Content of Presentation

- Introduction
- Overview of NATS involvement in SESAR
- Beyond R&D: from concept to deployment
- Detailed Case study: Time Based Separation
- Next Steps
- Conclusions
NATS involvement in SESAR: Phases

**Definition phase**
Resulted in the European ATM Master Plan & Target Concept

**Development phase – (R & D phase)**
Managed by the SESAR Joint Undertaking (SJU)
1. Deliver Early Wins
2. Develop Mature Concepts
3. Research, validate and develop technological solution for future concepts

**Deployment phase**
Implements the results
Deploys harmonised systems.
Delivers the performance increase foreseen in the ATM Master Plan

- **2006-2008**
- **June 2009-2016**
- **2013-2025**
Work Package Framework

WPB: Target Concept Maintenance

WPC: ATM Master Plan

WP3: Validation Infrastructure

WP4: En Route Operations
WP5: TMA Operations
WP6: Airport Operations
WP7: Network Operations

WP8: Information Management

WP10: ATC Systems
WP11: AOC
WP12: Airport Systems
WP13: NIMS

WP9: Aircraft Systems
WP14: SWIM
WP15: CNS

WP16: Transverse Areas

Key
- Operational
- System
- Tranversals
NATS Involvement in SESAR Development

Lead Work Package 5 - TMA Operations

- Overall Responsibility for consolidation of the Operational Concept definition and Validation
- Includes TMA Separation and Queue Management / TMA Manager

Major involvement, leading sub-WPs and projects, on:

- Work Package B - High Level Target Concept and Architecture
- Work Package 4 - En-Route Operations
- Work Package 7 – Lead NOP project
- Environmental Sustainability
NATS Involvement in SESAR Development (2)

Involvement in Approach / Airport Projects

• Time-Based Separation
• Integrated AMAN / DMAN
• Brake To Vacate

Overall

• Involved in 75 projects and SWPs across programme; leading 14
SESAR STEP 1/2 Integrated Validation Planning for Five Strategic Business Areas. As distributed 16 July 2012

- Network Management
- Time Based Spacing
- AMAN DMAN Co-operative Planning
- Trajectory Management Framework
- IMSP PBN
- Traffic Synchronisation
- En-route TMA Tools
- SM
- Human Factors
- ITEC V2 Requirements

Slide 8
Beyond R&D: from concept to deployment

▷ Point Merge
  ▷ Procedures for London City and Gatwick included as part of a major re-development of the London Terminal Area
  ▷ An enabler for reduced holding and improved descent (and climb) profiles

▷ Extended AMAN horizon
  ▷ Descent Phase procedures in operation at Swanwick (covering the London TMA)
  ▷ Initial focus on oceanic traffic; coordinating with the Irish
  ▷ Extended horizon trial in Spring 14 with Reims, Maastricht, Shannon and Prestwick using AMAN info supplied using SWIM

▷ Multi Sector Planner (MSP)
  ▷ MSP and Planner Tools taken forward and to be introduced as part of a long term strategic Solution based around the SESAR concept
NATS Progress to date – Completed R&D

› ADDEP Panel at Southampton Airport
  › Provides key departure information (DPI) from airports not currently connected to the central Integrated Flight Planning System (IFPS) into the network
  › Ensures airborne times of departures are logged as effectively as possible, ensuring up-to-date information for upstream sectors
  › Funding secured through a UK-sponsored Strategy Group FASIIG

› Approach Vertical Guidance
  › Localised with Vertical Guidance (LPV) Procedure now implemented and used operationally at Glasgow – satellite based approach as an alternative for ILS
  › Validation work completed at Bristol as part of the Bristol Hotspot project

› Using improved Airline Flight Plan information into the ATC Trajectory Prediction tool
  › Use of additional airline data, e.g. aircraft weight, is being implemented through the 4% CO₂ Programme
Time Based Spacing

- **Aim** - Improve landing rate resilience to headwind conditions on final approach

- **How** - Change from distance based separation to time based separation rules

- **Tools** to support the safe application of Time Based Separation (TBS) between wake separated arrival pairs at Heathrow
Headwind affect on landing rate

Normal Landing Rate – Light Headwind
Headwind affect on landing rate

Normal Landing Rate – Light Headwind

Reduced Landing Rate – Strong Headwind
Heathrow wind delay

Wind is the biggest cause of Heathrow ATFM delay

Heathrow Arrival ATFM Delays 2010 & 2011 by Cause

- 2010 Delay Minutes by Cause
- 2011 Delay Minutes by Cause
- 2010 Days Affected
- 2011 Days Affected

Causes:
- Snow
- LVPs
- Winds
- T/Storms
- Capacity Approach
- Other
DISTANCE BASED SEPARATION: Light headwinds

Medium: 5 NM (113 secs)
Heavy: 4 NM (90 secs)
Heavy: 6 NM (135 secs)

NM = Nautical Miles

WINDSPEED: Light headwinds
GROUNDSPED: Mean speed 160 Knots
SEPARATION: Fixed on distance based standards

Landing rate: 40-45 Aircraft per hour
DISTANCE BASED SEPARATION: Strong headwinds

Wind reduces groundspeed, aircraft are slower so landing rate reduced

WINDSPEED
Strong headwinds

GROUND SPEED
Mean speed 130 Knots

SEPARATION
Fixed on distance based standards

Landing rate
32–38 Aircraft per hour
TIME BASED SEPARATION : Strong headwinds

Wake vortices dissipate quicker so separation distance can be reduced safely.

WINDSPEED
Strong headwinds

GROUND SPEED
Mean speed 130 Knots

SEPARATION
Dynamically calculated on headwind conditions.

\[
\text{Landing rate} = 36 - 40 \quad \text{Aircraft per hour}
\]
The Comparison

1. DBS
   Light headwinds
   Landing rate
   40-45 Aircraft per hour

2. DBS
   Strong headwinds
   Landing rate
   32-38 Aircraft per hour

3. TBS
   Strong headwinds
   Landing rate
   36-40 Aircraft per hour
Indicators

Separation Indicators

- Linked to preceding aircraft
- A reference for separation

TEAM: parallel runway operations

- Required diagonal separation displayed
- In trail and not in trail indicators calculated
- Maximum constraint displayed
Normal Landing Rate – Light Headwind

Reduced Landing Rate – Strong Headwind

TBS Landing Rate – Strong Headwind
Landing rate

TBS will help maintain an efficient landing rate in strong headwinds.

Delay time

TBS will half delay time caused by strong headwinds saving approximately 80,000 minutes a year.

NOT CANCELLED
Next Steps – Continued Involvement

• NATS remains committed to SESAR
  • Concluding the current work on the SESAR development phase
  • Involvement in Demonstration Projects e.g. TOPFLIGHT
  • Developing proposals for SESAR 2020
  • Continuing to work closely with the SJU at all levels

• Deployment
  • As shown, NATS is “Deploying SESAR” – future strategic changes are built around the SESAR solutions
  • Working with our partners in SESAR, SJU and across the industry to ensure success and achievement of benefits
Thanks for your attention

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