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Quality Assurance
ICAO 9906

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Quality Assurance Introduction

- Need for quality assurance
- Overall presentation of Doc 9906 volumes
- Conclusion
Need for Quality Assurance
PBN Concept – Involve all stakeholders

- Authorities
- Airlines
- ANSP
- Airport
- Environment (communities)
- Procedure Designer

Civil Aviation Authority

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Need for quality assurance - Stakeholders

Figure 1. Participants in the development of an IFP.
« The implementation of procedures is the responsibility of Contracting States. This means that the State authorities have the final responsibility for the procedures published within their territory »

*ICAO Doc 9906, § 5.1*

> Whatever the state provides the procedures design or subcontract to a 3rd party, the ICAO Doc 8168 (PANS-OPS) requires that each state puts in place a process to control the quality and criteria used in the IFP achievements
Need for quality assurance - Data

With the advent of new navigation systems, the IFP process and its products have become key enablers of the worldwide Air Traffic Management (ATM) system. They must therefore be managed effectively to ensure that quality assured procedures are provided in support of ATM operations.

Annex 15* recognizes this trend as follows: “The role and importance of aeronautical information/data changed significantly with the implementation of Area Navigation (RNAV), Required Navigation Performance (RNP) and airborne computer-based navigation systems (i.e. FMS) and data link systems. Corrupt or erroneous aeronautical information/data can potentially affect the safety of air navigation.”

* ICAO Annex 15: Aeronautical Information Service
Need for quality assurance - Data

«The implementation of area navigation and associated airborne database navigation systems, however, means that even small errors in data can lead to catastrophic results. This significant change in data quality requirements (accuracy, resolution and integrity) has led to the need for a systemic quality assurance process (often part of a State Safety Management System).»

(ICAO Doc 9906 preface)
How to address the Need for Quality Assurance
How to address the Need for Quality Assurance

- ICAO Doc 9906 (Quality Assurance Manual in the process of IFP design) provides recommendations to meet the Quality objective

  - **Volume 1** — *Flight Procedure Design Quality Assurance System*
  
  - **Volume 2** — *Flight Procedure Designer Training*
  
  - **Volume 3** — *Flight Procedure Design Software Validation*
  
  - **Volume 4** — *Flight Procedures Design Construction* (to be incorporated later)
  
  - **Volume 5** — *Validation of Instrument Flight Procedures*
  
  - **Volume 6** — *Flight Validation Pilot Training and Evaluation*
Overall presentation of Doc 9906 volumes
Volume 1 - Quality Assurance Manual for Flight Procedure Design

• This Doc provides guidance for quality assurance in the elements of procedure design

• It also provides a generic process flow diagram for the design and implementation of flight procedures.
The Vol. 1 is the main 9906 document that covers the entire life of the IFP, as described in **16 steps** in the process flow diagram:

Last ICAO 9906 Vol. 1 contains 16 steps
Previous version was including 17 Steps (validation process now provided in Vol. 5)
The Vol. 1 is mainly divided in 3 parts:

- 16 steps defined in the flow diagram
- Process Description (§6.3)
  - Description of the step
  - Inputs
  - Outputs
  - Parties involved (stakeholders)
  - Ref. documents
- Step-by-Step Description of Activities within the Process (§7)
  - Detailed description of each step
Volume 2 - Flight Procedure Designer Training

• This Doc provides guidance for the establishment of flight procedure designer training.

• Training is the starting point for any quality assurance programme.
To ensure quality it is essential to provide competency-based training and assessment to all contributors to the flight procedure development process.

The activities of flight procedure designers are considered critical to the safety of aviation. The provision of erroneous, incomplete or badly designed flight procedures and associated minima has direct consequences for the users (safety issue).

Recently, procedure design work has become more critical due to:

- Increasing complexity;
- Increased importance of data integrity, especially for modern area navigation (RNAV) and satellite based navigation; and
- Introduction of new avionics.
Volume 3 - *Flight Procedure Design Software Validation*

- This Doc provides guidance for the validation (not certification) of procedure design tools
• When automation is used during the procedure design process, States must ensure that automation functions have been validated to ensure compliance of the final results with applicable criteria.

• Implementation of the validation can be carried out by States themselves or by delegation to any recognized 3rd party (such as another State, an ATS provider or a private company).

• The term “procedure design tool” stands for any numerical automation system that provides calculations and/or designs and layouts in the field of procedure design. This encompasses products ranging from automated formulas included in spreadsheets to dedicated software packages.

• Procedure design tools are increasingly being used by designers with the goal of quality control and integrity enhancement in the procedure design domain.
Whatever the Proc Designer is using simple calculation sheets or more sophisticated software, the tools must be validated.

Automation in calculations contributes to the improvement of data integrity. Use of automation is not intended to replace the procedure designer’s expertise.
Volume 4 - *Flight Procedures Design Construction*

• To be incorporated later
Doc 9906, Volume 5

- Volume 5 - Validation of Instrument Flight Procedures

- This Doc provides guidance for conducting validation of instrument flight procedures, including safety, flyability and design accuracy
The objective of conducting validation is to ensure safety, data accuracy and integrity and flyability of the instrument flight procedure, through a qualitative validation of the procedure.

The validation is the final step of the Quality Assurance in the process of IFP procedure design.

This is an essential step before the effective publication of the procedure.
The full validation process includes “Ground Validation” and “Flight Validation”

- **Ground validation** consists of an independent IFP design review and a pre-flight validation
- **Flight validation** consists of a flight simulator evaluation and/or an evaluation flown in an aircraft (if required!)
Volume 6 - Flight Validation Pilot Training and Evaluation

- This Doc provides guidance for the establishment of flight procedure validation pilot training
Each State should:

- Establish standards for the required competency level for flight validation pilots
- Ensure that flight validation pilots acquire and maintain this competency level through initial training, recurrent/refresher training and supervised on-the-job training

As for procedure designers, it is essential to provide competency-based training and assessment to flight validation pilots
Conclusion
ICAO Doc 9906 offers 6 volumes (Volume 4 still to be developed) to answer the need of implementing a Quality Assurance process.

→ It covers the complete lifecycle of an IFP

This workshop mainly focuses on:

• **Volume 1** — *Flight Procedure Design Quality Assurance System*

• **Volume 5** — *Validation of Instrument Flight Procedures*
Any Questions?