Release 5 SESAR Solution ID #20

Release 5 Initial collaborative network operations plan (NOP)

Contextual note – SESAR Solution description form for deployment planning

Improvements in Air Traffic Management (ATM)

Overview

The European ATM Collaborative Network Operations Plan (NOP) represents a view, at any moment in time, of the expected demand on the ATM Network on a particular day and the resources available across the network, together with a set of agreed actions to accommodate this demand, to mitigate known constraints and to optimize ATM Network performance.

The NOP has a dynamic and rolling lifecycle starting in the medium-term planning phase and progressively updated - up to and including the execution and post-flight phases. It supports and reflects the results of the collaborative ATM planning process: at each phase, stakeholders collaborate in developing a common view of the planned network situation. The NOP facilitates and supports all ATM stakeholders to take informed decisions considering the network effect and supports the Network Manager who is responsible for the overall coordination of individual decisions and actions needed to accommodate the demand and optimize network performance.

The NOP provides Common Situation Awareness to all ATM stakeholders. Due to the multiple services allowing access to the NOP unique source of data, it ensures that the same information is available to all ATM Stakeholders. The NOP is the common view of the Network situation, knowing that the information the ATM Stakeholder has access to depends on its role and associated access rights, adapted to its operational needs including different security levels.

Scope of the NOP project within SESAR

The work undertaken by the project was to evolve the existing NOP and was centred on four main areas:

1 Comprehensive integration of AOP and NOP data

Coming from the overall SESAR concept there was a strong need to integrate the airport and network operations The AOP-NOP Integration concept elaborated in SESAR is about a comprehensive integration of airports and network resulting in the relevant data exchange in a timely and automated manner. The concept supported a better Network and Airport planning, as means of better predictability, cost reduction and less air-holding facilitated by better usage of existing Network capacity by allocating resources to accurate demand.

To be able to do this the NOP identified inconsistencies and ambiguities in the Airport Schedule Information. e.g., when an arrival cannot be connected to a departure (or vice versa), and will inform the relevant AOP(s) of these identified inconsistencies. The AOP also exchanged specific departure and arrival planning information per flight, named DPI and API respectively.

The API included time estimates and actual values at specific milestones of the flight: such as landing, taxing, in-block etc .

The DPI included time estimates and actual values at specific milestones of the flight: off-block, taxing, take-off etc. as well as out-bound flight statues such as BRD, RDY, TXO, DEP etc. and other information such as the SID/runway, de-icing and departure terminal.

2 Increased visibility of network performance

This provided increased visibility of the network performance to support the move to performance driven operations. This evolution was achieved with the availability for further operational use of a set of global performance indicators (delays, adherence, predictability…) to assist the network monitoring in the pre-tactical, tactical and post-ops phases.

The NOP provided the data needed in post-operations to analyse the performance of the network vs. performance targets on a daily/weekly/seasonal/yearly basis and determined stakeholders' contribution to network performance.

3 Initial integration of weather information

This integration provides support to improved NM supervision and monitoring role in scenarios where measures are created and significant weather forecast impact is detected. However local weather assessments were used to assess the potential impact of weather on operations. The process was based on the 4DWxCube information and other information available from MET Services Providers (incl. temperature and wind at defined FL, CBs, thunderstorms / convective activity, Clear Air Turbulence, icing and potentially others). This information was then used to estimate the existence of significant weather areas that may call for the application of STAM or other ATFCM measures on the day of operations.

4 Improved collaboration via tool support

The integration of the NOP with local and regional tool support was the implementation of STAM Measures via local tools and consists of the preparation, co-ordination, and execution of Short Term ATFM Measures (STAM) such as Ground Delay, Horizontal Rerouting, and Flight Level Capping. This used NM B2B Web Services and allowed local ANSP tools to connect with the NM Systems to exchange data and information in order to improve the efficiency and effectiveness of STAM. The performance improvements were enabled by allowing the ANSP to act on local intelligence about complexity, workload, procedures, and other local knowledge and therefore become more successful to select the right flights at the right time to restore the Demand Capacity Balance (DCB).

Typically the local system was able to determine a Hotspot based on occupancy counts that exceeded the defined OTMV thresholds (Occupancy Traffic Monitoring Values), declare it, and monitor its evolution. In the case there was a significant Capacity Demand Imbalance, the ANSP could decide to propose a measure (STAM) to be created to alleviate the imbalance, selecting those flights that are picked by the local system using decision criteria that are optimised to the local ANSP.

The objective was to co-ordinate STAM via NM B2B Web Services between adjacent ANSPs, (here NATS and MUAC), in both directions. An ANSP created and proposed a STAM measure based on actual traffic situations, then asked for co-ordination and approval of the measures, implement them and monitored their evolution.

Operational Improvement Steps (OIs) & Enablers

- DCB-0103-A Collaborative NOP for Step 1 / OFA05.03.07
  - The NOP will be enhanced.
    - This OI step has been partially validated.

- The enablers for this are:
  - **Airport-38** : ATFCM –Extended Data Interface (VP-749):
  - **Meteo-06b**: Generate and provide MET information relevant for Network related operations, Step 1
  - **Mil-0502**: Support MIL-0501 with ground-ground COM interface for interconnection of military systems to PENS (VP-710)
  - **NIMS-13b**: Enhanced short term ATFM measures (STAM)
  - **NIMS-14b**: Demand Data Repository Phase II (VP-700) (VP-749)
  - **NIMS-21A**: Initial Flight Planning management enhanced to support 4D for Step 1
  - **NIMS-25**: Integration of Airports CDM data into Network
  - **PRO-028**: Procedures to support AOP-NOP
  - **AOC-ATM-20**: Sharing of trajectory data between AOC/WOC and the ATM world using B2B web services
  - **REG-0518**: Regulatory Provisions for the harmonised deployment of network collaborative management (VP-700) (VP-749)
  - **SWIM-APS-01a**: Provision of Aeronautical services for Step1 (VP-710)
  - **SWIM-APS-02a**: Consumption of Aeronautical Information services for Step 1(VP-710)
  - **SWIM-APS-03a**: Provision of ATFCM Information Services for Step 1 (VP-713)
  - **SWIM-APS-04a**: Consumption of ATFCM Information Services for Step 1
  - **SWIM-INFR05a**: General SWIM Services infrastructure Support and Connectivity (VP-710); (VP-749)
  - **SWIM-NET-01a**: SWIM Network Point of Presence (VP749)
  - **MIL-0501**: Specifications for the interoperability of military ground systems with SWIM (VP-710)
  - **SWIM-SUPT-01a**: SWIM Supporting Registry Provisions (VP749)
  - **SWIM-SUPT-03a**: Provision of ATFCM Information Services for Step 1
  - **SWIM-SUPT-05a**: General SWIM Service Inf. Support and Connectivity

Note: MIL-0501, SWIM-SUPT-01a, SWIM-SUPT-03a and SWIM-SUPT-05a were optional,

- Applicable Integrated Roadmap Dataset is DS15
- There was no pre-requisite Solution
- There was one pre-requisite OI Step – DCB-0102 – Interactive Rolling NOP

Release 5 SESAR Solution ID #20

Release 5 Initial collaborative network operations plan (NOP)

Background and validation process

The SESAR Solution has been validated through the following validations via Real Time Simulations and Shadow Mode Trials. These focussed on a range of objectives based primarily around other NM projects and were V3 validations.

- VP 700 – Advanced Short Term ATFCM including Network Supervision and interface with local tools. (Shadow Mode/Live trial).
- VP 710 - Real Time Airspace Status Data Exchange – Integrating of ASM, ATC and ATFCM processes for automated RTSA update in B2B via AIXM and ADEXP formats (Shadow Mode).
- VP713 Enhance Current Flight Planning Processes (Shadow Mode).
- VP 749 – TTA/TTO Management This validated the CTOT to TTA and AOP – NOP interface (Shadow Mode).

Results and performance achievements

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

- From the Pilots point of view
  - There was no impact from the pilots point of view
- From the ATCOs point of view
  - No impact on ATC
- From the local/sub Regional point of view
  - Local tools support the CDM process
- From the airport point of view
  - Enhanced co-operation between the NM and the airport
- From the Regional NM point of view
  - Enhanced collaboration between all actors.

The following potential benefits have been identified:

1. The main benefit that has been identified is that of better predictability of information between all the stakeholders. This gave rise to the following specific benefits:

2. Better Collaborative Decision Making (CDM) between all actors due to:
   a. Integration of AOP and NOP which gives enhanced collaboration,
   b. Increase in predictability,
   c. Increase in common situation awareness with the introduction of some new elements (as weather or performance indicators).

3. It was noted that with better predictability came the benefit of increased punctuality. However it was difficult to relate this to an increase in capacity, reduction in fuel burn etc.

These benefits need to be validated via further validations using multiple airports and Airspace Users.

4. The use of Met data allowed both the Regional and local stakeholders to have more knowledge and therefore make better and more informed decisions. However it was noted that other phenomenon such as the jet stream needed to be added to the Met data.

Recommendations and Additional activities

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

- Develop appropriate NM/FMP/AU/AO training
- Develop role for NMOC in assessing network impact in co-ordination with sub-regional/local actors and stakeholders.
- Develop operational and technical procedures to mitigate and manage system failures.
- Determine impact on ground systems and benefits for the stakeholders

Actors impacted by the SESAR Solution

- Regional NM unit
- Local/sub-regional NM units
- Airports
- FOC
- WOC
- Airspace Users

Impact on Aircraft System

There is no impact on the aircraft systems.

Impact on Ground Systems

This SESAR solution will require possible upgrades to the following ground systems:

- NM – Regional system
- ANSP – Local systems as required
- Airport – APOC systems as required.

Regulatory Framework Considerations

Release 5 SESAR Solution ID #20

Release 5 Initial collaborative network operations plan (NOP)

This solution is directly linked to one (identified as S-AF4.2 “Collaborative NOP” under AF-4 “Network Collaborative Management”) of the six ATM Functionalities identified in the Implementing Regulation (EU) No 716/2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan.

A number of Community Speculations will need to be updated in line with the relevant standards

Standardization Framework Considerations

Certain standards could be required to be amended in line with the AOP/NOP interface and the data that is now required to be sent/received.

Considerations of Regulatory Oversight and Certification Activities

There is no impact on the Regulatory Oversight and Certification Activities beyond those which are already in place.

Solution Data pack

The Data pack for this Solution includes the following documents:

- OSED - 07.06.01-D46 Edition 00.04.02. The document provides contextual information and the requirements for solution #20.
- VALR – 07.06.01- D05 Edition 00.02.05. The document provides contextual information as well as details of the validations that took place.

This solution did not deliver any Technical Specifications as these were developed by other projects. The two main TSs concerned with this solution are:

- 13.02.03-D353 - Final Technical Specification for Step 1 Federated DCB and TT management, Edition 00.02.01, 15/09/2016.
- Technical Specification 07.05.04- D49 Edition 00.01.02. This document provides the contextual information for the technical requirements for Real Time Airspace Status.

SWIM:

- ISRM: 08.03.10-D65 00.01.01 including the ISRM v2.0, the ISRM Service Portfolio and the SDDs of the NOP related services (METHazardEnrouteForecast Service, METHazardEnrouteObservation Service).
- TS: 14.01.04-D44-004 00.01.00. This document specifies the SWIM Yellow Profile including the requirements applicable to interface with the SWIM-TI.
- 08.01.01-D48 SWIM Compliance Report both Services listed above.

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

Intellectual Property Rights (foreground)

The foreground is owned by the SJU.