SESAR Solution

SESAR Solution Automated Support for Dynamic Sectorisation
Contextual note

Purpose:

This contextual note is a vehicle to summarize the results stemming from Release delivery activities. It provides a summary of the SESAR Solution in terms of results of the Validation exercises and achievements as well as additional activities to be conducted before or as part of deployment.

This contextual note is part of a package prepared for each SESAR Solution for which exercise results are conclusive and sufficient to support a decision for industrialisation. It complements a technical data pack comprising available deliverables required for further industrialization.

In addition, adequate consideration of the recommendations on the regulatory and standardisation frameworks and the regulatory and certification activities is required. These recommendations are detailed in the 'SESAR Solution Regulatory Overview – Automated Support For Dynamic Sectorization' included in the technical data pack.

Improvement in ATM Operations

Dynamic Capacity Management allows adapting the capacity to traffic load by grouping and de-grouping sectors and managing the staff resources accordingly. Unused latent capacity can occur at all Flow Management Positions (FMP) during peak traffic times. Current tools facilitate the detection of overload but do not offer better options to deal with it.

The SESAR Solution proposes an enhanced supporting tool for operations supervisors to evaluate the most suitable ACC En-Route sector configuration during the day of operations, in terms of capacity to match forecast demand. The tool is mainly used during the day of operations, between 8 to 2 hours before the beginning of an Air Traffic Controllers (ATCO) shift, taking into account:

1. Continuous refinement of planning using demand data through the planning phases (weeks, days, hours before execution) and determining how demand evolution has a direct impact on capacity management;
2. Local constraints such as the number of available ATCOs; and
3. "What If" scenarios designed at local level (such as impact in capacity due to bad weather conditions, change of operational circumstances in associated airports…).

Operational Improvements – OI Steps

CM-0102-A: Automated Support for Dynamic Sectorisation and Dynamic Constraint Management

This improvement relates to the dynamic management of airspace/route structure. The system provides support for decision making based on pre-defined sector sizing and constraint management in order to pre-deconflict traffic and optimise use of controller work force.

Background and validation process

The SESAR solution has been validated with a single exercise (EXE-04.07.07-VP-006) using the Shadow Mode Validation Technique on Spanish ATM System (SACTA) in Barcelona ACC IBP in October 2012. The purpose of the validation exercise consisted of assessing the use of a supporting tool for operations supervisors to evaluate the most suitable ACC En-Route sector configuration to match capacity to forecast demand.
The decision tool supporting the Operations Controller and the Flow Manager was provided through two different interfaces:

- One interface was in the ATC Control Room providing the Operations Supervisor with demand forecast, based on actual traffic data; and
- Another interface was in the FMP room providing the Flow Manager with demand forecast based on actual data, historical data or a combination of both; the CFMU system was also available in the FMP room.

Fourteen sessions were performed to validate the solution. Data were recorded and then post-processed to measure the following indicators:

- Perceived Situational Awareness;
- Saturation Periods (Demand over declared capacity per sector;
- Number of flights able to enter airspace volume; and
- IRCO (Operational Configuration Qual*ity Indicator).*

Results and performance achievements

A qualitative assessment demonstrated that tool functionalities are useable and useful, the supporting tool proving to be a significant aid for sector configuration.
The main conclusions of the validation are as follows
Safety improvements - due to increased situational awareness and early management of constraints in particular thanks to the “What-if” functionality;
Increased capacity - due to better use of available resources, both human and airspace:

- Saturation Periods are reduced;
- The number of flights able to enter airspace volume are increased by 10%; and
- The number of delayed flights is reduced by 5%.

Improved efficiency - due to the reduction in delays and adjusting ATC sectors to traffic flows; and
Improved cost-effectiveness - due to better usage of available resources adapting them to demand forecast in advance.

Additional activities

The validation activity identified the following recommendations to be taken into account for the industrialisation:

- Perform a sequence of different Validation Techniques within the same validation activity to address the Reduction of Delayed Flights;
- Improve the demand forecast for non-nominal conditions; and
- Enrich the decision tool during the industrialization phase with inclusion of occupancy counts, display of saturation periods, advisories about the most suitable demand source.

Actors involved

The Actors implementing the operations of the SESAR Solution are as follows:
Operation Supervisor,
Flow Manager.

Impact on A/C system

There is no impact on A/C system.

Impact on ground systems

The Solution relies on the following Ground System Enablers:
ER APP ATC 15: Flight Data Processing: support for Dynamic Sectorisation and Dynamic Constraint Management.
PRO-220a: ATC Procedures related to Detection and Resolution of Complexity, Density and Traffic Flow Problems.
These enablers were implemented and supported by the decision tool and CFMU system during the validation activity. However, the introduction of tools supporting the Operations Supervisor does not involve changes of operational procedures.

Consideration of Regulatory Framework

There is no specific topic in the field of the regulatory framework to be considered in deployment, beyond the applicable regulations currently existing.

Consideration of Standardisation Framework

There is no specific topic in the field of the standardisation framework to be considered in deployment, beyond the applicable standardisation currently existing.

Considerations of Regulatory Oversight and Certification Activities

Due consideration should be given, in the local deployment of the solutions, to the impact on safety, environmental impact and positiveness of the cost benefit analysis.

Intellectual property rights (foreground)

The foreground of this deliverable is owned by the SJU.