egis | Quality Assurance

Contents

Introduction

"The implementation of procedures is the responsibility of Contracting States." (ICAO PANS-OPS Doc 8168)

- States therefore want to ensure the quality of the entire process for safety reason

Need for quality assurance

With RNAV implementation and associated on-board systems, sensitivity to very small errors increased

- small errors in data could lead to catastrophic results as mentioned in ICAO Annex 15: “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 and data link systems. Corrupt or erroneous aeronautical information/data can potentially affect the safety of air navigation.”
- significant change in data quality requirements (accuracy, resolution and integrity)

Need for quality assurance

Quality of an IFP is flight critical

The en-route structure, departure, arrival, holding and approach procedures are derived from an IFP process which covers various steps from collection of user requirements to State publication to the integration into airborne systems

Lots of steps and actors

Need for quality assurance

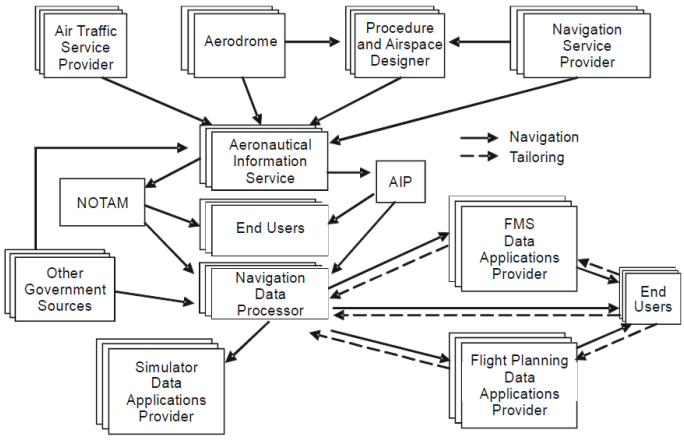


Figure 1. Participants in the development of an IFP.

Answer to the need of quality assurance

Answer to the need of quality assurance

PANS-OPS, Volume II, Part I, Section 2, Chapter 4 Quality Assurance

- Requirements for quality assurance in flight procedure design

Need of a systemic quality assurance process (often part of a SMS)

- Each State shall take measures to “control”’ the quality of the processes associated with the construction of instrument flight procedures.

Answer to the need of quality assurance

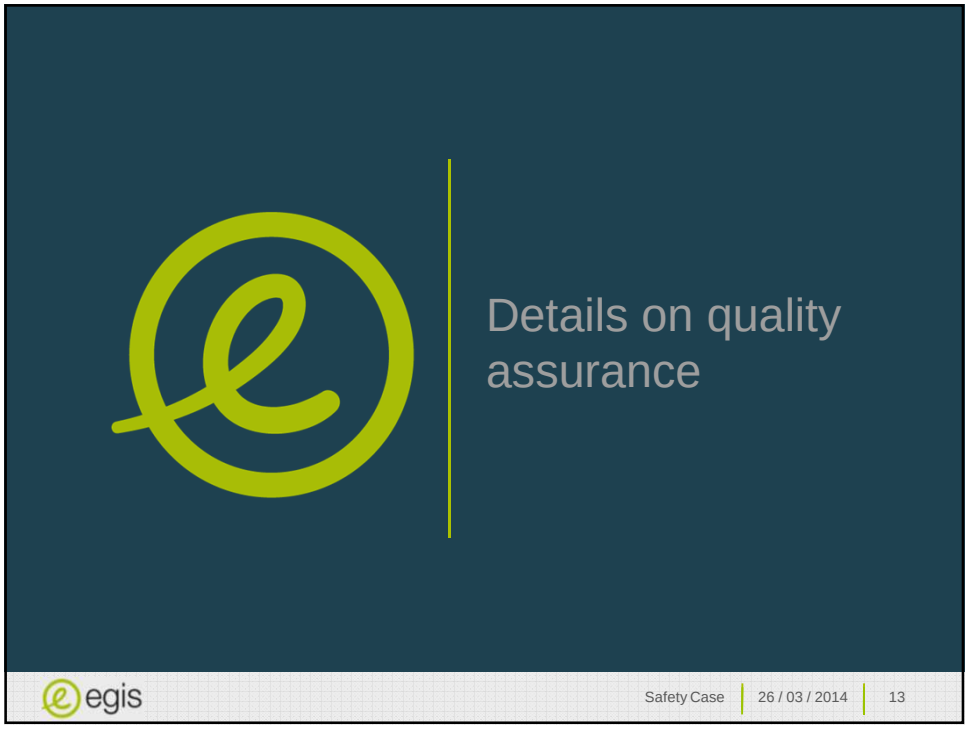
ICAO Doc 9906 (quality assurance manual for flight procedure design) published to answer this need (publication started in 2009)

- Guidance material for quality assurance supplementing provisions in PANS-OPS
- Verification of all obstacle and navigation data, and assessment of flyability of the procedure

Answer to the need of quality assurance

The *Quality Assurance Manual for Flight Procedure Design* (Doc 9906) consists of six volumes:

- 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 developed);*
- Volume 5 – *Validation of Instrument Flight Procedures;* and
- Volume 6 – *Flight Validation Pilot Training and Evaluation*



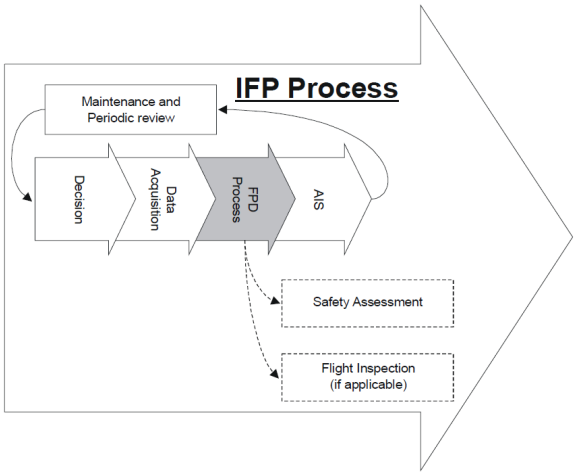
Details on quality assurance – Vol1

Volume 1 – *Flight Procedure Design Quality Assurance System*:

- Guidance for quality assurance in the procedure design processes, such as procedure design documentation, verification and validation methods, guidelines about the acquisition/processing of source information/data
- It also provides a generic process flow diagram for the design and the implementation of flight procedures

Details on quality assurance – Vol1

ICAO Doc 9906 covers the entire lifespan of an IFP



Details on quality assurance – Vol1

Outcomes

- conceptual design, including planned implementation dates, and resources needed to achieve the task;
- the FPD, including the procedure layout, the relevant calculation outputs, coordinates and a textual description of the intended procedure;
- validation and verification reports for the IFP;
- approval of the procedure by the regulatory authority;
- documentation throughout the various stages from the input through the publication process; and
- finally, the released AIP publication (charts, texts, coordinates, path terminators and any other pertinent information relevant to the procedure).

Details on quality assurance – Vol2

Volume 2 – *Flight Procedure Designer Training*:

- guidance for the establishment of flight procedure designer training
- Training is the starting point for any quality assurance programme

Details on quality assurance – Vol2

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

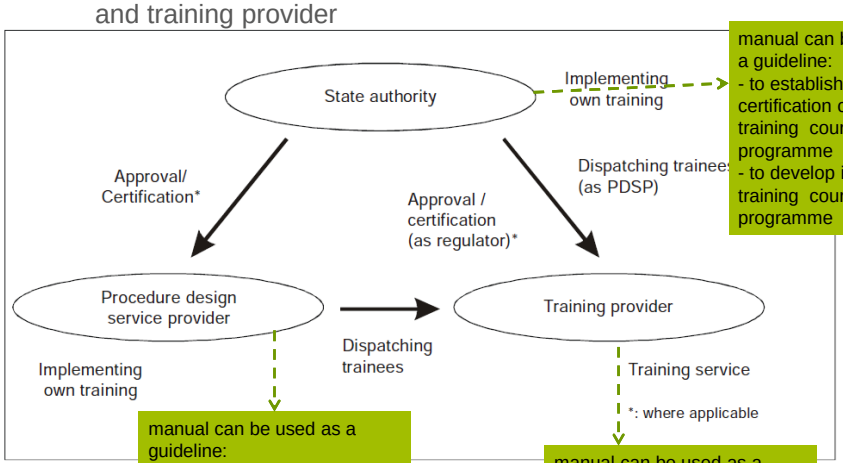
Details on quality assurance – Vol2

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

Details on quality assurance – Vol2

Relationships among State authority, procedure design service provider and training provider



manual can be used as a guideline:
- to establish approval/ certification criteria of a training course / programme
- to develop its own training course/ programme

manual can be used as a guideline:
- to evaluate potential courses
- develop their own training courses/programmes

manual can be used as a guideline to develop their own training courses/programmes

Details on quality assurance – Vol3

Volume 3 – *Flight Procedure Design Software Validation*:

- guidance for the validation (not certification) of procedure design tools, notably with regard to criteria

Details on quality assurance – Vol3

Procedure design tools are increasingly being used by designers with the goal of quality control and integrity enhancement in the procedure design domain

- Conventional and/or area navigation (RNAV) procedures for the departure, en-route, arrival, terminal and/or approach phases

Details on quality assurance – Vol3

- Automation in calculations contributes to the improvement of data integrity
- Use of automation **is not intended** to replace the procedure designer's expertise

Details on quality assurance – Vol3

Procedure design tools can be misleading if they contain errors, or if procedure design criteria compliance is not ensured through all the functions provided by such tools.

- Significant need to define a validation process for procedure design tools
- Additionally, the validation is a means for users to gain confidence in a tool

Details on quality assurance – Vol5

Volume 5 – *Validation of Instrument Flight Procedures*:

- guidance for conducting validation of instrument flight procedures, including safety, flyability and design accuracy

Details on quality assurance – Vol5

Purpose of validation

- to ensure safety, data accuracy and integrity and flyability of the instrument flight procedure
- applies to fixed wing and helicopter instrument flight procedures

Validation

- One of the final quality assurance steps in the procedure design process for instrument flight procedures
- Essential before the procedure design documentation is issued as part of the integrated aeronautical information package.

Details on quality assurance – Vol5

Validation process is subdivided into **ground validation** and **flight validation**

- Ground validation is a systematic review of the steps and calculations involved in the procedure design as well as the impact on flight operations by the procedure
- Flight validation is concerned with factors other than the performance of the navigation aid or system that may affect the suitability of the procedure for publication

Flight validation is different from Flight inspection

- Flight inspection is conducted with the purpose of confirming the ability of the navigation aid(s)/system upon which the procedure is based, to support the procedure

Details on quality assurance – Vol5

Ground validation is mandatory

- Independent IFP design review and a pre-flight validation

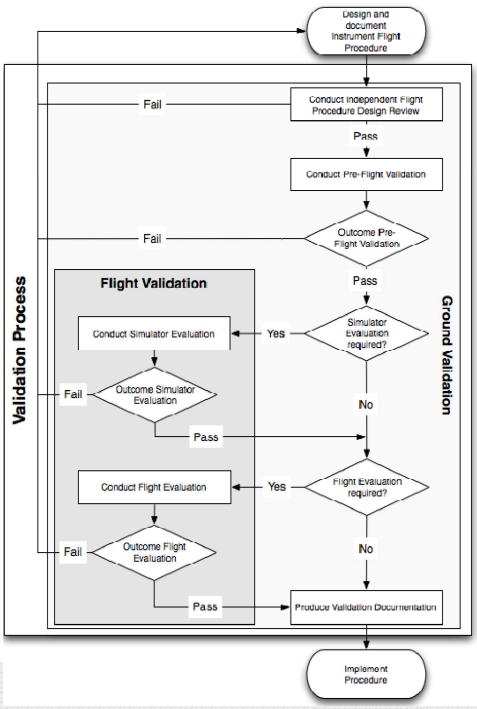
Flight validation

- Flight simulator evaluation and evaluation flown in an aircraft
- If the State can verify through ground validation the accuracy and completeness of all obstacle and navigation data considered in the procedure design, and any other factors normally considered in the flight validation, then the flight validation requirement may be dispensed with

Details on quality assurance – Vol5

Flight validation is required under the following conditions:

a) the flyability of a procedure cannot be determined by other means;
b) the procedure requires mitigation for deviations from design criteria;
c) the accuracy and/or integrity of obstacle and terrain data cannot be determined by other means;
d) if new procedures differ significantly from existing procedures; and
e) helicopter PinS procedures



Details on quality assurance – Vol6

Volume 6 – *Flight Validation Pilot Training and Evaluation*:

- Guidance for the establishment of flight procedure validation pilot training
- As for procedure designers, training is the starting point for any quality assurance system

Details on quality assurance – Vol6

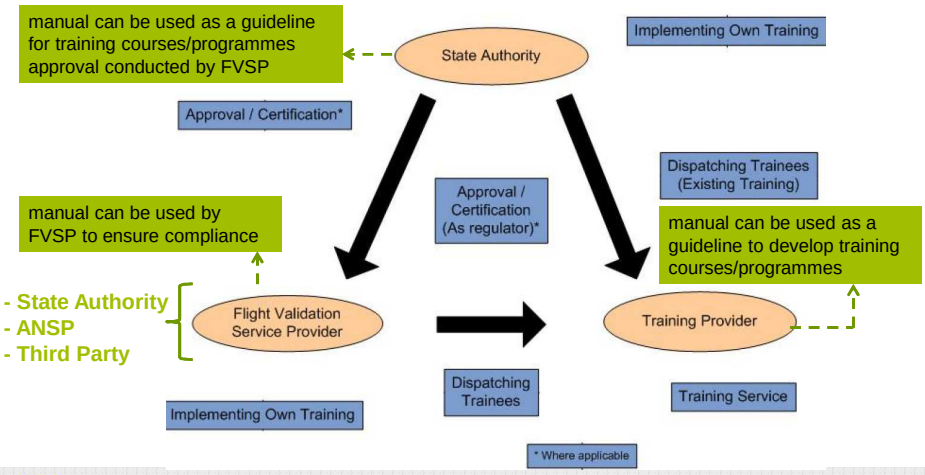
Each State should:

- 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

Details on quality assurance – Vol6

Relationships among State Authority, Flight Validation Service Provider and Training Provider



Conclusion

Based on the requirements from PANS-OPS (Doc 8168), the quality assurance manual for flight procedure design is a complete guidance material adressing of the life cycle from procedure design to validation steps

Volume 4 (Flight Procedures Design Construction) only is missing at this stage

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