

# ***CPDLC & ADS-B in Europe***

*Alive and Kicking*

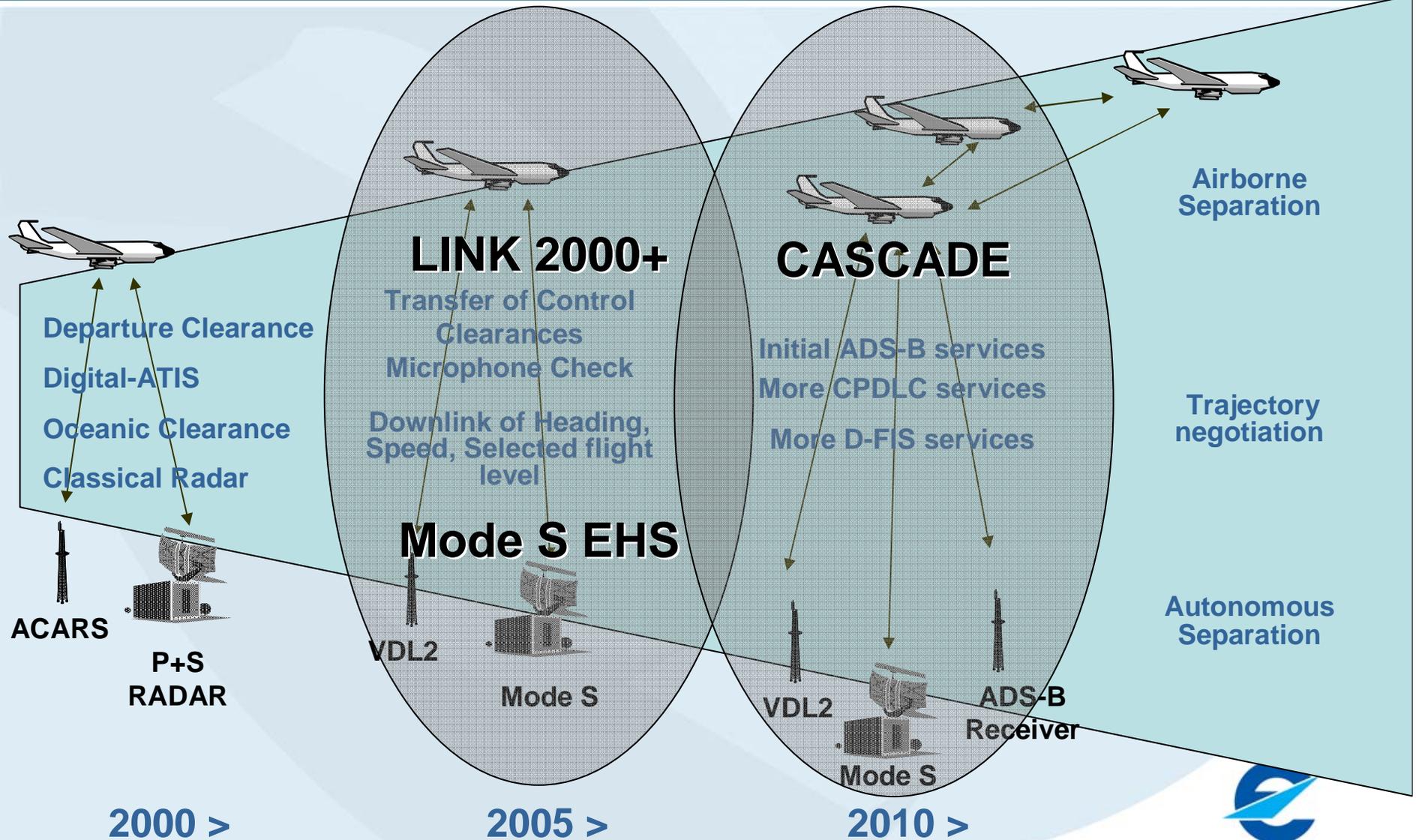
NASA ICNS Conference  
Fairfax, Va.

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EUROCONTROL

# Content

- Strategic Context
- LINK 2000+ The logo for LINK 2000+ features the word "Link" in a blue, sans-serif font with a slight 3D effect, and "2000+" in a smaller, bold, blue font directly below it.
- CASCADE The CASCADE logo consists of the word "CASCADE" in a bold, blue, sans-serif font. Below the text are three horizontal lines of binary code (0s and 1s) in a lighter blue color, and a light blue circular graphic element to the right.
- Conclusion - a comparison

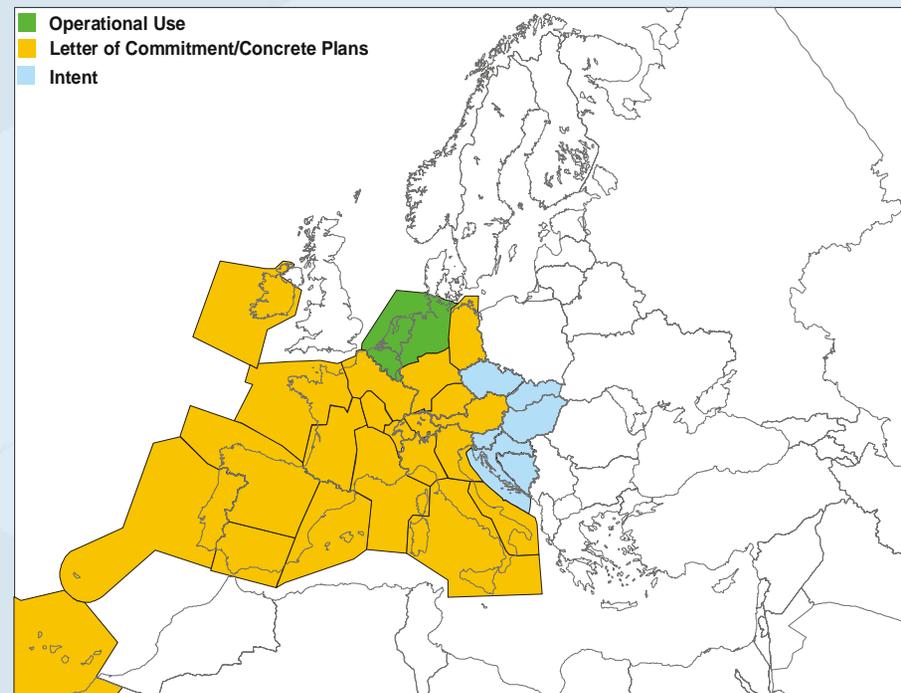
# Strategic Context



# The LINK 2000+ Programme

## Programme Objectives

- Co-ordinating the implementation of en-route CPDLC (ACM, ACL, AMC, DLIC) over ATN/VDL2 .
- Providing a migration path for legacy data link services from ACARS to ATN/VDL2.



# Main Benefits

For Air Navigation Service Providers:

- Increased capacity (decreased controller workload per aircraft)
- Cost avoidance compared to traditional means of increasing capacity (more efficient controllers....avoid the need for the introduction of new sectors)

For Airlines:

- Increased airspace capacity
- Efficiency gains translate into lower unit rates
- The CPDLC avionics package also brings
  - Support for AOC services via AOAVDLM2 and/or ACARS
  - Legacy Airport services via AOAVDLM2 and/or ACARS (DCL, D-ATIS, DSC)

# Three Steps

Pioneers  
Incentives  
Mandate

**1**

Pioneers

- Objective: 100+ aircraft equipped.

**2**

Incentives

- Objective: Accelerate airborne equipage in LINK airspace for early benefits.

**3**

Mandatory Carriage

- SES Implementing Rule
- Objective: At least 75% of flights equipped.

# Excellent Progress in the Air

Airborne implementation has started

Generating more than 170,000 CPDLC flights/year

 Scandinavian Airlines	– 20 B737 NG	now
 AirEuropa	– 19 B737 NG	Certified
 American Airlines	– 13 B767	now
 AIRBUS TRANSPORT INTERNATIONAL   snc	– 5 A300-600ST	Certified
 Lufthansa	– 20 A320	2 <sup>nd</sup> Q 05
 FedEx Express	– 15+ A310	Certified
 Hapag-Lloyd	– 20 B737	3 <sup>rd</sup> Q 05
 AIR-BERLIN We fly Europe	– 2 B737	1 <sup>st</sup> Q 05
 FINNAIR	– 20 A320	end 06
 AEROFLOT Russian Airlines	– 18 A320	end 06

Discussions with others ongoing



# Current Plans On the Ground

## Ground implementation proceeds

- Maastricht UAC: - since June 2003
- Karlsruhe UAC (Germany) - 4Q 2007
- Roma ACC (Italy) - 2006/2007
- Switzerland UAC - 2006/2007
- Canarias ACC (Spain) - 4Q2007/3Q2008
- Lisboa ACC (Portugal) - 1Q2008/4Q2008
- Barcelona ACC (Spain) - 1Q 2009
- Madrid ACC (Spain) - 1Q 2009
- Sevilla ACC (Spain) - 1Q 2009
- Reims ACC (France) - 2007/2009
- Shannon UAC (Ireland) - 1Q 2006/?



DFS Deutsche Flugsicherung



ENAV



NAV

skyguide

Aena



**LINK area upper airspace: 2009**

# Pioneers are Flying



Scandinavian Airlines

**American Airlines**

**AIRBUS TRANSPORT INTERNATIONAL | sné**



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# CASCADE Objective

- Co-ordinate the implementation of
  - the first ADS-B services,
  - more CPDLC services,
  - D-FIS and other services;
- Making use of existing Mode S (1090 ES) and VDL2/ATN infrastructures where possible.

# CASCADE Stream 1

- Ground Surveillance Applications (ADS-B-out)
  - In a radar environment
  - In a non-radar environment
  - On the airport surface
  - Airborne derived data
  
- CPDLC, D-FIS and other Services
  - Automatic-CPDLC
  - Data link taxi
  - Data link operational terminal information
  - Pilot preferences downlink

**Providing/enhancing  
surveillance  
where necessary**

**Exporting the benefits of  
CPDLC to other areas**

# CASCADE Stream 2

- Airborne Surveillance Applications (ADS-B-in)
  - Situational awareness on the surface
  - Airborne situational awareness
  - Enhanced visual separation on approach
  - Sequencing & Merging
- CPDLC, D-FIS and other Services
  - Graphical Trajectory Co-ordination
  - Down stream clearance
  - Flight Plan Consistency

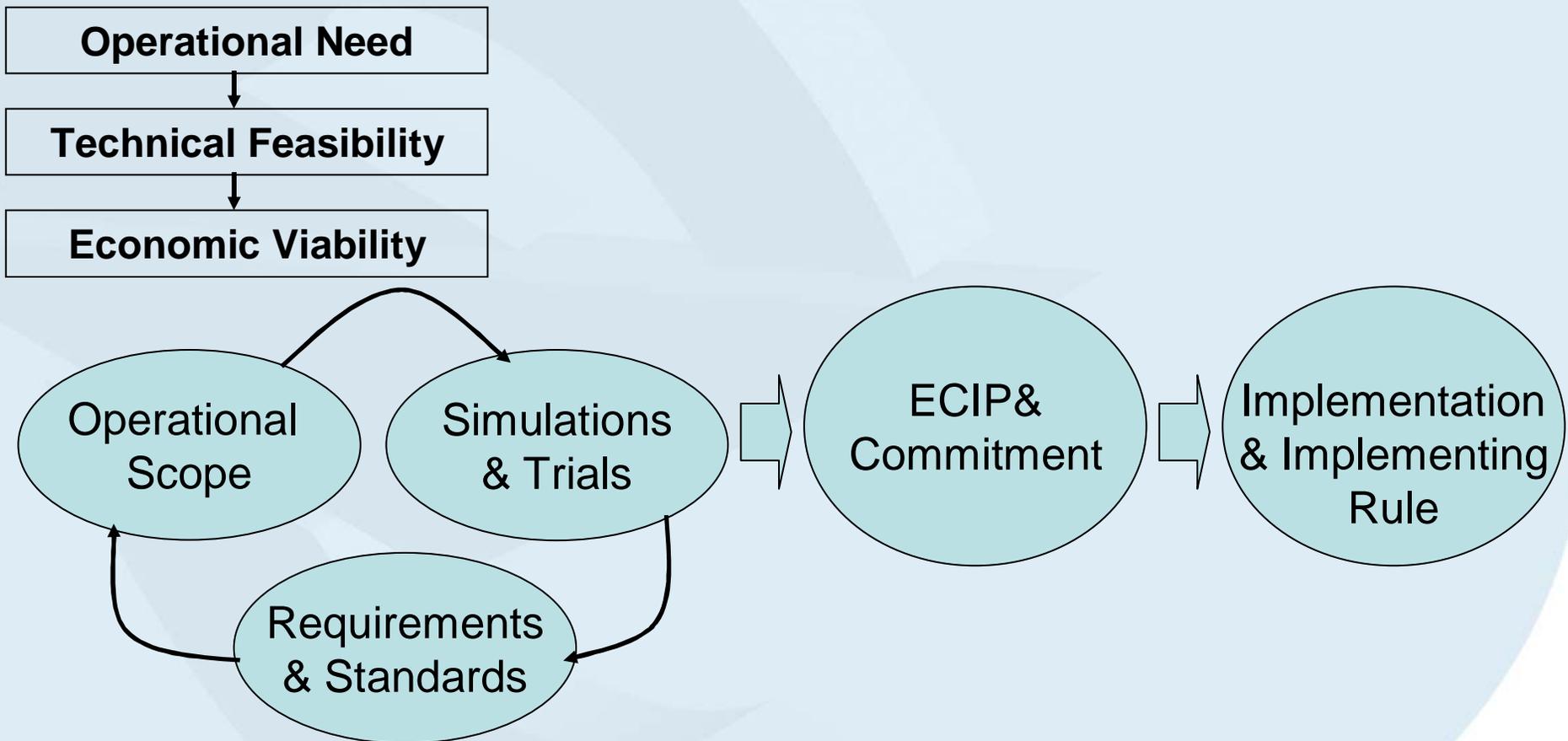
**Improving/exploiting  
situational awareness  
in the cockpit**

**Making CPDLC  
easier and more effective**

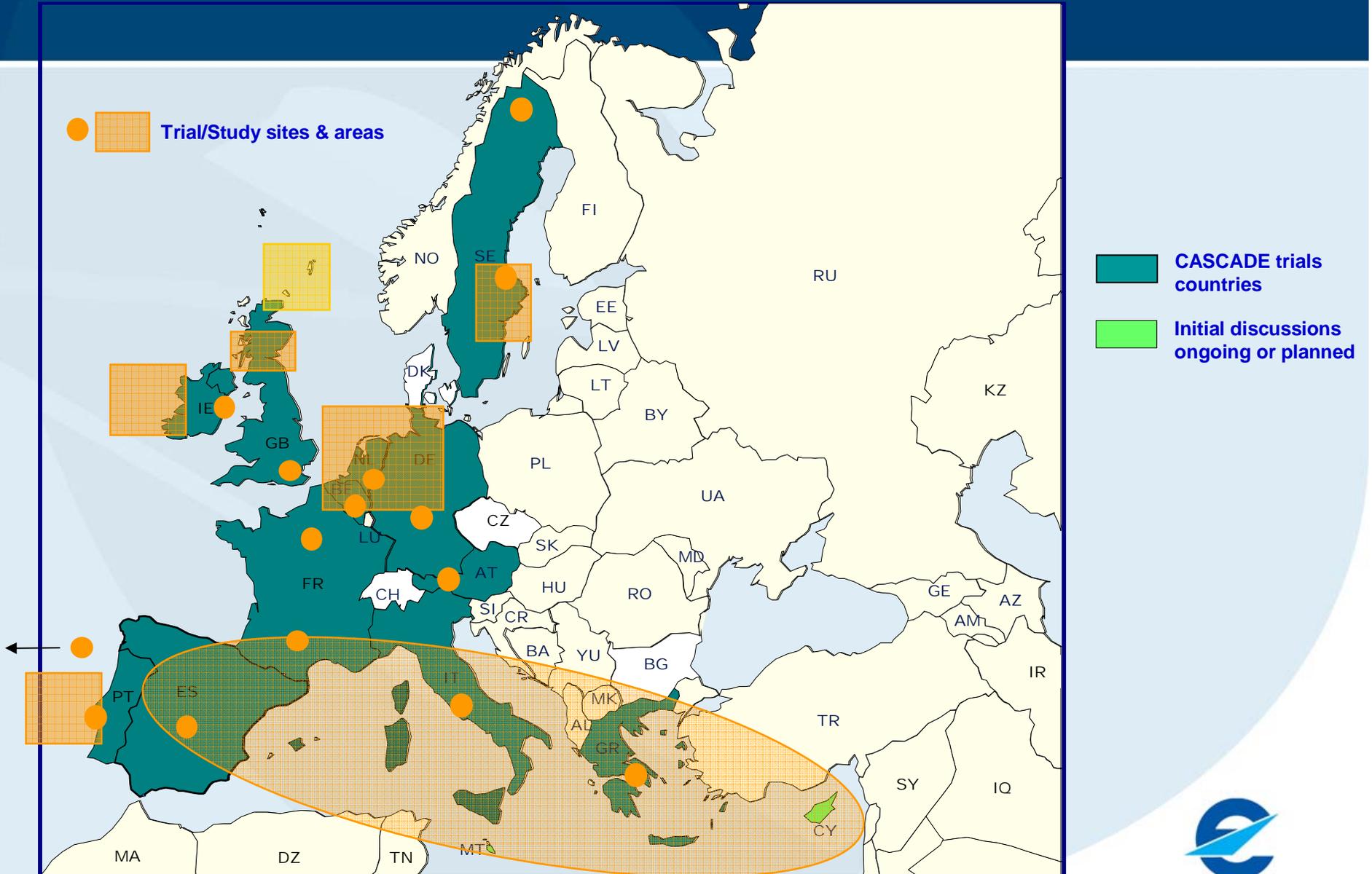
# CASCADE Benefits

- ADS-B
  - provides quality surveillance in a cost effective way.
  - provides improved situational awareness in the cockpit and
  - creates opportunities to delegate some ATC tasks to pilots.
- CPDLC
  - reduces voice communication workload
  - limits the probability of misunderstandings,
  - provides clear readable messages in a timely and unintrusive manner to pilots and controller

# CASCADE Initial Approach



# CASCADE Validation



1 Feb. 2005



# Conclusion – a Comparison

## EUROCONTROL

- Applies an incremental approach: PETAL LINK 2000+ CASCADE: a clear path
- Re-uses infrastructures put in place by other programmes;
- Makes CPDLC attractive to airlines (support & incentives)
- Keeps global harmonisation in mind (ICAO, RTCA, EUROCA baselines).

## The FAA

- Does not provide a roadmap
- Is perceived to impose new technologies
- Does not provide incentives to airlines
- Does not seem to care about global harmonisation.

But..

Americans will always do the right thing ...  
after having exhausted all the alternatives.

**Winston Churchill**  
**1847-1965**

# More information?

[www.eurocontrol.int/link2000](http://www.eurocontrol.int/link2000)

[link2000@eurocontrol.int](mailto:link2000@eurocontrol.int)

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**Encourage the bold and convince the reluctant**