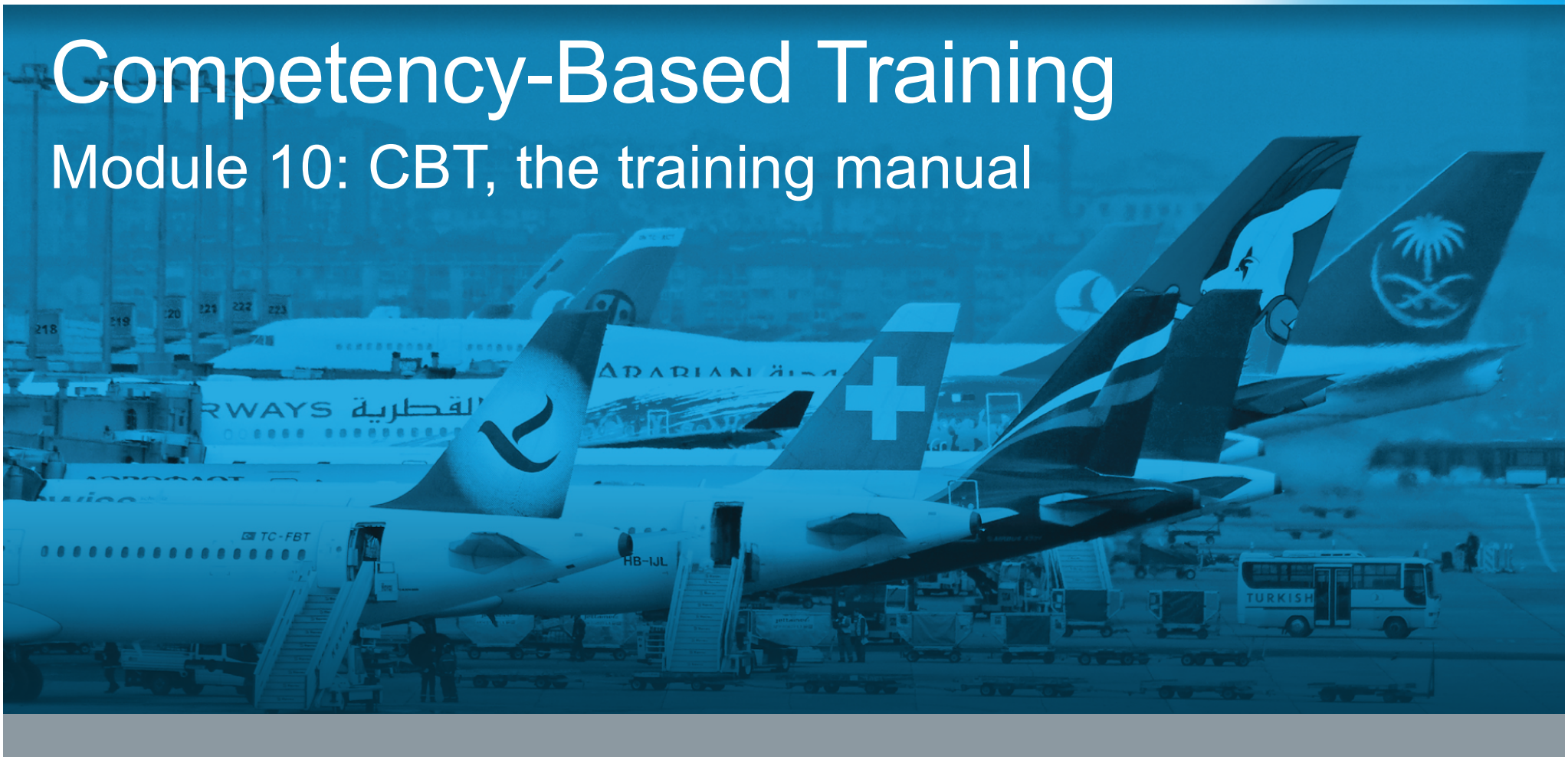
ICAO UNITING AVIATION

NO COUNTRY LEFT BEHIND

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.

COMPETENCY UNIT	DEFINITION	CE No.	COMPETENCY ELEMENT	PC No.	PERFORMANCE CRITERIA OBSERVABLE BEHAVIOUR
SITUATIONAL AWARENESS	Comprehend the current operational situation and anticipate future events	CE1.1	• Monitor the operational situation	PC1.1	• Monitors air traffic in own area of responsibility and nearby airspace
		CE1.2	• Scan for specific or new information	PC1.2	• Monitors the meteorological conditions that impact on own area of responsibility and nearby airspace
		CE1.3	• Comprehend the operational situation	PC1.3	• Monitors the status of the ATC systems and equipment
		CE1.4	• Anticipate the future situation	PC1.4	• Monitors the operational circumstances in nearby sectors to anticipate impact on own situation
		CE1.5	• Recognize indications of reduced situational awareness	PC1.5	• Acquires information from available surveillance and flight data systems, meteorological data, electronic data displays and any other means available
				PC1.6	• Integrates information acquired from monitoring and scanning into the overall picture
				PC1.7	• Analyses the actual situation based on information acquired from monitoring and scanning

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 are used to develop **adapted competency model** (WORKFLOW 2.1).

The adapted model is used to design the **training and assessment programmes**, taking into account the environment (WORKFLOW 2.2).

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;

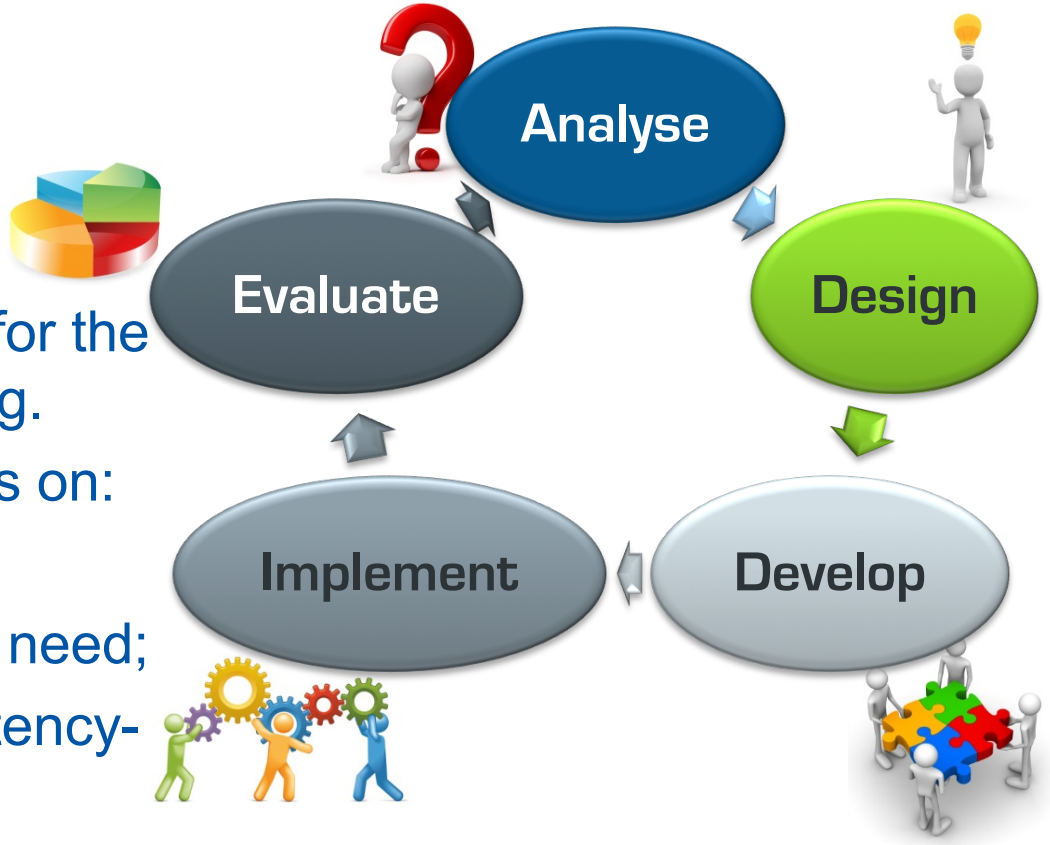
c) Elements that are specific to each of the **phases of training**.

Do *not* expect from the manual:

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

The Workflows

The ADDIE ISD model



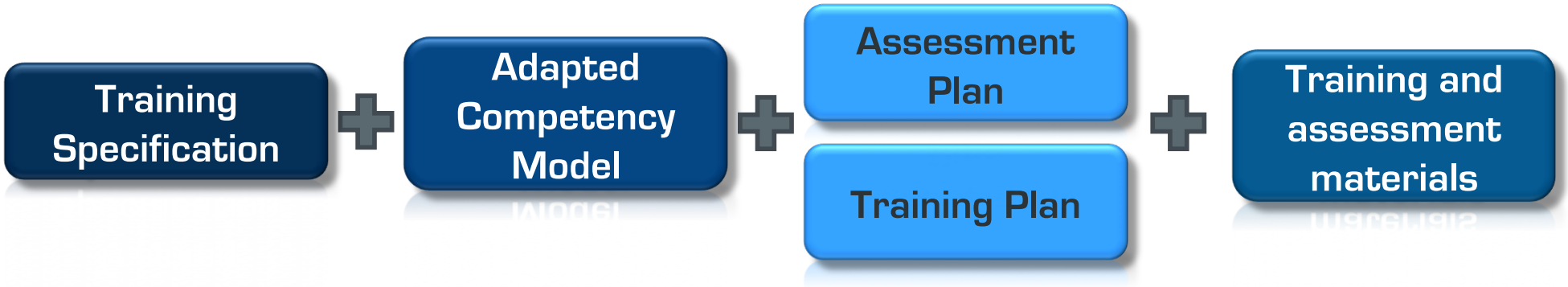
Other valid models are appropriate for the design of competency-based training.

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	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

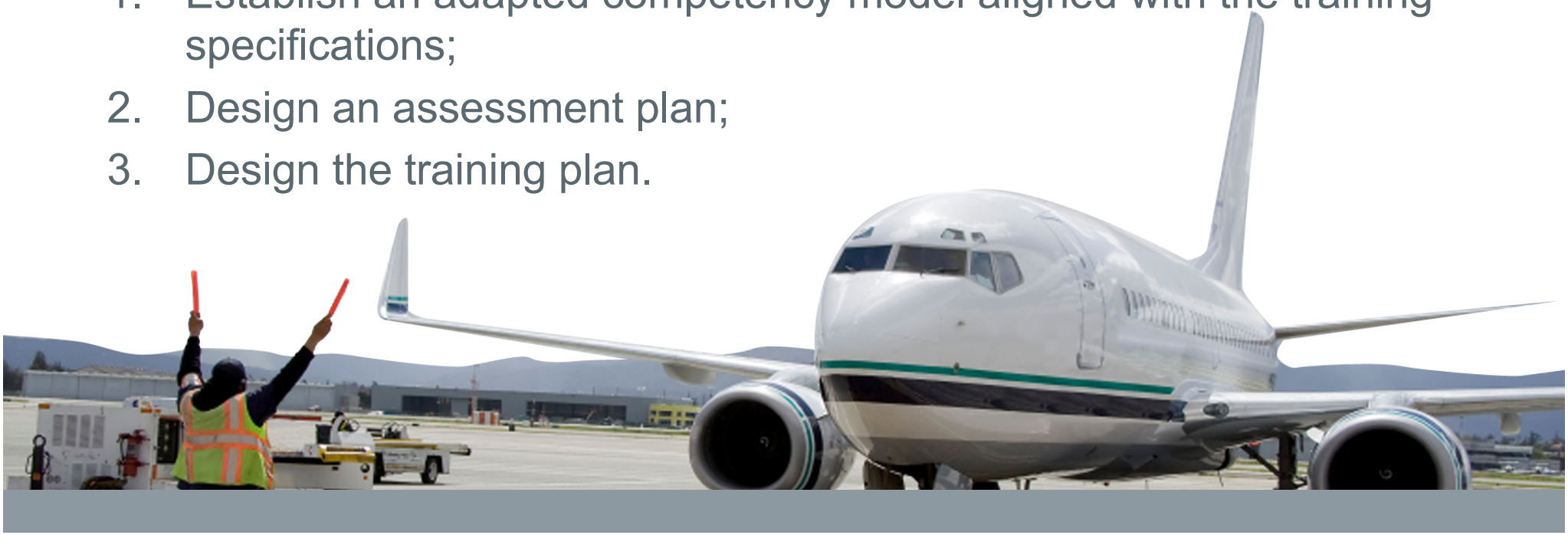
CHAPTER 2 - Appendix A – Example Training Specification

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

Purpose	
What is the purpose of the training?	Train new aerodrome controllers
State the phase/s of training.	Initial training (basic + aerodrome rating)
What qualification, if any, will the trainee achieve on successful completion of the training?	Student licence with aerodrome control rating
Tasks	
Describe the tasks associated with the purpose of the training	The trainee shall carry out the following tasks: 1. Separate aircraft and vehicles operating on the manoeuvring area. 2. Separate aircraft in the circuit, and from arriving and departing aircraft. 3. Select runway in use. 4. Issue IFR clearances for departing aircraft and ensure correct readbacks. 5. Manage inbound and outbound IFR aircraft. 6. Issue inbound and outbound Visual Flight Rules (VFR) clearances to aircraft. 7. Integrate VFR arrivals into the aerodrome traffic circuit

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

<u>Adapted competency model:</u>

- Competencies
- Description
- Performance Criteria
  1. Observable behaviours
  2. Standards
  3. Conditions

Chapter 2, Appendix B

1	Situational Awareness	Definition	*Comprehend the current operational situation and anticipate future events*
PC No.	**Observable Behaviour**		
PC 1.1	*Monitors air traffic in own area of responsibility and nearby traffic in Coach ACC lower sector.*		
PC 1.2	*Monitors the meteorological conditions that impact on own area of responsibility.*		
PC 1.3	*Monitors the status of the Wondertree VCS, Wondertree ILS and WTV (VOR).*		
PC 1.4	*Integrates information obtained from monitoring and scanning into overall picture.*		
PC 1.5	*Analyses the actual situation based on information obtained from monitoring and scanning.*		
PC 1.6	*Interprets the situation based on the analysis.*		
PC 1.7	*Predicts the future operation situation.*		
PC 1.8	*Identifies potentially hazardous situations.*		
PC 1.9	*Verifies that information is accurate and assumptions are correct.*		

CHAPTER 2 - Appendi

This competency model has been adap
for Wondertree approach unit, which
mountainous terrain that serves one aer

The unit has secondary surveillance an
centre above Wondertree is called Coa
use at Wondertree approach.

The controller typically works the secto
become necessary.

The traffic levels are typically betwee
mountainous terrain the traffic situations

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

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

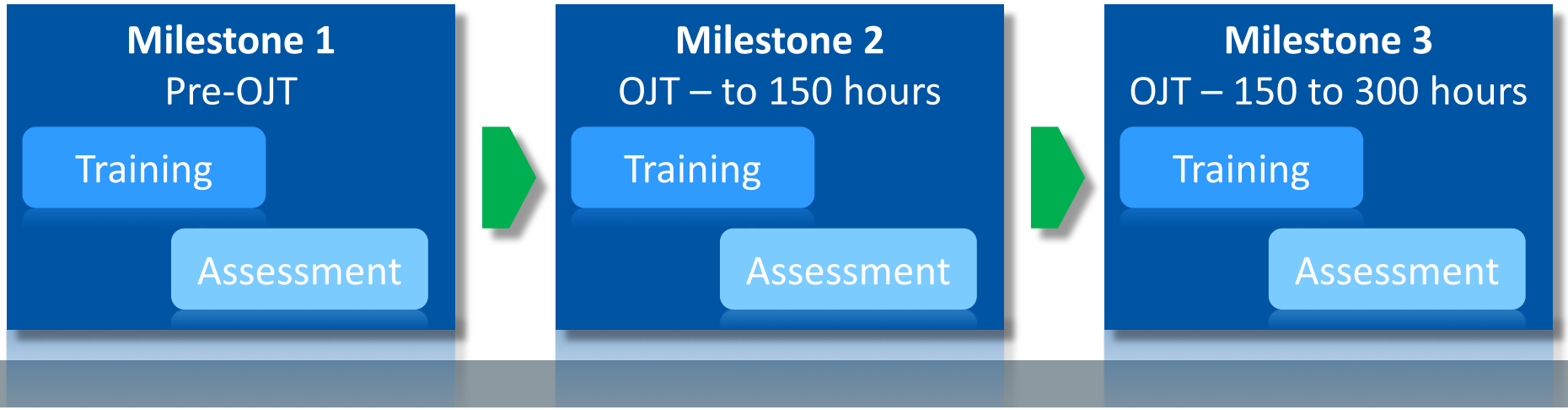
a) Clear performance criteria are used;
b) An integrated performance is observed;
c) Multiple observations are taken;
d) Assessments are valid;
e) Assessments are reliable.

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.



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.

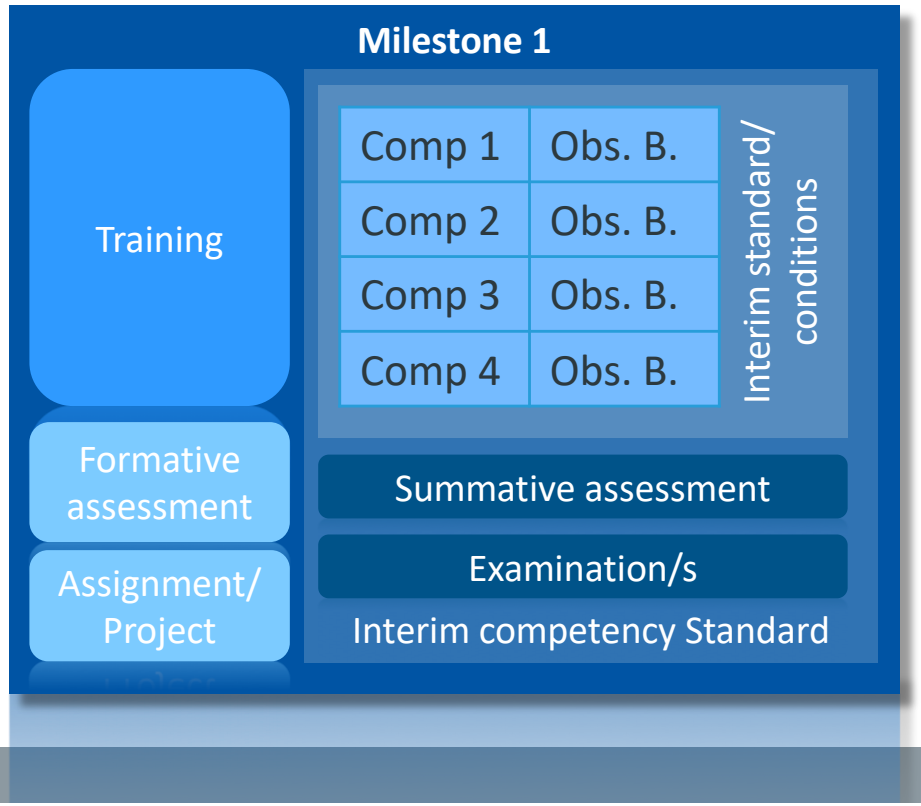
Interim competency standards are easier to achieve in a simulator. During OJT there are less opportunities to modify the conditions.

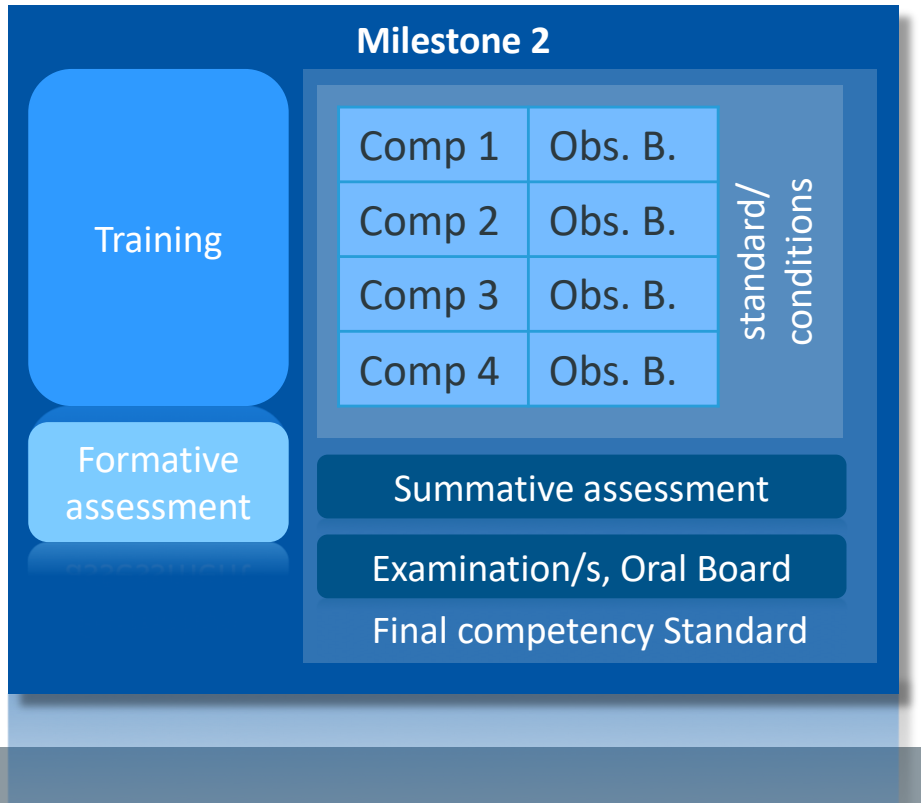
Final and interim competency standards

EXAMPLE of degree of achievement expected (area surveillance):

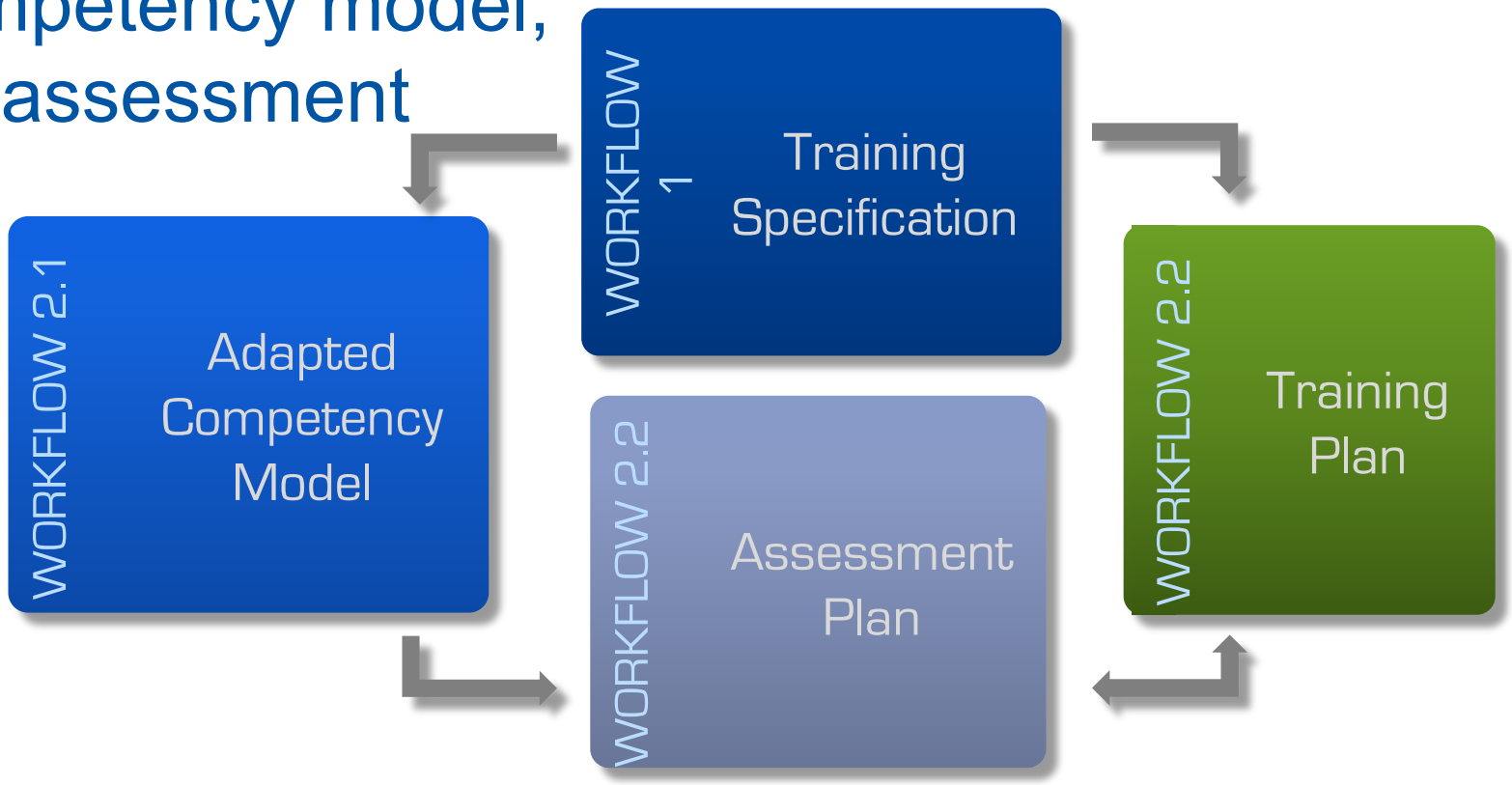
Traffic & Capacity Management			
Uses a variety of techniques to manage the traffic	**ICS 1**	**ICS 2**	**FCS**
	Makes predominate use of vectoring. Will occasionally use speed control when prompted but with difficulty.	Uses vectoring and ROC/ROD techniques effectively. Applies speed control correctly but may need to be prompted.	Uses vectoring, ROC/ROD and speed control effectively.

Final and interim competency standards





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	ICS 1	ICS 2	FCS
1.1	Monitors traffic in own area of responsibility and nearby airspace	Routinely scans surveillance data during low to medium traffic and can be observed de-collapsing menus and radar labels to obtain addition information. May fail to scan the complete screen during high traffic and only concentrate on specific areas.	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.	Routinely scans the surveillance data during all traffic levels and efficiently obtains additional information through menus and radar labels, as required.
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 situation's (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

Trainee name: J Blogs
Unit: XYZ Centre
Sector/s: Upper and Mid Delta Sectors
Date: 01.01.01
ICS or FCS: ICS 2
Instructor/assessor name: J Smith

The evidence guide describes the level of performance required for each competency standard. An overall assessment of competent 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.

Situational Awareness: Comprehends the current operational situation and anticipates future events	1 (NC)	2 (NC)	3 (C)	4 (C)
PC 1.1 Monitors traffic in own area of responsibility and nearby airspace				
PC 1.2 Monitors the meteorological conditions that impact on own area of responsibility and nearby airspace				
PC 1.3 Monitors the status of the ATC systems and equipment				

CHAPTER 2 - Appendix E – Example Competency Assessment Form

Competency Assessment Form

Trainee name: J Blogs
Unit: XYZ Centre
Sector/s: Upper and Mid Delta Sectors
Start of training: 01.05.01
ICS or FCS: FCS

Formative assessments

Number of assessments:	Date of recommendation for summative assessment:

Summative assessments

Number	Date undertaken	Assessor/s	Result

Chapter 2, Appendix F

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!

ICAO UNITING AVIATION

NO COUNTRY LEFT BEHIND

ICAO

North American Central American and Caribbean (NACC) Office
Mexico City

South American (SAM) Office
Lima

ICAO Headquarters
Montréal

Western and Central African (WACAF) Office
Dakar

European and North Atlantic (EUR/NAT) Office
Paris

Middle East (MID) Office
Cairo

Eastern and Southern African (ESAF) Office
Nairobi

Asia and Pacific (APAC) Sub-office
Beijing

Asia and Pacific (APAC) Office
Bangkok

THANK YOU