SAFE SKIES.
**SUSTAINABLE FUTURE.**

# RASG-AFI CONTROLLED FLIGHT INTO TERRAIN (CFIT) WORKSHOP

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# RASG-AFI CFIT WORKSHOP

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## PBN regulatory approval process and its impact on safety and prevention of CFIT-related occurrences

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# Outline

- Regulatory framework
- State responsibilities
- ICAO CFIT prevention initiatives
- PBN regulatory approvals
- Impact on safety and prevention

# PBN regulatory approval process and its impact on safety and prevention of CFIT-related occurrences

## Regulatory framework

# Regulatory framework



## ICAO

- Annex 11-Aircraft operation
- Doc 9997 – PBN Ops Approval
- Doc. 9906 – Quality assurance
- Doc. 8168 –PANS-OPS
- Doc. 10068-Development of a regulatory framework for IFPDS

## Regional or National

- Applicable national regulation

# PBN regulatory approval process and its impact on safety and prevention of CFIT-related occurrences

## State responsibilities

# State responsibilities



- Annex 11:
  - "States shall ensure that an Instrument Flight Procedure Design Service is in place in accordance with Appendix 7."
- Appendix 7:
  - State shall:
    a. Provide an instrument flight procedure design service; and/or
    b. Agree with one or more Contracting State(s) to provide a joint service; and/or
    c. Delegate the provision of the service to external agency(ies).
  - State shall approve and remain responsible for all IFPs for aerodromes and airspace under the authority of the State.

# State responsibilities



- Annex 11 (cont'd)
- Appendix 7:
  - Instrument Flight Procedures shall be designed in accordance with State-approved design criteria.
  - State shall ensure that an Instrument Flight Procedure Design Service (IFPDS) intending to design an IFP for aerodromes or airspace under the authority of that State meets the requirements established by that State's regulatory framework.
  - State shall ensure that an IFPDS utilizes a quality management system at each stage of the instrument flight procedure design process.

# State responsibilities



- Annex 6:
  - One or more instrument approach procedures designed to support instrument approach operations shall be approved and promulgated by the State in which the aerodrome is located to serve each instrument runway or aerodrome utilized for instrument flight operations.
  - Annex 11, App 7. A State shall ensure that maintenance and periodic review of instrument flight procedures for aerodromes and airspace under the authority of the State are conducted. Each State shall establish an interval for periodic review of instrument flight procedures not exceeding five years.

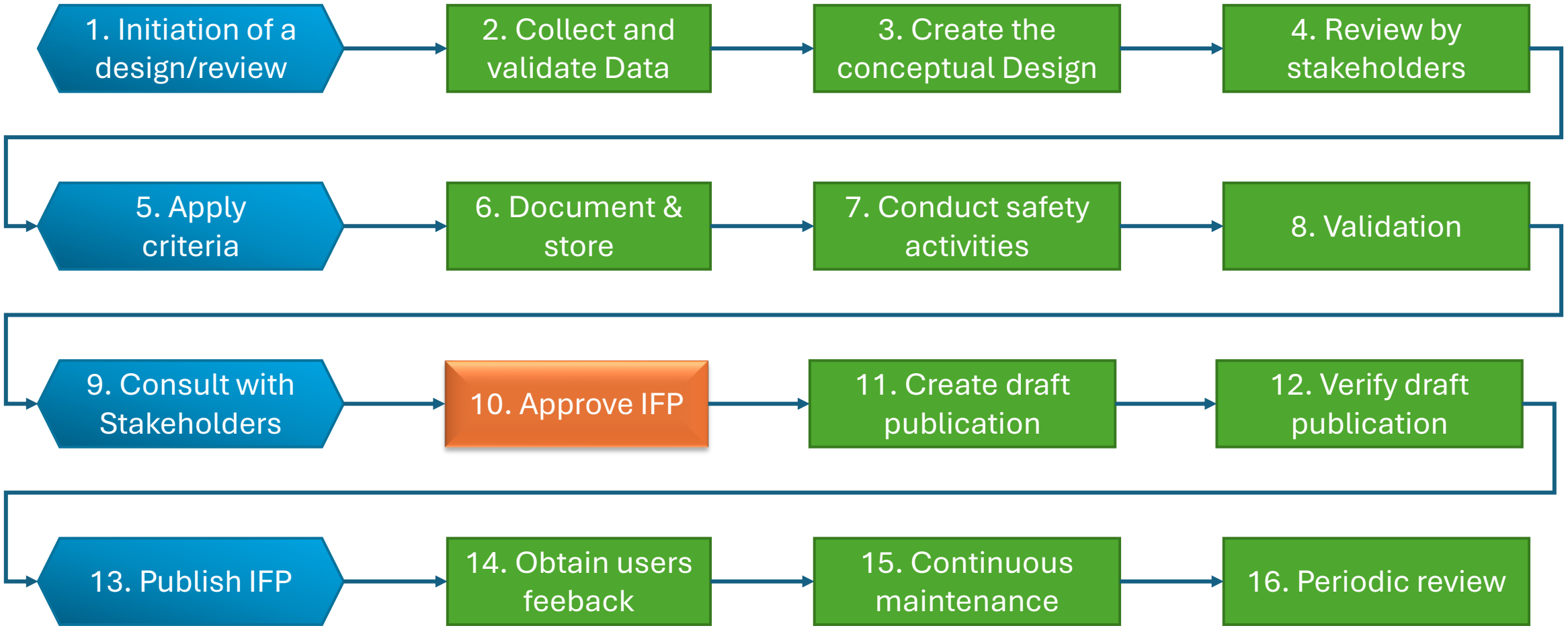
# State responsibilities



- The implementation of flight procedures is the responsibility of States!!!
  - Establish operating rules for IFPD;
  - Carry out FPD process or delegation to third parties.
- Establish of IFPD quality management system;
- Training program for IFP designers;
- Validation of tools and software;
- Approve the instrument flight procedures.

# Flight procedure implementation diagram





**PBN regulatory approval process and its impact on safety and prevention of CFIT-related occurrences**

**ICAO CFIT prevention initiatives**

# ICAO CFIT prevention initiatives



- Generally occurs in the arrival and approach phases:
  - Approaches without vertical guidance in final approach are the main cause of the CFITs.
- The risk of CFIT) is higher on Non-Precision Approaches (NPAs);
- Operators typically employ one of three techniques for vertical path control on NPAs:
  - Continuous descent final approach (CDFA);
  - Constant angle descent; and
  - Step down approach (or dive and drive technique).

# ICAO CFIT prevention initiatives



- ICAO CFIT safety initiatives:
  - Introduction of the Continuous Descent Final Approach (CDFA)
  - Introduction of the APV baro-VNAV;
  - Other PBN vertically guided approaches (LPV, GLS);
  - Introduction of Procedure altitudes concept;
  - Depiction of Minimum Obstacle Clearance altitudes (MOCA).

# PBN regulatory approval process and its impact on safety and prevention of CFIT-related occurrences

## PBN regulatory approvals

# PBN approvals



- PBN flight procedures apply to all phases of flight:
  - **En-route:**
    - En-route Oceanic/Remote continental;
    - En-route continental.
  - **Arrival (STARs)**
  - **Approach (IAP), and**
  - **Departure (SIDs).**
- PBN operations shall be approved by States:
  - Regulatory approval for the flight procedures;
  - Operational approval for the aircraft and the crew.

## Regulatory approval

- PBN flight procedures shall be designed using the ICAO relevant documents and the design shall follow the Quality Assurance Manual (Doc. 9906) requirements;
- Prior to their effective implementation, the flight procedures shall be formally approved by the State to grant that the following ICAO requirements are met:
  - The data used in the design;
  - The design team for the competency and skills (Doc. 9906, vol. 1);
  - The flight validation pilots and the flight validation service provider (Vol. 6);
  - The design and charting automated solution (Vol. 3);
  - The design process compliance (Vol. 1 and 5).

## Operational approval

- PBN operational approval authorizes PBN operations:
  - In a designated airspace;
  - On a specified route;
  - On a PBN approach.
- Up to Three States/Regulatory bodies can be involved:
  - State of Design/Manufacture;
  - State of registry;
  - State of the operator.

## Other requirements

Other air operators requirements for conducting PBN operations:

- Operations manual;
- Flight crew operating procedures, training and competency;
- Checklists (Crew Review Cards);
- MEL;
- Database management;
- Dispatch;
- …

# PBN regulatory approval process and its impact on safety and prevention of CFIT-related occurrences

Impact on safety and prevention

## Impact on safety and prevention of CFIT

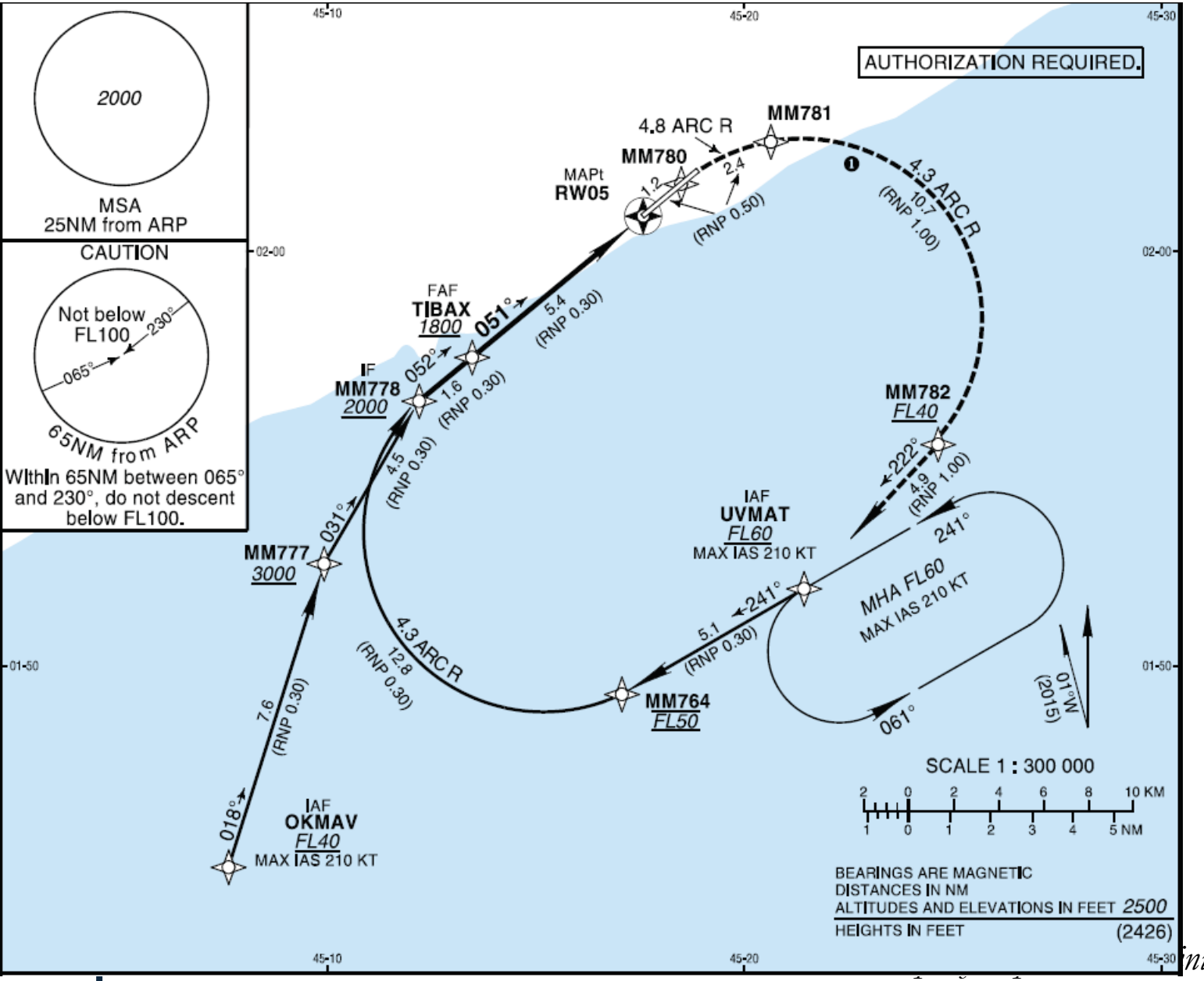
## Impact of PBN regulatory approval process on safety

- The positive impact derive from the PBN benefits:
  - Direct routings;
  - Possibility to smoothly avoid all obstacles using waypoints or RNP AR capabilities
  - Parallel unidirectional routes;
  - Continuous decent and continuous climb operations;
  - Stabilized approaches:
    - **CDFA (altitudes/distances table)**
    - **Vertically guided approaches (baro-VNAV, LPV, GLS, etc.),**

# Impact on safety and prevention



## Impact of PBN regulatory approval process on safety



# Impact on safety and prevention



## Impact of PBN regulatory approval process on safety

## Impact of PBN regulatory approval process on the prevention of CFIT

- The regulatory approval process approval prevents the CFIT occurrences by ensuring that:
  - Data used are meeting the required accuracy , resolution and integrity;
  - Personnel (designers, flight validation pilots, etc.) involved in the design are duly qualified;
  - The software tools used are approved;
  - The process followed is compliant with the quality assurance requirements.
  - The charts are meeting the established quality requirements.


# Thank You!

# Questions?

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