Results & Impacts of ICAO ANC/12

Integration & Harmonisation of SESAR and NextGen into the global framework

ATM 2013 Seminar
June 13 2013
Michael Standar
Has endorsed:

- Revised Global Air Navigation Plan (GANP)
  - Aviation System Block Upgrades (ASBU)
    - Operational & performance improvements
    - Available for global deployment
    - Ensuring global interoperability
    - Allowing better synchronisation
  - Technical systems roadmaps
  - Basis for ICAO work plan in next 10 years
- Proposals for improving planning & standardisation processes: principles agreed, more to be done
FUNDAMENTAL CHANGES TO BE ACHIEVED IN STEPS

INTEGRATION OF AIRPORTS

Integrating airports - time synchronised operations of surface trajectories and flight turnaround

THE 4D TRAJECTORY PRINCIPLE

Integrating airspace users flight systems to build predictable time synchronised flight precision

THE SYSTEM WIDE INFORMATION MANAGEMENT

The Intranet for Air Traffic Management

AUTOMATION

Human operators concentrate on high value-added tasks

COLLABORATIVE NETWORK PLANNING

Integrated with airport operations planning and airspace user flight planning
SESAR IS ORGANISED IN THREE PHASES

<table>
<thead>
<tr>
<th>Definition phase</th>
<th>Development phase</th>
<th>Deployment phase</th>
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Managed by the SESAR Joint Undertaking


EUROPEAN COMMISSION
EUROCONTROL
THE INDUSTRY = public-private partnership

700 mio€
700 mio€
700 mio€

2 founding members
3rd ‘founding’ member

Budget: € 2.1 billion

Public-Private Partnership: a première
• Innovation from private sector
• Public financial stability & enforcement power

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What is SESAR

• 1. Partnership
  • 3000 persons, 110 companies, airspace users, military, staff, reg. authorities…

• 2. Pragmatism
  • Operational procedures and technical systems are validated in real life operational environments
  • Demonstration flights (e.g. Green flights)

• 3. Business cases
  • Involvement of suppliers, integrators and investors
  • Direct link to standardisation and regulation
Global traffic development spreads the same issues globally

--> We need timely global standards for interoperability

Deployment where and when needed, but based on common principles/rules/data & interoperable technologies

--> One-size –does-not-fit-all

Cooperation early in life cycle is more efficient

--> Among programmes, within/across regions, with ICAO

--> On requirements, R&D activities

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ICAO GANP / European ATM Master Plan: Concurrent, Complementary, not Competitive

- Same philosophy
  - Need to improve ATM performance
  - Through harmonisation of systems, procedures
    - And regulations
  - Through deployment of a series of step changes
  - Aim at the Global ATM Operational Concept

- Mutual impact, Global ↔ European
  - From concept definition to operations
  - For timely and useful standards
European ATM Master Plan

- **Aims at successful, timely & efficient deployment**
  - Includes additional essential considerations
    - Features not requiring global interoperability
    - Institutional, managerial, regulatory aspects, e.g.
      - Change management process
      - Effective commitment of all actors
      - Financial instruments
      - **European Single European Sky**
        - Common regulatory framework incl. performance
        - FABs

- **Bridges R&D and deployment in a consistent plan**
  - A cohesive programme across industry through SESAR
  - An objective: wide cooperation
Research-Innovation – The ‘Pipeline Principle’
- delivering SES performance improvement

The Innovation and R&D Cycle
- Concept development, System development & verification, Validation, Delivery

Programme management & technical process domains to support and monitor the execution of the R&D cycle

The Innovation Cycle includes all phases
- Exploratory Research
- Applied Research
- Pre-Industrial Development
- Industrialisation
- Deployment

‘IDEAS’ – Concept development
‘UNDERSTANDING’ – System development & verification
‘POTENTIAL’ – Validation
‘PRODUCTION’ – Industrialisation
‘RESULTS’ – Deployment

Single European Sky
ATM Master Plan
ATM 2013 Chicago, IL
European ATM Master Plan Mapping with ICAO ASBUs: Steps and Blocks

Same notions of:
- Progressive deployment
- Performance orientation
- Synchronised actions

Presentation tailored to audience
European ATM Master Plan Technology Roadmaps consistent with those of the GANP
Challenges

- **Sensitivity of solutions to local situations**
  - The issue is not the target but the path to it
  - New good ideas not an exclusivity of Europe or US
  - Buy-in to a well understood common plan is essential

- **Need for new interoperable standards**
  - How to get them timely, widely recognised

- **Need for consistent plans to mutually support individual business cases**
  - Cooperation within/across regions to optimise synchronised deployments
  - Need for training, change management
  - Need to validate, demonstrate

- **Europe can assist a lot, while fulfilling European specific objectives**

- **Risk of global bottleneck: process, resources, representation (geographical), recognition/endorsement of delegated work**

Data Communications: a typical challenge area
Essential Considerations for Europe & Global Plan

The network of actors & assets

The flight trajectory over time

Measured business performance

Network

Trajectory

Performance

Informed decisions taken collaboratively on early and accurate information

Partnership – Interoperability

RPAS

Wake

“BEBS”

SWIM and data comm. are cornerstones
Some Key Critical Issues
4D Trajectory Management
The SESAR Trajectories

- Aircraft (FMS) Trajectory
- Ground Local ATC Trajectory
  - TP via RDP (State Vector)
  - TP via FDP (Flight Intent)
- Strategic Business Trajectory
- Reference Business Trajectory
- Reference Mission Trajectory
- Airport Transit View
Performance Benefit Mechanism

Predictability & Planning Stability

Uncertainty [std dev]

Predictability gain due to:
- Downstream Traject Mgt
- NMF/ATC coop. and real-time data sharing
- RBT adherence

Predictability gain due to:
- Integrated NM/Apt/ATS processes
- SMAN DMAN/AMAN

Predictability gain due to:
- SBT/RBT development under consideration of constraints;
- Dynamic DCB

Predictability gain due to:
- Layered planning of Traffic & Airspace Demand and ATM Resources;
  DCB processes;

Current Operations
2005

Current Operations
2030

SESAR Operations
2030

Time Horizon

Real time
-30min
-1h
-2h
TO
TOBT
RBT Inst.
-1d
-2d
-1w

After t/o

Before t/o

Pre-tactical Planning
Need to Identify & Follow Aircraft

European ATM Network

- Links the fragmented airborne elements with the Airport Aircraft Trajectory
- To build a complete, continuous AIRCRAFT Trajectory
- Enables us to bring down the operational variability to +3 minutes

Airport ATM “The Missing Link”

- European ATM Network
- RTA/CTA CDA Arrival, Departure management Runway throughput
SWIM Definition

SWIM

- standards
- infrastructure
- Governance
- Qualified parties
- ATM Information
- Services
SWIM in SESAR – next steps?

**Governance**
- Test SWIM compliance framework
- Use prototype Registry
- 'prototype' governance in the Programme

**Services**
- Identify and define further services
- Implement in prototypes
- Validate

**Information**
- Extend and evolve AIRM
- Coordinate common global model
- Extend and evolve physical models (AIXM, WXXM, FIXM,..)

**Infrastructure**
- Prototypes for ground systems
- Prototypes for airborne use
- End-to-end security

**Standards**
- Refine information model standard
- Refine service model standard
- Infrastructure technology profiles

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Enablers - Datacomm

- HF
- VHF ACARS (continental)
- SatCOM ACARS (global)
- VDL Mode 2/ATN (continent)
- New terrestrial (continental) e.g. LDACS?
- New SatCOM (global) e.g. Iris?
- Multi link Management
- AeroMACS (airport)
- Link 16 interconnection (Military)
- New flexible avionics

Legend:
- Green: Legacy or currently implemented technology
- Blue: Future technologies

SESAR Steps:
- SESAR Step 1
- SESAR Step 2
- SESAR Step 3

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BEBS, MCBS, ....

*Best-Equipped-Best-Served or*

*Best-Efficiency-Best-served or*

*Most-Capable-Best-Served or*

..................

Two elements;

- Operational service priority
- Economic/Financial incentives!
Need to:

1) facilitate identification of interoperability requirements
2) map planned evolutions
3) visualise status of capabilities at different times
4) facilitate integrations of airspace user system capabilities
RPAS and ATM

- Integration of RPAS in the ATM is a key priority for the future ATM in Europe
- European roadmap for integrating RPAS in the Aviation System from 2016
  - R&D perspective
  - State of play in Europe
  - Regulatory framework
Airport Capacity – Wake Vortex Considerations

Achievements

RECAT 1

- European and US Regional approach
- European and US Wake data bases
- New knowledge and methodologies
- US Deployment at Memphis shows benefits

Time Based Spacing (TBS)

- TBS head wind procedures validated
- Exploits wake and wind knowledge
- Safety case delivered
- Deployment decision at London Heathrow

CREDOS (cross-wind departure)

WIDAO (CDG closely spaced parallel runway operations)
Wake Vortex: Next Steps

Moving to dynamic pairwise via static pairwise separation

Static Pairwise (RECAT 2)

- Common European and US methodologies
- 100 X 100 aircraft matrix
- Customise categories by airport traffic mix
- Proposal to ICAO for new wake separations provisions

Dynamic Pairwise (RECAT 3)

- Technology development on:
  - Weather Radar
  - Wake detection (Lidar)
  - Down link of aircraft weather parameters

Integrates TBS, Weather Dependent and aircraft sensors

Benefit driven phased approach to deployment
Wake Vortex: Required Commitment

RECAT 2 is a pre-requisite to reaching RECAT 3.

Europe is committed to deliver RECAT 2 together with the US to ICAO in December 2014

Will need to start work on R3 operational and technical scope as soon as possible
GLOBAL COOPERATION & INTEROPERABILITY

Standards built on SESAR and NextGen developments will support harmonised Implementation and Regulation.

Programme level coordination enhanced by interoperability and wider industry buy-in.
US/FAA Coordination

It is about identifying interoperability issues in SESAR that needs to be harmonised to safeguard both development and deployment activities.

Strong coordination with FAA/NextGen and other regional modernisation programmes is essential for standardisation activities in ICAO and in standard making bodies like EUROCAE and RTCA.

The need for global interoperability and standards requires support at the ICAO level and a concerted approach is essential.
EU-US MoC Annex 1

Work Area 1 – Transversal
Work Area 2 – Information Management
Work Area 3 – Trajectory Management
Work Area 4 – CNS & Airborne Interoperability
Work Area 5 – Demonstration Projects
Conclusions

• One size does not fit all, But
  • Solution involving interoperability should be implemented the same way by all
  • Business cases are not independent, but must reflect the conditions of those who invest and operate

• Transition is complex and must be anticipated
  • It is easier to converge when cooperating early

• 12th ICAO Air Navigation Conference
  • The starter of a regular improved planning process

• Interoperability, a constant consideration locally, regionally and globally
Thank You!