The Challenge:
Air Transport System Efficiency

Jan van Doorn
Rapporteur of Working Team 4
EUROCONTROL Senior R&D Co-ordinator
A new age in Aeronautics

Air Traffic Growth

1925 1950 1975 2000

engineering & military driven

commercially driven

sustainability driven

Concorde (1969)
Comet (1949)
A380 (ca. 2004)
A318 (2002)
F13 (1919)

time

One sky for Europe
One sky for Europe

The Advisory Council for Aeronautics Research in Europe (ACARE)

<table>
<thead>
<tr>
<th>Quality &amp; Affordability</th>
<th>Fall in travel charges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger choice</td>
</tr>
<tr>
<td></td>
<td>Air freight services</td>
</tr>
<tr>
<td></td>
<td>Halve time to market</td>
</tr>
<tr>
<td>Environment</td>
<td>50% CO2 Reduction</td>
</tr>
<tr>
<td></td>
<td>80% NOx Reduction</td>
</tr>
<tr>
<td></td>
<td>10 dB reduction in external noise</td>
</tr>
<tr>
<td>Safety</td>
<td>80% reduction of accident rate</td>
</tr>
<tr>
<td></td>
<td>Reduction of human error impact</td>
</tr>
<tr>
<td>Efficiency of the Air Transport System</td>
<td>3X increase in movements</td>
</tr>
<tr>
<td></td>
<td>99% arrivals/departures within 15 min</td>
</tr>
<tr>
<td></td>
<td>Time in airport &lt; 15 min (SH) &lt; 30 min (LH)</td>
</tr>
<tr>
<td></td>
<td>Seamless ATM system</td>
</tr>
<tr>
<td>Security</td>
<td>Zero successful hijack</td>
</tr>
</tbody>
</table>
General Findings

- Holistic approach to Air Transport System
- Safety is key to efficiency
- Incorporate new/non-conventional types of traffic
- Transition: a critical element
Revolution in ATM?

30 years of Research have not succeeded in bringing about new ideas.

But the ATM system capacity has doubled in the last 20 years.

Will it still be possible for the next twenty years?
One sky for Europe

The Air Traffic Management of the future
Chosen R&T paths

Optimise use of existing airspace capacity

Remove the airspace capacity barrier

Airport of the future

Seamless Global European ATM System

Maximise current airport performance
Optimise Use of Existing Airspace Capacity

– Flexible and dynamic use of airspace
– Integrate air traffic control with flow management
– Collaborative Decision Making

Enablers

• 4D Trajectory based, end to end system
• System Wide Information Management
One sky for Europe

Remove the Airspace Capacity Barrier

Need for a paradigm shift in ATC operating mode

- More Autonomous aircraft, linked with co-operative ground ATC
- New operational concepts (group control, dynamic sectors, innovative control by airspace volume)
- Towards full automated air traffic control
Maximise Current Airport Performance

Efficient Runway usage
- Simultaneous operations on dependant runways
- New landing aids
- Reduced separation minima

All Weather Capability
- Improved Meteo forecasts
- Enhanced A-SMGCS
Maximise Current Airport Performance

New operational concepts for Airports and Airline Ops

– New hub&spoke operations, using different airports infrastructures and different feeding capabilities:

*development of small airports, airport clusters, use of rotorcraft or ground transportation feeds.*
Airport of the Future

Innovative Passengers & Luggage processes

– Integrated, passive pax processes, without queuing, using bio-technologies or microchip-based travel documents

– New passengers movements concepts inside the terminals
# Airport of the Future

## Consistent and integrated airport processes
- Need for common standards
- Integration of multi-actors, multiple processes into efficient channels

## System Wide Information Management
- CDM-networks, using remote access technologies (PDAs, pagers, mobiles)
- Passengers communication tools
Seamless Global European ATM System

Interoperability
- Applies to humans and machines
- Concerns procedures, equipment and data

Seamless, satellite-based technologies
- Communications capabilities
- Navigation capabilities

New Airspace design
- New airspace concepts, using innovative ATM paradigm

Global Interoperability
- Air transport per nature: a world-wide industry
- Pre-requisite for competitiveness of European aeronautics industry
Key Points

- No “new start” ➔ Transition Issues are key
- New ATC paradigms / Fundamentally changed Operational Concepts
- Breakthrough Technologies / Total System Approach
- Safety / Security inherently built-in
- Network approach for airports, airspace, service providers and users
- Necessity for co-operation of all stakeholders
Too many stakeholders, no decision makers

ATC is an infrastructure service, not economically significant on its own

All actors have different objectives

National providers with national programmes whereas air transport is multinational by nature

No political owner of the system

High dispersion, low return on investment
No Scientific Background

ATM is computer-science oriented

Monk-Engineers making technical choices like entering religion

Very little cross-fertilization with other industries

Small technology push and no economic or social pull
Conclusion

Research is needed, more than ever

ATM service providers focus more on short term, immediate profitability issues

Research should be funded by public funds rather than by airspace users

ATM supply industry should enable cross-fertilisation, and make the « technology push » which is needed to succeed

US, Europe and Asia have to work hand in hand