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Workshop on quality assurance for the implementation of an instrument flight procedure

29 March -2 April 2021

Flight Validation Pilot Training and Evaluation

(Doc. 9906, Vol. 6)

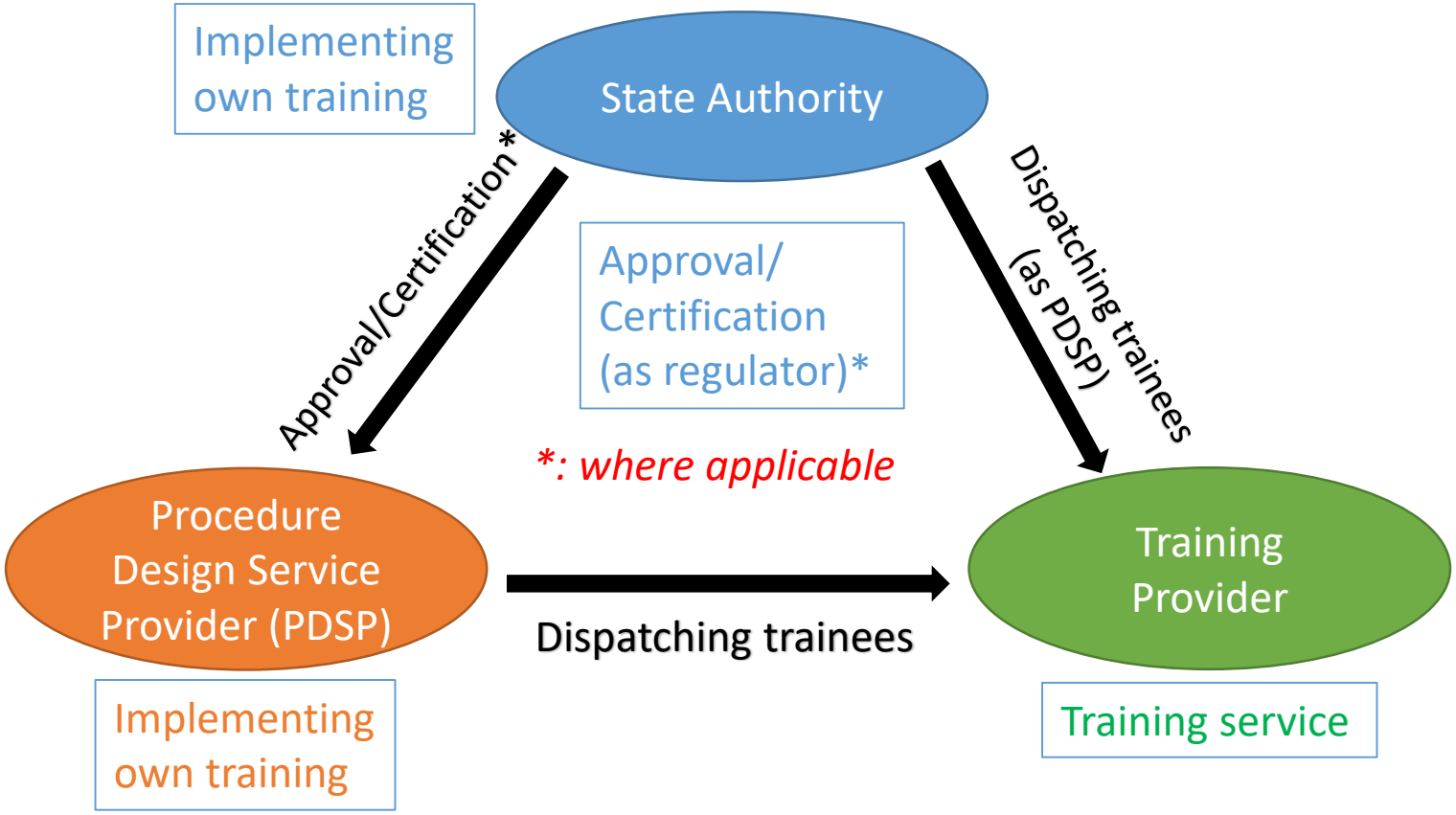
Outline

1. General
2. General provisions for competency-based training
3. Flight validation pilot requirements and evaluation
4. Course development methodology
5. Instructor competencies
6. Evaluation of FVP training

General

- Doc. 9906, Volume 6:
  - Chapter 2. General provisions for competency-based training and assessment;
  - Chapter 3. Flight validation pilot (FVP) requirements and evaluation;
  - Chapter 4. Design curriculum;
  - Chapter 5. Instructor competencies;
  - Chapter 6. Validation and post-training evaluation of FVP training;
  - Appendix. Skills, knowledge and attitudes (SKA).

Objective of the manual



General provisions for competency-based training

Category	Phases	Outputs
Analysis	Phase 1 — Preliminary study	Training proposals, their justification and proposed course of action.
	Phase 2 – Job analysis	Task description and performance standards.
	Phase 3 – Population analysis	Trainees' characteristics and their existing skills and knowledge.
Design and Production	Phase 4 – Design of curriculum	Training objectives, mastery tests and sequence of modules.
	Phase 5 – Design of modules	Mode of delivery, training techniques and media, draft training material.
	Phase 6 – Production and development testing	Production of all trainee materials.
Evaluation	Phase 7 – Validation and revision	Try-out of course and revision as required.
	Phase 8 – Implementation	Human resources training.
	Phase 9 – Post-training evaluation	Evaluation of training effectiveness; plans for remedial action.

The competency framework

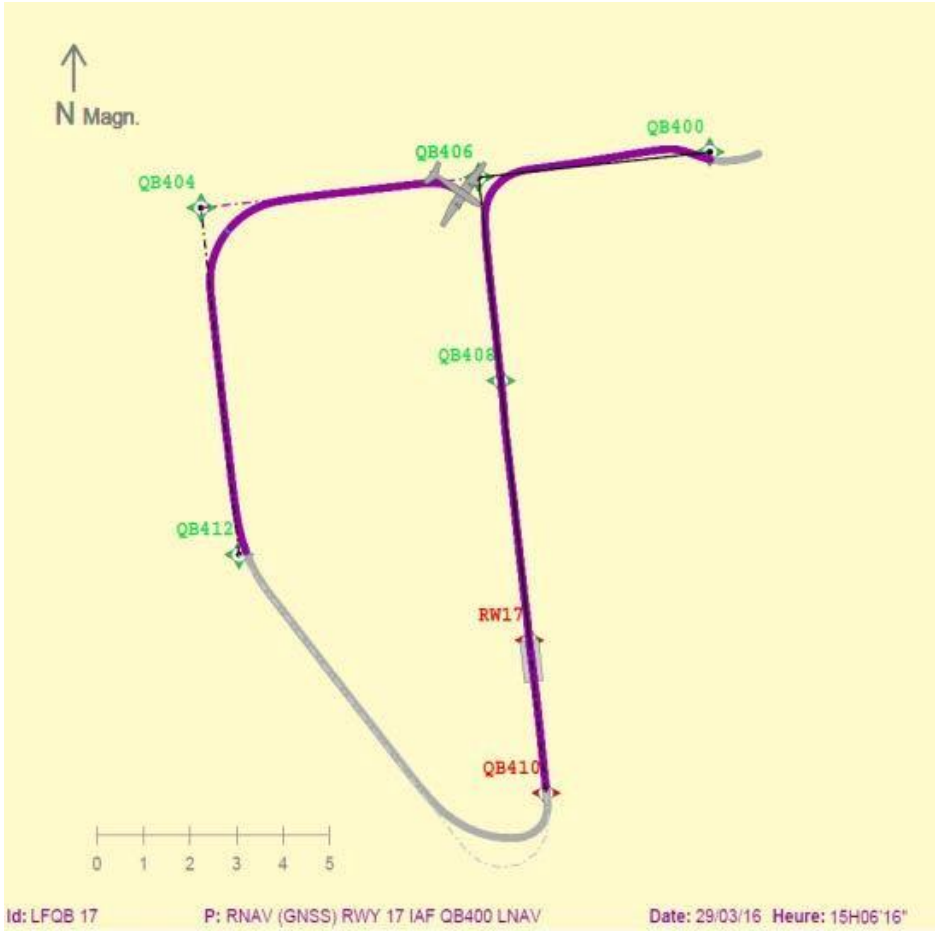
- The competency framework consists of:
  - Competency units;
  - Competency elements;
  - Performance criteria;
  - An evidence and assessment guide and,
  - A range of variables.
- The FVP competency framework is based on the following competency units:
  - Conduct preflight validation;
  - Conduct flight preparation;
  - Conduct simulator evaluation (as required);
  - Conduct flight evaluation (as required) and,
  - Conduct post-flight analysis.

General provisions for competency-based training

X.	***Competency unit***			
	X.X	***Competency element***		
		X.X.X	***Performance criteria***	
				Reference (PANS-OPS, Part-Section-Chapter)
2.	**Conduct flight preparation**			
	2.1	Conduct flight preparation for simulator evaluation		
		2.1.1	Ensure that the simulator and aircrew availability are suitable for the flight validation.	Doc 9906, Volume 5
		2.1.2	Ensure the availability of flight validation recorders, as required.	Doc 9906, Volume 5
		2.1.3	Ensure that the electronic data is correctly loaded into the aircraft navigation system.	Doc 9906, Volume 5
		2.1.4	Review the results of the ground validation (GV) so far.	Doc 9906, Volume 5
		2.1.5	Review the required assessments during the simulator evaluation.	Doc 9906, Volume 5, preflight validation report

Flight validation pilot requirements and evaluation

- States responsibilities:
  - ☞Ensure the highest level of experience and qualification when certifying FVPs.
- Required qualifications:
  - ☞At least commercial license with instrument rating or
  - ☞An equivalent authorization from the State meeting the Annex 1 knowledge and skill requirements for issuing the commercial pilot license and instrument rating.



Flight validation pilot requirements and evaluation

- Additional requirements:
  - FVP shall meet all the experience requirements for the airline transport pilot license in the relevant aircraft category (Annex 1).

- *Notes:*
  - *The FVP doesn't have to be the pilot-in-command of the validation flight or,*
  - *Have the type rating on the aircraft used for the validation flight!*

Skills, Knowledge and Attitudes (SKAs)

- Useful SKAs for FVP expert candidates :
  - Demonstrate three-dimensional visualization (skill);
  - Multi-tasking (Skill);
  - Mathematical understanding (skill/knowledge)
  - Ability for team working (Attitude);
  - Cockpit resource management (Attitude);
  - Attention to detail (Attitude).

There is not prerequisite to be a FVP!!

Flight validation pilot requirements and evaluation

- FVPs should possess the following basic underpinning knowledge of:
  - Standards, procedures and guidance pertinent to aeronautical information services (i.e. Annex 15);
  - Standards, procedures and guidance pertinent to flight inspection (i.e. Annex 10, Doc 8071);
  - Standards, procedures and guidance pertinent to aerodromes (i.e. Annex 14; the *Airport Services Manual* (Doc 9137) and the *Aerodrome Design Manual* (Doc 9157);
  - Standards, procedures and guidance pertinent to charting and aviation publications (i.e. Annex 4 and the Aeronautical Chart Manual (Doc 8697)).

Flight validation pilot requirements and evaluation

- FVPs should possess the understanding of:
  - The PBN concept (i.e. the *Performance-based Navigation (PBN) Manual* (Doc 9613));
  - PBN and conventional instrument procedure construction (i.e. PANS-OPS, Doc 8168);
  - The basic concept of and differences between flight validation and flight inspection;
  - The ARINC 424 coding;

Flight validation pilot requirements and evaluation

- FVPs should possess the understanding of:
  - Human Factors (i.e. the *Human Factors Training Manual* (Doc 9683));
  - Different types of aircraft operations and aircraft performance (i.e. limitations and equipment);
  - Obstacle assessment methodology;
  - Safety assessment process;
  - Geodesy (i.e. Doc 9906, Volume 2, 3.3.3.8); and
  - A comprehensive understanding of Doc 9906, Volume 5.

Course development methodology

General

- The duration of the course should derive from a competency-based course plan;
- The stakeholders in the instructional process:
  - Course developers;
  - courses instructors and ,
  - Trainees.
- Full competency is achieved through a training programme consisting of several phases involving each a curriculum development process:
  - State the aim of the training;
  - Derive terminal and intermediate objectives (form CBT);
  - Design a competency-based mastery test per terminal objective;
  - Ensure that all SKAs required for each intermediate objectives are covered;
  - Sequence terminal and intermediate objective;
  - Group objectives into modules.

Course development methodology

- Four (04) phases are defined for the FVPs trainings:
  - ☞ Initial training:
    - Goal: Provide basic skills and knowledge to FVP.
  - ☞ On-the-Job Training (OJT):
    - Goal: reinforce formal training and support the achievement of competency standards.
  - ☞ Recurrent training:
    - Goal: Address changes in the available criteria and standards
  - ☞ Refresher training:
    - Goal: Strengthen skills and knowledge weakened through disuse and time.

Course development methodology

Establishing prerequisite SKAs

Course goal	At the end of this course, the participant will be able to conduct preflight validation in accordance with Doc 9906, Volume 5, and the competency framework specified in Chapter 2.
Target population	Pilots who want to qualify as a FVP according to PANS-OPS, Volume II, Part I, Section 2, Chapter 4.
Course duration	15 days.
Prerequisite SKAs	Commercial pilot licence/instrument rating (CPL/IR) and experience required for an ATPL.

Course development methodology

- "Evaluate data and coding“

Task (expected behaviour):	the FVP can interpret the IFP legs and path terminators and verify that the data set represents the designed procedure
Condition:	given an ARINC 424 data set
Standard:	the correct selection of ARINC 424 path terminators in a given circumstance can be identified with a defined level of confidence and within a reasonable time

- “SKA“

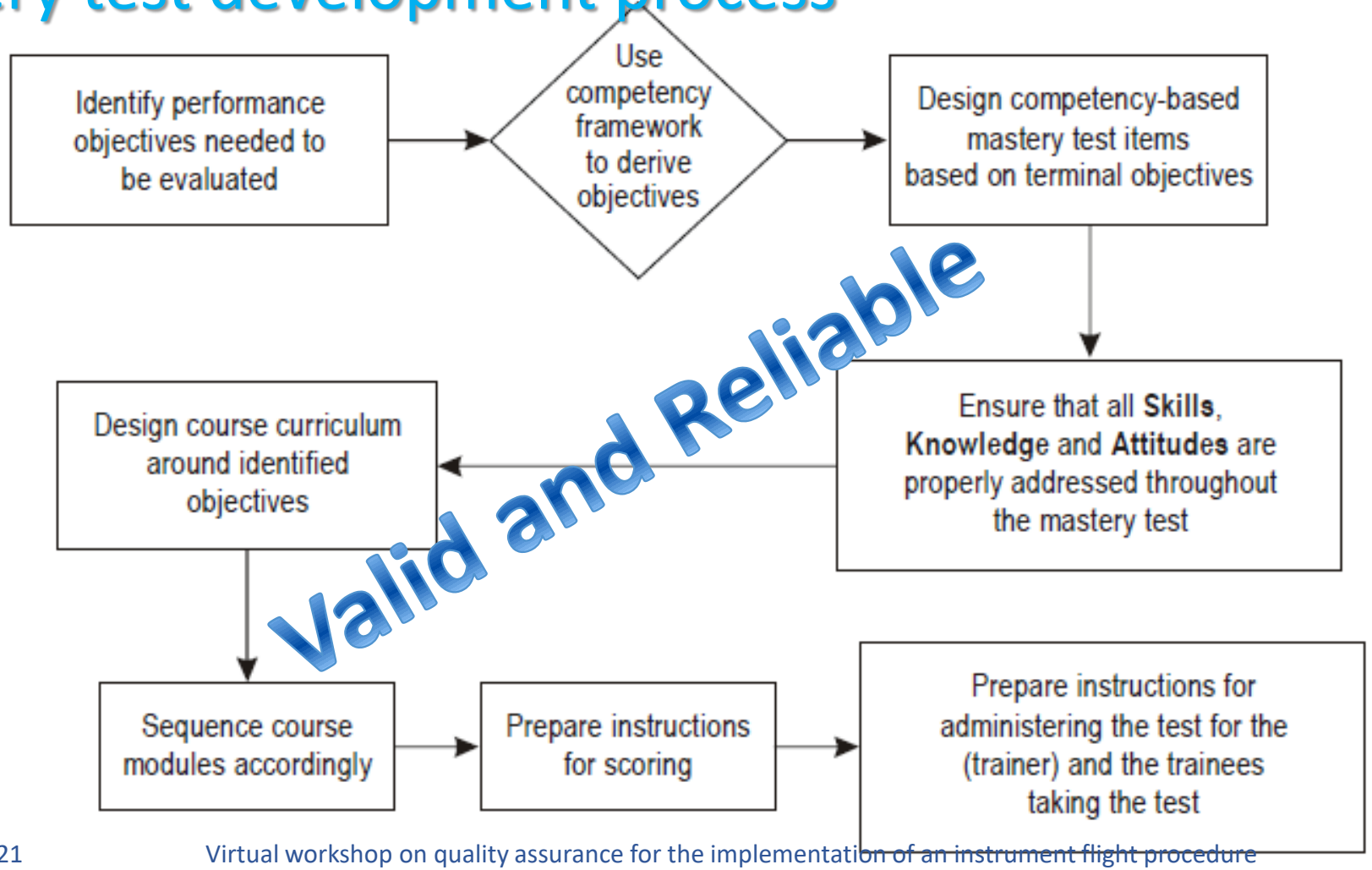
Skills:	apply methods and knowledge to identify corrupt data
Knowledge:	identify all sources of necessary data as well as the format in which data is presented
Attitude:	understand the importance of entering an accurate and unambiguous translation of the procedure into the database

Course development methodology

- **OJT: "Compare ARINC 424 coding for legs and path terminators between data file and procedural data":**
  - ☞Students must be able to verify that the navigation database represents the procedure as documented and charted;
  - ☞Must be familiar with ARINC 424 path terminators and their limitations;
  - ☞Must be aware of limitations of the onboard navigation system with regard to the correct execution of the selected path terminators.

Course development methodology

Mastery test development process



Instructor competencies

- Competency:
  - ☞Instructors competencies should be explicit and they have to demonstrate instructional skills, knowledge and expertise in the subject matter and training course content.
- Origin: FVP instructors may come from various fields of expertise.

Instructor competencies

- FVP instructor should have and maintain the following competencies:
  - ☞Techniques of applied instruction;
  - ☞Assessment of trainee performance;
  - ☞The learning process;
  - ☞Element of effective teaching;
  - ☞Trainee evaluation and testing, training and learning theories;

Instructor competencies

- FVP instructor should have and maintain the following competencies:
  - ☞Training programme development;
  - ☞Lesson planning;
  - ☞Classroom instructional techniques;
  - ☞Use of training aids;
  - ☞Analysis and correction of trainee errors.

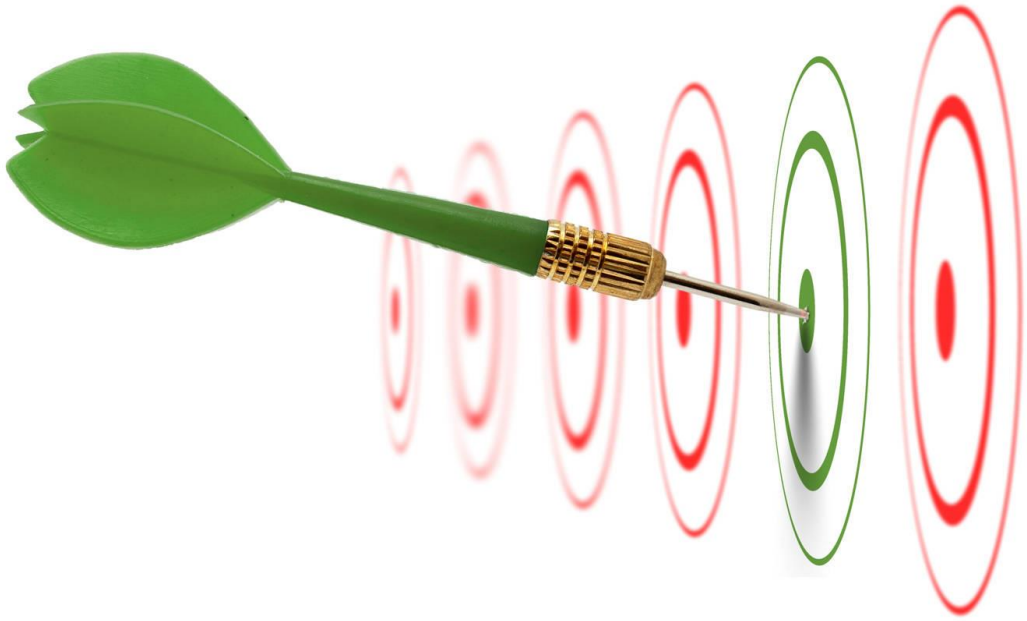
Evaluation of FVP training

- The process of validation and post-training evaluations FVP training ensures a harmonized level of effective training.
- Four (04) levels identified:
  - ☞Evaluation of trainee reaction;
  - ☞Evaluation of trainee mastery learning;
  - ☞Evaluation of flight validation performance; and
  - ☞Evaluation of result/impact.
- Each of the four levels should consider the role and responsibilities of the following stakeholders:
  - ☞The State authority approving the training;
  - ☞The FVSPs that conduct ground and flight validation of the procedures, and
  - ☞The training providers for validation.

Evaluation of FVP training

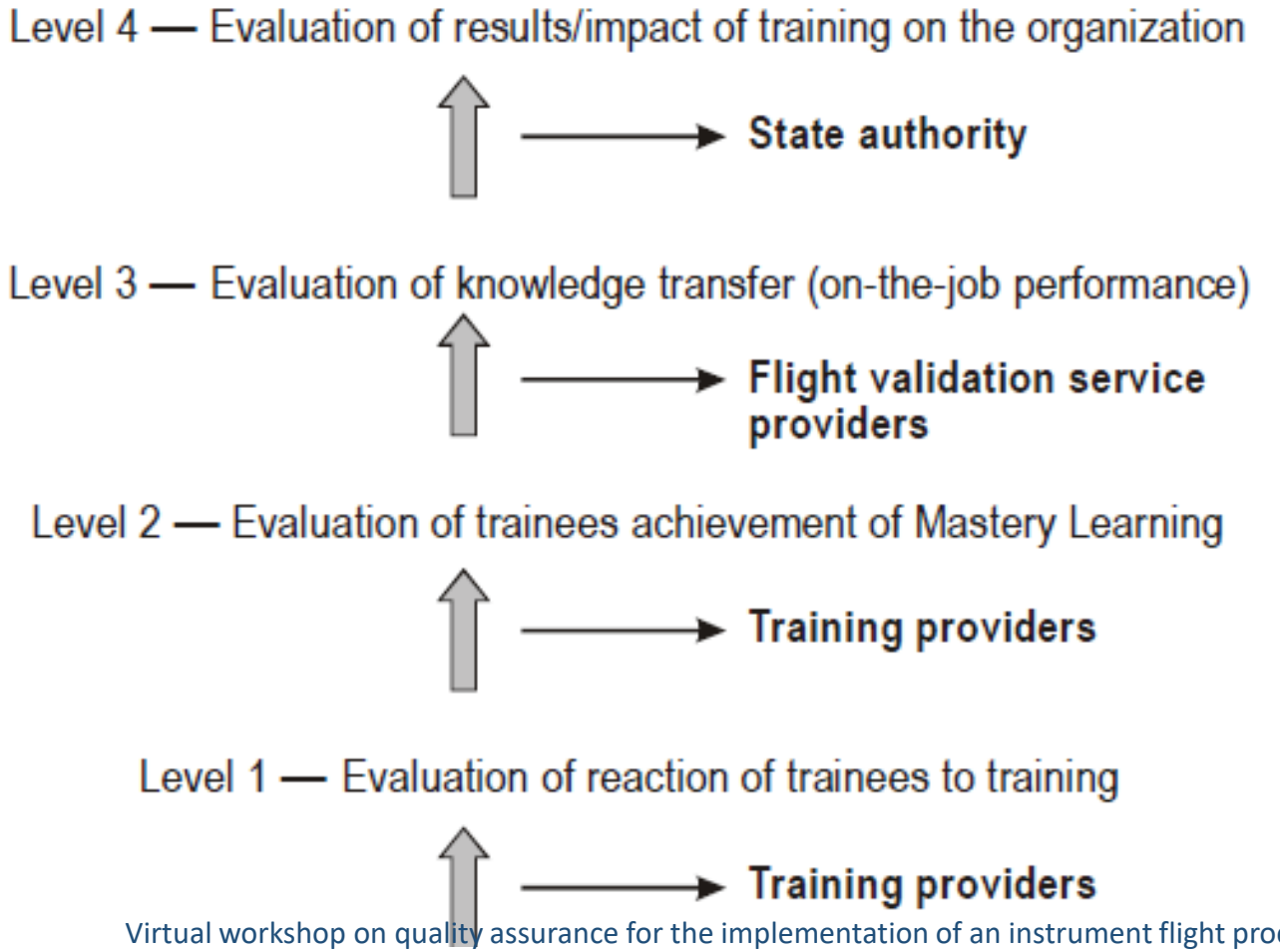
Purpose and approach of evaluation

- Purpose:
  - Ensure a level of consistency among all organizations involved in the implementation of FVP training.
- Evaluation approach:
  - The Kirkpatrick's four levels Model of evaluation is used.



Evaluation of FVP training

❑ Four levels of evaluation



Level 1: Evaluation of trainee reaction

- **Goal:**
  - ☞Identify the trainee's reactions and opinions to the course.
- Responsibilities:
  - ☞Training providers.
- Useful guidelines in developing a level 1 survey:
  - ☞Identify what information is needed and the goals of the evaluation;
  - ☞Design a form that captures the required information while minimizing the time required to complete and evaluate forms;
  - ☞Encourage written comments or suggestions, which can point to issues that could otherwise be missed;

Level 1: Evaluation of trainee reaction

- Useful guidelines in developing a level 1 survey:
  - ☞Allow enough time for trainees to respond;
  - ☞Allow for an anonymous survey or signature option to provide a more reliable data collection;
  - ☞Closely align survey objectives with course objectives; and
  - ☞Use the results of the evaluation to revise course materials as necessary.

Level 2: Evaluation of trainee mastery learning

- Goal:
  - ☞Determine to what extent training has impacted attitudes, increased knowledge and improved skills.
- Responsibilities:
  - ☞Training providers.
- Based on mastery test results and should apply to the following principles :
  - ☞Measures trainees' performance before and after training;
  - ☞Mastery test based on criterion-referenced;
  - ☞Ensure that terminal objectives are used to design the mastery ests;
  - ☞Ensure statistics are collected on mastery test results for each course module.

Level 3: Evaluation of flight validation performance

- Goal:
  - Ensure that all newly designed or revised training materials are based on required job performance and safety standards;
  - Review and analyze programme reports and recommend modifications to training programmes as necessary.
- Responsibilities:
  - Flight Validation Service Providers.
- Level 3 evaluation will collect data from various questions :
  - Is the task for which training was provided performed on the job?
  - How confident are trainees in their ability to perform the task once training has been completed?
  - How often do the trainees perform the trained task?
  - Will OJT reinforce the needs of the trainee or is formal training required again?
  - Additional comments?

Level 4: Evaluation of result/impact

- Goal:
  - Ensure that FVSPs utilize a current competency framework that can be reflected in terminal objectives;
  - Review data provided by the FVSP;
  - Analyze statistical data based on performance goals and eventual outcome;
  - Review and establish performance indicators of the flight validation system indicating job performance of flight evaluation pilots; and
  - Oversee the flight validation system.
- Responsibilities:
  - State authorities.

6.9 SAMPLE SURVEY OF COURSE VALIDATION

Course instructor: _____ **Module title/number:** _____

Participant's name (optional): _____

Date: _____

Instructions: Below you will find a series of questions related to the training course. Please take your time to complete all sections of the survey.

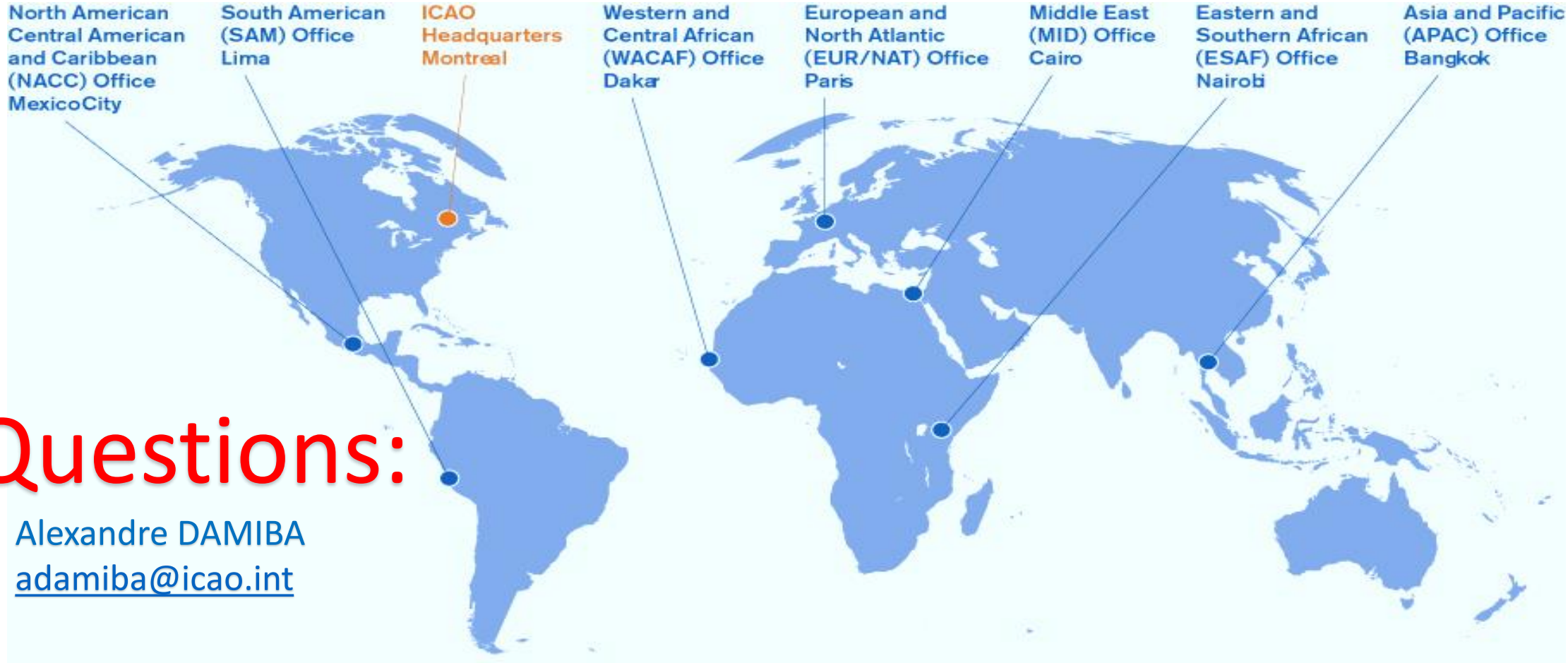
Overall view of training: Please mark the response that most closely expresses your opinion.

Scale: 1 = Strongly disagree 2 = Disagree 3 = Somewhat disagree 4 = Agree 5 = Strongly agree

	1	2	3	4	5
1. The information presented was well organized.					
2. Training activities were very engaging.					
3. Information presented was applicable to my performance on the job.					
4. The objectives for this course were met.					
5. The instructor for this course was easy to understand.					

Table A-1. Sample evidence and assessment guide

Competency unit				
	Competency element			
		Performance criteria		
			Evidence and assessment guide	**Reference: PANS-OPS: Part-Section-Chapter**
1.	**Conduct preflight validation**			
	1.1	Review IFP package		
		1.1.1	Ensure the completeness of the IFP package	
			1.1.1.1 Verify that the procedure report contains an executive summary of the procedure.	Doc 9906, Volumes 1 and 5
			1.1.1.2 Verify that the report clearly identifies the controlling obstacle for each segment.	Doc 9906, Volumes 1 and 5
			1.1.1.3 Verify that the report lists any other obstacle dictating the design of the procedure.	Doc 9906, Volumes 1 and 5
			1.1.1.4 Verify that the MDA/H or DA/H is clearly stated in the report.	Doc 9906, Volumes 1 and 5
			1.1.1.5 Verify that the procedure deviates from design criteria and if so, if a mitigation is provided.	Doc 9906, Volumes 1 and 5
			1.1.1.6 Verify that the report contains proposed ARINC 424 path terminators.	IFP design report



Questions:

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