provision of Digital Integrated Briefing services/products should be subject to similar safety assessment as currently done for the traditional pre-flight briefing services.

Solution Data pack

The Data pack for this Solution includes the following documents:

- OSED - 13.02.02-D118 Edition 01.01.01 (30/06/2016). The document provides contextual information and operational requirements for Digital Integrated Briefing, updates after execution and assessment of all validation exercises. It also provides a minimal list of Information Exchange Requirements.
- TS: 13.02.02-D120 Edition 00.01.02 (06/07/2016). This document refines the functional analysis of the Digital Integrated Briefing operational concept and provides the functional and non-functional requirements for the development of a "Digitally Enhanced PIB (ePIB)" application.
- ISRM: 08.03.10-D65 00.01.01 (25/07/2016) including the ISRM v2.0, the ISRM Service Portfolio and the SDDs of the service: AeronauticalInformationFeature.
- 14.01.04-D44-004 00.01.00 (04/07/2016): This document specifies the SWIM Yellow Profile, including the requirements applicable to interface with the SWIM-TI.
- SWIM Compliance Report for EXE-13.02.02-VP-461: 13.02.02-D27 Edition 00.01.01 (12.01.2016)
- SWIM Compliance Report for EXE-13.02.02-VP-462: 13.02.02-D18 Edition 00.00.03 (24.09.2014)

In addition to the above mentioned documents, the SWIM reference documents are included in the data packs of the SESAR Solutions SWIM Technological Solution and the SESAR SWIM Framework.

Intellectual Property Rights (foreground)

The foreground is owned by the SJU.