



Performance Based Navigation

Overview of ICAO PBN Planning Processes





Overview

- ➔ ICAO PBN Manual
- ➔ Review of Processes
 - Selected key points
 - Relationship to Airspace Concept development and implementation activities





ICAO PBN Manual

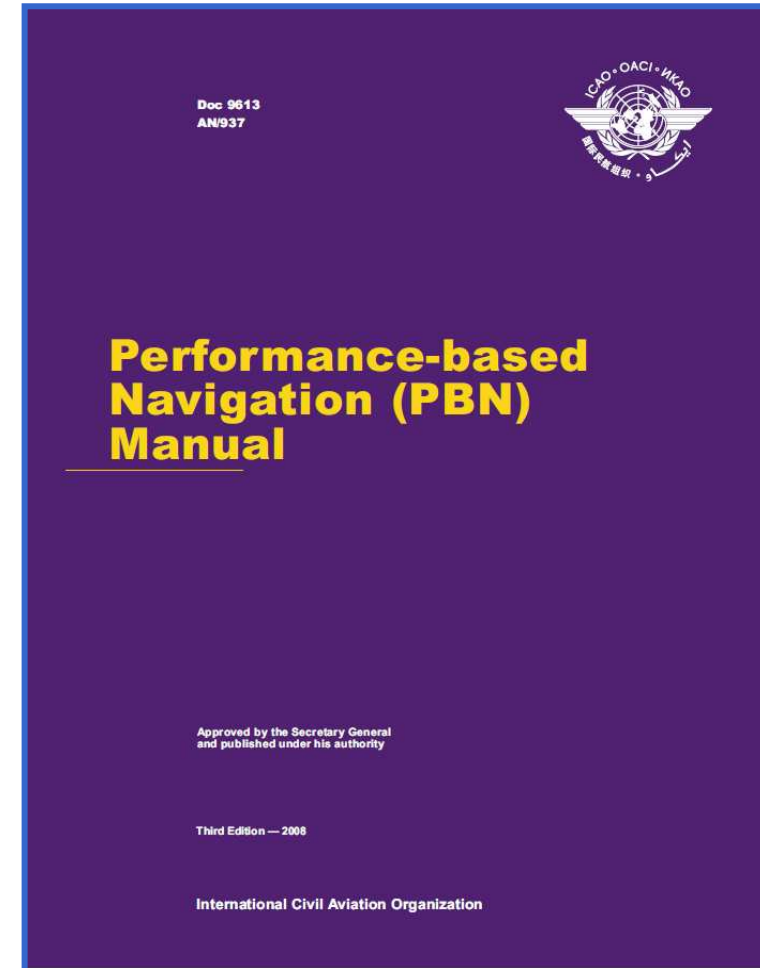
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→ Volume I

- *Airspace Concept*
- *Implementation Processes*

→ Volume II

- *Navigation Specifications*





ICAO PBN Manual

PBN Implementation Processes

- High-level outlines of processes that a State can use when deciding on implementation of PBN -- used in sequence
- Process 1 — Determine requirements
 - Determine strategic and operational requirements for PBN via an airspace concept
 - Assess Fleet equipage and CNS/ATM infrastructure in the State or region
 - Identify navigation functional requirements





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PBN Implementation Processes

➔ Process 2 — Identifying ICAO navigation specifications for implementation

- How a State/region determines whether implementation of an ICAO navigation specification (Vol II)
 - Achieves the objectives of the airspace concept,
 - Provides the required navigation functions, and
 - Can be supported by the fleet equipage and CNS/ATM infrastructure
- May result in review of the airspace concept and required navigation functions to identify trade-offs that would allow a better fit with a particular navigation specification





ICAO PBN Manual

PBN Implementation Processes

→ Process 3 — Planning and implementation

- Guide to planning and implementation the selected specifications to support the Airspace Concept



PBN: An Airspace Concept Enabler

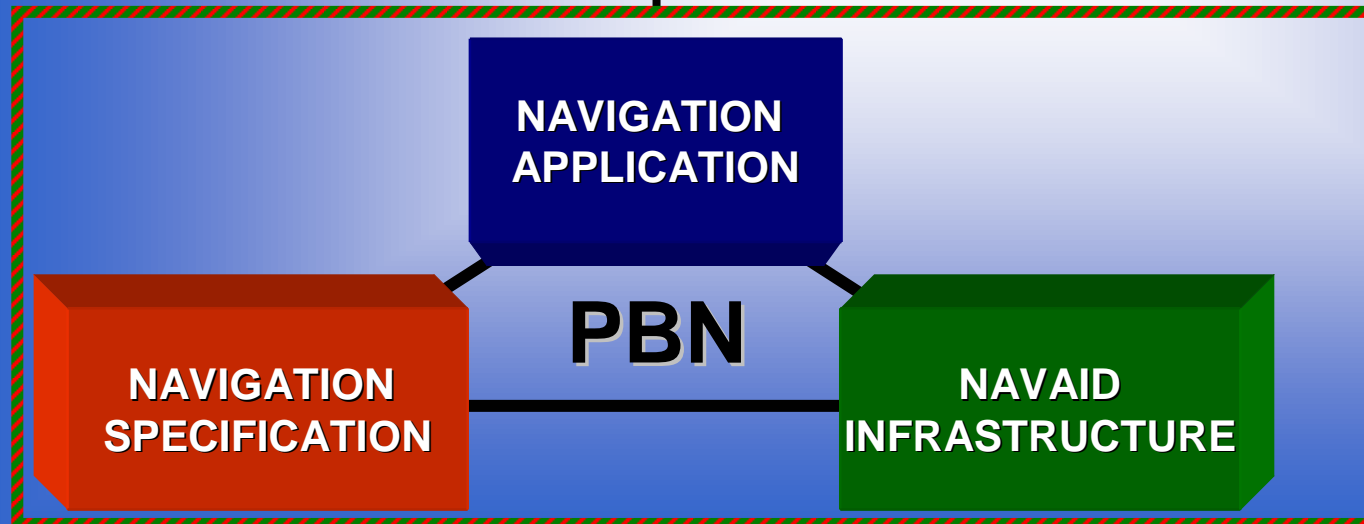
Airspace Concept

COM

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Overview of PBN Manual Processes 1, 2 and 3

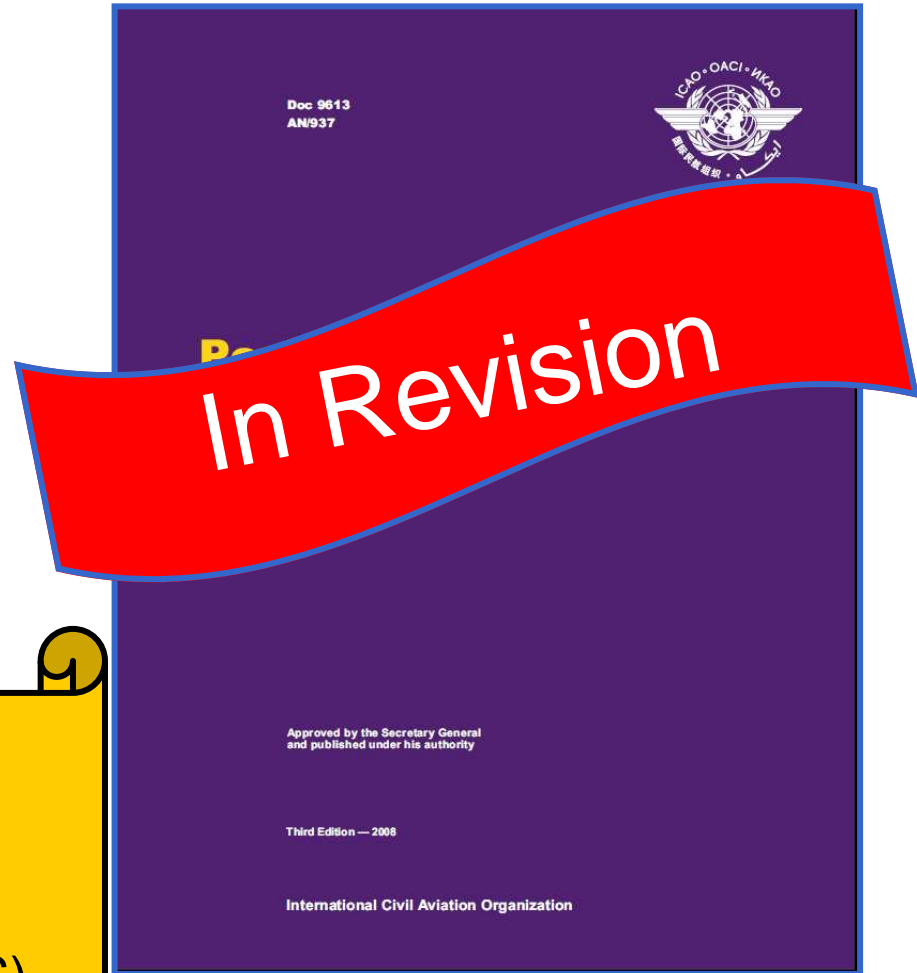




Volume 1

Part B, Chapter 2:

A Snapshot of Process #1



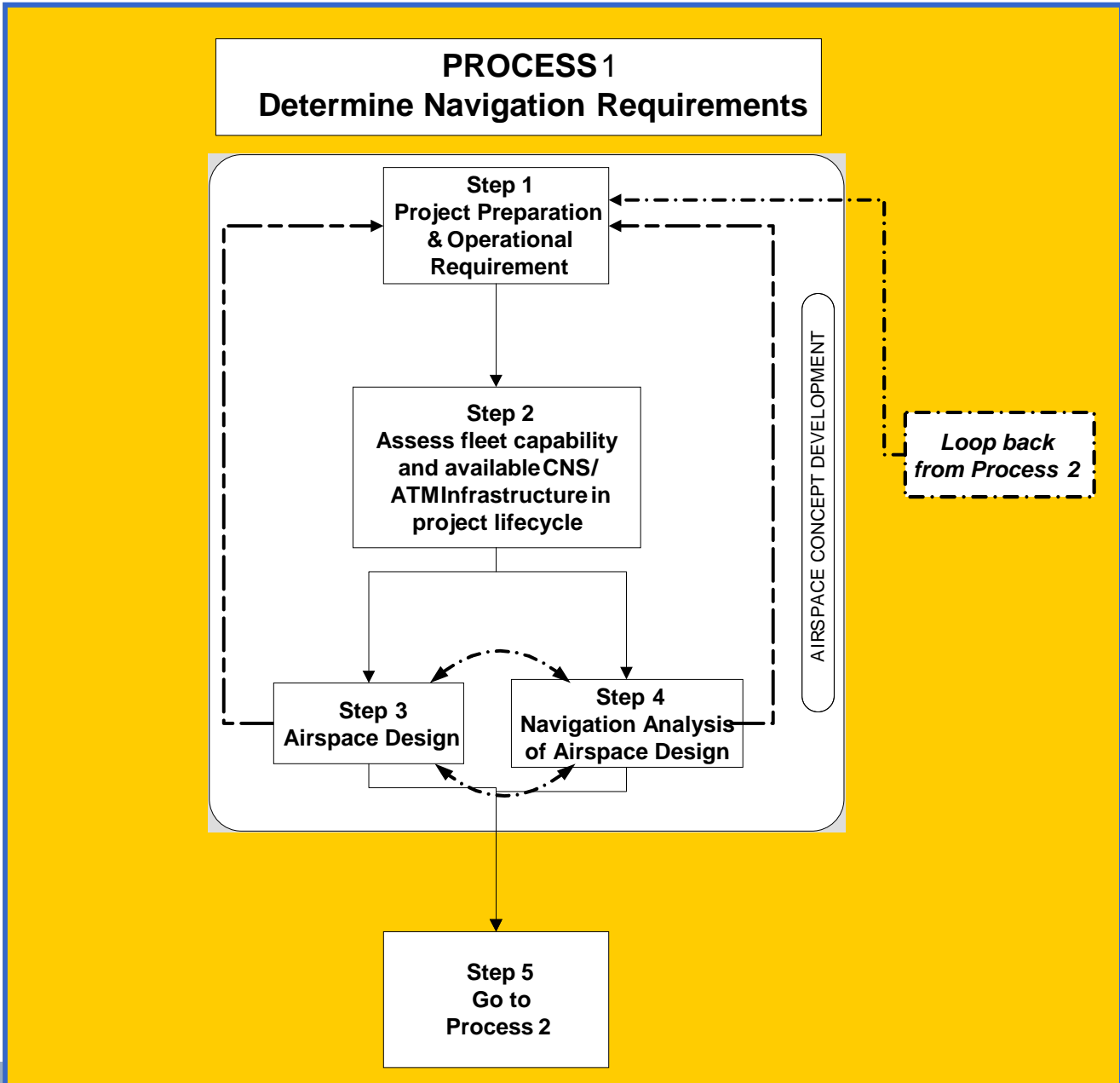
**DETERMINE
REQUIREMENTS**
(NAVIGATION FUNCTIONALITIES)



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Overview of PBN Manual Processes 1, 2 and 3







Process 1 (Revised) example: Step 1

Project Preparation and Operational Requirements

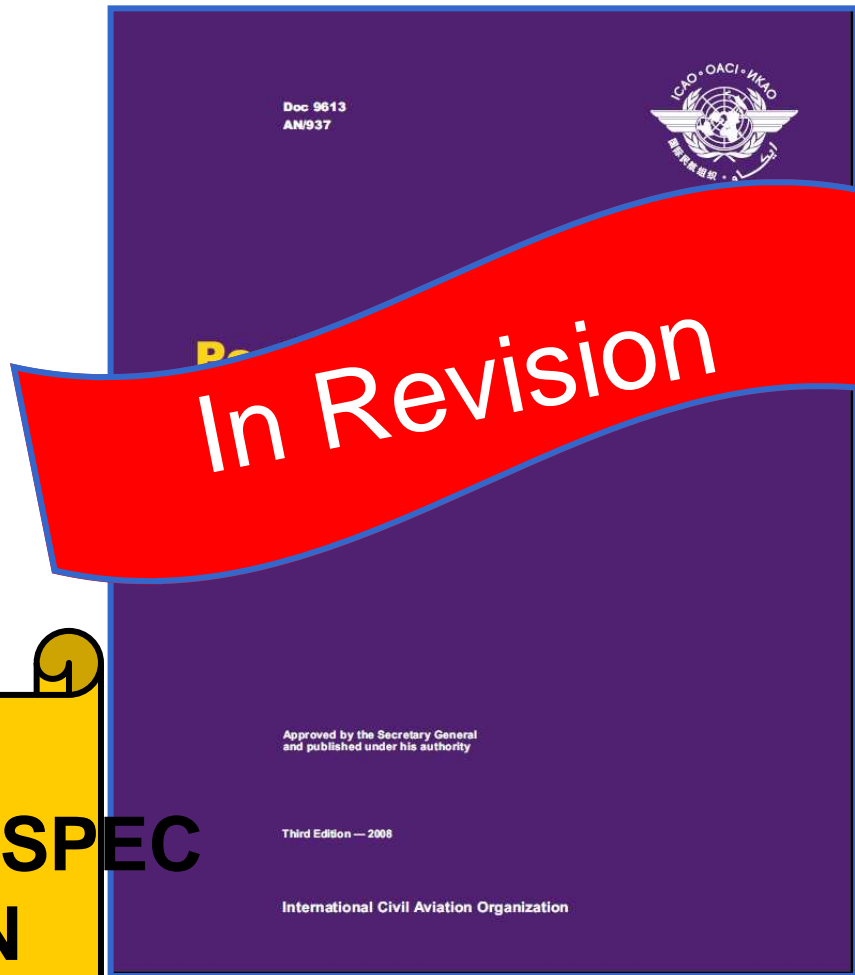
Activities include:

- ✈ Determine project objectives and scope, based on
 - Operational objectives (new runway, CDOs, shorter flight paths, etc)
 - Time (deadlines?) and resources available (people, money, tools)
 - Beware of tendency for “project creep!”
- ✈ Analyze and document the “Reference Scenario”
 - Current operations (airspace volumes, traffic flows, routes, procedures etc)
 - A baseline to determine if strategic objectives are achieved





Volume 1 Part B, Chapter 2: A Snapshot of Process #2

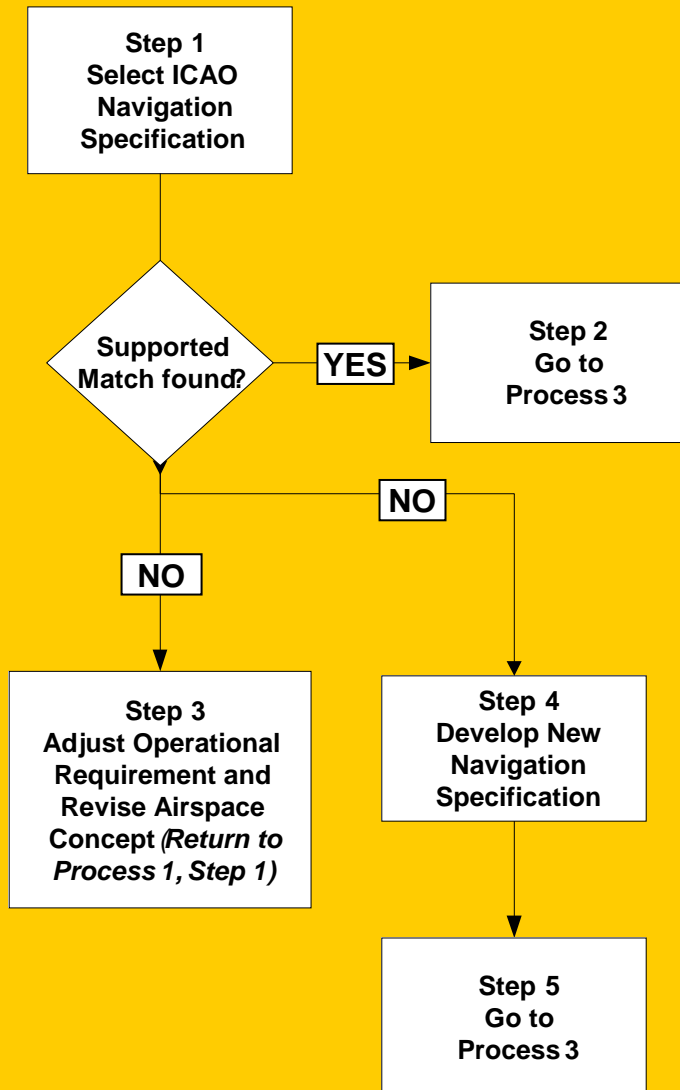


**IDENTIFYING AN ICAO NAV SPEC
FOR IMPLEMENTATION**





PROCESS 2 Identifying an ICAO Navigation Specification for Implementation





Navigation Specifications

ICAO PBN Manual, Vol II

NAVIGATION SPECIFICATION	FLIGHT PHASE							
	En Route Oceanic / Remote	En Route Continental	ARR	APPROACH				DEP
				Initial	Intermed	Final	Missed	
RNAV 10 (RNP 10)	10							
RNAV 5		5	5					
RNAV 2		2	2					2
RNAV 1		1	1	1	1		1	1
RNP 4	4							
Basic-RNP 1			1	1	1		1	1
RNP APCH				1	1	0.3	1	
RNP AR APCH				1 - 0.1	1 - 0.1	0.3 - 0.1	1 - 0.1	



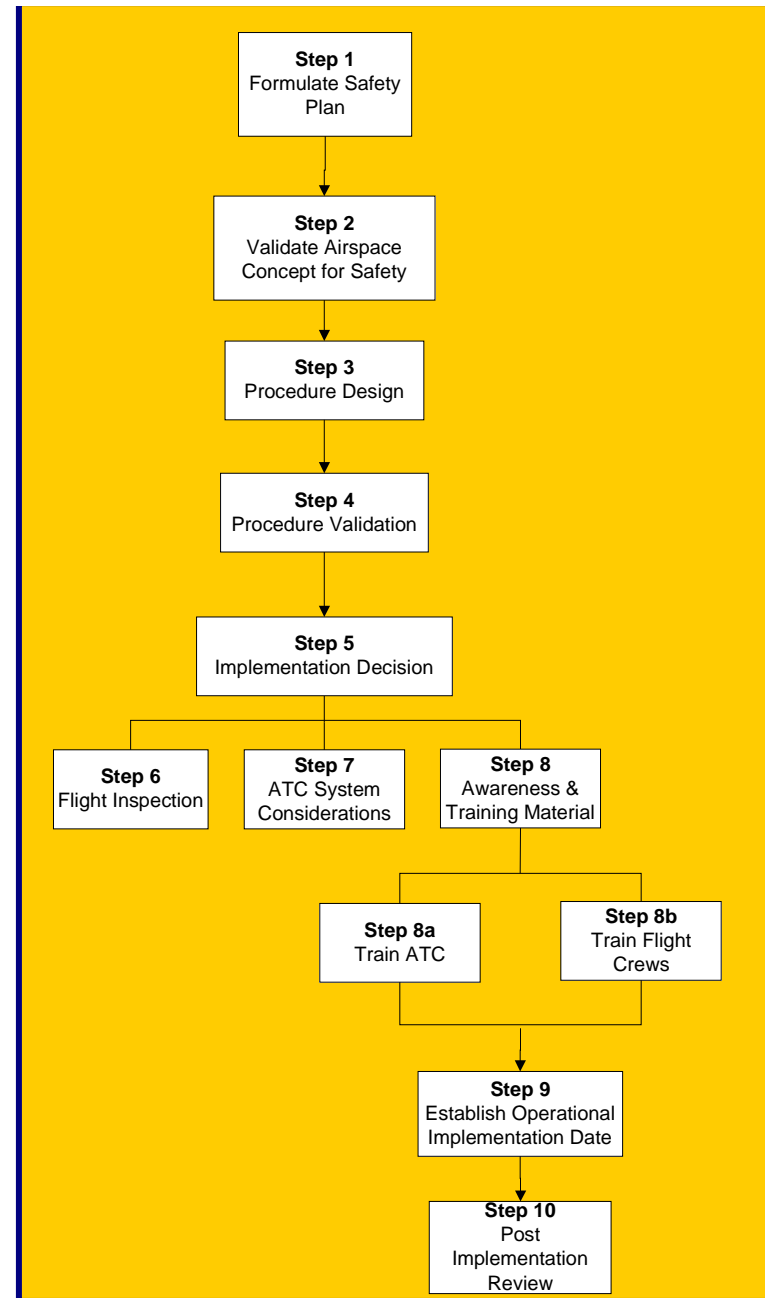


Volume 1

Part B, Chapter 4:

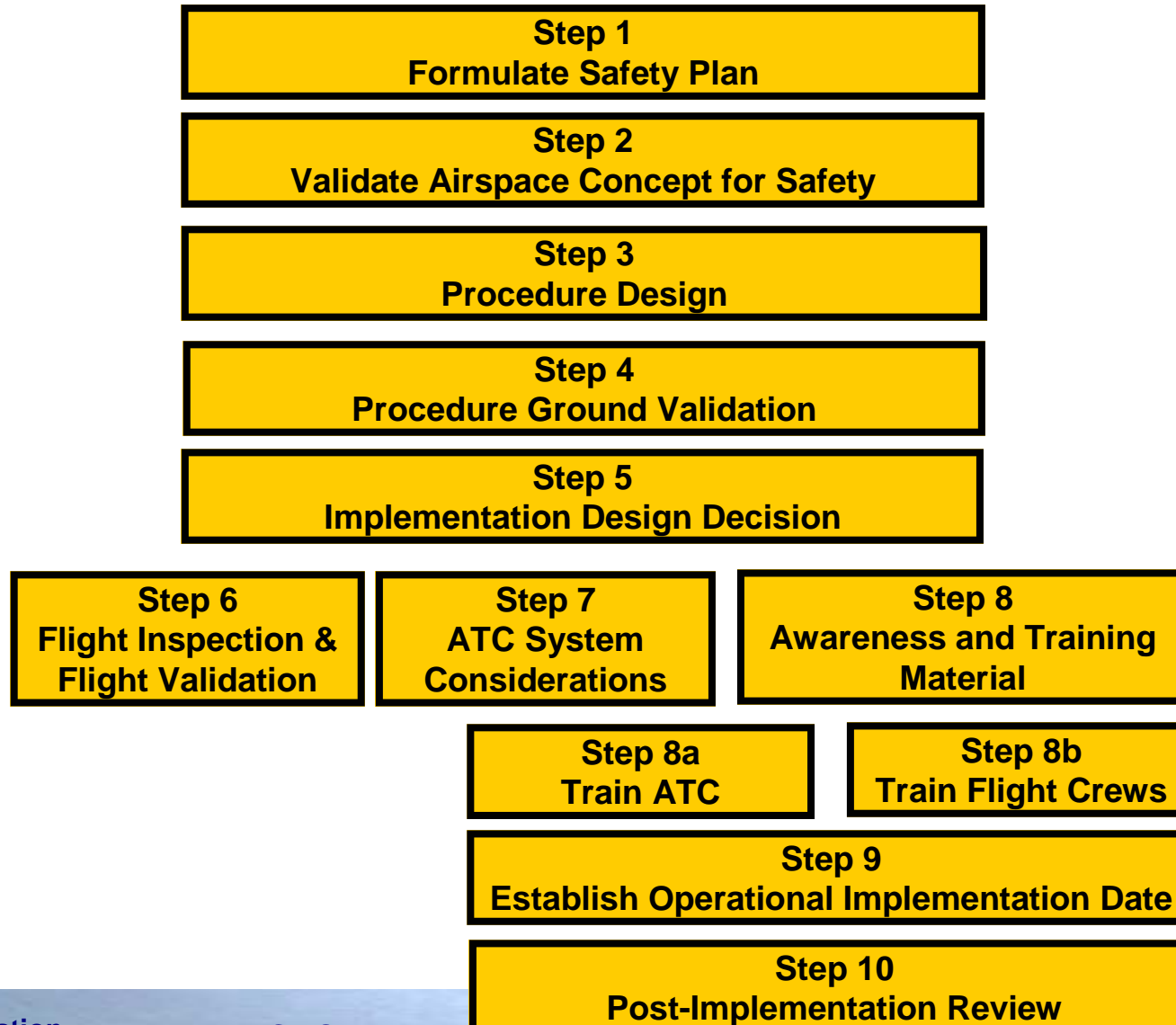
A Snapshot of Process #3

PLANNING AND IMPLEMENTATION





Process #3: Planning and Implementation





Notes on Process 3

- The activities in Process 3 would be followed for any level of PBN implementation
 - A single instrument approach procedure
 - A set of terminal arrival and departure routes
 - A entire airspace redesign
- The activities described in Process 3 are not new – undertaken with any implementation





ICAO PBN Implementation Processes and Airspace Planning Activities



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Airspace Concept

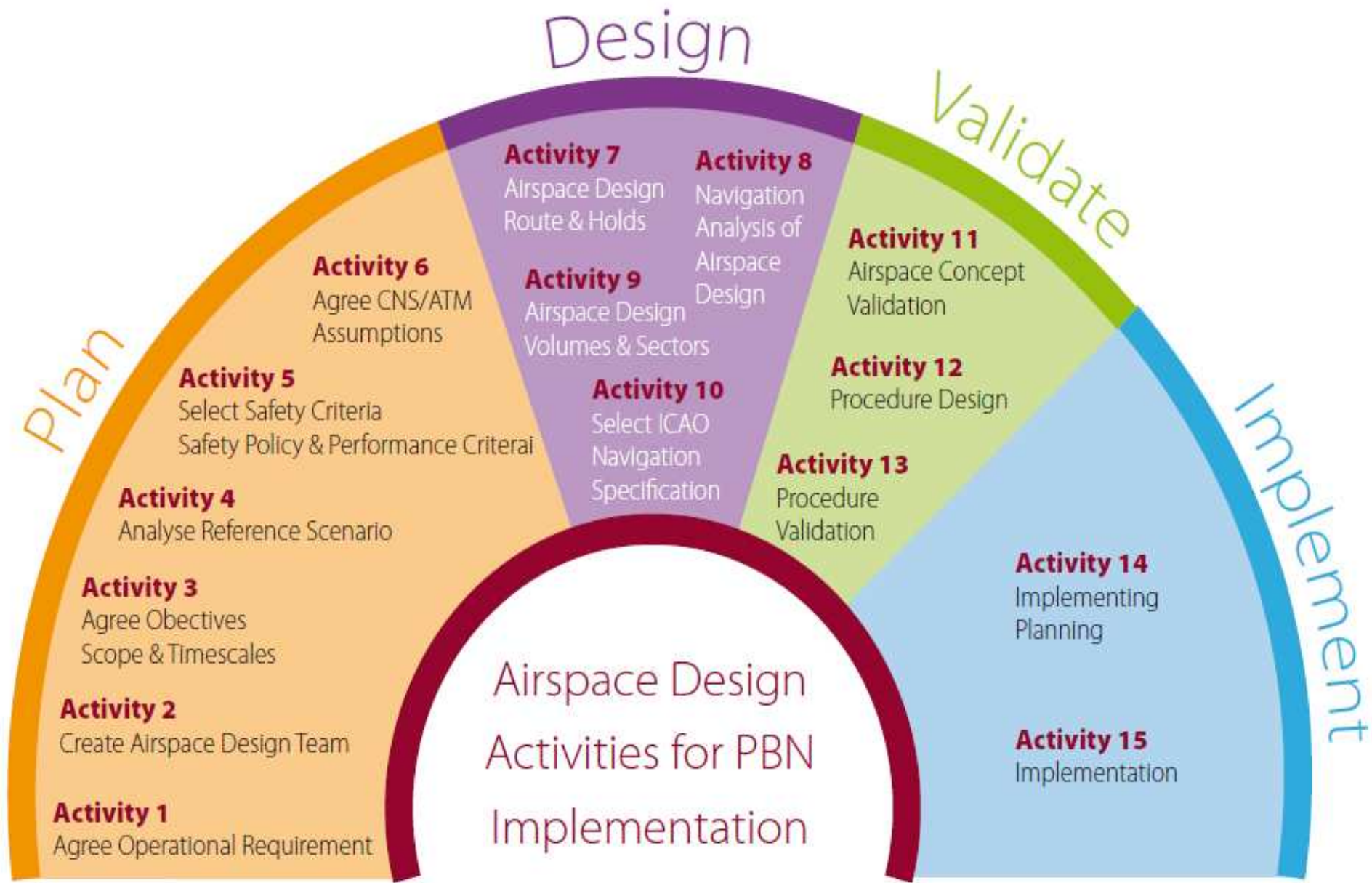
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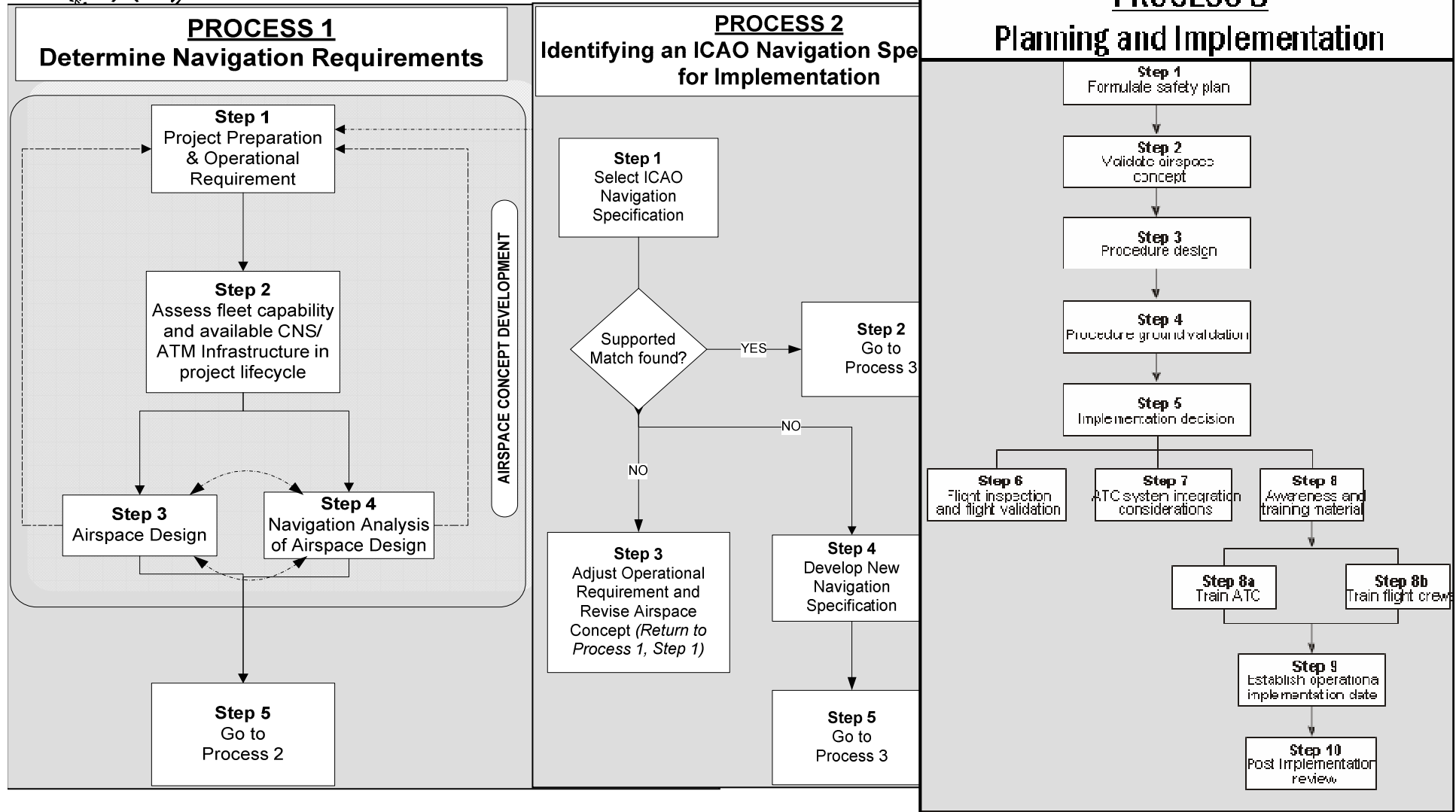
ATM



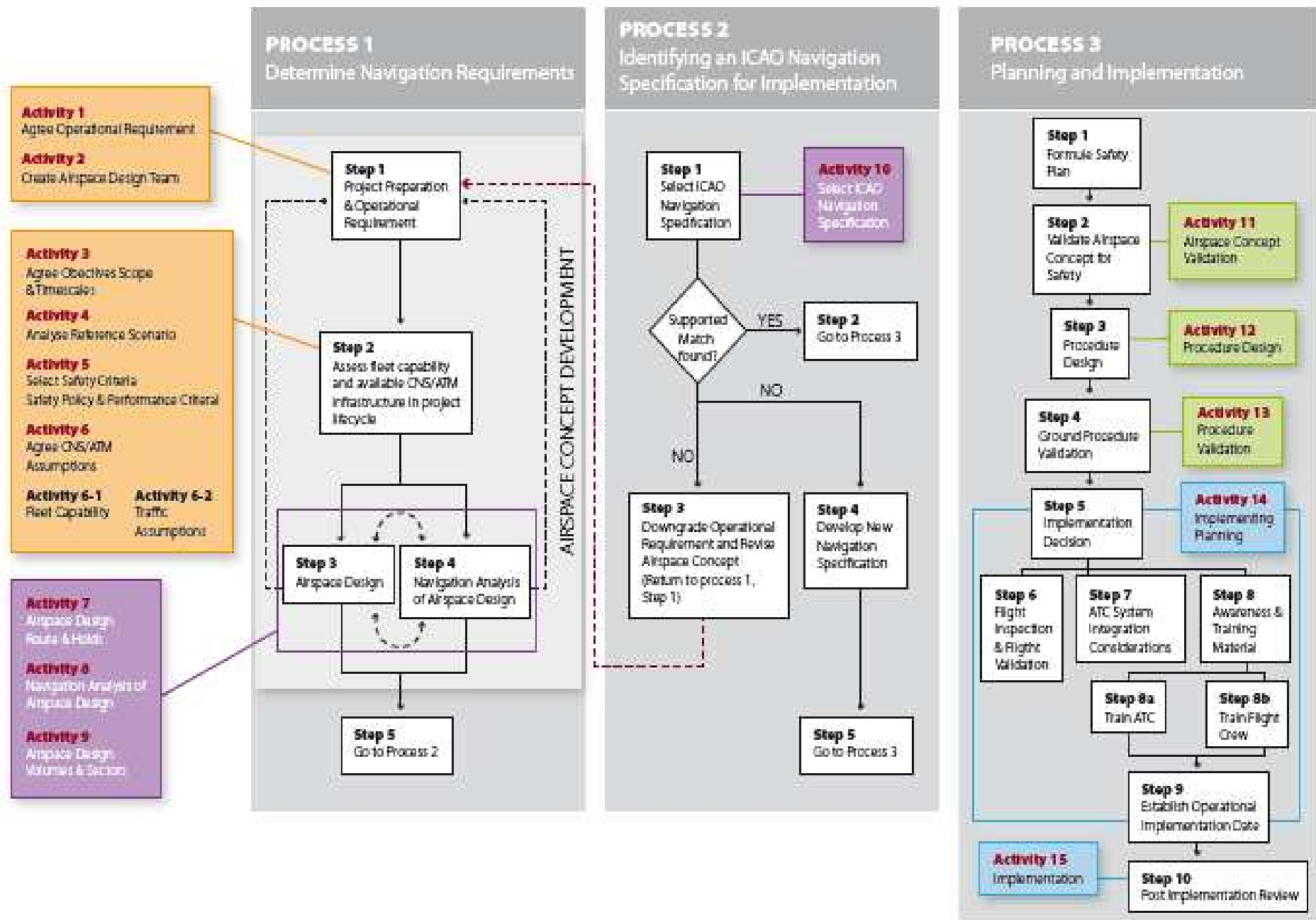




ICAO PBN Processes



Mapping: STEPS of PBN Implementation Process / Activities Airspace Concept Development





Thank you



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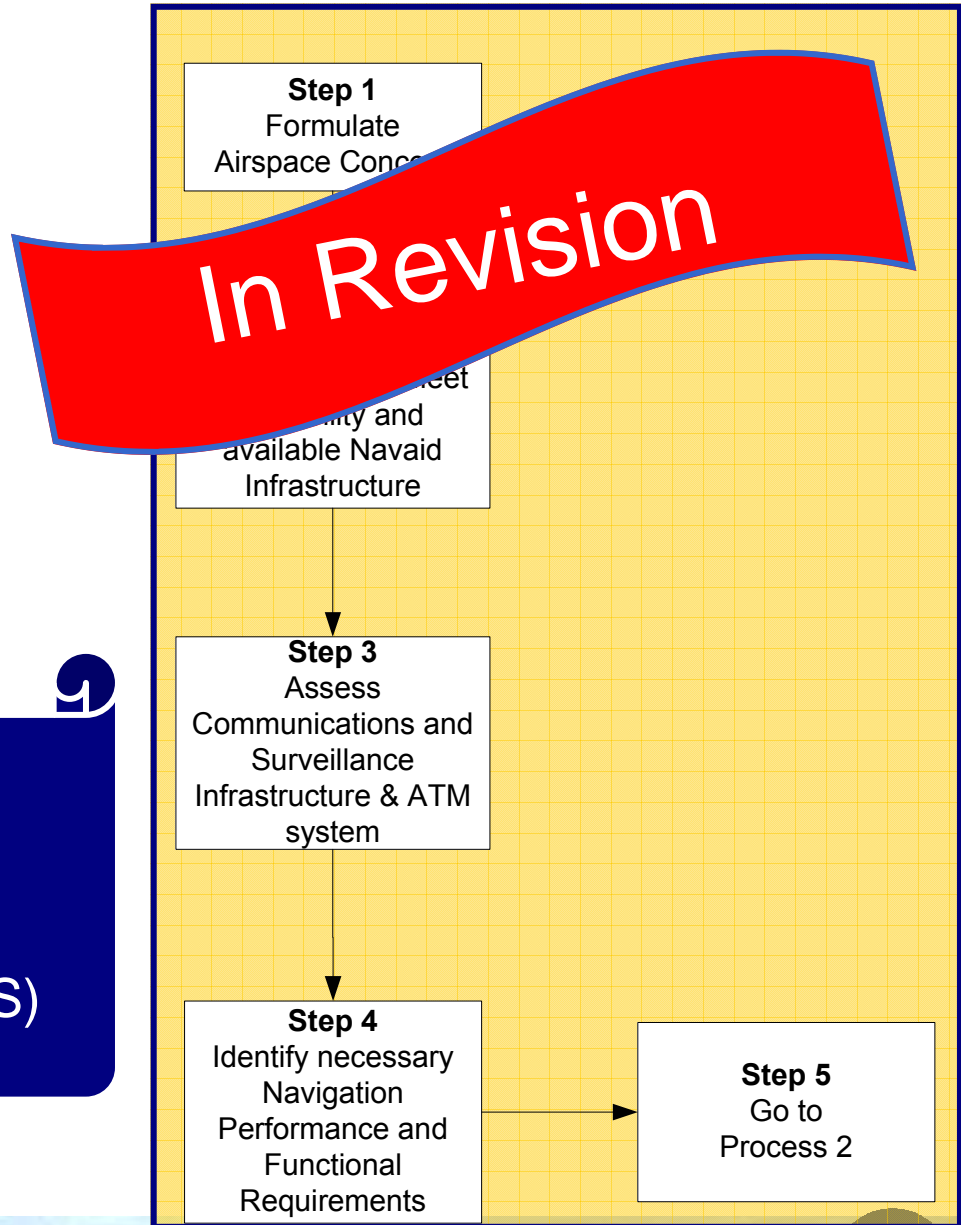
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Volume 1 Part B, Chapter 2: A Snapshot of Process #1

**DETERMINE
REQUIREMENTS
(NAVIGATION FUNCTIONALITIES)**



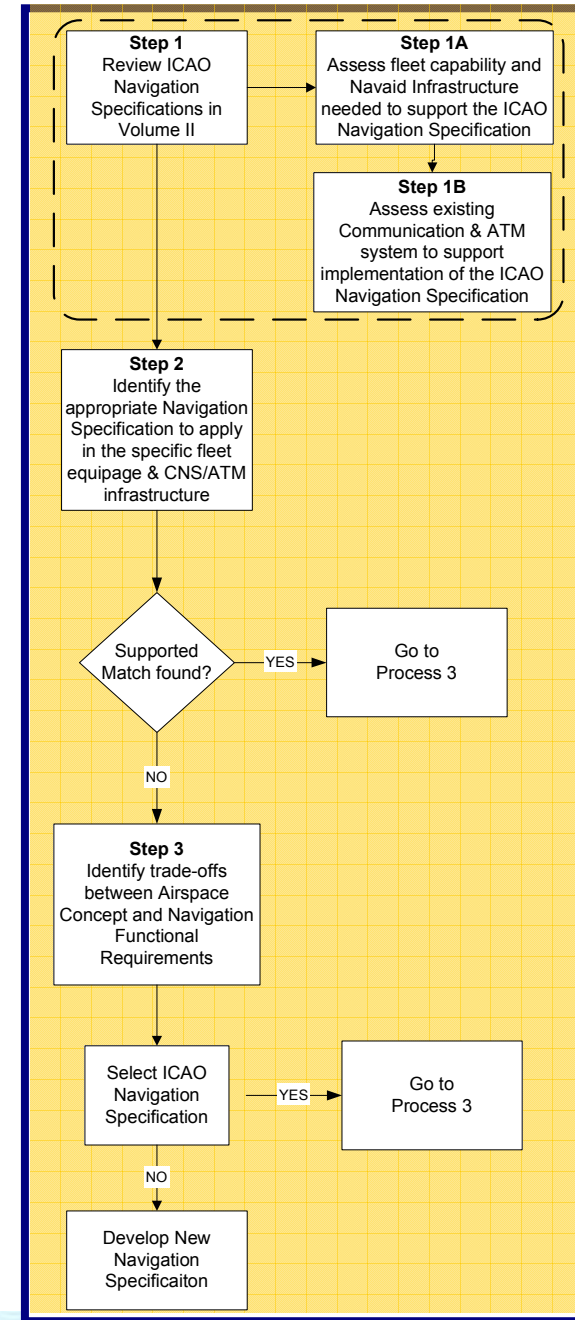


Volume 1

Part B, Chapter 3:

A Snapshot of Process #2

IDENTIFY AN ICAO NAV SPEC FOR IMPLEMENTATION





Example: NAV Capability

✈ En-route Continental

- Accuracy
- Offset route capability
- Turn performance
- Nav aid requirements

✈ En-route Oceanic and Remote

- Accuracy
- Self contained Navigation capability (inertial)
- GNSS

✈ Terminal Airspace

- Accuracy
- TMA leg types
- Work load implication
- data base etc

✈ Approach

- Straight in or curved approach
- Missed approach requirements
- Multiple runways

