PBN
AIRSPACE CONCEPT WORKSHOP

Safety / Performance Criteria

Agreeing Assumptions

Federal Aviation Administration

EUROCONTROL

PERFORMANCE CRITERIA & ASSUMPTIONS

OBJECTIVE

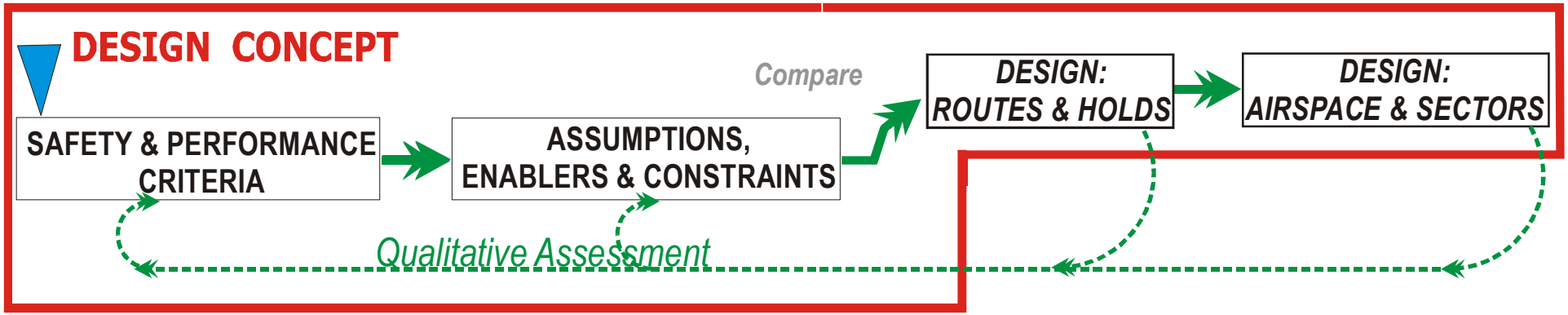
This module provides an overview of Performance and Safety Criteria as well as Project Assumptions

WHY

Why set safety & performance criteria

- Measurement
- Determine success
- ..Other

Interconnections

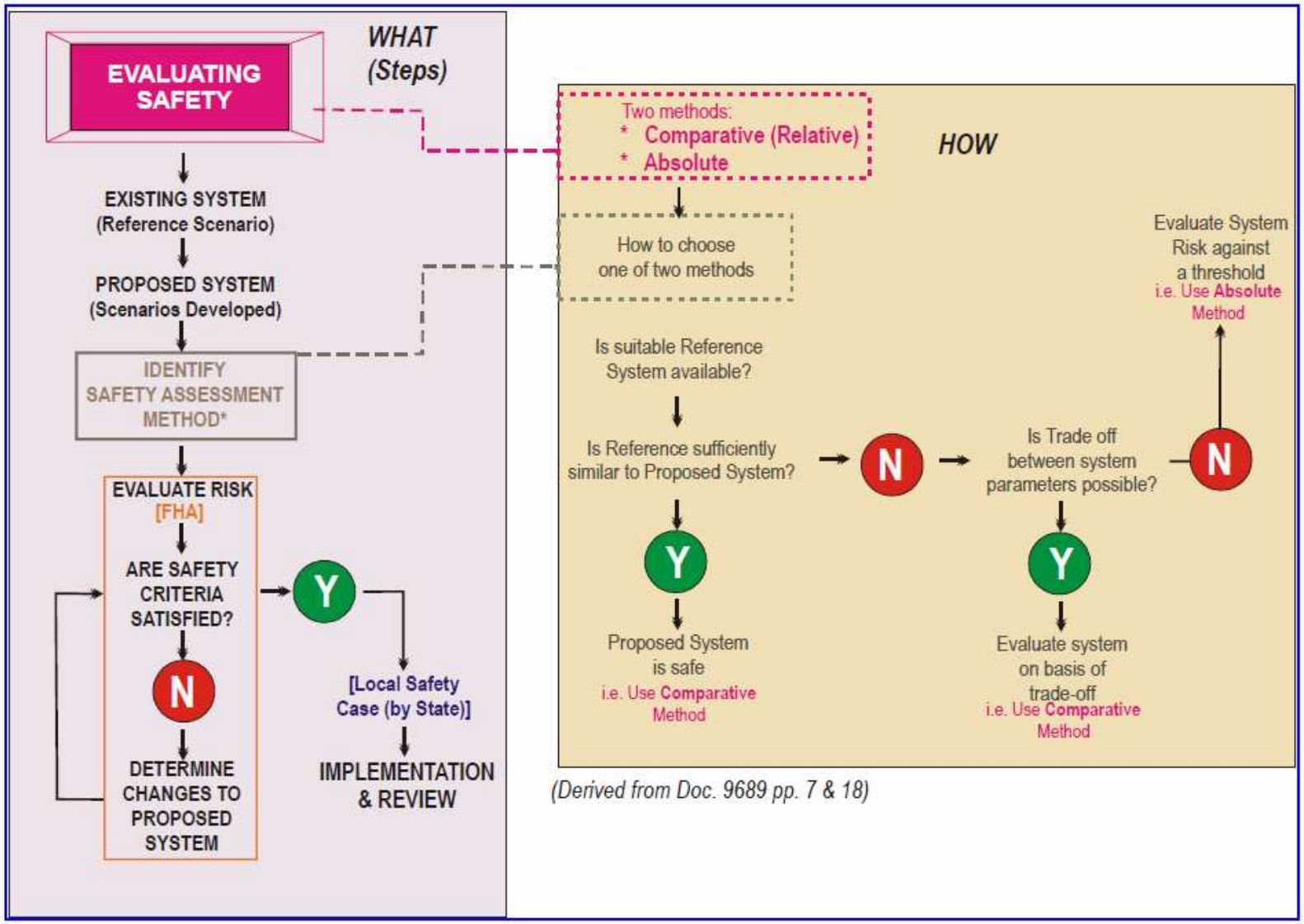


Assessment

- Qualitative Assessment
  - Expert judgement used to assess the design based on ICAO SARPs and Procedures
- Quantitative Assessment
  - Quantified results produced in the form of numerical data e.g. capacity increased by 20%

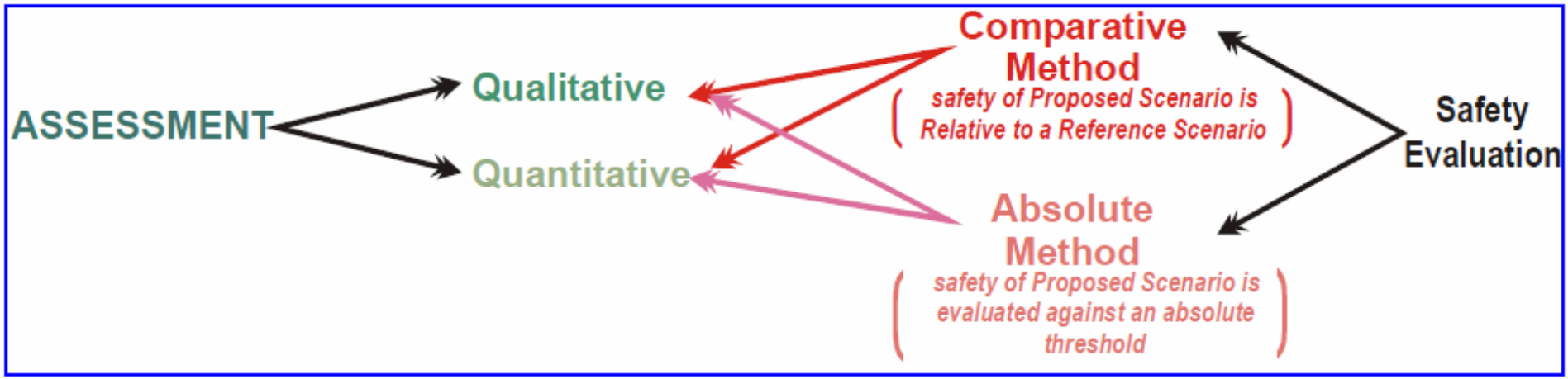
Both Qualitative and Quantitative assessment are crucial to safety and performance assessment

EVALUATING SAFETY

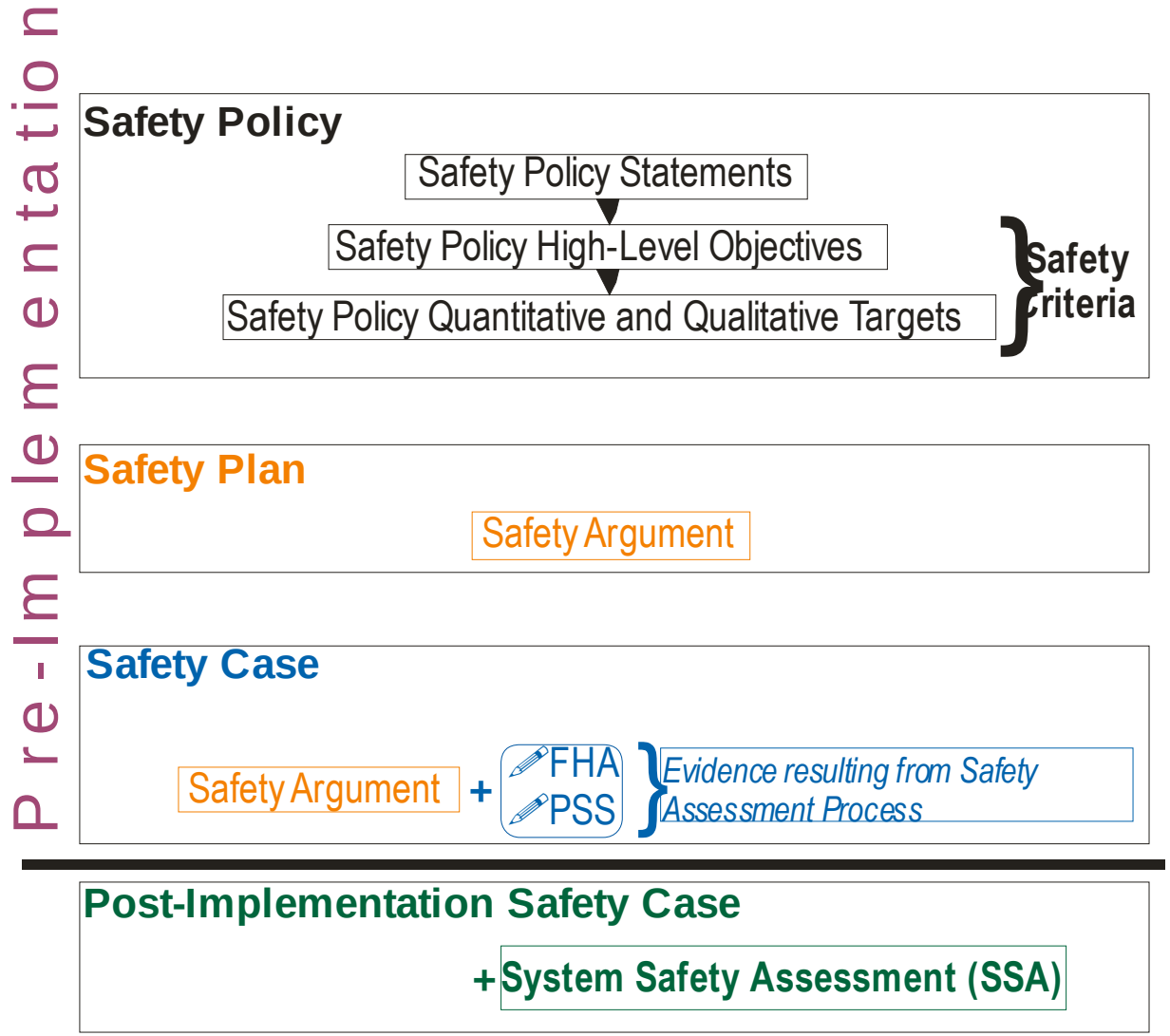


(Derived from Doc. 9689 pp. 7 & 18)

EVALUATING SAFETY



SAFETY &PERFORMANCE CRITERIA



PERFORMANCE CRITERIA

1a. an airport capacity increase of 20% is demonstrated; and	
2a. no increase in noise pollution is experienced by the residents of Suburb Y between 22:00 and 05:00 UTC;	
3a. track mileage flown by arriving aircraft is not extended by more than 5%;	
1b. TARGET airport capacity = 43 movements p.hour	
2b. noise emitted by each ACFT does not exceed 65dB at the noise monitoring point.	
3b. track mileage flown by arriving aircraft does not exceed 32 NM from Terminal Airspace Entry point.	

Sample Checklist: Safety and Performance Criteria

Checklist: PERFORMANCE CRITERIA (ref. Part , Ch.3)	
ASSESSMENT AND MEASUREMENT (ref. Part C 3.2)	
	• Is the chosen Assessment methodology (qualitative vs. quantitative) the correct methodology for the required measurement? • Do the people that are assigned to the assessment have the suitable background and support tools to do the assessment? • Is the assessment done by people from the project team or by external parties? • Is the assessment done repetitive during the design process?
SAFETY CRITERIA (ref. Part C 3.3)	
	• What has been the motivation to decide on either relative or absolute measurement of safety? • What is the chosen frequency approach on safety assessment (phased vs. once-only) and why was this approach chosen? • What is the chosen support to substantiate the safety assessment; simulations (fast- real-time), analysis and/or expert judgement? • What is the "benchmark" used in the determination of safety criteria?
PERFORMANCE CRITERIA (ref. Part C 3.4, 3.5)	
	• Are the design objectives met? • Depending on the objectives were quality and or quantity measured in order to determine if the objectives are met? • Are there measurement tools used, that would normally be outside the scope of the design project, to measure if the objectives are met (e.g. noise modelling tools)?

Outstanding Actions/Issues

Action	Due date	Responsible

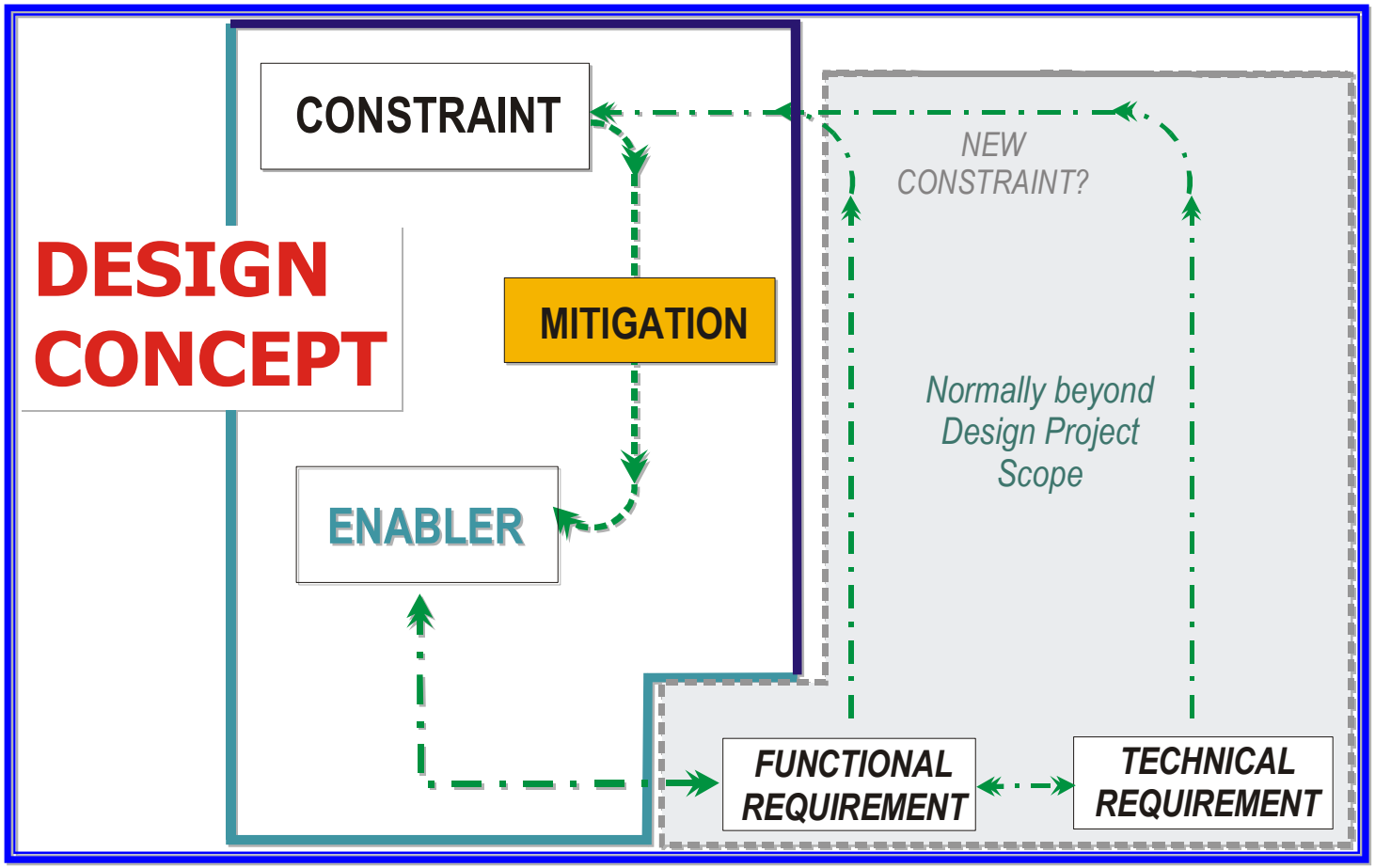
Reports

REPORT TYPE	DUE DATE	RESPONSIBLE	CONSULTATION PERIOD
DRAFT REPORT			
REVIEW			
FINAL REPORT			

Federal Aviation Administration

EUROCONTROL

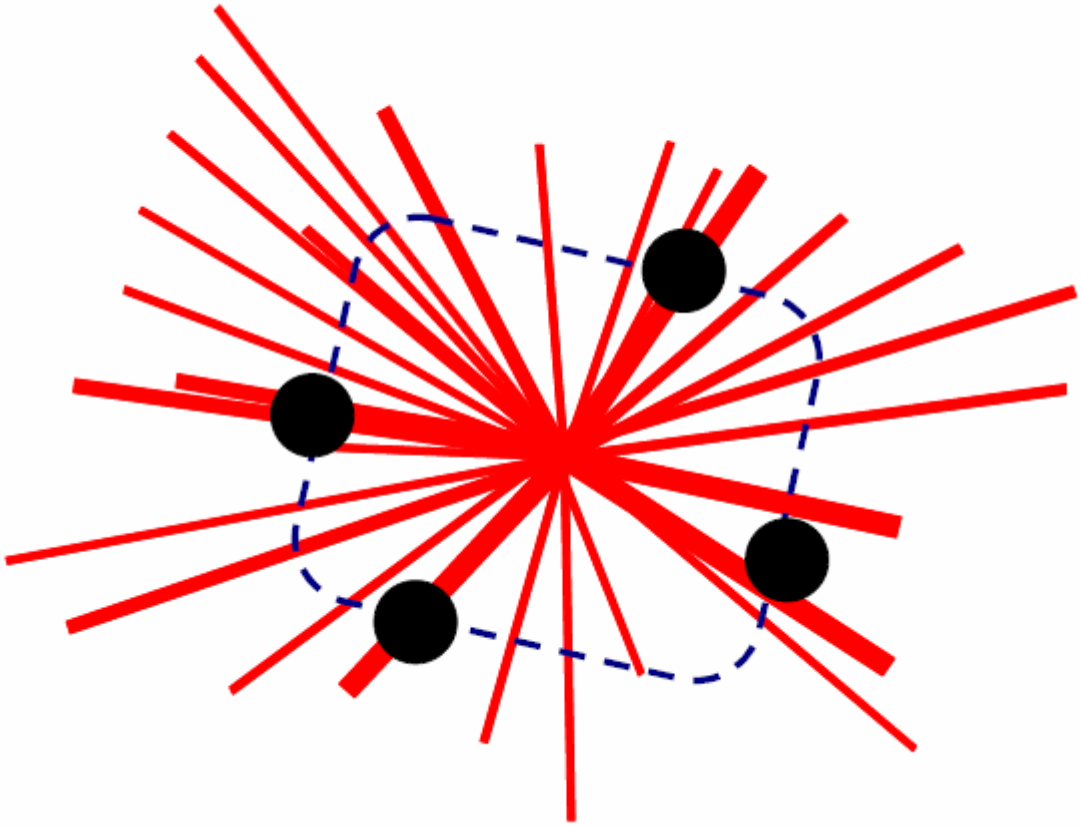
ASSUMPTIONS / ENABLERS & CONSTRAINTS



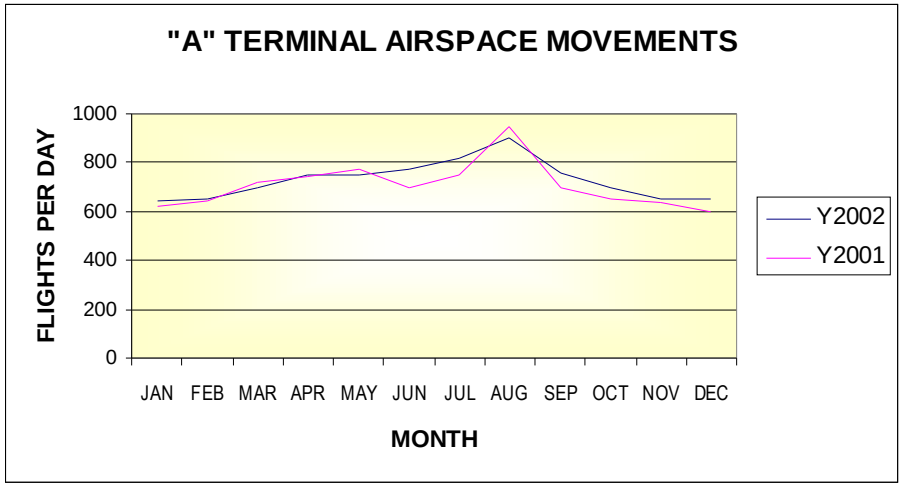
ASSUMPTIONS / ENABLERS & CONSTRAINTS

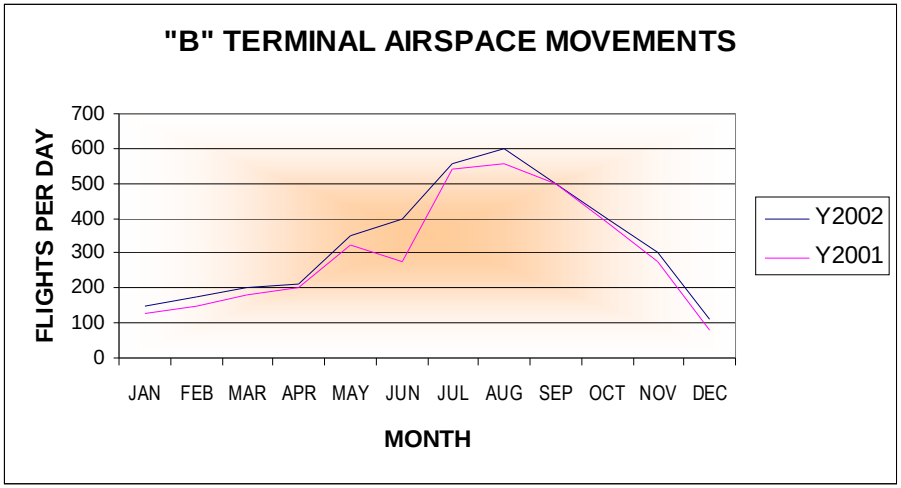
CONSTRAINTS	*MITIGATION*	ENABLERS
High Terrain on final approach RWY X	Increase ILS angle by 1°?	Specification change for ILS
Multiple airports within close proximity with poor co-ordination agreement	Letter of Agrrement	EUROCONTROL DOC The Cross-Border Common Format Letter of Agreement
Aircraft Performance Mix limits capacity	Design different SIDs for high and low performance aircraft.	Airspace Design
Aircraft Navigation Performance Mix limits capacity by increasing ATC workload	ATC system modification to allow FDPS/RDPS to show aircraft navigation capability	Software Application Change
Inadequate Navigation infrastructure	New DME at Location A	Enhance NAV infrastructure
High mix of IFR-VFR movements limits capacity	SEGREGATED VFR/IFR ROUTES	Airspace Design
Fixed-wing/Rotor craft mix increases approach workload and complexity	Separated routes based on aircraft category	Airspace design
TSA which adversely affects traffic patterns	Airspace sharing arrangements	Flexible Use of Airspace Concept and EUROCONTROL DOC The Cross-Border Common Format Letter of Agreement
Poor Radar Coverage prevents route placement in part of the Terminal Airspace	Improve Surveillance capability	Enhance Radar infrastructure
Poor Radio Coverage adversely affects route placement in part of the Terminal Airspace	Improve Radio Coverage	Enhance communications infrastructure
Severe weather disrupts traffic, especially at peak times	Create 'contingency' routes for poor weather operations; re-locate holding patterns	Airspace design
No flights permitted over Village X	Diverge departure routes as soon as possible after take-off	Airspace design
Flights over City Y not permitted below 10,000 feet	Continuous Descent Approach	Airspace design and Level constraints in procedures

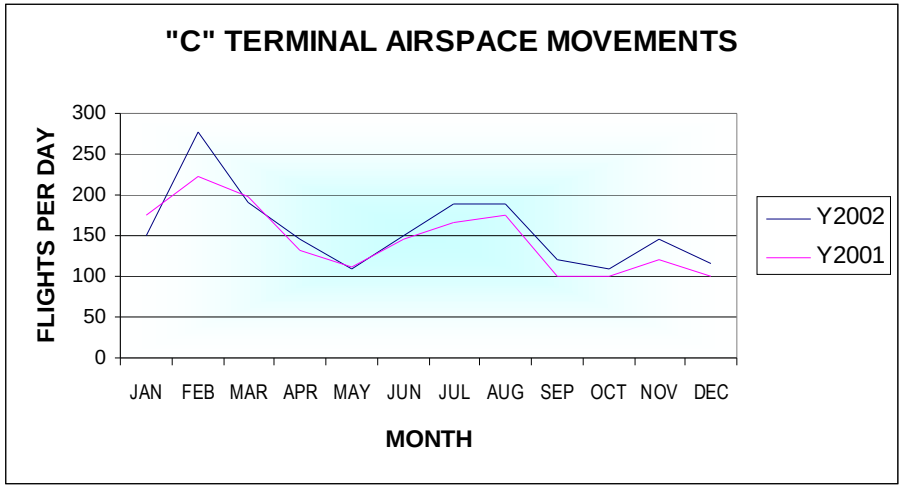
ASSUMPTIONS



ASSUMPTIONS







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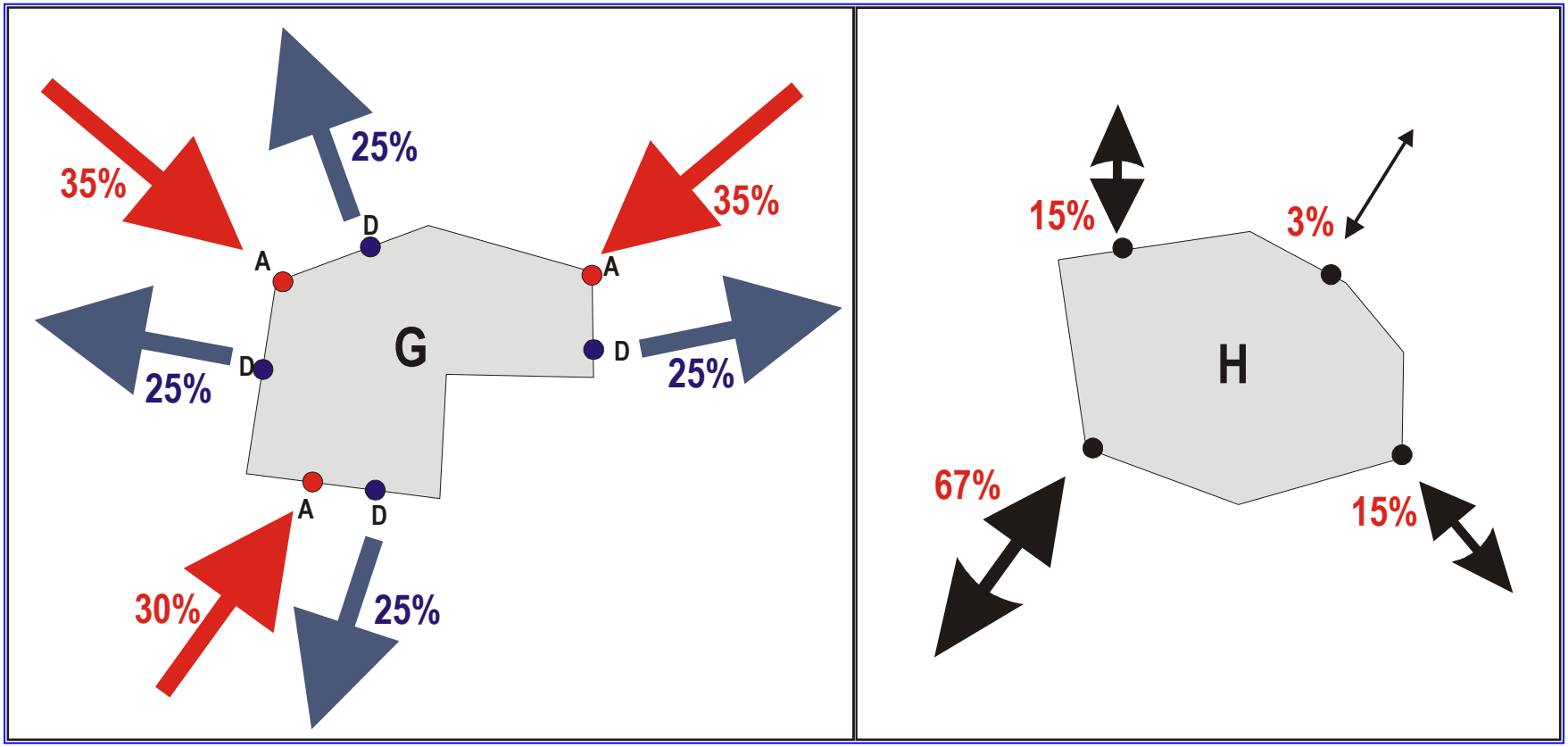

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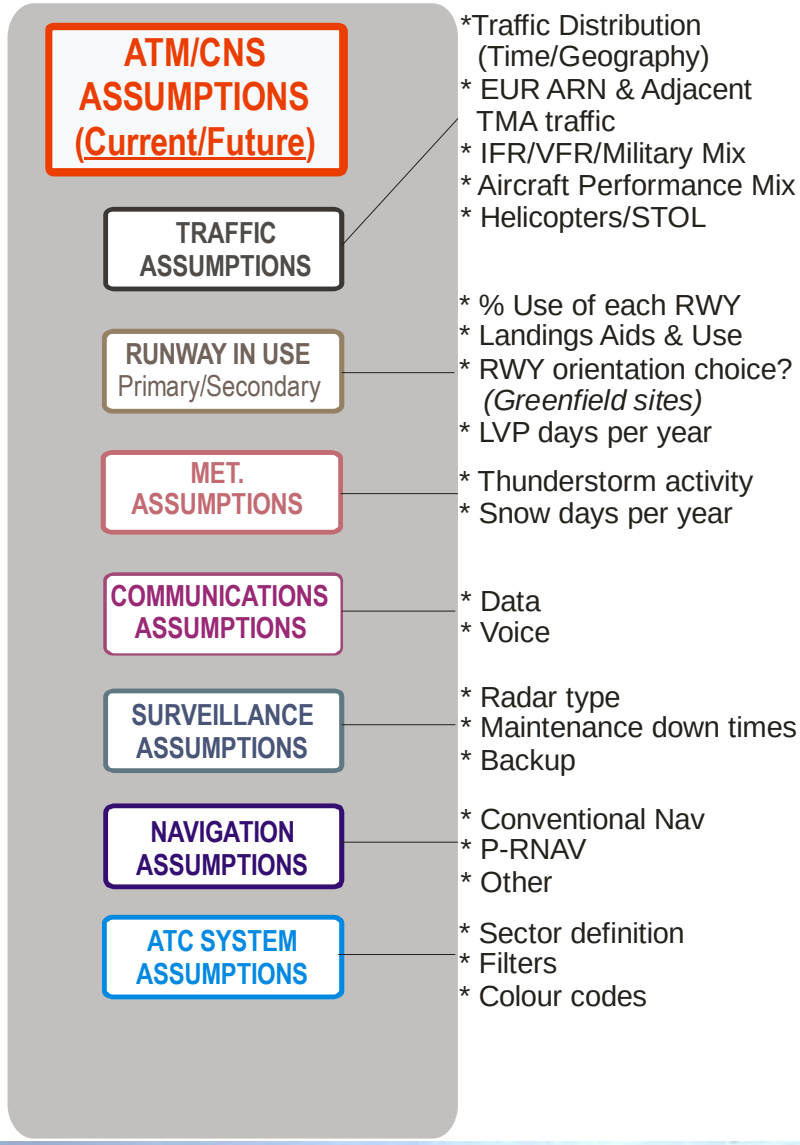

A few examples ….

- Changing a Radar for approach
- Blocked military airspace – that wasn't
- Changing planned Runway orientation
- Change to the number of runways available

KAPITALI ASSUMPTIONS: FLEET CHARACTERISTICS

- 75 % GPS/DME EQUIPPED
- 95 % DME
- ALL RNAV 5 approved
- 65% RNAV-1 approved
- 25% Retro fittable
- 10 % to old

Which Nav Spec as basis for Kapitali Design?

Table 1-1: Application of Navigation Specification by Flight Phase

NAVIGATION SPECIFICATION	FLIGHT PHASE							
	En Route OCEANIC /REMOTE	En Route Continental	ARR	APPROACH				DEP
				Initial	Interm.	Final	MISSED	
~~RNAV 10~~								
~~RNAV 5~~								
RNAV 2								
RNAV 1								
~~RNP 4~~								
BASIC-RNP 1								
~~RNP APCH~~								
~~RNP AR APCH~~								

KAPITALI ASSUMPTIONS: INFRA and TECHNICAL

- Two radar (APP and feed from ACC) full coverage as from 2000ft update rate
- 10 per min
- Full RADAR and Flight plan data processing
- ILS both rwy ends Cat 3
- DME coverage as from 2000 ft Whole TMA
- NDB for NPA

Sample Checklist: Assumptions, Constraints and Enablers

Checklist ASSUMPTIONS, CONSTRAINTS & ENABLERS (ref. Part C , Ch.4)
1. What are ASSUMPTIONS, CONSTRAINTS & ENABLERS (ref. Part C 4.2)
• Are all the assumptions established after verification with experts on the subject of the assumptions? • Are there assumptions that are based on factors beyond ATM/CNS e.g. weather phenomena? • Is there a sufficient level of confidence in the project team that the assumptions were established cautiously? • Is the traffic sample chosen as the baseline for the design considered as representative? • Are all the enablers that are identified as outside the design scope, adopted by the ANSP and defined as functional requirements? • If the functional requirements derived from design enablers are defined as functional requirements, is action taken to fulfil these requirements (thereby creating the enabler). • Does the planning/project of a functional requirement meet the design project planning (if not, the constraint that is to be mitigated by the requirement/enabler becomes a negative constraint)? • Are all possible ways to mitigate constraints investigated? • Are all the Assumptions Constraints & Enablers derived from the reference scenario?
2. Selecting ASSUMPTIONS, CONSTRAINTS & ENABLERS (ref. Part C 4.3)
• Are all the assumptions established after verification of publications in state originated documents such as the Aeronautical Information Publication (AIP)? • Are the Assumptions, Constraints & Enablers linked to a certain date (where appropriate)? • When choosing a representative traffic sample, was the traffic distribution over time taken into consideration? • When choosing a representative traffic sample, was the geographic traffic distribution taken into consideration? • Is the option considered to create two (or more) sets of Terminal Routes to accommodate significant changes in traffic density or distribution? • Is it considered as necessary to sort the geographic traffic distribution by origin and destination so as to identify the raw demand (this is only necessary when doubt exists that the current En-Route ATS route network is not sufficiently refined)? (note: see next bullet) • Has there been a "raw-demand" investigation done by En-Route airspace designers within the greater EUR ARN in the course of a project that is connected to the TMA design project? If so, the previous bullet has become obsolete. • Has there been an assessment of the relative certainty of "triggering event" that may influence Forecast Traffic Samples?
3. When to identify ASSUMPTIONS, CONSTRAINTS & ENABLERS (ref. Part C 4.4)
• Where the Assumptions, Constraints & Enablers identified, reviewed and verified at the different stages of the design process as suggested in the guidelines?

THANK YOU