Competency-Based Training
Module 10: CBT, the training manual
Overview

- Presentation of the Manual (Doc 10056)
- Presentation of the Workflows 1 and 2 (Part 1&2)

- At the end of this presentation, you will be able to:
  - **Name** the five phases of the ADDIE ISD model;
  - **Explain** what is the ICAO ATCO Competency Framework;
  - **Describe** at a high level the requirements (inputs), key steps (process) and expected results (outputs) contained in Workflows 1 and 2.
What is needed?

A knowledge and understanding of:

a) The provisions related to ATCO competency-based training and assessment in PANS-TRG;

b) Chapters 1, 2 and 3 of this manual;

c) Chapters 4 to 7 relevant to the phase(s) of training to be designed.
# Overview of Doc 10056

| Chapter 1                | - Regulatory requirements for ATCO training  
|                         | - Competency-based training and framework  
|                         | - The organization of ATC training  
|                         | - How to use the manual  
| Chapter 2               | Step-by-step process for analysing and designing  
|                         | competency-based training  
| Chapter 3               | Role of instructors and assessors  
| Chapter 4-7             | Phases of training (initial, unit, refresher and conversion)  

The ICAO Competency Framework

ATCO COMPETENCY FRAMEWORK

Note 1.—Paragraph 3 of Appendix 2 states that this framework should be adapted to the local context of the organization. The framework is generic and is intended to be adapted to the operating environment and challenges of the organization as well as to the professional experience of ATCOs. It does not address the specific definition of duties, sharing of tasks, ratings and proficiency levels existing in the organization. Local implementation of this framework includes selecting competencies appropriate to their local context. The competencies in the table are not listed according to any pre-defined priority.

Note 2.—Performance criteria defined in the following table may serve one or more of the competency units and elements. The criteria used to judge whether the required level of performance has been achieved is to be established by the ANSP and/or ATO.

Note 3.—The principles of threat and error management should be integrated in the development of competency-based training programmes.

<table>
<thead>
<tr>
<th>COMPETENCY UNIT</th>
<th>DEFINITION</th>
<th>CE No.</th>
<th>COMPETENCY ELEMENT</th>
<th>PC No.</th>
<th>PERFORMANCE CRITERIA OBSERVABLE BEHAVIOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITUATIONAL AWARENESS</td>
<td>Comprehend the current operational situation and anticipate future events</td>
<td>CE1.1</td>
<td>Monitor the operational situation</td>
<td>PC1.1</td>
<td>Monitors air traffic in own area of responsibility and nearby airspace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CE1.2</td>
<td>Scan for specific or new information</td>
<td>PC1.2</td>
<td>Monitors the meteorological conditions that impact on own area of responsibility and nearby airspace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CE1.3</td>
<td>Comprehend the current operational situation</td>
<td>PC1.3</td>
<td>Monitors the status of the ATC systems and equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CE1.4</td>
<td>Anticipate the future situation</td>
<td>PC1.4</td>
<td>Monitors the operational circumstances in nearby sectors to anticipate impact on own situation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CE1.5</td>
<td>Recognize indications of reduced situational awareness</td>
<td>PC1.5</td>
<td>Acquires information from available surveillance and flight data systems, meteorological data,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>electronic data displays and any other means available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PC1.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PC1.7</td>
</tr>
</tbody>
</table>
The ICAO Competency Framework

The ATCO competency framework (Appendix 2 of Chapter 2 – PANS-TRG) is generic, high level, and applies to all ratings and during any phase of training and assessment.

Competency units, competency elements and observable behaviours used to develop adapted competency model (WORKFLOW 1). The adapted model is used to design the training and assessment programmes, taking into account the environment (WORKFLOW 2).
Expect from the manual:

a) A step-by-step **process** to analyse local training needs and design competency-based training and assessment based on PANS-TRG;

b) Fundamental **elements** to the development, conduct and evaluation of competency-based training;

c) Elements that are specific to each of the **phases of training**.

Do *not* expect from the manual:

- A template **syllabus**,
- Generic instructional techniques
- Administrative policies
- Procedures for training programmes.
The Workflows

WORKFLOW 1: Analyse training need

WORKFLOW 2: Design local competency based training

WORKFLOW 3: Develop the training and assessment materials

WORKFLOW 4: Conduct the course (Implement)

WORKFLOW 5: Evaluate the course
The ADDIE ISD model

Other valid models are appropriate for the design of competency-based training. The main emphasis of this manual is on:

a) Workflow 1: **Analyse** the training need;
b) Workflow 2: **Design** local competency-based training and assessment.
The Components: how it works

- Training Specification
- Adapted Competency Model
- Assessment Plan
- Training Plan
- Training and assessment materials
Training Specification

Purpose of the training, task list and requirements

Adapted Competency Model

Competencies with their description and performance criteria

COMPETENCIES required to be achieved by the end of training

PERFORMANCE CRITERIA: observable behaviours, conditions and standards used to judge if the performance has been achieved.

Assessment Plan

Events & tools used to determine if competence has been achieved.

Training Plan

Document used to structure, develop and deliver the training.

Training and assessment materials

Course programme, training notes, manuals, presentations, simulated exercises, etc.
A stepped approach

The first two workflows, **ANALYSE** training need and **DESIGN** local competency-based training and assessment, establish the training specification, the adapted competency model, the assessment plan and the training plan.
WORKFLOW 1: Analyse

INPUTS
- Training request
- Task list
- Documents:
  - Operational
  - Technical
  - Regulatory
  - Organisational

PROCESS
- Identify the purpose of the training;
- Identify the tasks associated with the purpose of the training;
- Identify operational, technical, regulatory and organisational requirements.

OUTPUTS
- Training Specification
CHAPTER 2 - Appendix A – Example Training Specification

The table below contains an example of a completed training specification for an initial training/aerodrome control rating course.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the purpose of the training?</td>
<td>The trainee shall carry out the following tasks:</td>
</tr>
<tr>
<td>Train new aerodrome controllers</td>
<td>1. Separate aircraft and vehicles operating on the manoeuvring area.</td>
</tr>
<tr>
<td>State the phase/s of training.</td>
<td>2. Separate aircraft in the circuit, and from arriving and departing aircraft.</td>
</tr>
<tr>
<td>Initial training (basic + aerodrome rating)</td>
<td>3. Select runway in use.</td>
</tr>
<tr>
<td>What qualification, if any, will the trainee achieve on successful completion of the training?</td>
<td>4. Issue IFR clearances for departing aircraft and ensure correct readbacks.</td>
</tr>
<tr>
<td>Student licence with aerodrome control rating</td>
<td>5. Manage inbound and outbound IFR aircraft.</td>
</tr>
<tr>
<td></td>
<td>7. Integrate VFR arrivals into the aerodrome traffic circuit.</td>
</tr>
</tbody>
</table>
Workflow 2: Design training and assessment

1. Establish an adapted competency model aligned with the training specifications;
2. Design an assessment plan;
3. Design the training plan.
WORKFLOW 2-1: Framework

**INPUTS**
- Training Specification
- ICAO ATCO Competency Framework

**PROCESS**
- Select relevant competencies;
- Select and adapt observable behaviours;
- Determine the relevant competency standards;
- Determine the conditions under which the competencies must be performed.

**OUTPUTS**
- Adapted competency model:
  - Competencies
  - Description
  - Performance Criteria
    1. Observable behaviours
    2. Standards
    3. Conditions
Chapter 2, Appendix B

CHAPTER 2 - Appendix B

This competency model has been adapted for Wondertree approach unit, which services one area along with secondary surveillance in the unit. The traffic levels are typically between mountainous terrain in the traffic situations.

The conditions and standards apply to all the competencies and are therefore listed at the beginning of the model.

<table>
<thead>
<tr>
<th>PC No.</th>
<th>Observable Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC 1.1</td>
<td>Monitors air traffic in own area of responsibility and nearby traffic in Cochrane area sector.</td>
</tr>
<tr>
<td>PC 1.2</td>
<td>Monitors the meteorological conditions that impact on own area of responsibility.</td>
</tr>
<tr>
<td>PC 1.3</td>
<td>Monitors the status of the Wondertree VCS, Wondertree ILS and WTV (VOR).</td>
</tr>
<tr>
<td>PC 1.4</td>
<td>Integrates information obtained from monitoring and scanning into overall picture.</td>
</tr>
<tr>
<td>PC 1.5</td>
<td>Analyses the actual situation based on information obtained from monitoring and scanning.</td>
</tr>
<tr>
<td>PC 1.6</td>
<td>Interprets the situation based on the analysis.</td>
</tr>
<tr>
<td>PC 1.7</td>
<td>Predicts the future operation situation.</td>
</tr>
<tr>
<td>PC 1.8</td>
<td>Identifies potential hazards situations.</td>
</tr>
<tr>
<td>PC 1.9</td>
<td>Verifies that information is accurate and assumptions are correct.</td>
</tr>
</tbody>
</table>

Wondertree Approach Surveillance Unit Competency Model

Performance
The trainee shall demonstrate an integrated performance of all the competencies described in this model.

Conditions
The following conditions shall apply:
- with all levels of traffic up to the maximum sector capacities as listed in Chapter 2 of the Wondertree Approach Surveillance Operations Manual;
- with all levels of traffic complexity;
- under all typical weather conditions.
The principles of assessment

a) Clear performance criteria are used;
b) An integrated performance is observed;
c) Multiple observations are taken;
d) Assessments are valid;
e) Assessments are reliable.
Assessment methods

- Formative assessments;
- Summative assessments;
- Oral assessments;
- Examinations;
- Other methods.
Milestones

Milestones are cohesive chunks or units of learning that are organized into a logical sequence that generally progress from the simple to the complex. Each milestone is comprised of both training and assessment/s.

**Milestone 1**
Pre-OJT
- Training
- Assessment

**Milestone 2**
OJT – to 150 hours
- Training
- Assessment

**Milestone 3**
OJT – 150 to 300 hours
- Training
- Assessment
Final and interim competency standards

If a course has been divided into milestones, it will be necessary to define an interim competency standard for each milestone. This is achieved by:

a) modifying the adapted competency model, especially the conditions and/or standards;

b) stating the degree of achievement for each performance criteria.

Interim competency standards are easier to achieve in a simulator. During OJT there are less opportunities to modify the conditions.
Final and interim competency standards

*EXAMPLE of degree of achievement expected (area surveillance):*

<table>
<thead>
<tr>
<th>Uses a variety of techniques to manage the traffic</th>
<th>ICS 1</th>
<th>ICS 2</th>
<th>FCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes predominate use of vectoring. Will occasionally use speed control when prompted but with difficulty.</td>
<td>Uses vectoring and ROC/ROD techniques effectively. Applies speed control correctly but may need to be prompted.</td>
<td>Uses vectoring, ROC/ROD and speed control effectively.</td>
<td></td>
</tr>
</tbody>
</table>
Final and interim competency standards

Milestone 1

- Training
  - Formative assessment
  - Assignment/Project

Interim competency Standard

- Comp 1 Obs. B.
- Comp 2 Obs. B.
- Comp 3 Obs. B.
- Comp 4 Obs. B.

Summative assessment

- Examination/s

Interim standard/conditions

Milestone 2

- Training
  - Formative assessment
  - Assignment/Project

Final competency Standard

- Comp 1 Obs. B.
- Comp 2 Obs. B.
- Comp 3 Obs. B.
- Comp 4 Obs. B.

Summative assessment

- Examination/s, Oral Board

Final competency Standard
Adapted competency model, training and assessment plans
WORKFLOW 2-2: Training and assessment

**INPUTS**
- Training Specification
- Adapted Competency Model
- Task Analysis

**PROCESS**
- Determine sub-tasks and KSA;
- Perform gap analysis;
- Develop a syllabus;
- Milestones and interim competency standards;
- Define the list of assessments and assessment tools;
- Remaining elements of the training plan

**OUTPUTS**
- Assessment plan:
  - Final & Interim Competency Standards;
  - Assessment List and Assessment Tools
- Training plan:
  - Syllabus; Composition and Structure;
  - Milestones; Modules/Training events; Course Schedule
The FCS will be achieved when the candidate has completed:

**Formative Assessments**: A minimum of 30 formative assessments have been completed. The candidate is ready to undertake summative assessment when 4 formative assessments indicate an integrated and consistent performance.

**Written Examinations (pass mark)**:
1. Local Procedures, letters of Agreement (90%)
2. XYZ System (80%)

**Summative Assessments**: The candidate must demonstrate a consistent performance for at least 6/10 consecutive summative assessments.

**Oral Assessments (after summative assessments)**:
1. Scenario-based questions relating to ATC procedures + one non-routine scenario
2. System questions relating to functionality of the SDPS and FDPS.
Chapter 2, Appendices C, D & E

Chapter 2 - Appendix C – Example Evidence Guide

Note that this is only a partial example. A complete evidence guide would contain all the competency units and observable behaviours.

1. Situational Awareness
   
<table>
<thead>
<tr>
<th></th>
<th>ICS 1</th>
<th>ICS 2</th>
<th>FCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Monitors traffic in own area of responsibility and nearby airspace</td>
<td>Routinely scans surveillance data during low to medium traffic and can be observed de-collapsing menus and sizer labels to obtain additional information. May fail to scan the complete screen during high traffic and only concentrate on specific areas.</td>
<td>Routinely scans the surveillance data during all traffic levels. Can be observed accessing data from flights in other sectors and highlighting traffic that may cause a conflict in own sector.</td>
</tr>
</tbody>
</table>

1.2 | Monitors the meteorological conditions that impact on own area of responsibility and nearby airspace | Occasionally monitors the weather in own sector, usually only when traffic brings it to his/her attention. Passes relevant weather information only during extreme situations (e.g. thunderstorms) or when asked. Not able to monitor the weather in other sectors or aerodromes. | Monitors weather during low to medium traffic situations. Occasionally manages to monitor weather in other sectors during high traffic levels. Passes relevant weather information most of the time. | Consistently monitors the weather and passes relevant information to traffic well in advance. |

Chapter 2 - Appendix D – Example Competency Checklist

A competency checklist is a comprehensive document that could be lengthy. The example below shows the competency checklist for only two competency units: situational awareness and traffic and capacity management. A complete list would include all the competencies and performance criteria listed in the adapted competency model.

Competency Checklist – Area Surveillance Control

<table>
<thead>
<tr>
<th>Competency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Monitors traffic in own area of responsibility and nearby airspace</td>
</tr>
<tr>
<td>1.2</td>
<td>Monitors the meteorological conditions that impact on own area of responsibility and nearby airspace</td>
</tr>
</tbody>
</table>

Chapter 2 - Appendix E – Example Competency Assessment Form

Competency Assessment Form

<table>
<thead>
<tr>
<th>Trainee name:</th>
<th>J. Njega</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit:</td>
<td>XYZ Centre</td>
</tr>
<tr>
<td>Sector:</td>
<td>upper and mid altitude sectors</td>
</tr>
<tr>
<td>Date:</td>
<td>01/01/03</td>
</tr>
<tr>
<td>ICS or FCS:</td>
<td>FCS</td>
</tr>
</tbody>
</table>

Formative assessments

| Number of assessments: |
| 1 | 2 | 3 |

Summative assessments

<table>
<thead>
<tr>
<th>Number</th>
<th>Date undertaken</th>
<th>Assessor/s</th>
<th>Result</th>
</tr>
</thead>
</table>

The evidence guide describes the level of performance required for each competency standard. A formal assessment of competency at the competency standard being assessed can only be made when all performance criteria have been achieved.

For formative assessment grading supports the learning progress and is intended to be used for diagnostic purposes only.
CHAPTER 2 - Appendix F – Example Syllabus

This example shows all the subjects for an initial training aerodrome control course. However, it only provides a further elaboration of one subject: air traffic management, to demonstrate how the subjects are divided into topics, sub-topics and training objectives.

Subject 1: Introduction to the course
Subject 2: Aviation law
Subject 3: Air traffic management
Subject 4: Meteorology
Subject 5: Navigation
Subject 6: Aircraft
Subject 7: Human Factors
Subject 8: Equipment and systems
Subject 9: Professional environment
Subject 10: Abnormal and emergency situations
Subject 11: Aerodromes

Subject 3: Air traffic management

The subject objective is:

Learners shall manage air traffic to ensure safe, orderly and expeditious services.
WORKFLOW 3: Training & assessment materials

**INPUTS**
- Adapted Competency Model
- Assessment Plan
- Training Plan

**PROCESS**
- Develop educational materials to support the delivery of the course;
- Develop examinations and assessments.

**OUTPUTS**
- Training Materials:
  - Course Schedule;
  - Training event materials;
  - Examinations;
  - Practical assessments;
  - Other assessments.
Take away items

• Training request + requirements = Training Specification
  – Training Specification + ICAO Framework = Adapted Framework
  • Adapted Framework + Training Specification + Task Analysis =
    – Assessment Plan
    – Training Plan
    » Training Plan + Assessment Plan = Training Materials!