

# *The CASCADE Programme*

*From Concept to Operations*

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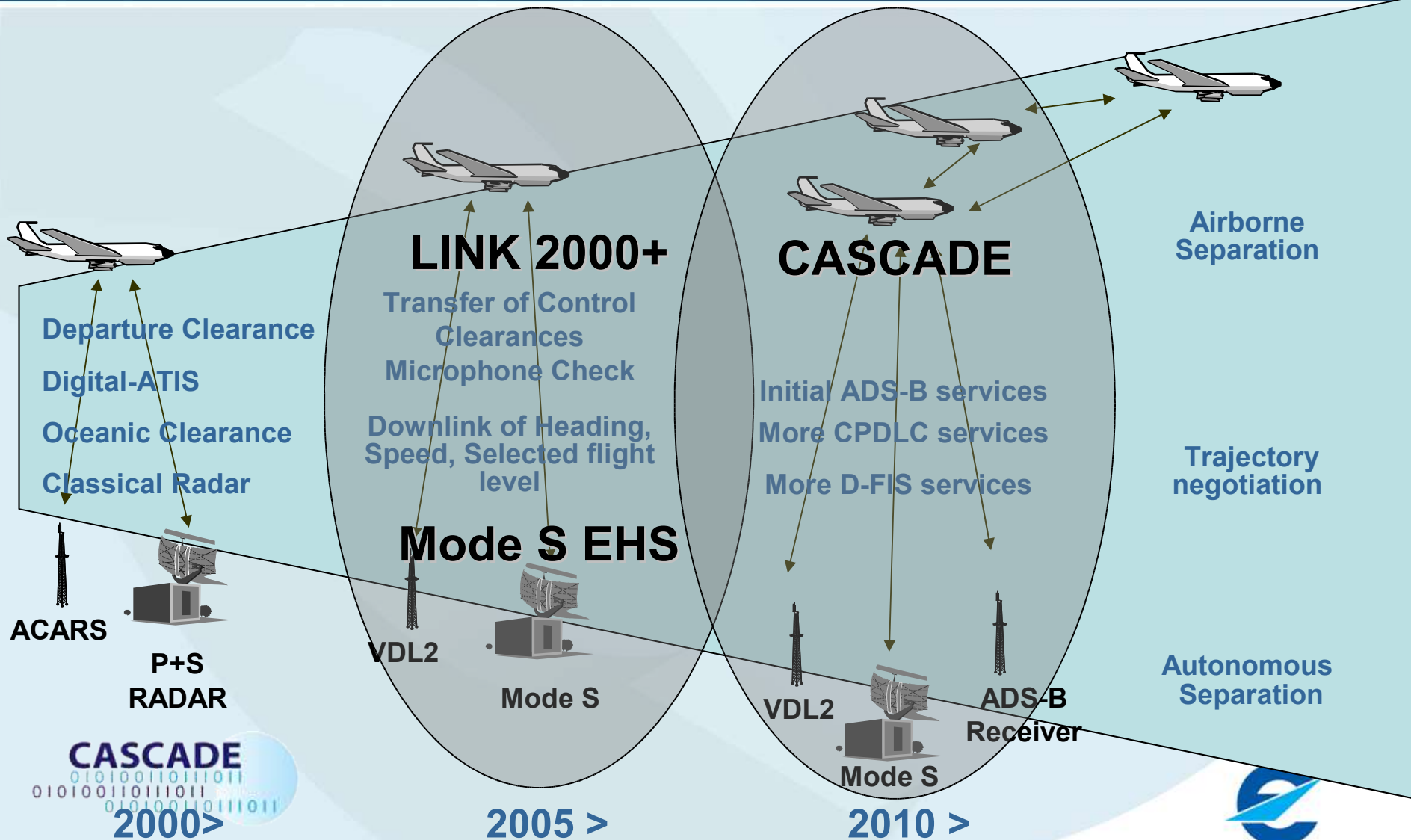
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# Strategic Context



# CASCADE Objective

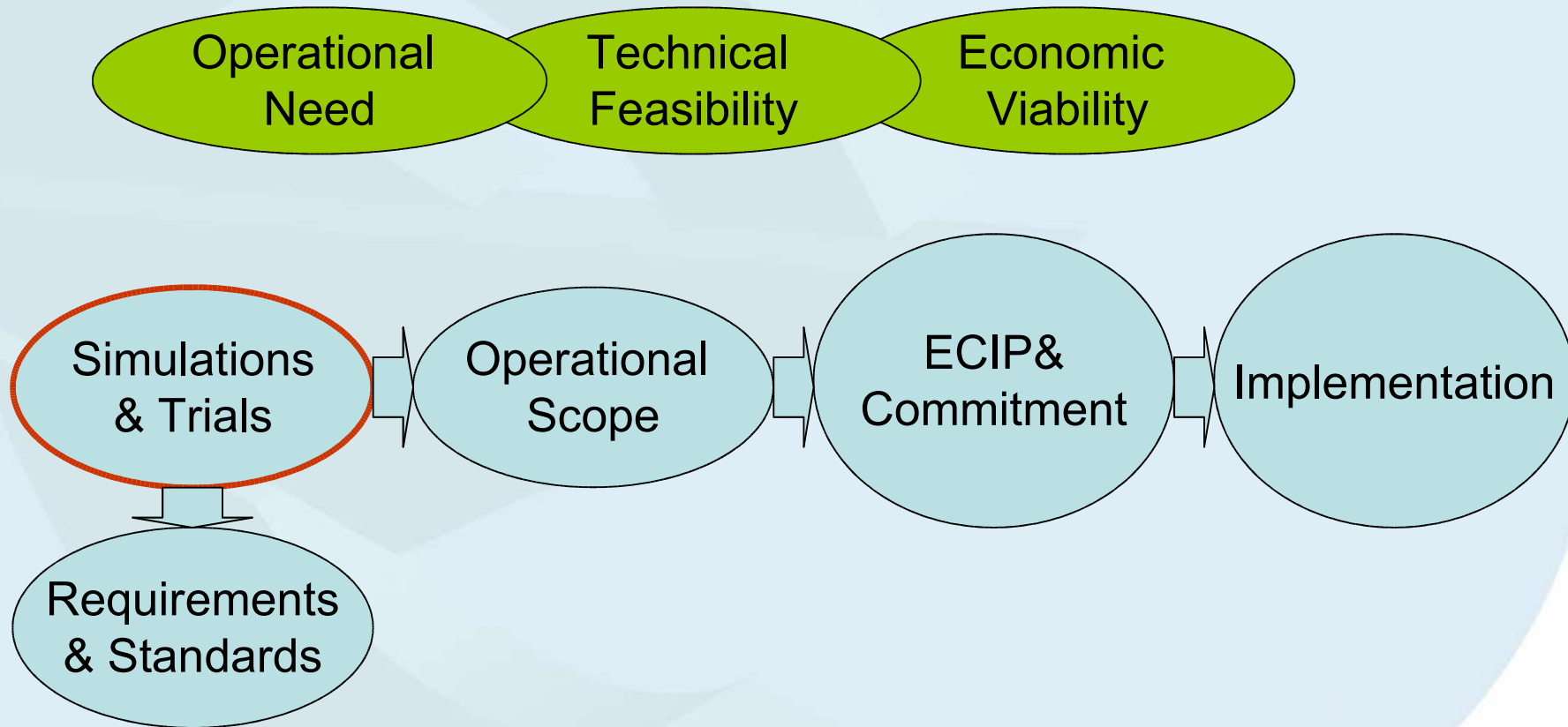
- Co-ordinate the implementation of
  - the first ADS-B services,
  - more CPDLC services,
  - D-FIS and other services;
- Making use of existing Mode S (1090 ES) and VDL2/ATN infrastructures where possible
- To improve ATC sector productivity

- 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

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

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

# Initial Approach

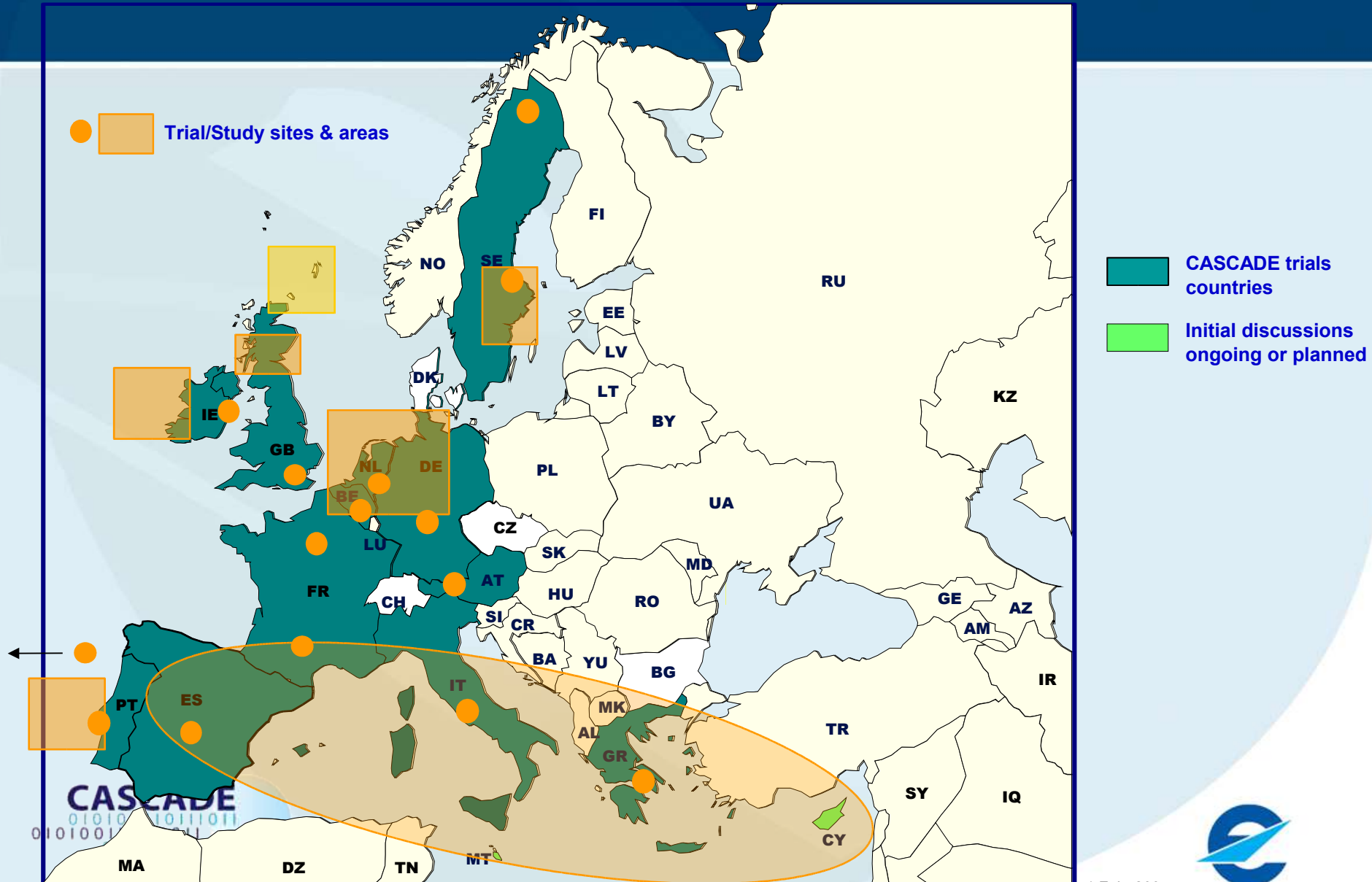




# Validation Approach

- **Simulations** for each service/application visible for controllers
- **Trials** for all the services/applications
- **Trials Characteristics:**
  - In an environment where the need exists
  - Integrated in operational systems (air and ground)
- **Locations:**
  - D-OTIS & D-TAXI trials in Brussels (2005-2006)
  - AUTO-CPDLC, PPD and ADD in Maastricht (2006)
  - ADS-B through CRISTAL trials in
    - **On-going:** Sweden (NRA) , UK (RAD), Ireland (NRA), Portugal (NRA), Mediterranean, Iberia (NRA and RAD)
    - **Coming:** Paris (S&M), Germany (TIS-B) and UK (RAD)

# CASCADE Validation



# Infrastructure Requirements

## Stream 1

- ADS-B (in addition to Mode S)
  - Airborne: enable 1090 ES capability of Mode S transponder
  - Ground: install 1090 ES receivers and upgrade/install SDPS
- CPDLC & D-FIS (in addition to LINK 2000+)
  - Airborne: upgraded CMU software
  - Ground: upgrade FDPS and HMI

**Marginal investment**

# Infrastructure Requirements

## Stream 2 (in addition to Stream 1)

- ADS-B
  - Airborne: upgrade 1090 ES receiver, traffic computer and HMI
  - Ground: none
- CPDLC & D-FIS
  - Airborne: upgrade CMU software upgrades and HMI
  - Ground: upgrade FDPS and HMI

**Major investment**

# Stakeholder Support?

- Airlines
- Air Navigation Service Providers
- Communication Service Providers

**Do you experience an operational problem that could be solved by our services/applications?**

**Talk to us!**

# Conclusion

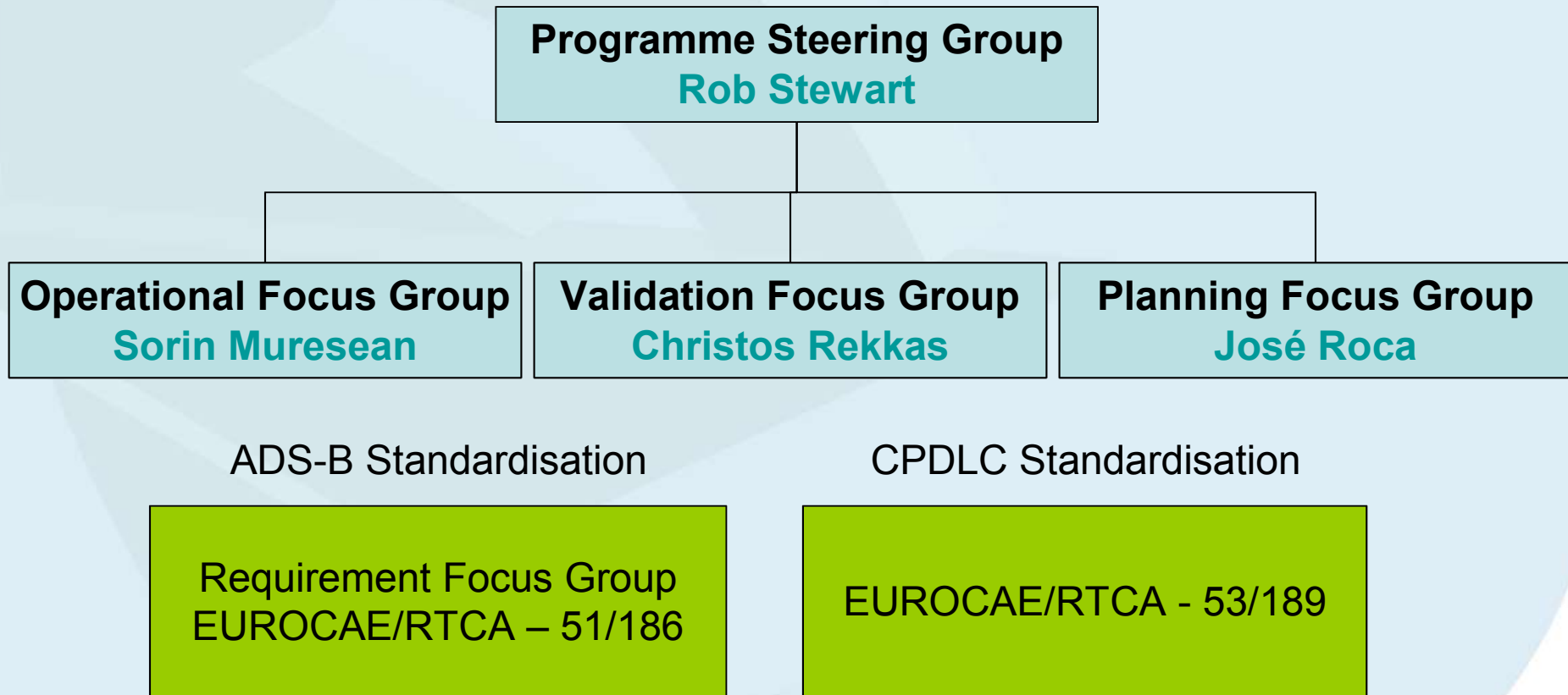
## CASCADE

- Continues to exploit the potential of air ground data links;
- Re-uses the infrastructures put in place by other programmes;
- Provides the key to future concepts;
- Keeps global implementation in mind.

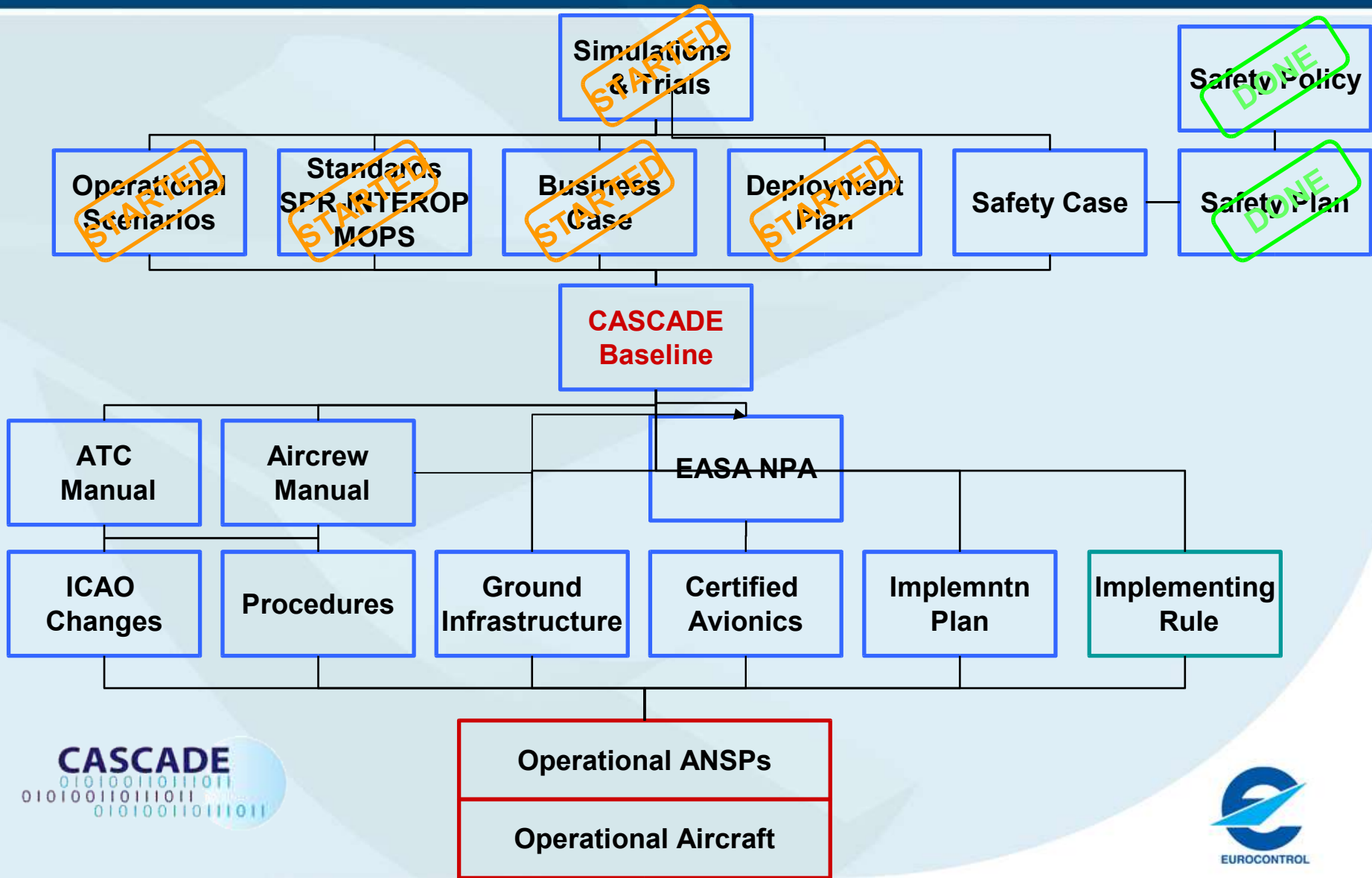
[www.eurocontrol.int/cascade](http://www.eurocontrol.int/cascade)



# External Organisation



# Plan – Essential Deliverables





# SESAME and CASCADE

- Based on future requirements
- Building on current plans
- Stream 1 will add to the baseline
- Stream 2 may need to adapt

