SESAR 2020 Concept

A Brief View of the “Business Trajectory”
The Presentation

SESAR Concept: Capability Levels
Key Themes: Paradigm change
Business Trajectory
Issues
Conclusion
Workshop ATM Capability Levels

ATM Capability Level

Available 2025+: Trajectory Sharing Air-Air; Met data sharing (Air-Air/Air-Ground); Avionics with Longitudinal Navigation Performance Capability (4D Contract) and Airborne Self-Separation

SESAR 2020 Requirements: Trajectory Sharing meeting ATM requirements; Avionics with Vertical Navigation Performance capability; multiple RTA and Airborne Separation capability

Aircraft Delivered 2013 onwards: ADS-B/IN and avionics enabling airborne spacing – “Sequencing and Merging”; Datalink: Link 2000+ applications

“Current Aircraft”: ADS-B/out (position/aircraft/met data); Avionics with 2D-RNP, vertical constraint management and a single RTA; Datalink: Event reporting/Intent sharing
SESAR’s concept brings a new approach to air traffic management - key features are:

- Moving from airspace to trajectory based operations, so that each aircraft achieves its preferred route and time of arrival.
- Collaborative planning, so that all parties involved in flight management from departure gate to arrival gate can plan their activities based on the performance the system will deliver.
- Dynamic airspace management through enhanced co-ordination between civil and military authorities.
- New technologies providing more accurate airborne navigation and optimised spacing between aircraft to maximise airspace and airports capacity.
- Central role for the human, widely supported by advanced tools to work safely and without undue pressure.
Collaborative ATM!
Key Themes – Pulling Together

Performance Based Operations

Capability 4
SESAR 2020

Capability 3

Time Based Operations

Capability 1+2

An example ..

Network Management
Information Management
Network
TM and Automation

Airport

Performance Based Operations

Trajectory Based Operations

Network Management
Information Management
Network
TM and Automation

Airport

2009 2012 2017 2020
The Business Trajectory
The Business Trajectory
Workshop
The Business Trajectory

Expresses the Business/Mission intention of the airspace user.

Owned by the airspace user and agreed with the ANSP and Airport:-

- Changes via CDM processes involving user **BUT does not interfere with ATC/Pilot time-critical decision processes.**
- When constraints are needed the solution is chosen by the user whenever possible.

Based on most timely and accurate data available:-

- AOC, Airborne Automation, ANSP, 3rd Party on behalf user.
- ANSP will compute trajectory for Military or non-capable users during flight.

Exists through out all phases of the ATM process.
“Business” emphasises that the trajectory has a purpose, be it commercial or mission orientated. RBT is iteratively negotiated until agreed.

Owned by the airspace user, respects a set of agreed 4D constraints and is facilitated by the ANSP and Airport. Aircraft is “Authorised” to proceed in accordance with the RBT by defined “conflict free” segments.

This set of “business objectives” may be “Updated” or “Revised” ....
Trajectory Authorisation

- The RBT is authorised in segments. Authorisations are similar to ATC clearances
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Reference Business Trajectory Update

Trajectory Update

RBT is updated with the latest trajectory predictions

- Trajectory Management Requirements (TMR)
  - Specify the aircraft requirement to share the predicted trajectory in the event that the flight detects a delta (Δtime, Δlevel, Δlateral) from previous predictions
  - Designed to minimise network loading by specifying the accuracy and frequency of updates
  - May specify any periodic trajectory sharing and the data content required

- Updates
  - Do not trigger trajectory revision unless the update indicates that a constraint on the trajectory cannot be respected (TMR)
  - Transparent to controllers and pilots. The primary benefit will be for conflict detection, sequencing and monitoring tools

- Parameters may be set according to separation needs and operational context
  - May be ‘carried’ by airspace/route/procedure, or
  - Tailored to specific needs
Trajectory Revision

- Trajectory Revision may be triggered by
  - Inability of the aircraft to respect constraints in the RBT
  - Need to change trajectory due to weather or urgent operational reasons (i.e. diversion)
  - Need to provide separation
  - Need to organise a queue for a constrained resource (i.e. runway)
  - Due a new operational constraint (i.e. airspace segregation or runway change)

- Trajectory revision will be a collaborative process except under time critical conditions
Network Managers, ANSPs, Airports and Airlines working together to define and agree an optimum trajectory that is safe, efficient, economic and acceptable to the environment.

Controllers and pilots working together to flexibly manage constraints according to that agreement.

One way of achieving the SESAR Business Trajectory
Issues – Validation & Verification

Detailing the concept and retaining “buy-in”.
Defining the Architecture and technical systems.
Achieving the target performance
Proving performance through Validation and Verification
Achieving endorsement by the ATM Community

A “Huge Challenge!”
Summary of Business Trajectory Process

An example...

Collaborative Planning  Execution
Network Management  Pre-Departure  Trajectory Management

Capacity Imbalances and Airspace Restrictions Assessed
Updated

Corporable Business Planning  Shared through the NOP

Refined and Updated

Agreed and Referenced
Authorised

Negotiation and Agreement

Revised

NOP – Network Operations Plan

SWIM – System Wide Information Management
The SESAR concept moves ATM from Airspace to Trajectory Management.

The Business Trajectory is owned by the “Airspace User” and any revisions to it need to be agreed with the owner.

It is the shared objective of the Airspace User, Service Providers and Airports to achieve the Business Trajectory.

- Can provide us with an opportunity to further understand the SESAR Business Trajectory and how it may operate.
- Will input significant understanding to the validation required for complex concepts.