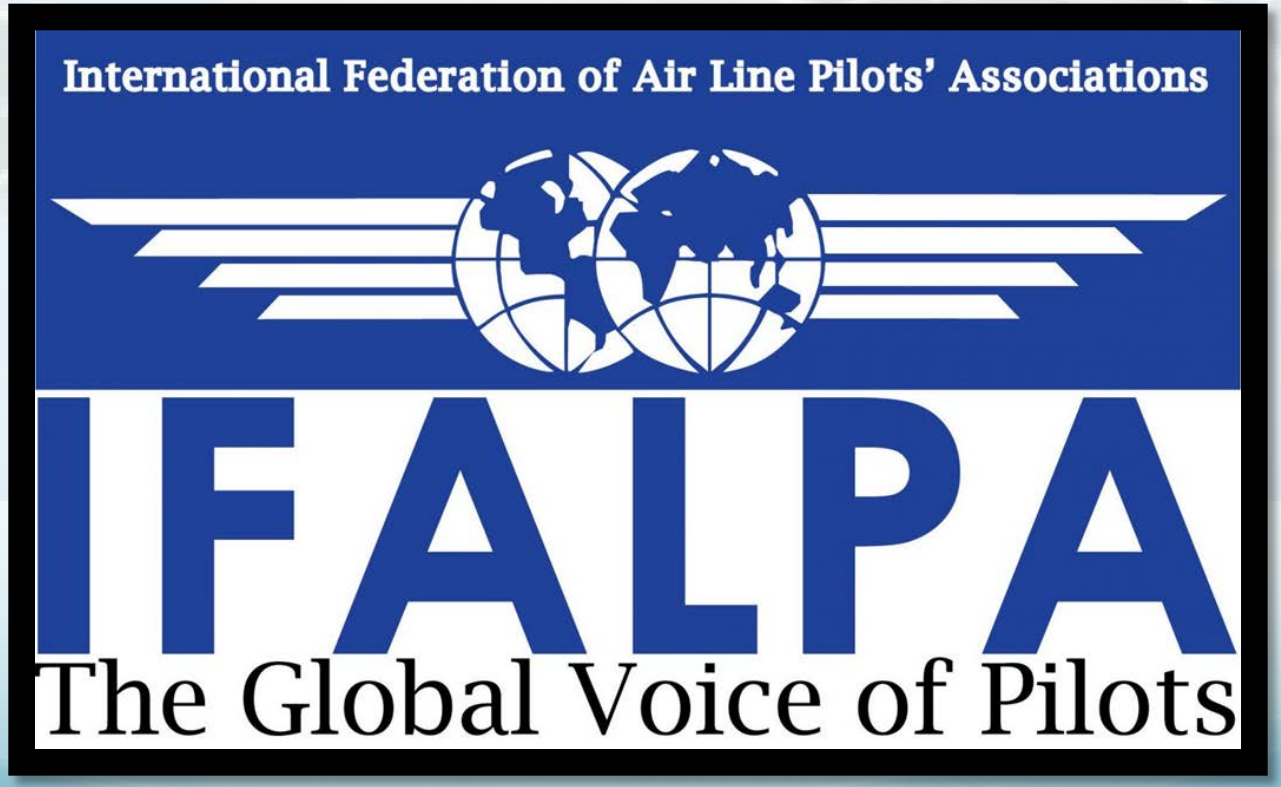

WELCOME
Capt. Yuri Yomel Estrada Magaña

A Pilot Perspective on PBN Operations



History

Mexican regulations
International source

Basic concepts

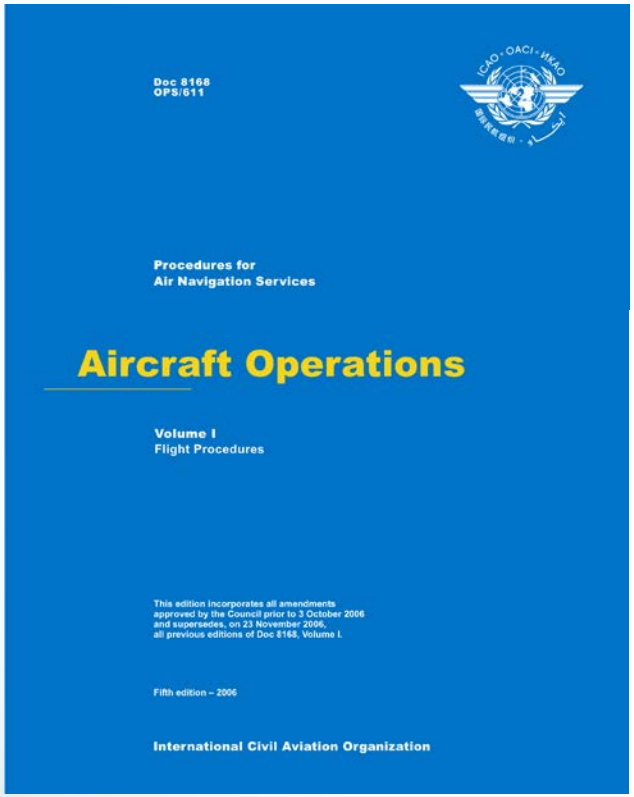
Safety

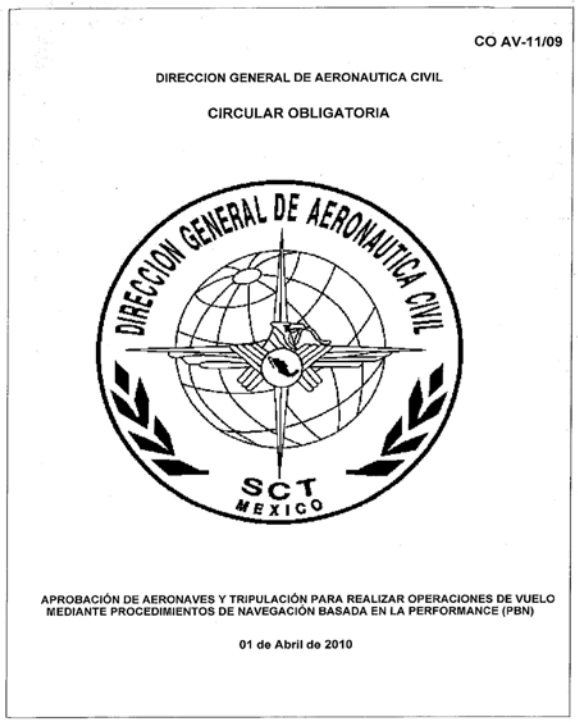
- CFIT
- Unstabilized approach
- Runway overruns

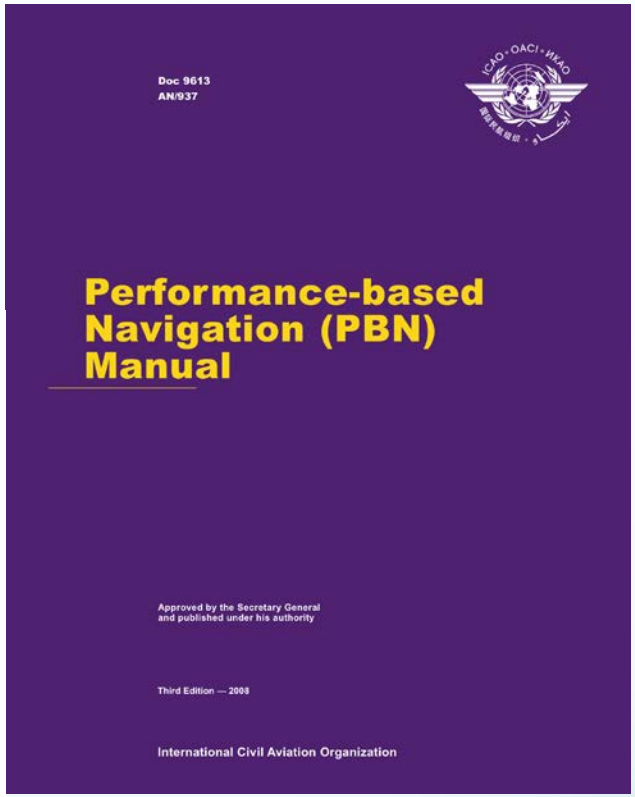
PBN improving safety

Questions

MEXICAN REG. & INT. SOURCE







- Notice *CO AV-10/09* - registration of aircraft equipment for implementation of PBN
- Notice *CO AV-11/09* - approval of aircraft and crew to perform flight operations through navigation (PBN) performance-based procedures
- Notice *CO AV-15/10* - application procedures of the global navigation satellite system (GNSS), into the Mexican air space

- ***PANS OPS Doc. 8168***
  - Part II Flight procedures – RNAV and Satellite-based
    - Section 1. General
      - ☞ Chapter 1. General information for RNAV systems
    - Section 4. Approach procedures with vertical guidance
      - ☞ Chapter 1. APV/Baro – VNAV approach procedures
- ***PBN Manual Doc. 9613***

IFALPA Vision

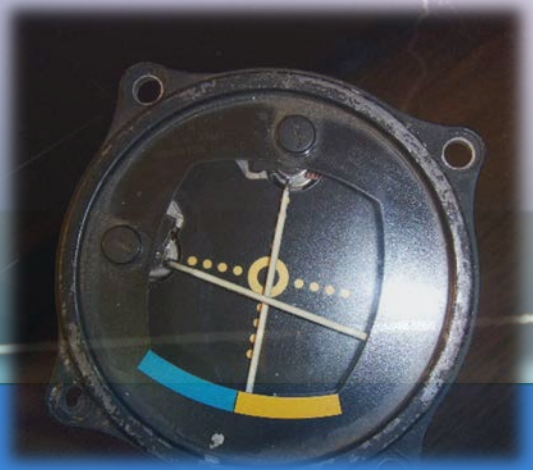
IFALPA *"Single"* Global Air Navigation System-One set of common Procedures Worldwide.

Recognize that *RNAV* and *RNP* systems considerably increase the safety of our operations, as well as operational advantages over conventional navigation methods.

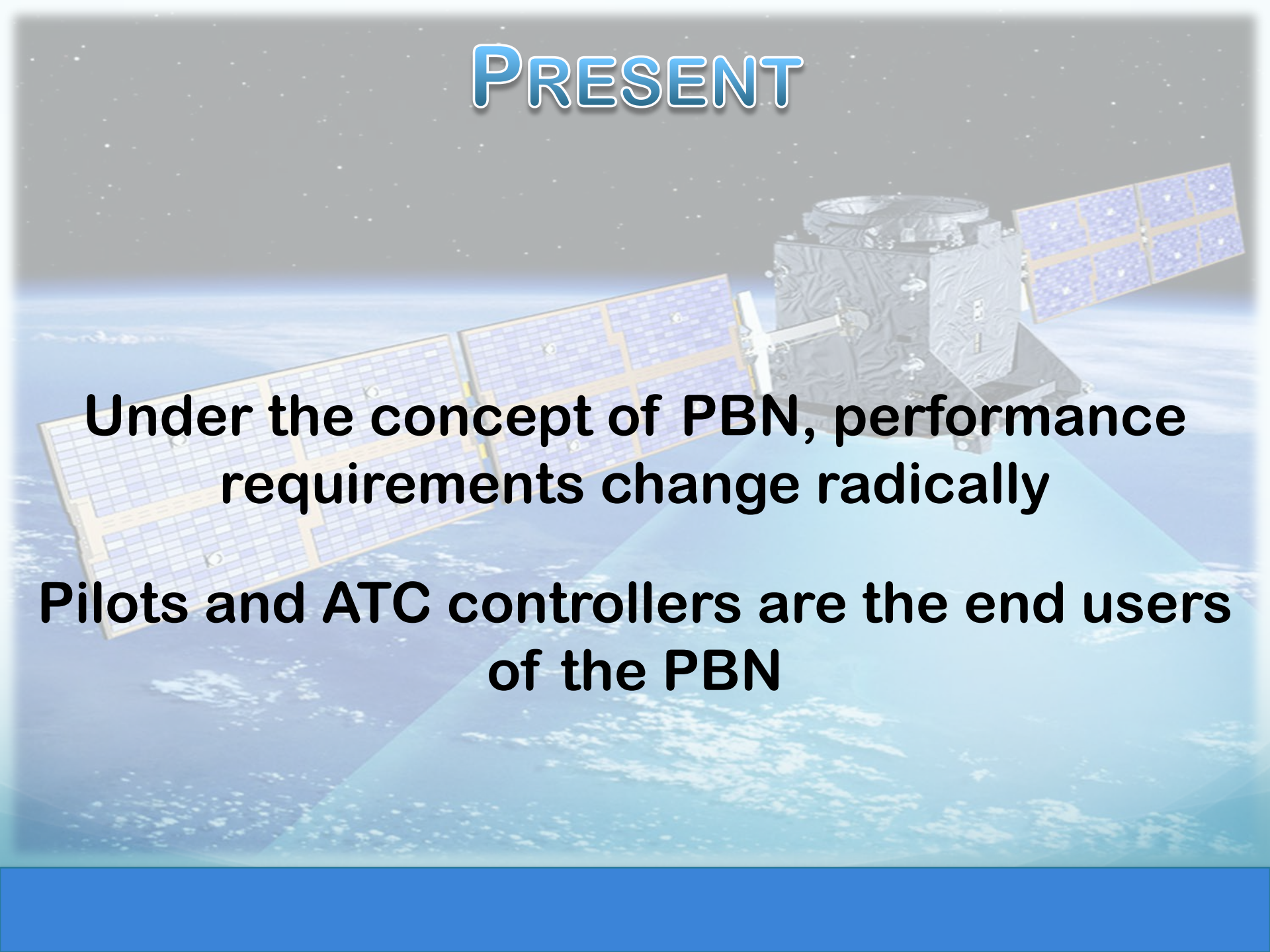
History

Pilots flying from one point to another through visual references such as railways, roads, rivers, villages, buildings, power lines.

Markers, Beacons,
VOR, ILS were developed.



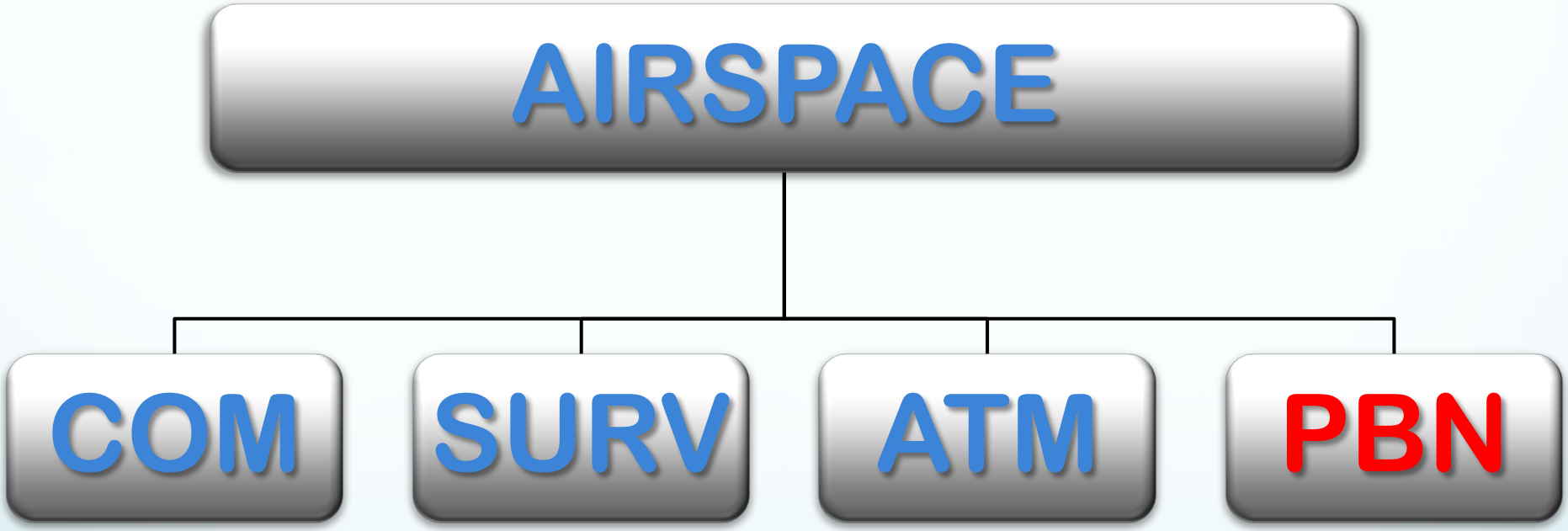
PRESENT

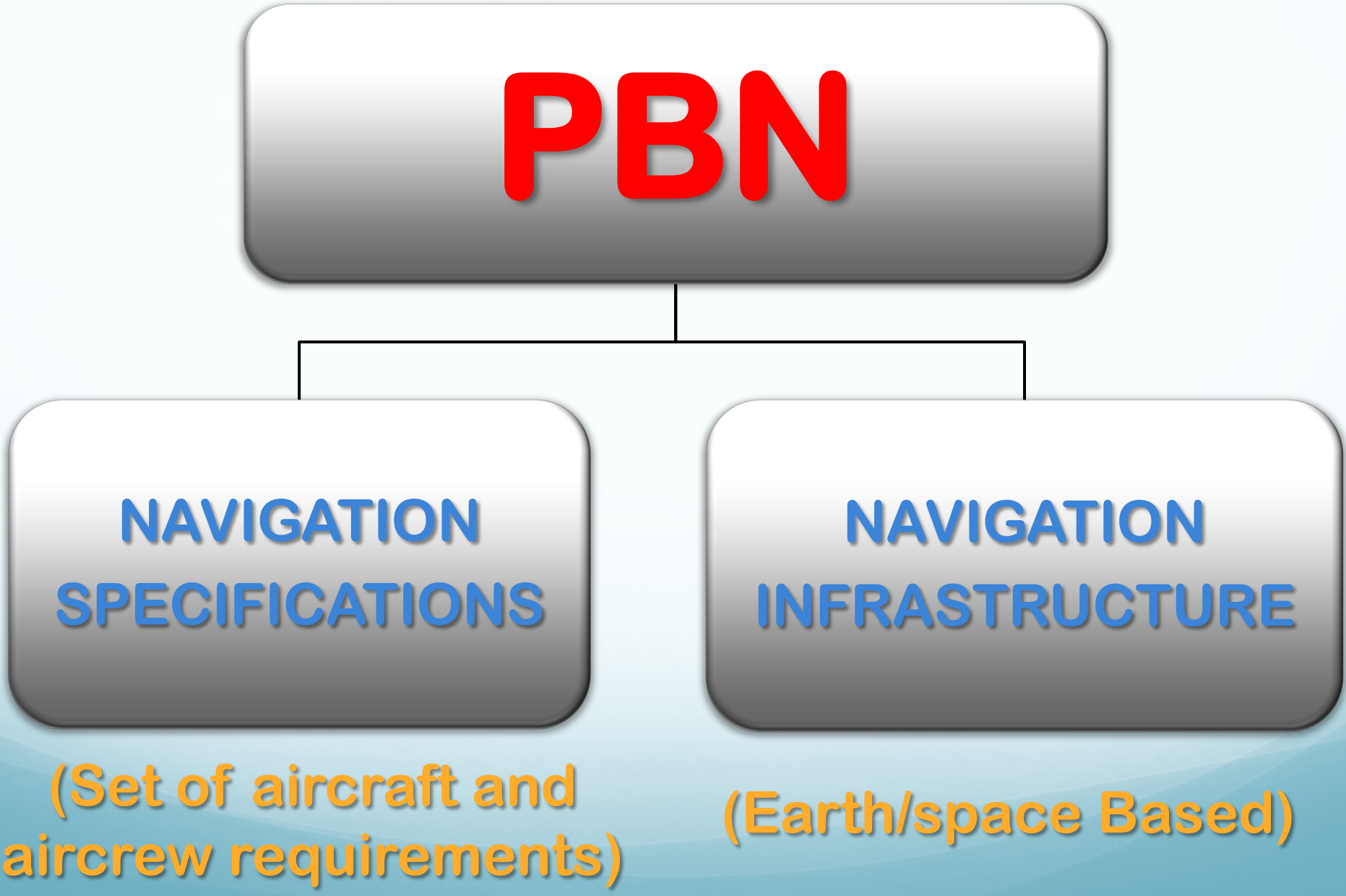


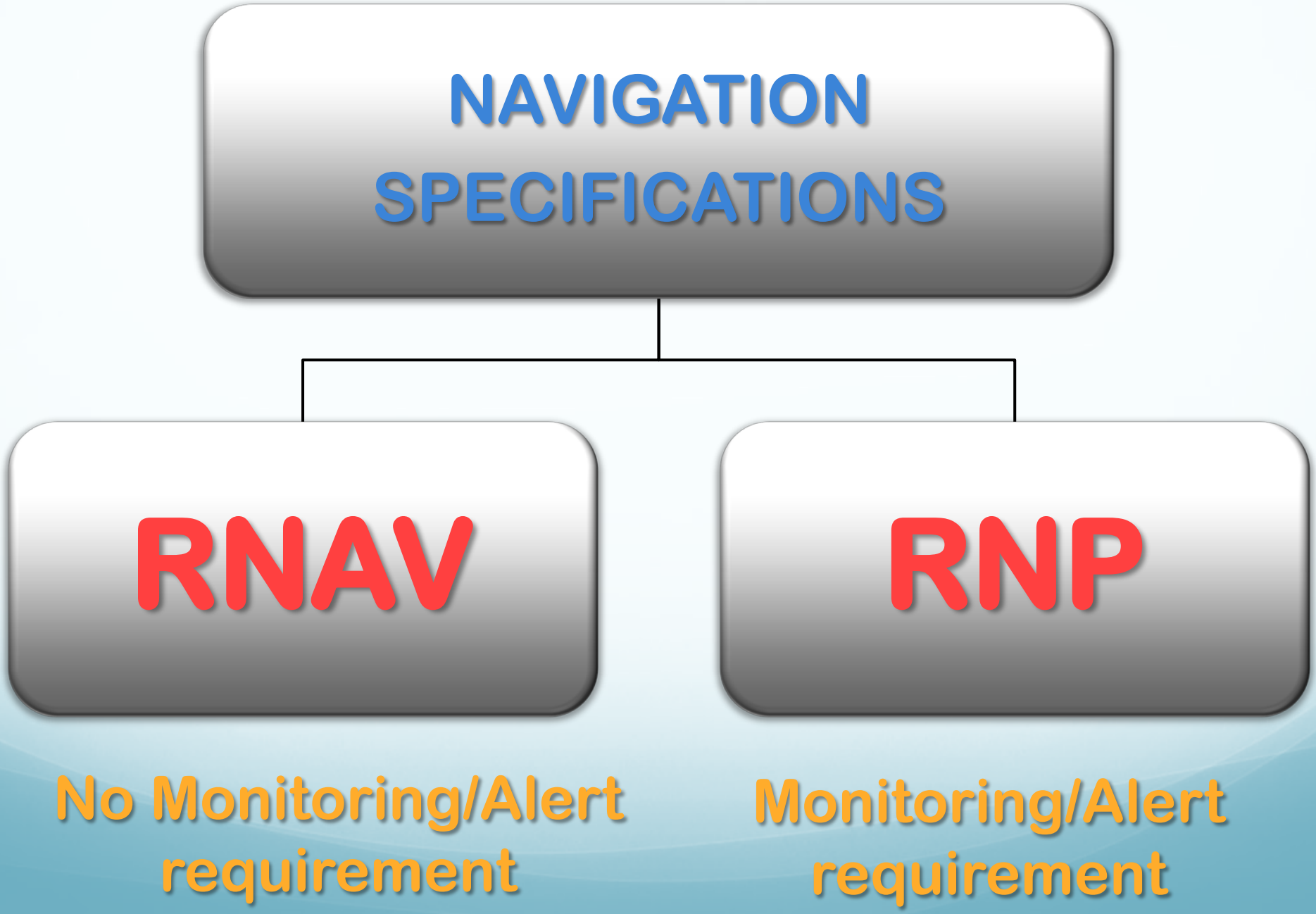
Under the concept of PBN, performance requirements change radically

Pilots and ATC controllers are the end users of the PBN

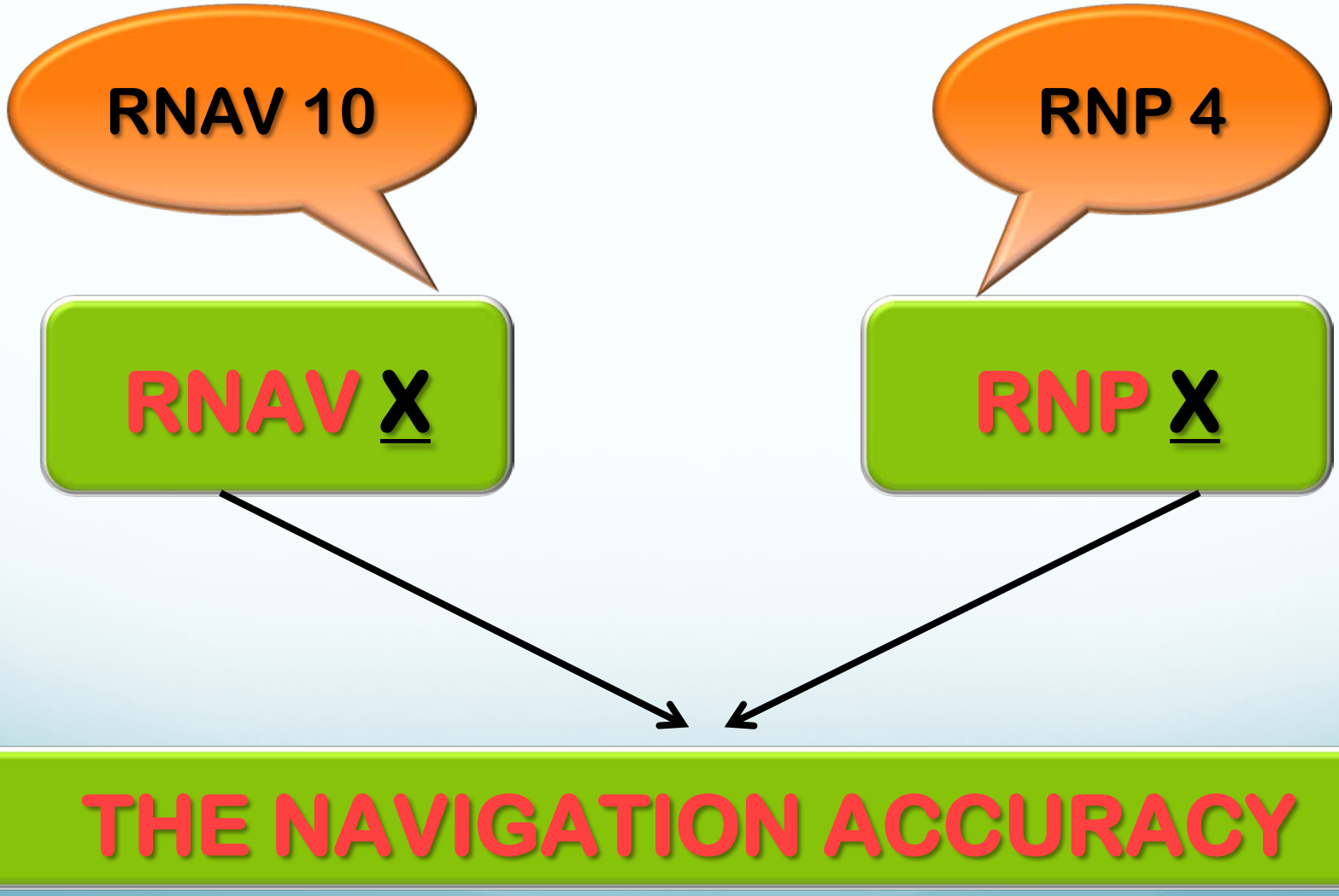
CONCEPTS

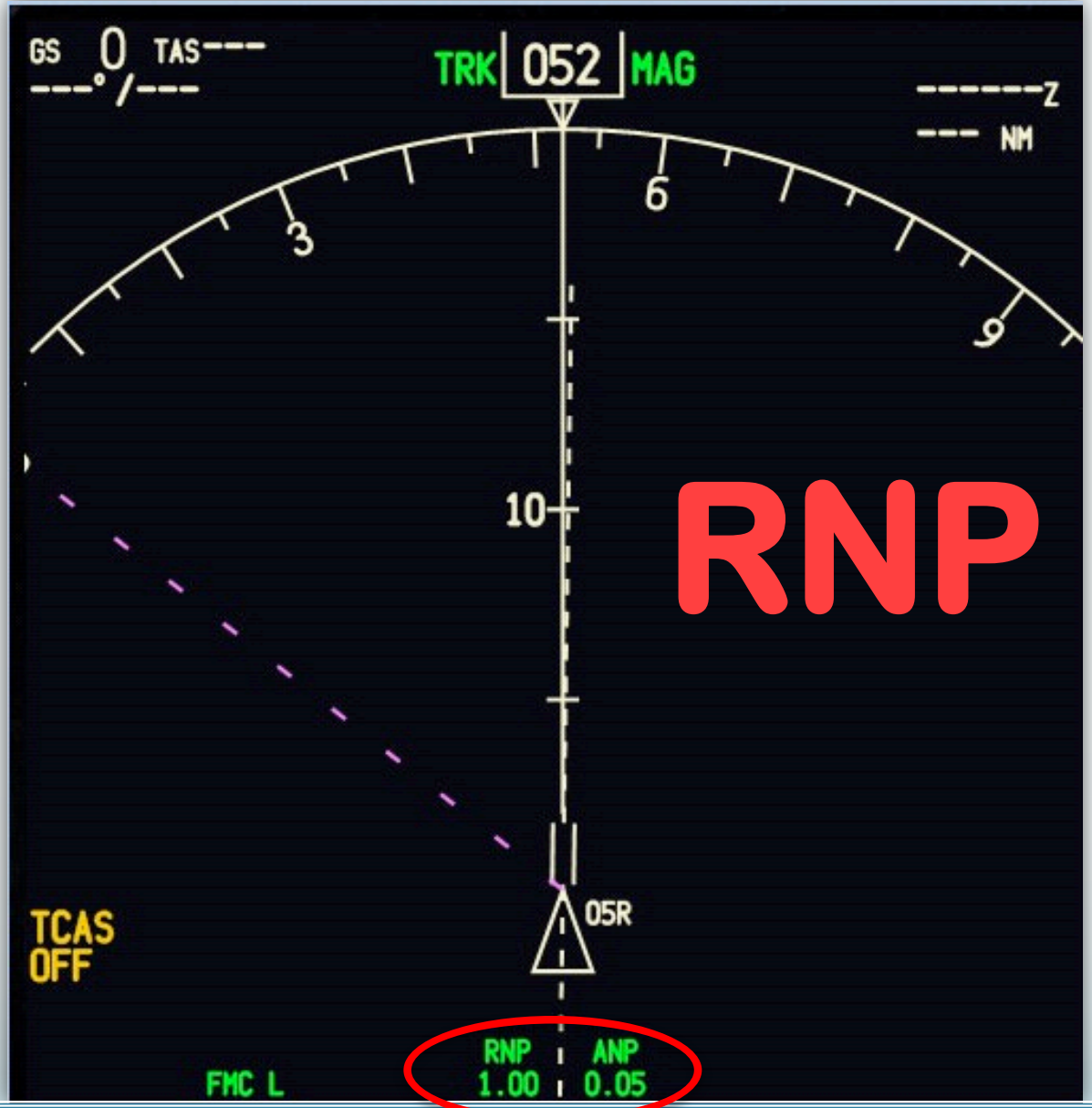



PBN
NAVIGATION SPECIFICATIONS
NAVIGATION INFRASTRUCTURE
(Set of aircraft and aircrew requirements)
(Earth/space Based)


NAVIGATION SPECIFICATIONS
RNAV
RNP
No Monitoring/Alert requirement
Monitoring/Alert requirement

DESIGNATION OF NAVIGATION SPECIFICATIONS





ONBOARD PERFORMANCE MONITORING AND ALERTING

ONBOARD PERFORMANCE MONITORING AND ALERTING

SAFETY

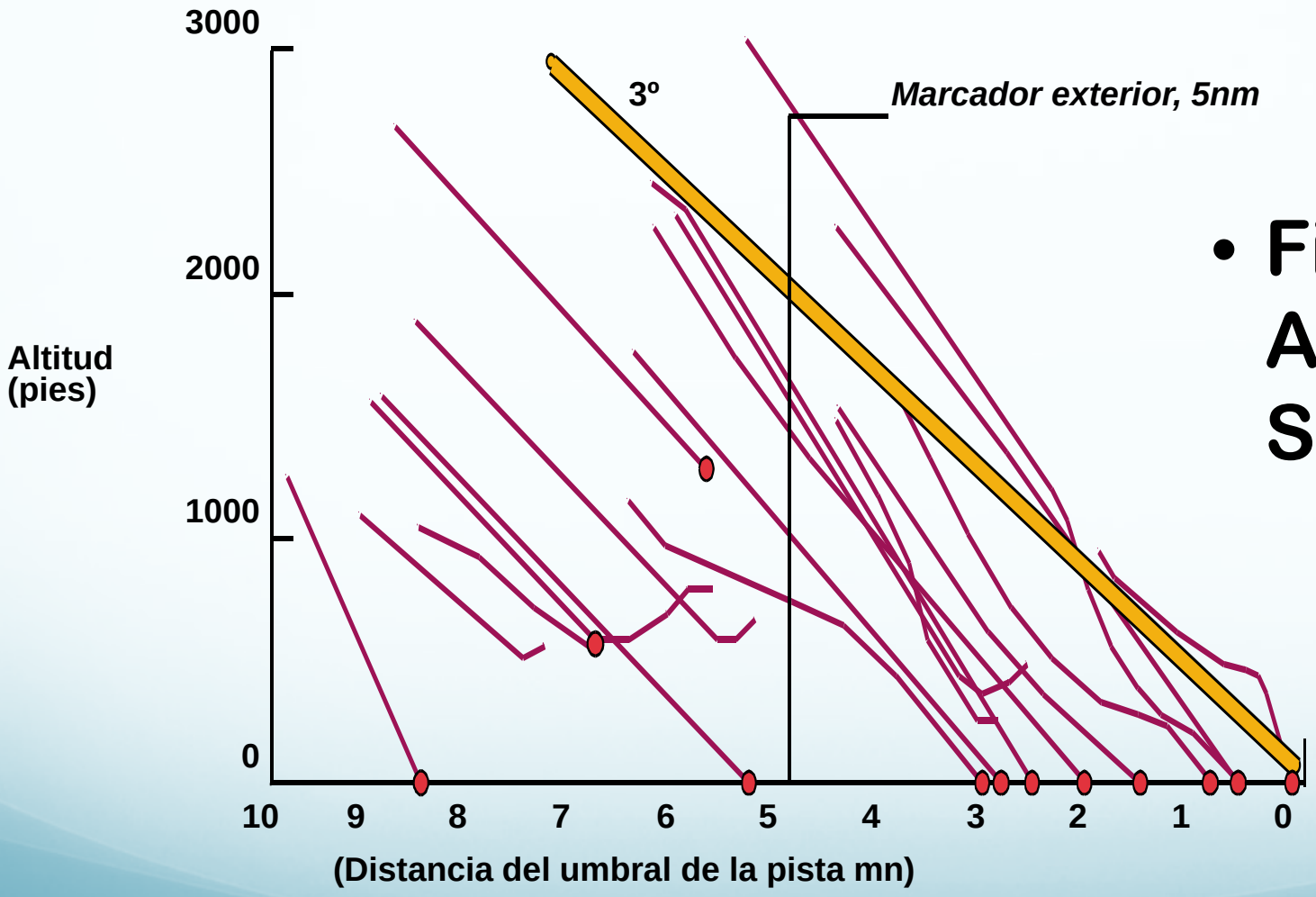
A hull loss is 8 times more likely to occur during a non - precision approach, than during a PBN approach

-ICAO-

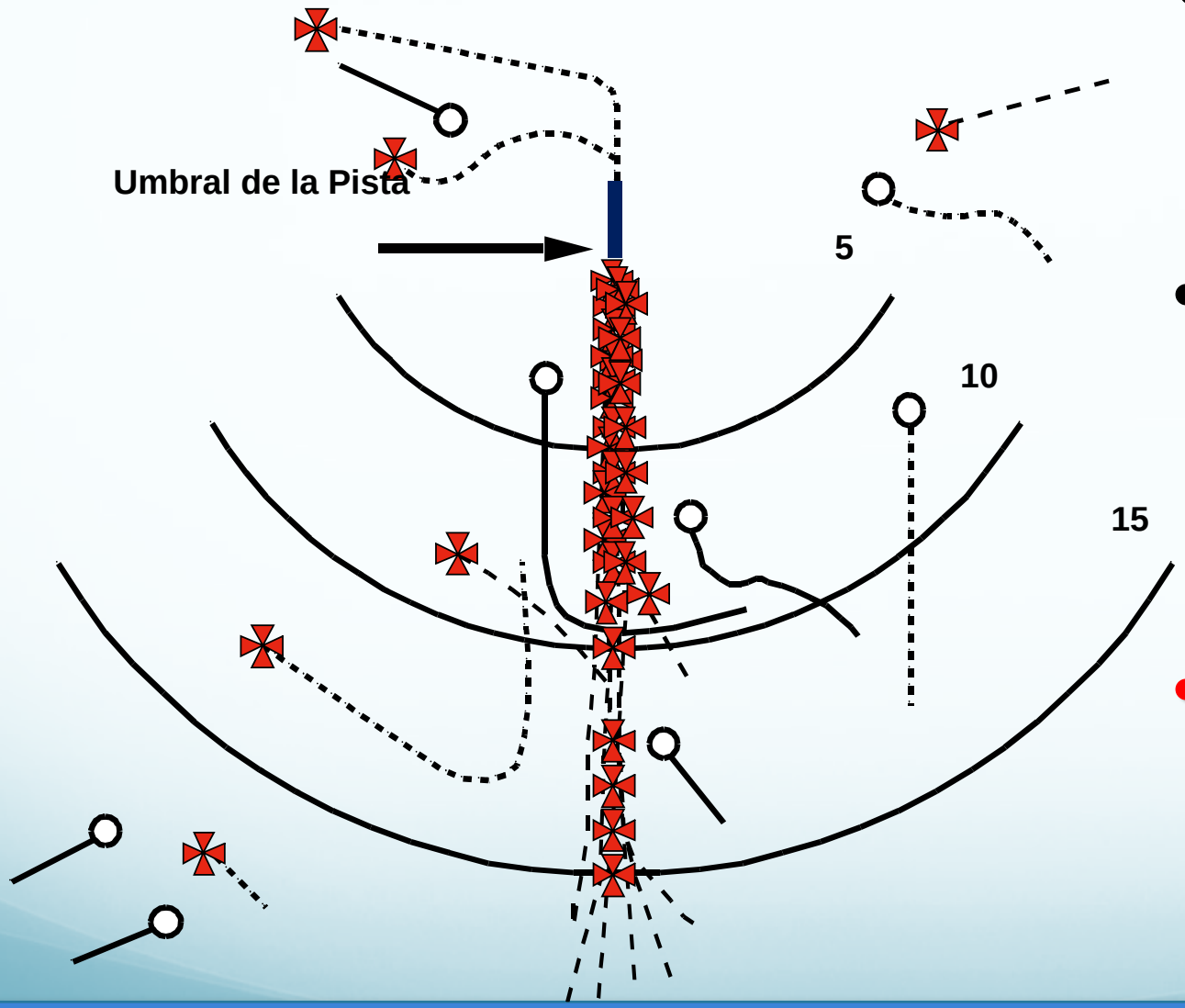
CFIT

The controlled flight into terrain (CFIT) occurs when an aircraft in conditions of airworthiness and crew control is inadvertently flown against the terrain, obstacles, or water, usually without awareness of the crew.

- > 60% within 8NM

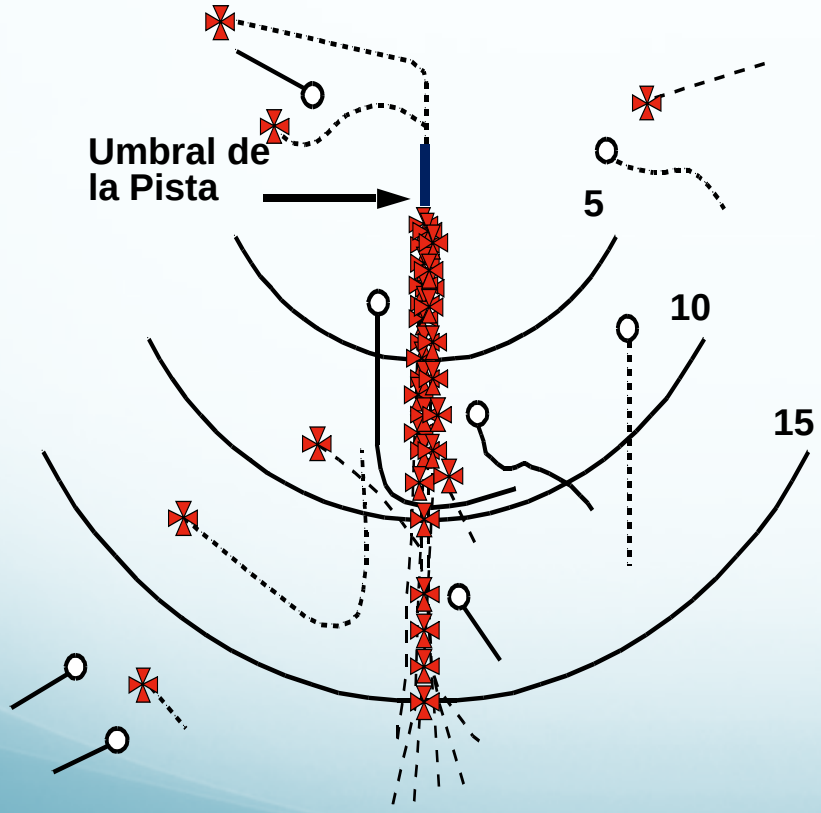


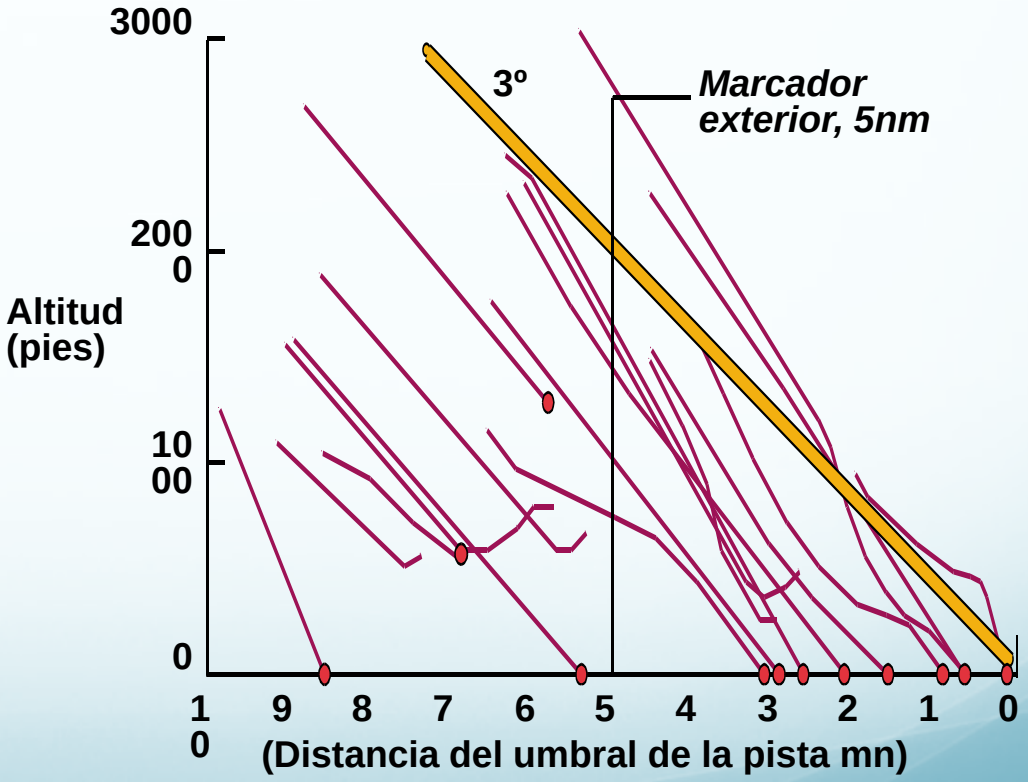
- Final Approach Segment



- > 60% within 8NM
- Final Approach Segment
- Lateral tracking not the cause

- The *Vertical* trajectory is the determining factor.



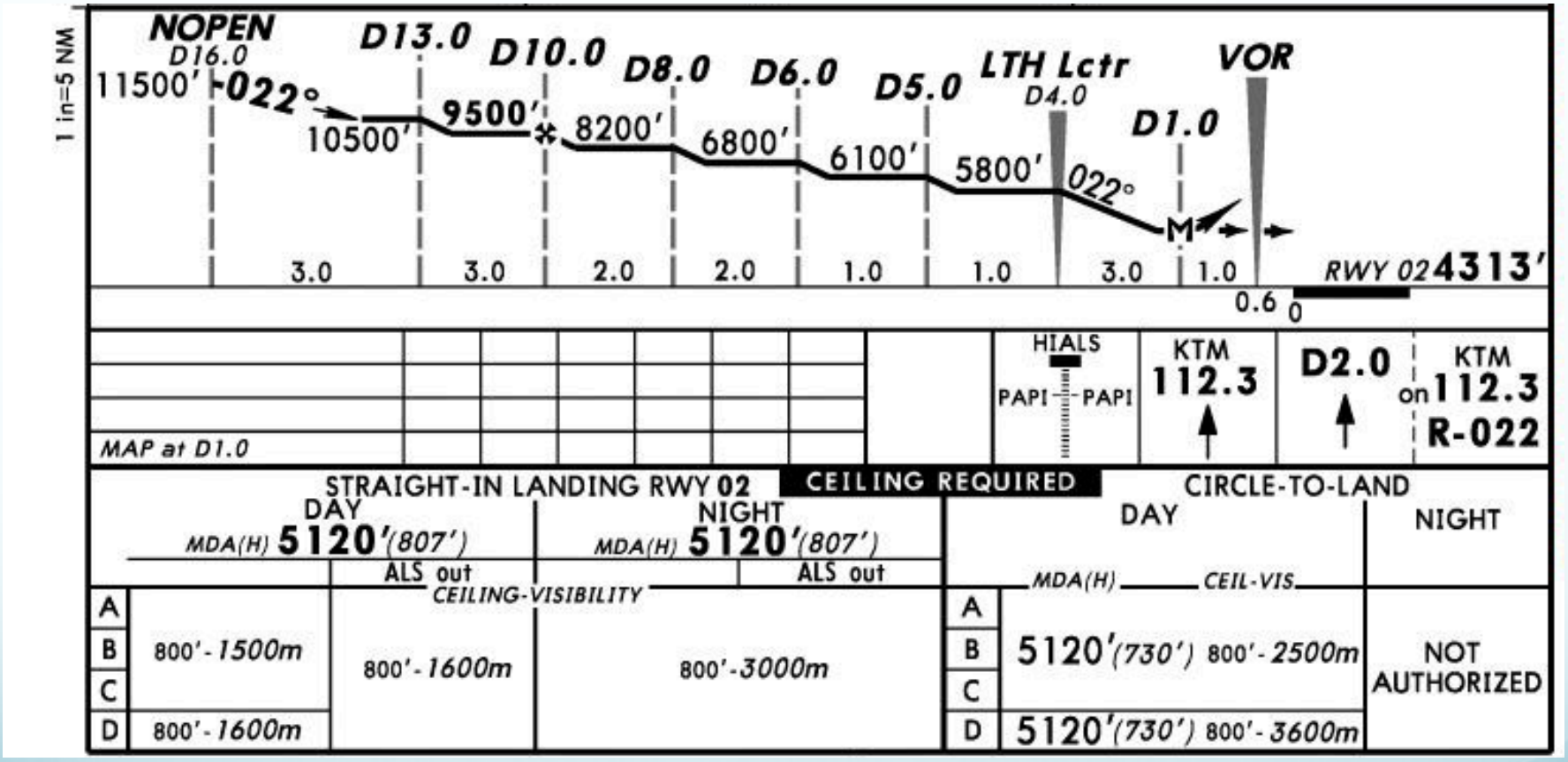


CONTRIBUTING FACTORS

- Loss of vertical situational awareness
- The approach contains multiple altitude steps from the IAF - FAF
- The airplane wasn´t in the correct path of flight
- Non – precision approaches (No vertical guidance *APV*)

Conventional approach

VOR



Unstabilized Approach

The non-stabilized approaches were in some cases contributor factors in CFIT accidents since the aircraft was not stabilized 1000 feet above airport elevation in “IMC” and 500 feet above airport elevation in “VMC”.

Runway Overruns

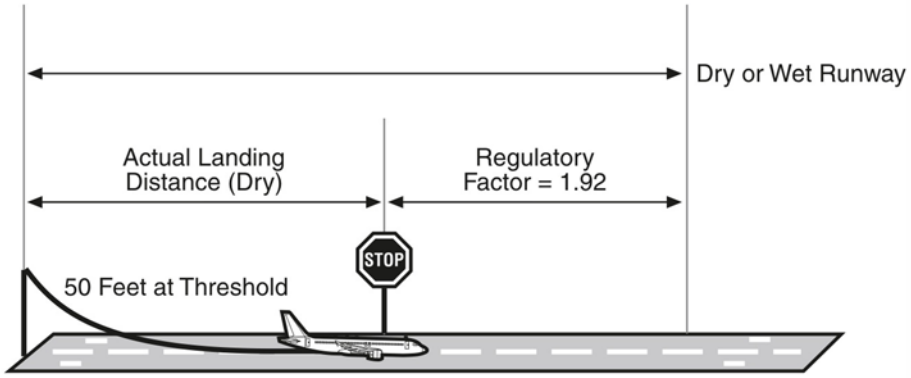
Likewise, the non-stabilized approaches were a contributing factor in accidents related to runway overruns.

A runway overruns occurs when the aircraft roll-out extends beyond the end of the landing runway.

Factors Involved

- Unstable approach path (steep and fast)
- Landing fast; and,
- Excessive height over threshold, resulting in landing long

Required Runway Length — U.K. CAA



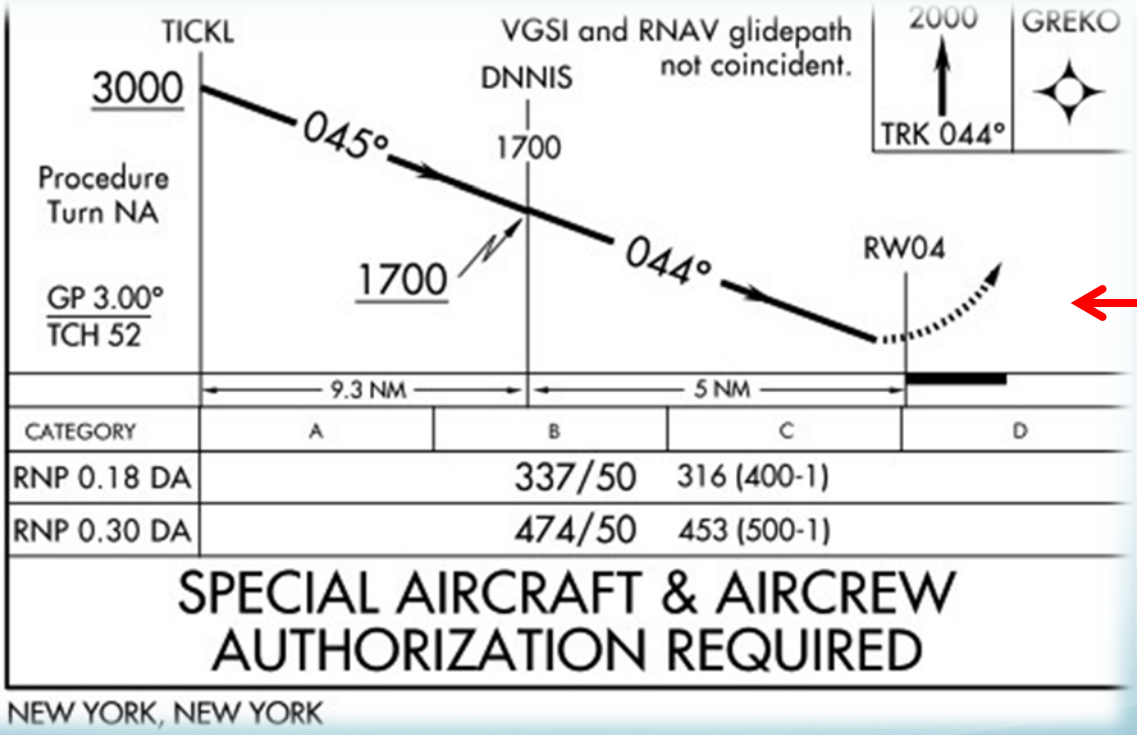
Required runway length (dry or wet) = Actual landing distance (dry) x 1.92

CAA = Civil Aviation Authority

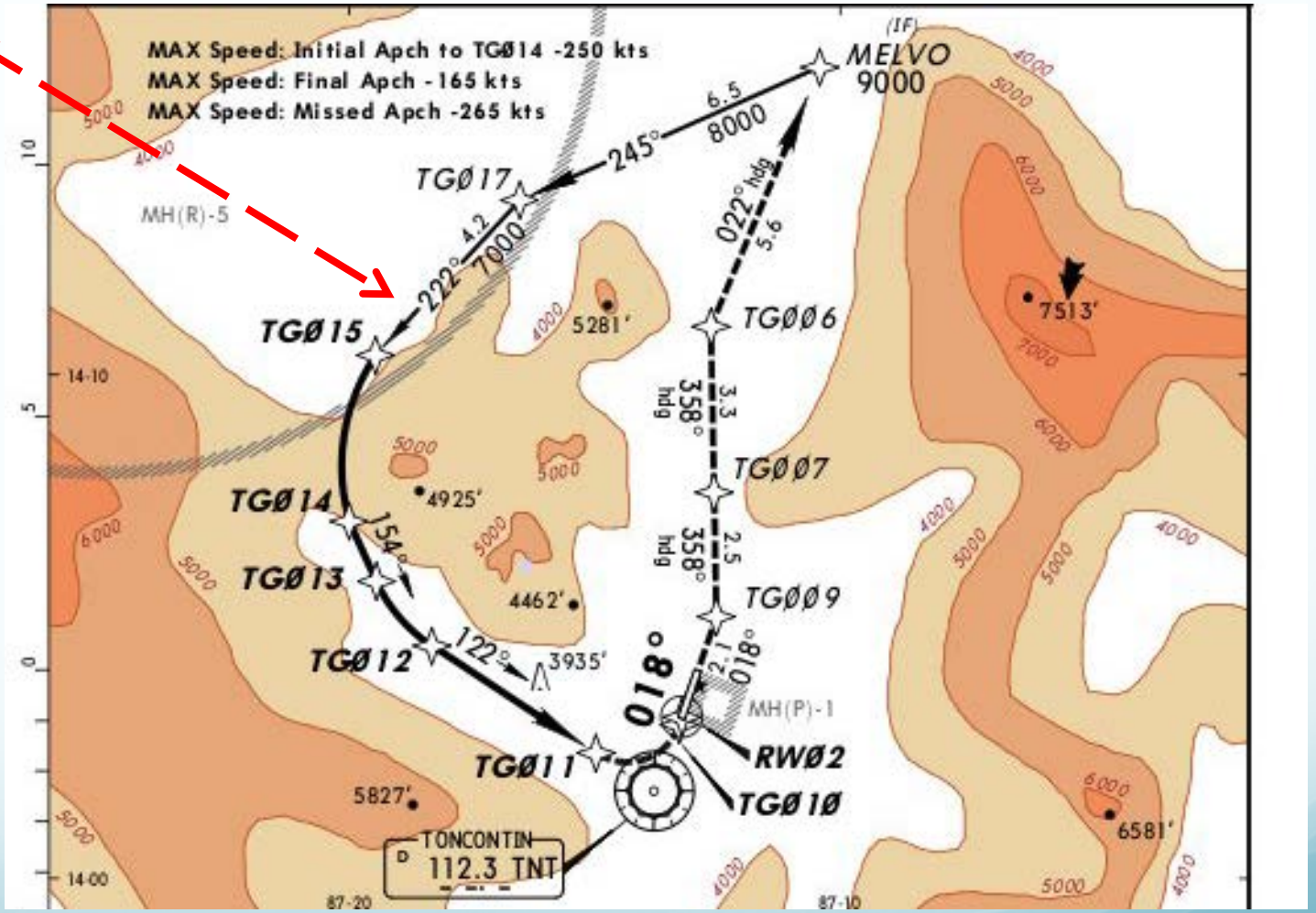
Source: Flight Safety Foundation Approach-and-landing Accident Reduction (ALAR) Task Force

PBN IMPROVING SAFETY

It reduces the risk of CFIT accident, since it provides a very accurate vertical flight path.



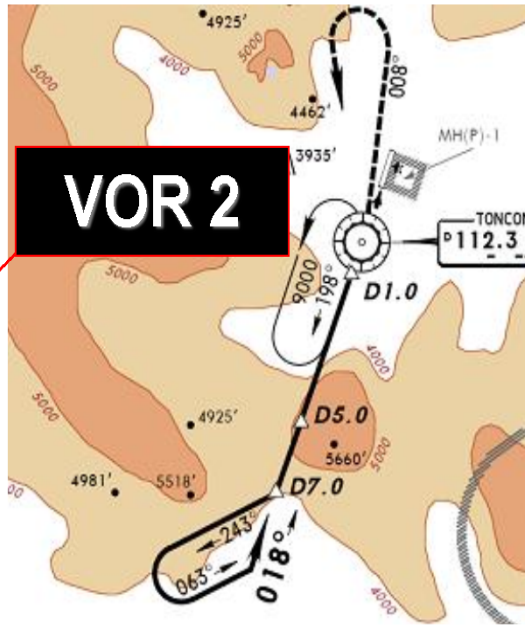
It reduces the risk of CFIT accident, since it provides a very precise lateral flight path.

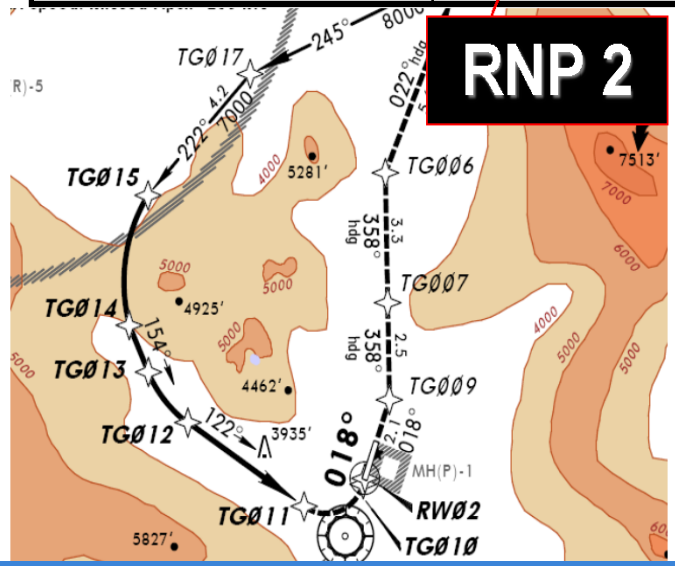


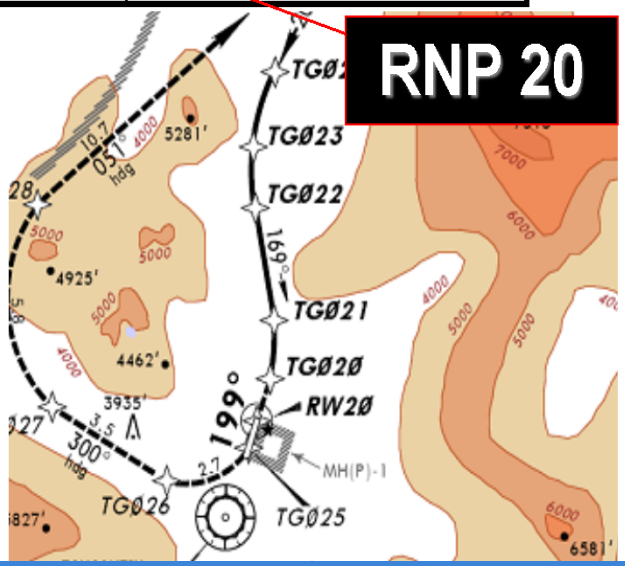
Provides stabilized approaches, since the aircraft track is aligned with the center of the runway, in the same configuration, with the same speed every time, which guarantees that it crosses the threshold of the runway at 50 feet, improving the safety and reducing runway overrun.

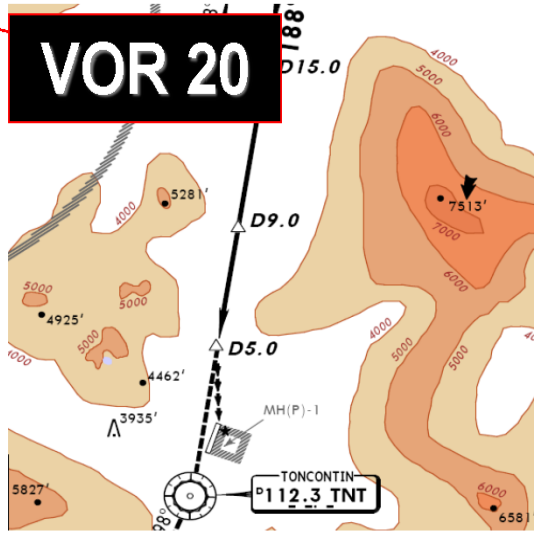
APROACH MINIMA BEFORE RNAV (RNP)

	Approach Minima	
	RNP	VOR
Runway 2	847’	2,333’
Runway 20	433’	2,703’









¡ THANK YOU!

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