SESAR Definition Phase
Towards a New European ATM System

Worldwide Symposium on enabling the Net-Centric information environment
2-4 June 2008

Bo Redeborn
Director ATM Strategies
SESAR: Committing to Make Future Happen

European Challenges:
- Traffic forecast to double by 2025
- Growth must come with significant performance improvement
- Issues: ATC pushed to its limits; obsolescent technologies; airspace fragmentation

A new ATM System is required

Needs:
- Turn off fragmented approach
- Accelerate evolution in response to challenges
- Synchronise plans and actions
  - from research to operations
  - airborne and ground deployments

SESAR
- Technical/operational change, supported by Single European Sky legislation
- Direct involvement of aviation industry in all phases
- Address European needs and Global interoperability
SESAR Cohesive Programme for Stepwise Implementation

- **Definition**
- **Development**
- **Deployment**

**SESAR Phases**

- **2005**
- **2010**
- **2015**
- **2020**

**Current work**

**European ATM Master Plan**

- **Implementation**
- **Development work**
- **Planning work**
Air Transport Framework: The Current Situation

ATM Performance Targets

ATM Target Concept

ATM Deployment Sequence

T0: 6 March 2006

Reference to derive technical requirements for architecture & enabling systems

Change steps with performance gains from agreed baselines (now, 2013, 2020)

Actions of all stakeholders to achieve the performance benefits

ATM MASTER PLAN
Shorter term: Implementation actions
Longer term: R&D actions

ATM Master Plan
Work Programme for 2008-2013
Design for Growth – Deploy When & Where Needed

Performance targets derived from needs of society & airspace users

Design Goals for scalable future capability:
- **Capacity**: handle 3 times traffic
- **Safety**: factor 10
- **Environment**: - 10% effects / flight
- **Costs** to airspace users: - 50%

Progressive deployment, when/where needed

2020 targets:
- **Capacity**: + 73% overall
- **Safety**: improvement factor 3
- **Environment**: max. contribution
- **Costs** to airspace users: - 50%

(Reference: 2005)
Design goals aligned on the 11 ICAO Key Performance Areas

**Societal Outcome**
- Safety
- Security
- Environmental Sustainability

**Operational Performance**
- Cost Effectiveness
- Capacity
- Efficiency
- Flexibility
- Predictability

**Performance Enablers**
- Access & Equity
- Participation
- Interoperability

**Design Goals for scalable future capability:**
- **Capacity:** handle 3 times traffic
- **Safety:** factor 10
- **Environment:** - 10% effects / flight
- **Costs to airspace users:** - 50%
SESAR Concept of Operations is a Paradigm Shift for ATC

Past

Radar Control
*Know the current and estimate planned a/c positions*

Today

Trajectory Management
*Know & share the current & planned a/c positions*

Future
Concept of Operations

- Enhanced automation
- Human to remain central in the system as manager and decision-maker
- New separation modes

- Starting in strategic planning phase
- Dynamic airspace design & management
- Continuously reflected in the “Network Operations Plan”

- Defined in 4D, gate-to-gate, including turnaround operations
- Executed as close as possible to the owner’s intention
- User-preferred routing (except where capacity requires structured network)

- Collaborative Decision Making
  - better decisions & efficient operations
- System Wide Information Management

- Network Operation
  - Plan / Collaborative Planning

- Business Trajectory

- Integrated Airport Operations
A Net-centric system

The ATM network

= A set of nodes (including the aircraft) providing or consuming information

1. Source
2. RESPONSIBILITY
3. Output

AIS App

World

AIS Supplies Traditional AIS products

A net-centric system

<table>
<thead>
<tr>
<th>Source</th>
<th>RESPONSIBILITY</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORE</td>
<td>DISTRIBUTE</td>
<td>CHECK</td>
</tr>
<tr>
<td>A/O OPS</td>
<td>ATFM</td>
<td>MET</td>
</tr>
<tr>
<td>ATFM</td>
<td>CDM</td>
<td>NAV</td>
</tr>
<tr>
<td>CDM</td>
<td>FDM</td>
<td>FIS</td>
</tr>
<tr>
<td>FDM</td>
<td>WIMPOO</td>
<td>ATC</td>
</tr>
<tr>
<td>ATC OPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Enablers of the Operational Change

Technical
- Common system architecture, service oriented
  - Reusable modules, reduced development costs
- New CNS technologies
  - E.g. satellite navigation, new data link

Managerial & Institutional
- Comprehensive business case to support decision making
  - Safety, security, environment, economical, human factors
- Change management process
  - including human aspects & social dialogue
- Timely standardisation & rule making
- Effective commitment of all actors
- Financial instruments
## ATM Deployment Sequence Based on Capability & Service Levels

Implementation based on **ATM Capability Levels**: sets of functional evolutions for Aircraft, ATC Centres, Airports, Network Management

<table>
<thead>
<tr>
<th>IP1</th>
<th>IP2</th>
<th>IP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACL #0</td>
<td>ACL #1</td>
<td>ACL #2</td>
</tr>
<tr>
<td>2008</td>
<td>2013</td>
<td>2017</td>
</tr>
</tbody>
</table>

- **ACL #0**
  - Implementing available technologies & Best practices e.g. DMEA, Link

- **ACL #1**
  - Curved approaches
  - AMAN/DMAN integration
  - ATSAW
  - ...  

- **ACL #2**
  - ASPA-S&M
  - UDPP
  - Improved LVO
  - 3D-PTC on predefined routes
  - 2D-PTC

- **ACL #3**
  - 3 Airspace categories
  - Free routing from TOC -> ToD
  - Revision of RBT/DL
  - Multiple CTOs
  - ...  

- **ACL #4**
  - 2 Airspace categories
  - ASEF C&P
  - 3D-PTC on preferred routes
  - SVS
  - ...  

- **ACL #5**
  - ASAS-SSEP
  - 4D-PTC
  - Self adjustment on WV
  - ...  

**ATM Service Level** delivered to the Airspace User: results from the lowest ATM Capability Level of the different interacting Stakeholders
Performance Benefits by 2020

With IP1 + IP2 implemented

- 16 M accommodated flights/year (73% more 2005)
- Average ATM delay: 0.5 min (Vs 2.2 min 2008)
- Fuel inefficiency reduction: ~ 25%
- Significant direct and indirect cost savings
ATM Service = Service delivered to the Airspace User

Its level results from the individual ATM Capability Levels of the different interacting Stakeholders

ATM Service Level delivered: 3
Full benefit only if all involved stakeholders consistently equipped

Service achieved: Level 2
→ Full benefit Not Realised
Master Plan Overview

- Trajectory based operations preparation
- Net-centric trajectory management
- Advanced automation in a shared trajectory environment
- Full 4D-trajectory management & self separation

Best practices

R&D

Deployment

Operations

Commitment to deployment now

Commitment to R&D Investment

Agreed way Forward
Provide different views:
- Roadmap for Operational Evolutions
- Plans viewed from Stakeholders perspectives
- Roadmap for “transversal” aspects (regulation, safety, environment)

Address full life cycle:
- R&D, Deployment, Innovative research

Soon available at: www.atmmasterplan.eu
The SESAR Master Plan

Products of the SESAR Definition Phase

The Master Plan content

D5

Task Deliverables

Electronic Master Plan
www.atmmasterplan.eu

Renewed ECIP/LCIP

Agreed strategic guideline

Working and Planning area

Derived agreed & committed actions
The Work Programme WBS for the next phase (2008-2013)
SESAR brings a new dimension to European ATM

A Key success factor:

All stakeholders’ commitment to the ATM Master Plan