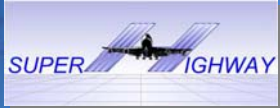


# Operationally Driven Airspace Traffic Structure based on Dynamic Airspace and Multi- Layered Planning: SUPER-HIGHWAY

Overall Project Description

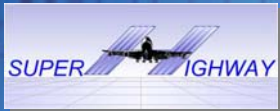




# Presentation Objectives

- Describe the SUPER HIGHWAY Project
  - Overview
  - Objectives
  - Technical Approach





1

# Project Objectives

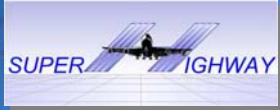
# Expected Benefits

	Safety	Capacity	Efficiency & Reliability	Economy
Airlines	<ul style="list-style-type: none"> <li>• No incidents</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure on-time performance</li> </ul>	<ul style="list-style-type: none"> <li>• Smaller flight times</li> <li>• Ensure on-time performance</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced fees</li> </ul>
Pilots	<ul style="list-style-type: none"> <li>• Improved situational awareness</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased workload</li> </ul>	<ul style="list-style-type: none"> <li>• Accurate flight paths</li> </ul>	
Controllers	<ul style="list-style-type: none"> <li>• Improved situational awareness</li> <li>• Increased Predictability</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased workload</li> </ul>	<ul style="list-style-type: none"> <li>• Predictable a/c trajectories</li> </ul>	<ul style="list-style-type: none"> <li>• Lower workload</li> </ul>
Service Providers	<ul style="list-style-type: none"> <li>• Decreased incident rate</li> </ul>	<ul style="list-style-type: none"> <li>• Increased throughput</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce delays</li> </ul>	<ul style="list-style-type: none"> <li>• Smaller aircraft to controller ratio</li> </ul>



# Capacity and Efficiency Objectives

- Increase **traffic rate** during peak hours
  - Extra capacity when demand exceeds the achievable movement rate using conventional procedures
- Increase **traffic rate** per annum
  - In sectors limited to a maximum number of aircraft per year due to sector workload
- Increase **efficiency** by reducing the delays:
  - Through the operation in a more predictive environment
  - Easing adjustments due to unpredictable events and exceptions
  - Providing just-in-time delivery of traffic
- Increase **efficiency** by optimising the en-route & TMA interface:
  - Capability to operate in a more coupled en-route / TMA interface
  - Optimised airspace and route structure



# Safety Objectives

- Use Layered Planning Functions to de-conflict and manage complexity through network, flow and inside flow processes
  - Standardize working methods
- Use Automated support tools
  - Better exploitation of the predictability and the complexity indicators
- Increased situational awareness of controllers and pilots
  - CDM procedures
  - Technological enablers (e.g. ASAS CDTI for pilots).



# Environmental Objectives

- Limit emissions and noise,
  - Use of improved trajectories
  - Use of direct city pair lanes
  - Improve planned flight times
- Preserve natural resources (fossil energy)
  - Reduced fuel consumption (for the same reasons)

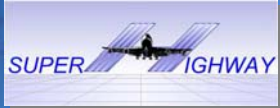




# Strategy to achieve the objectives

- Decrease the Workload per Aircraft
  - Comparison between the workload per aircraft baseline results and the workload per aircraft assessments
- Improve Situational Awareness
  - Comparison between the baseline average separation and the average separation obtained in the assessments
- Ensure On Time Performance
  - Comparison between the minimum theoretical flight time along the proposed routes and the average of the flight time obtained from the assessments

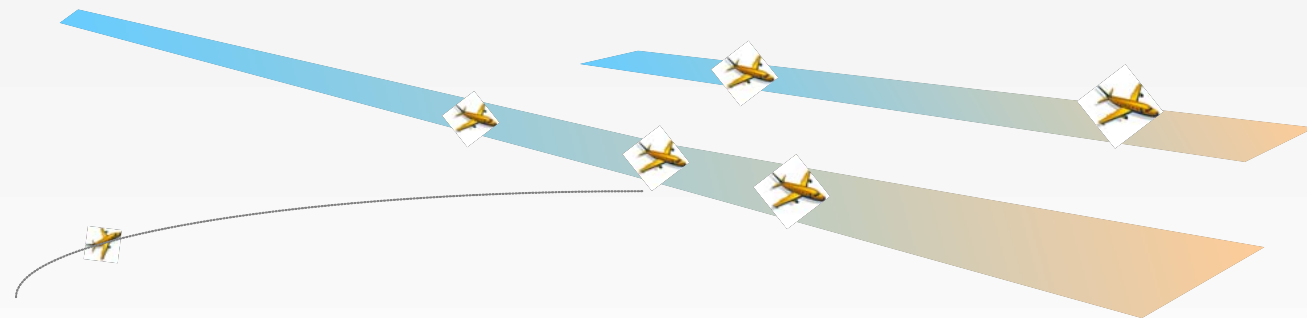




2

# Project Overview

## Ensuring Flight Efficiency using pre-planned conflict trajectories

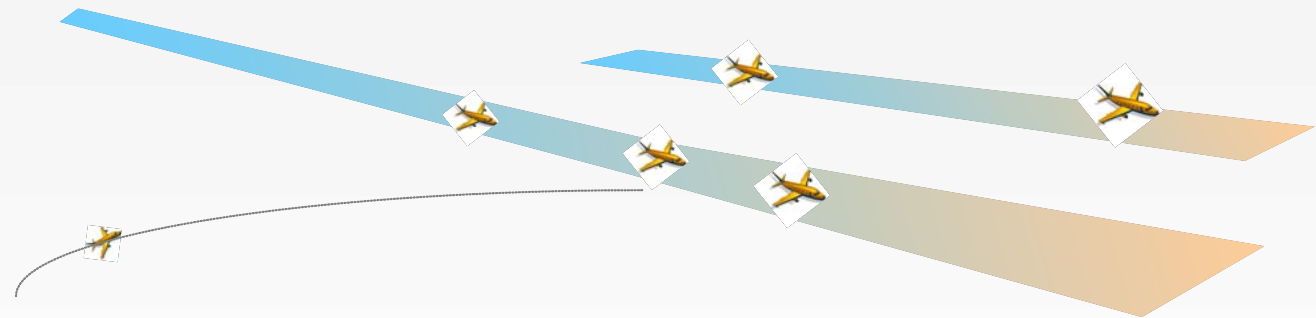


## Enhancing ATM Efficiency by decreasing controller workload per aircraft:

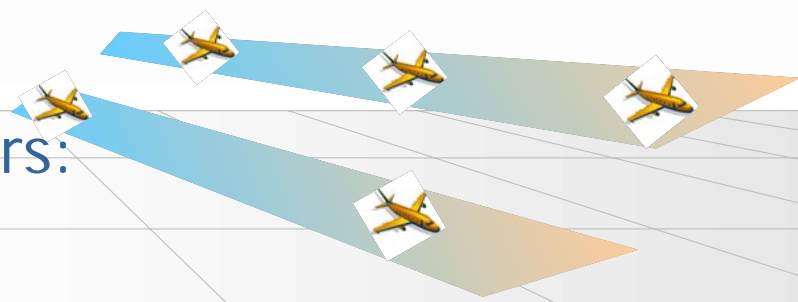
- Moving tasks to the pilot: ASAS
- Moving tasks to the ATC: Automation concept
- Improving the airspace design: PRNAV, FLAS, Parallel Routes, and the Super Highways



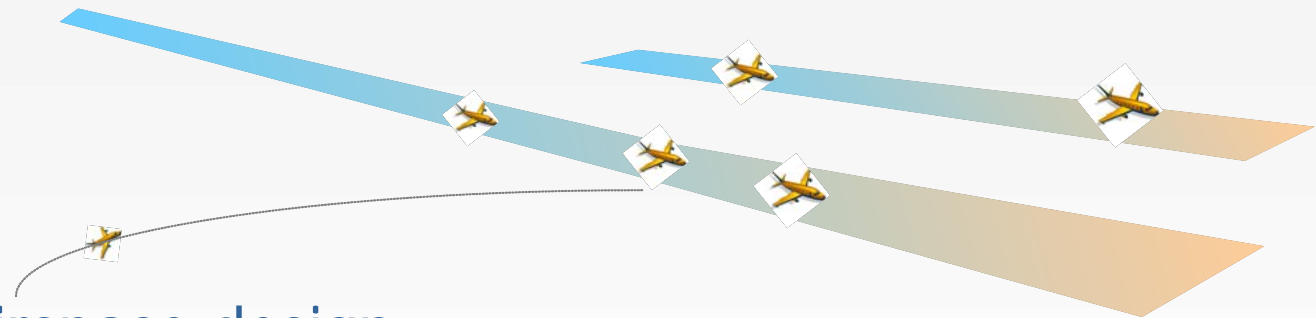
Decrease the task-load to reduce the workload per aircraft



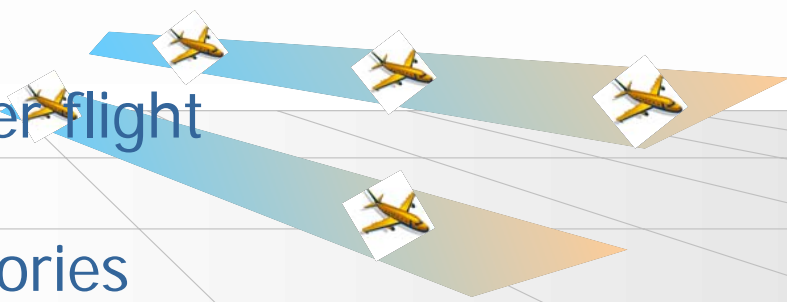
- Avoiding constraints from National Borders
- Using new concepts and enablers:
  - ASAS
  - CDM / SWIM
  - D/L
  - Layered planning



Reduce the emissions per flight through the improvement of the flight profile

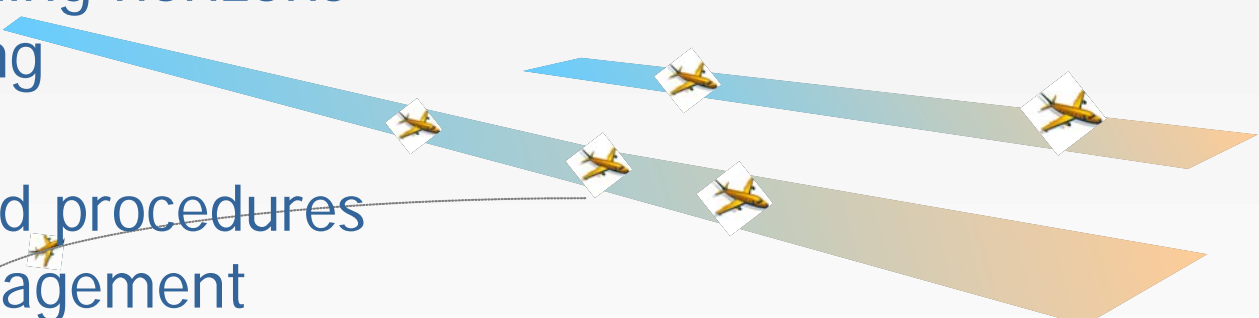


- Improve the airspace design:
  - Shorten the horizontal paths
  - Optimise cruise flight levels
- Reduce the time spent in stacks per flight
  - Improve on time performance
  - Improve predictability of trajectories
  - Reduce flight-disturbance (conflict-free trajectories)



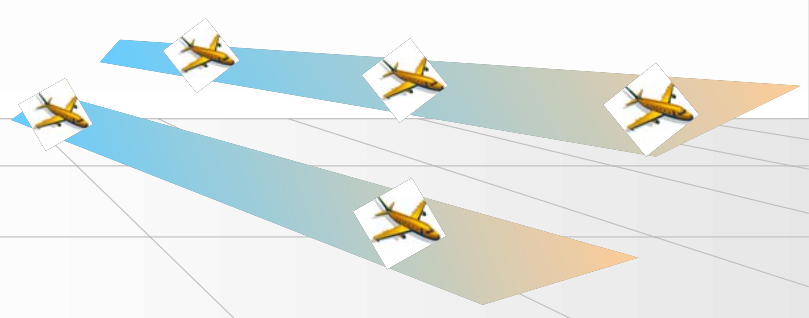
Increased predictability through the provision of conflict free routes

- Improved Planning horizons
- Layered Planning
- ASAS
- Trajectory based procedures
- Separation Management



Simplifying the route structure

- Air Traffic flows segregated by speed & cruise regime



3

# Technical Approach



# Two drivers

- Based on the **innovation of the operational framework** rather than on the development of new technologies
- Emphasis placed on obtaining maximum **synergies** between locally available systems and the overall European framework
  - Optimise the overall efficiency of the system
  - Guarantee accessibility and equity of the proposed structure



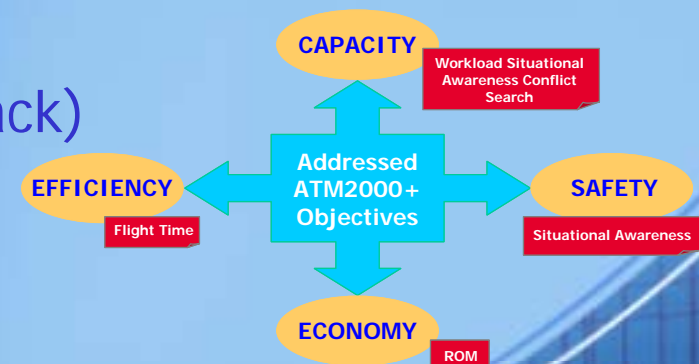


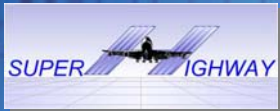
# Elaborate Operational Concept Scenarios

- Exploit existing Operational Concept principles to arrange the “major” traffic flows and patterns using pre-defined routes
- Airspace structure located on the Single European Sky functional blocks of airspace
  - No constraints coming from national borders
  - Two essential components:
    - Entry / exit into the SUPER HIGHWAY (junctions)
    - Routes (lanes)

# Assessments

- Focused on the impact on the controllers
- Performed on the operational concept scenarios in the two main SUPER HIGHWAY elements: lanes and junctions.
- Aspects considered for the Planner Controller:
  - Conflict Search for future traffic, Planning of entry/exit conditions and Sector Coordination.
- Aspects considered for the Executive Controller:
  - Planning (as regards conflict solving)
  - Actual traffic conflict search
  - Monitoring (deviations from flight track)
  - Implementation of solutions
  - Initial and transfer calls

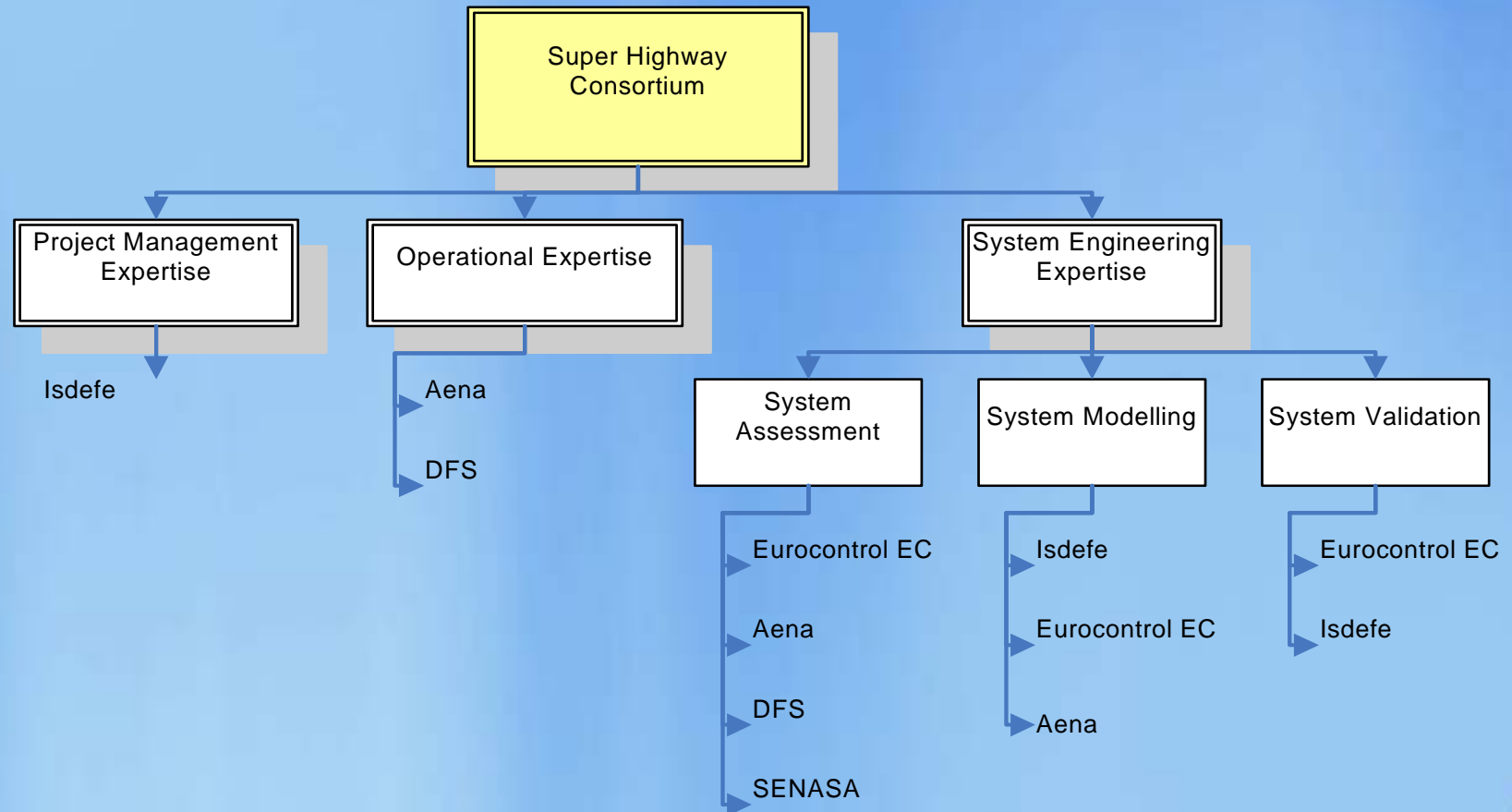




4

# Consortium & Participation

# Consortium Structure

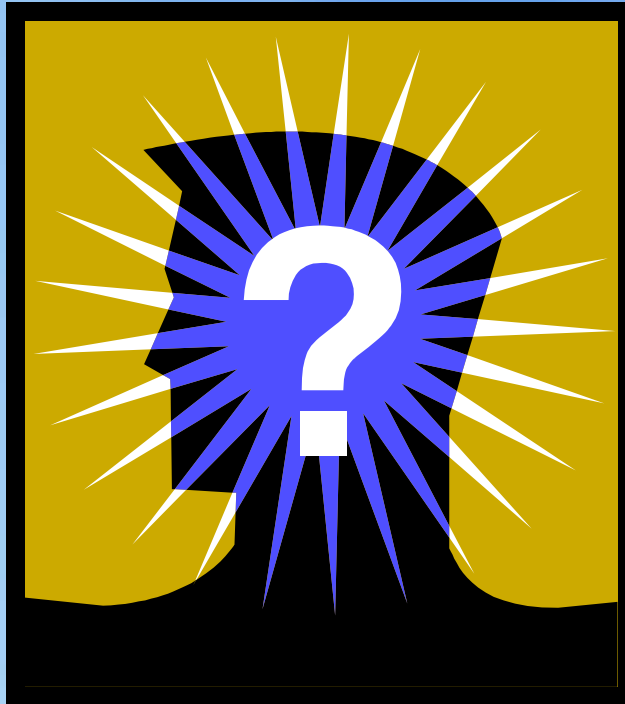


# How to participate

- Users Workshop → Around October 2006
  - Technical nature: Discuss and review the proposed Super-Highway structures
  - (small) Limited assistance
- User Forum → Around February 2008
  - Dissemination of results
  - (larger) Limited assistance

Let me know if you are interested!!!





<http://www.sh.isdefe.es/>