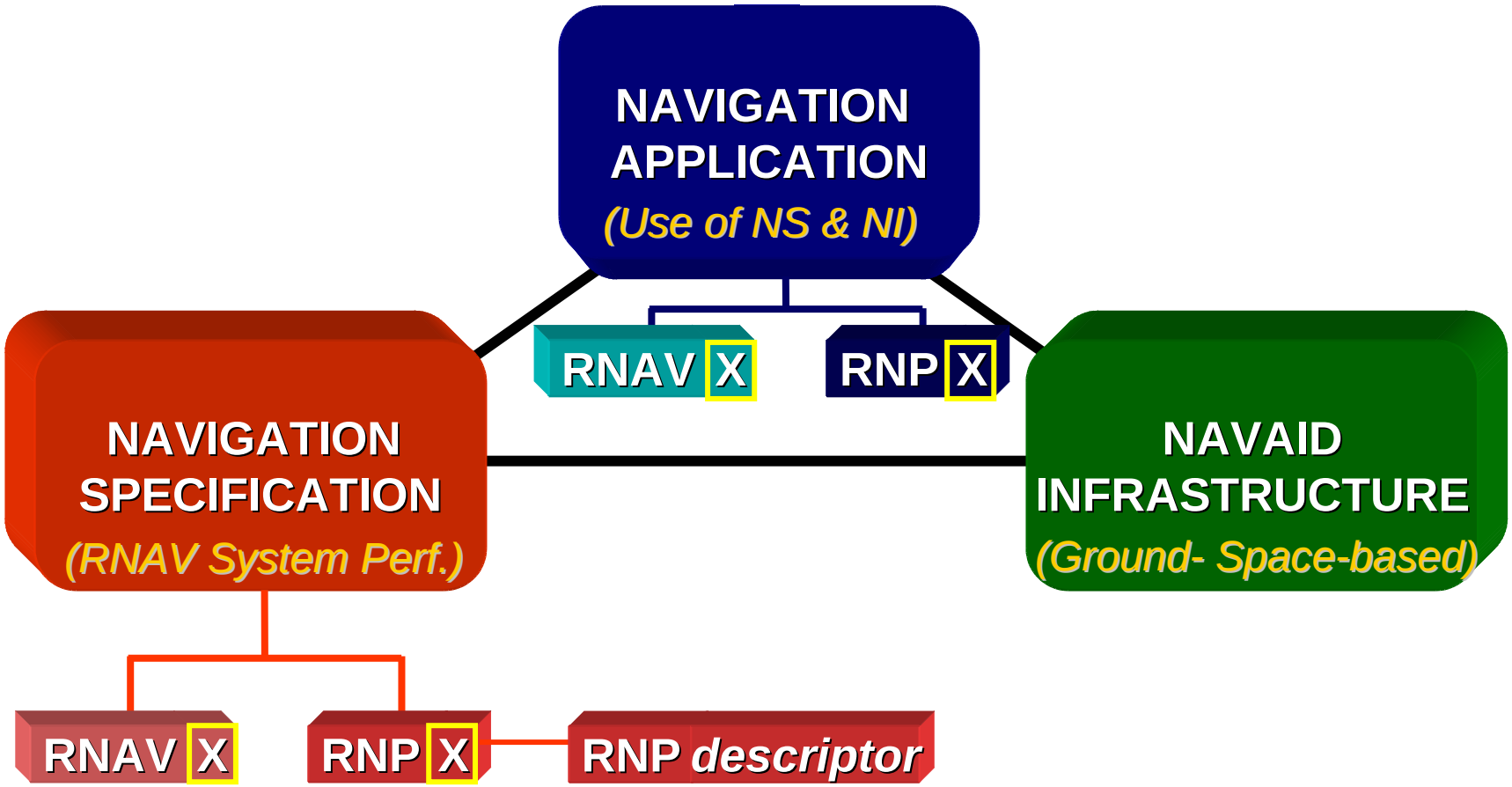
Performance Based Navigation

Airspace Concept Development

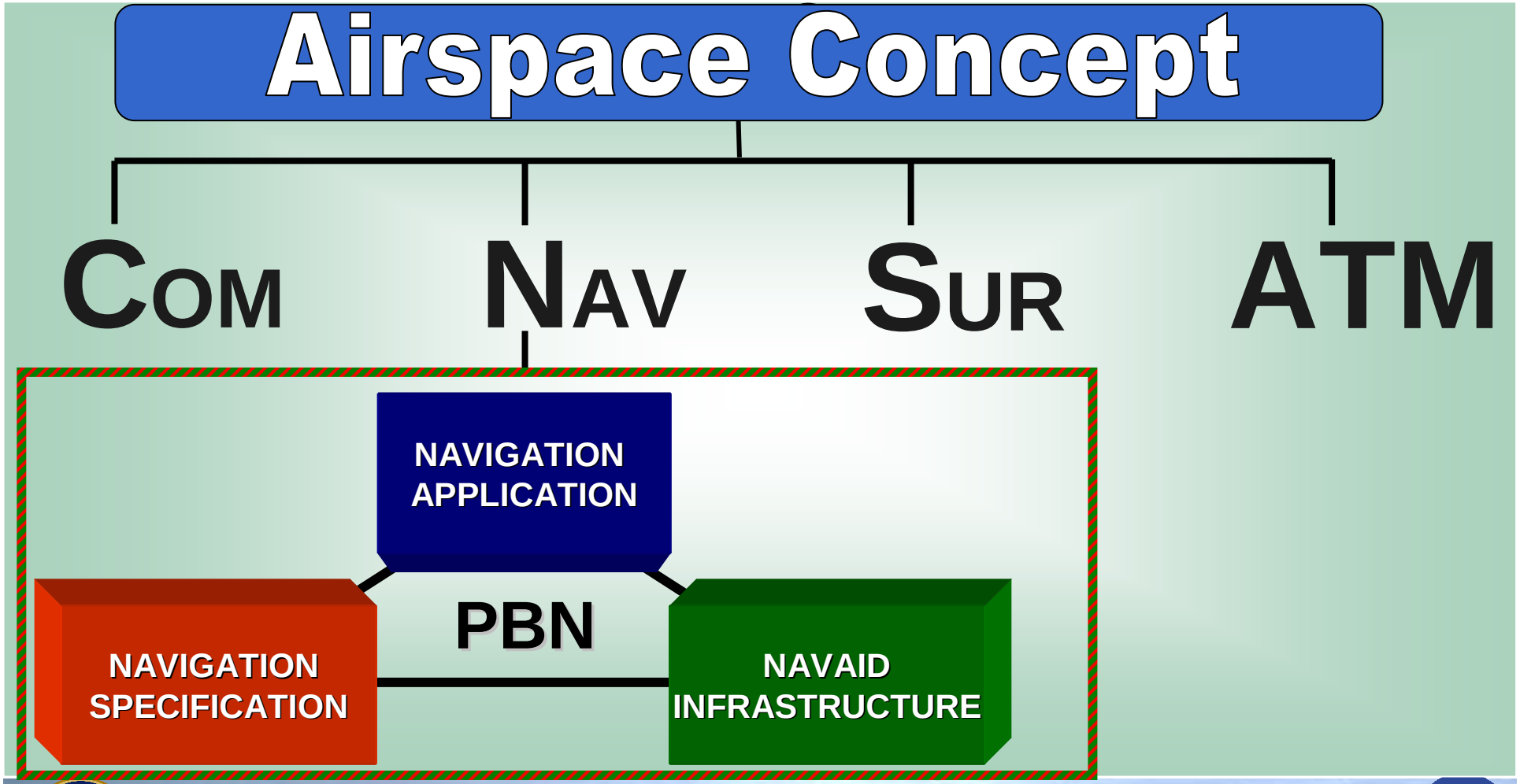
Overview

- PBN Concept Review
- Airspace Concept
  - What is it?
  - Why develop it?
  - Who develops it?
  - What do they need to develop it?
  - What does it look like?
  - After the Airspace Concept is developed, *then* what?

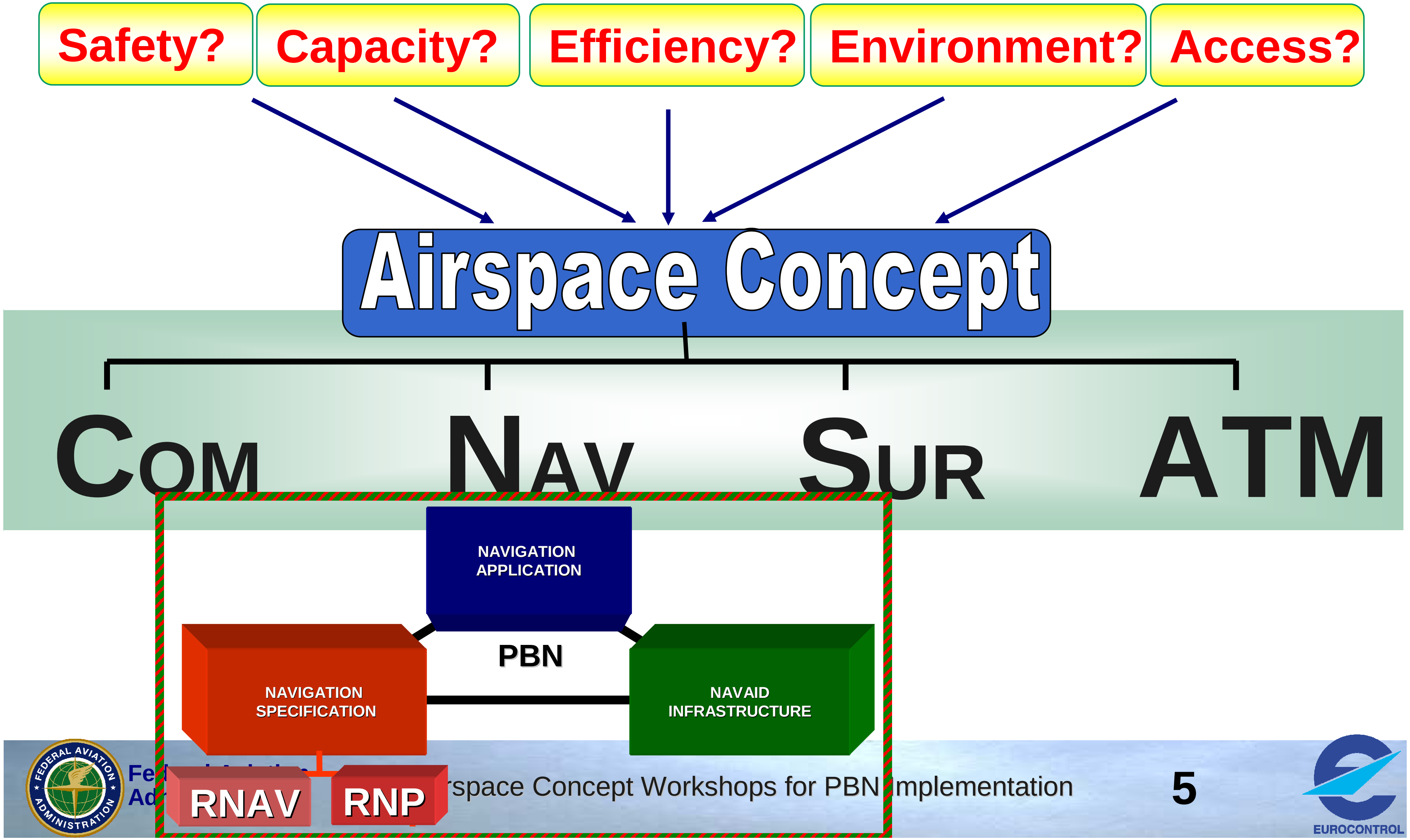
PBN Concept Review



Context of PBN: An Airspace Concept Enabler



Context of an Airspace Concept: Strategic Goals (Expected Benefits)



What is an Airspace Concept?

- A master plan or schema of the intended airspace design and its operation
  - Describes the intended operations within an airspace
  - Developed to satisfy explicit and implicit strategic objectives (e.g. improved safety, increased air traffic capacity, improved efficiency, mitigation of environmental impact)
- A fully developed Airspace Concept:
  - Describes in detail the planned airspace organization and its operations
  - Addresses all of the strategic objectives identified for the airspace project
  - Addresses all CNS/ATM enablers
  - Identifies operational and technical assumptions

Why develop an Airspace Concept?

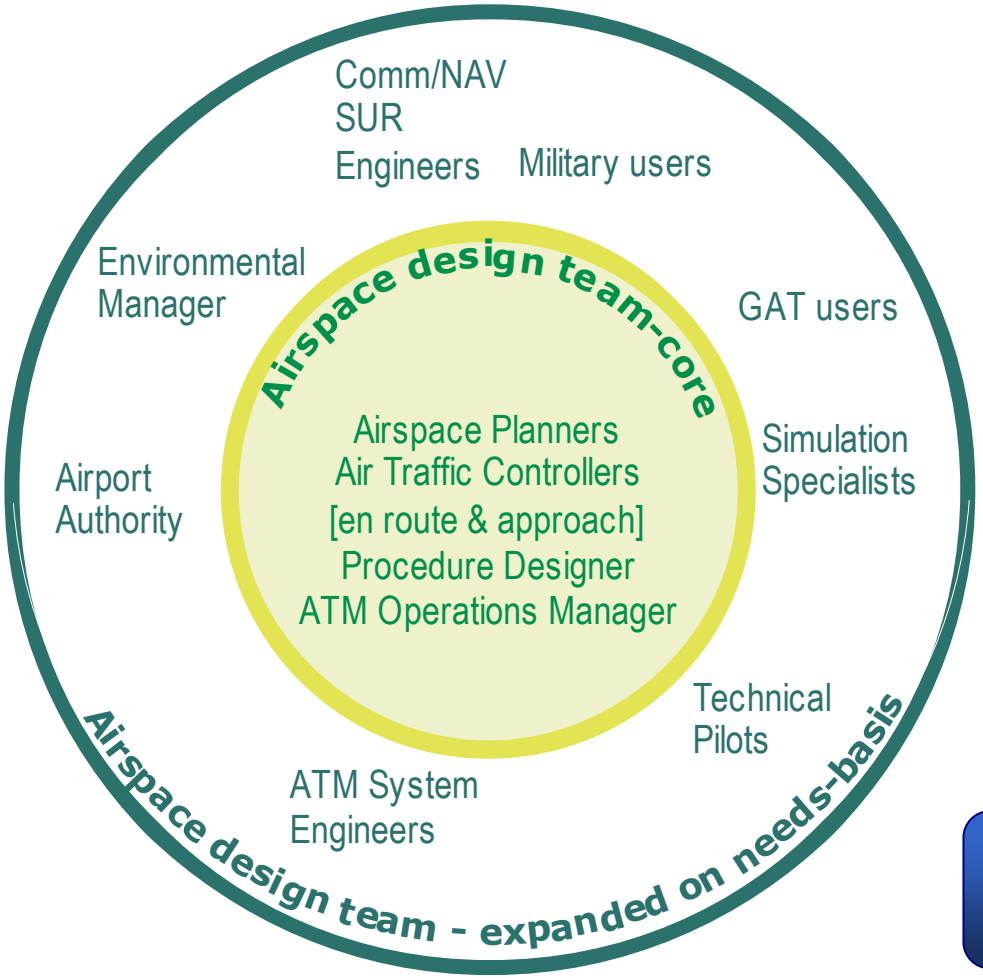
- The development of an Airspace Concept provides a structured and systematic way of determining
  - **What** is to be achieved in an airspace, and
  - **How** it will be achieved
- Development process helps ensure
  - ✓ Goals (expected benefits) of planned airspace structure are clearly stated;
  - ✓ Objectives of the airspace change are met; and
  - ✓ the means chosen to achieve those benefits are appropriate to the goals as well as feasible within the resources available to the particular airspace system

Who develops an Airspace Concept?

- A ***team effort*** by representatives of various organizations and technical specialties
- Particular composition of the team depends on the scale and nature of the project
  - A simple airspace concept (e.g. a SID, STAR and IAP) would have experts from
    - ANSP (including PANS OPS procedure designer)
    - civil aviation regulator
    - airport operator
    - operators' representative
  - A more extensive Airspace Concept (e.g. new runway, plan for terminal and enroute airspace) could also include
    - safety management system experts
    - simulation studies experts
    - additional operator representatives
    - environmental personnel
- ***Team lead*** - usually an airspace planner or knowledgeable ANSP air traffic manager- *Not a hard and fast rule*. The fundamental requirement is for:

A knowledgeable, proactive and dedicated individual with a sound understanding of air traffic management and airspace organization, along with appropriate and sustained support from participating agencies

Airspace Concept Development Team



- Airspace Concept development requires the combined efforts of
  - Air Navigation Service Providers;
  - Regulators; and
  - System Users

To Do What?

Airspace Concept Development Team

1. **Identify and Prioritise** strategic objectives

Safety? **Efficiency?** **Capacity?**

2. **Develop the target airspace design**

3. **Address enablers**

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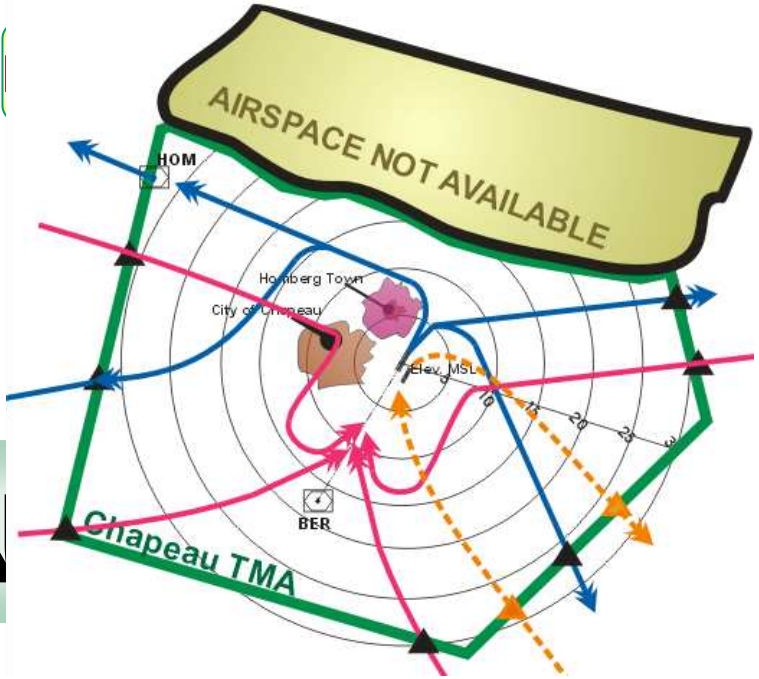


4. **Identify technical/operational assumptions**

Address Enablers

Capacity

Increase number of ATS routes to reduce congestion; accommodate projected growth

Communications

VHF? HF? Two Way?

Navigation

NAVAIDs?
– Primary/Reversionary?
Aircraft and Operator Capabilities?

Surveillance

Radar? Non-Radar?

Air Traffic Management

ATC Procedures? Workload? Automation?

Efficiency

Reduce delays that result from excessive "leveling off" flight profiles

Agree Assumptions

Capacity

Increase number of ATS routes to reduce congestion; accommodate projected growth

Traffic
In/Out/Transit
IFR/VFR/Military

Runway in Use
Primary
Secondary

Aircraft Nav Equipage

Aircraft Performance
Speeds / Climb / Descent

Efficiency

Reduce delays that result from excessive "leveling off" flight profiles

Design the Airspace

Capacity

Increase number of ATS routes to reduce congestion; accommodate projected growth

IDENTIFY KNOWN TRAFFIC FLOWS

DETERMINE PLACEMENT FOR SIDS/STARS

INCLUDE SPECIAL TECHNIQUES e.g. CDO, CCD & POINT MERGE

FIND GOOD CROSSING POINTS

BUILD AIRSPACE VOLUME & SECTORISE

Efficiency

Reduce delays that result from excessive "leveling off" flight profiles

Objectives ➲ Implementation

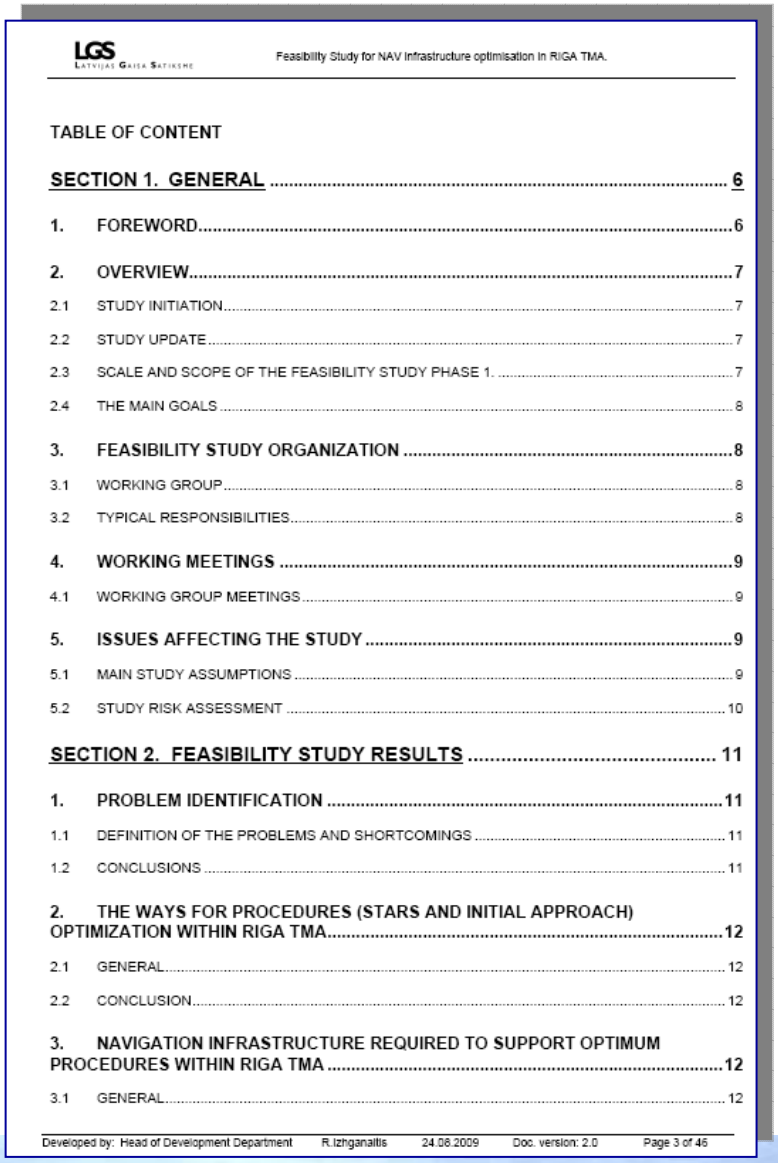
Safety	Capacity	Efficiency	Environment	Access
Reduce Controlled Flight Into Terrain via lateral & vertical course guidance to runway	Increase number of air traffic routes to reduce congestion; accommodate projected growth	Reduce delays that result from excessive “levelling off” flight profiles	Reduce noise over sensitive area	Improve airport and airspace access in all weather conditions
RNP approach to replace circling approach	Parallel RNAV-2 ATS routes between cities	RNAV-1 SID that allows continuous climb to enroute	RNP (AR) APCH w/ guided Curved Missed Approach Segment	RNP approach allowing lower minima

What does the team need to develop an Airspace Concept?

- TIME – to explore the needs of the various stakeholders, reach agreement on goals, identify current ground and airborne equipment limitations, conduct traffic flow analyses, etc
- MONEY – Costs may include (but are not limited to)
  - education and training (regulators, operators, ATC, procedure designers, etc),
  - establishment and sustainment of robust airworthiness, operations approvals, data quality techniques,
  - changes to ATC automation, flight validation, possibly new NAVAIDS (DMEs), etc
- TOOLS - design and modeling tools to support the design, validation and assessment of the present ("reference scenario") and planned Airspace Concept

What does it look like?

- An Airspace Concept can be in any document format
- Maintain configuration control!



LGS Latvijas Gaisa Satiksme — Feasibility Study for NAV Infrastructure optimisation in RIGA TMA.

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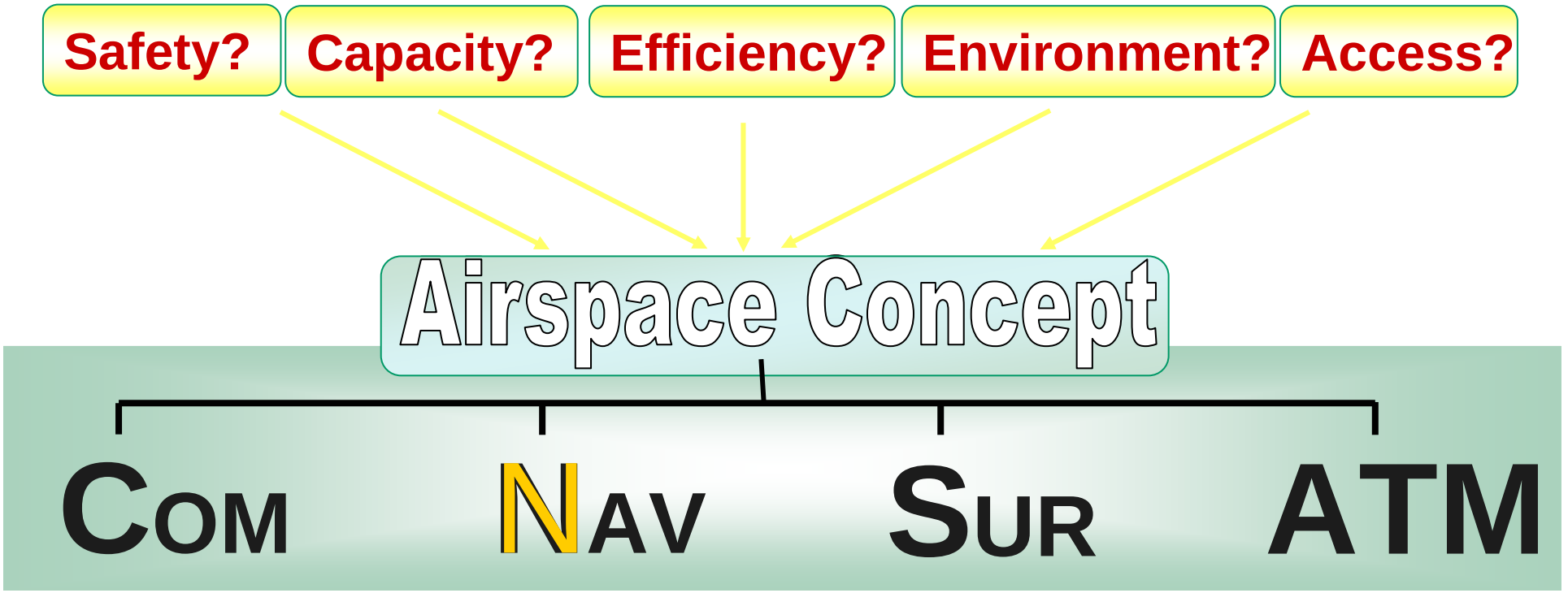
What is the most critical point in developing an Airspace Concept?

- The most critical part of developing an airspace concept is *setting the appropriate objectives and scope of the project*
- Enables the project team to remain focused and the budget to be managed within the set time
- Most projects which fail to meet the intended goal do so because of poorly defined scope and objectives.
  - Beware of *project creep!*

Once the Airspace Concept is developed, what's next?

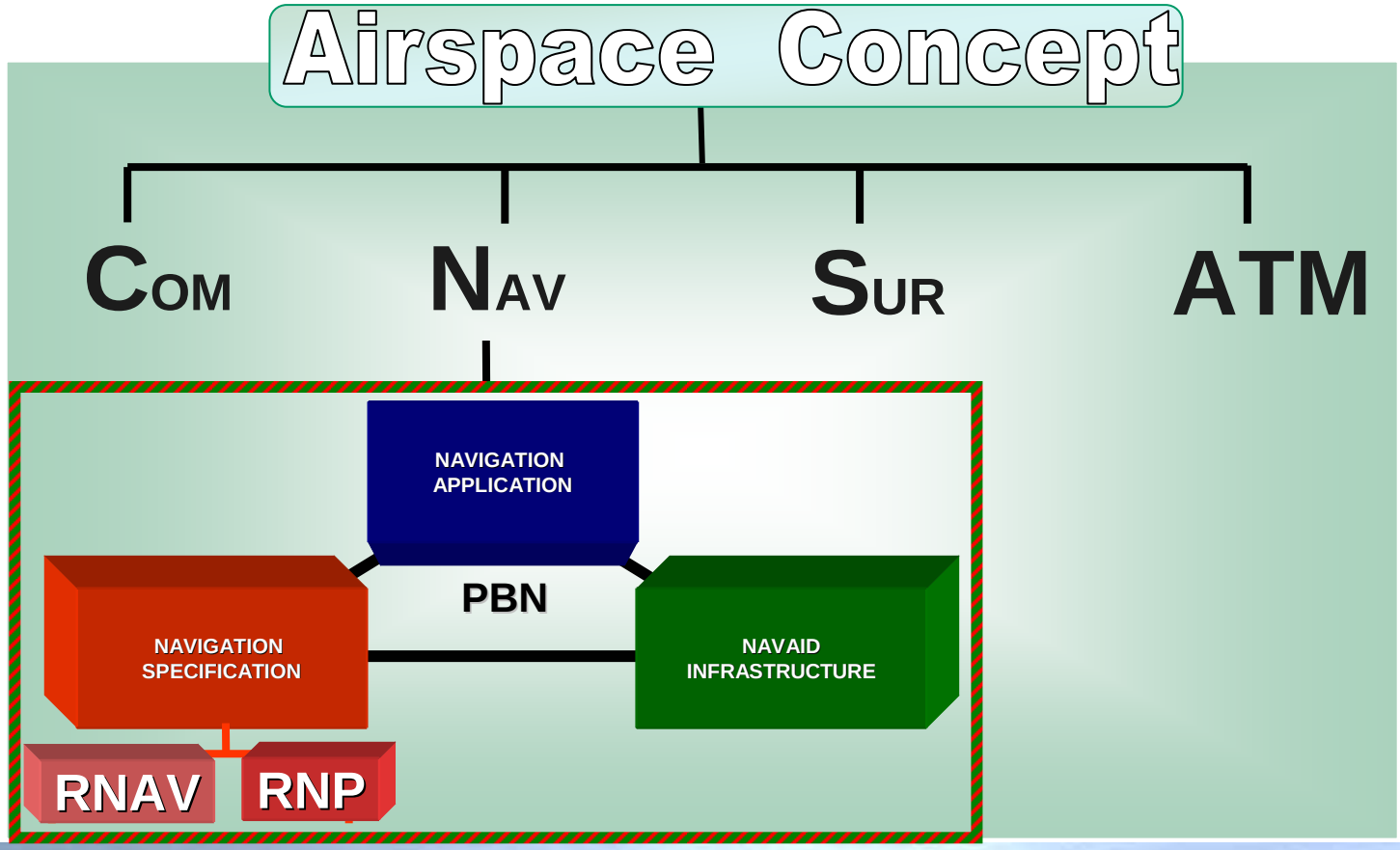
- Lay out a detailed program plan for the specific implementation(s) in the Airspace Concept
- ICAO sample action plans (domain-specific and comprehensive)
  - Consider just as a starting point
  - Adapt as needed to the specific circumstances of a project
  - Steps not always conducted in strict sequence
  - Certain steps may be conducted on a recurring basis as the project progresses
  - Steps and the sequence in which they are performed in the project should be evaluated by the implementation team on the basis of experience and judgment

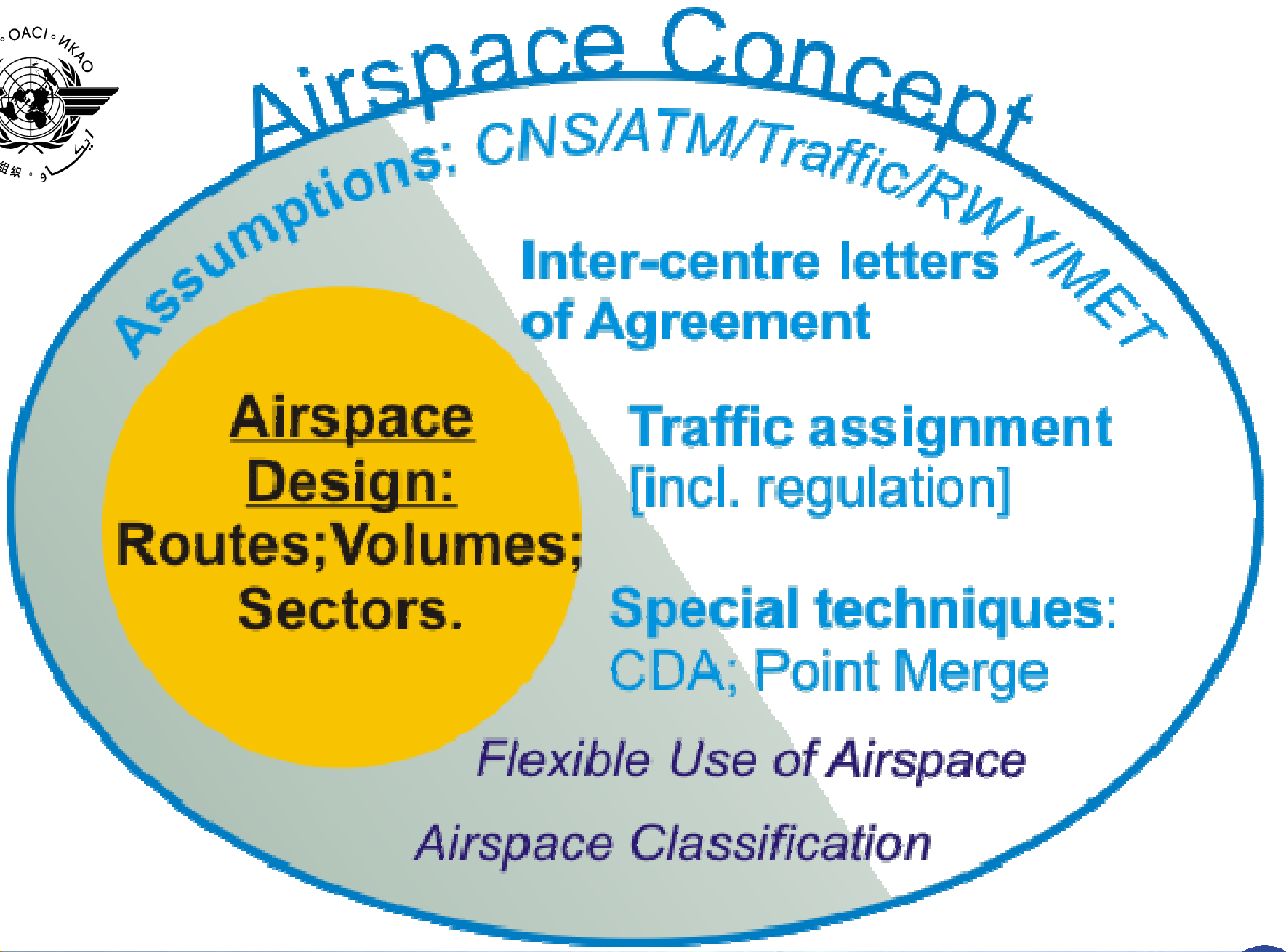
Airspace Concept Summary (1)



Airspace Concept Summary (2)

ICAO GLOBAL ATM CONCEPT




Airspace Concept
Assumptions: CNS/ATM/Traffic/RWY/MET
Inter-centre letters of Agreement
Airspace Design: Routes;Volumes; Sectors.
Traffic assignment [incl. regulation]
Special techniques: CDA; Point Merge
Flexible Use of Airspace
Airspace Classification

Thank you