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Manual on Air Traffic Controller Competency-based Training and Assessment

Volume II — On-the-job Training Instructor (OJTI)
First Edition, 2022



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Competency-based Training and Assessment

Volume X — XXXXXXXX Training Instructor XXXXXXXX
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**Doc 10056, *Manual on Air Traffic Controller Competency-based Training and Assessment*
Volume II — *On-the-job Training Instructor (OJT)***

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AMENDMENTS

Amendments are announced in the supplements to the *Products and Services Catalogue*; the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

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FOREWORD

The Next Generation of Aviation Professionals (NGAP) initiatives were launched to ensure that sufficient numbers of qualified and competent aviation professionals will be available to operate, manage and maintain the future international air transport system. In May 2009, the NGAP Task Force was created and was instrumental in supporting the preparatory work for the NGAP Symposium conducted at ICAO from 1 to 4 March 2010. Among the outcomes drawn from the NGAP Symposium were: the need to develop regulatory frameworks that enable and support the use of modern training and learning technologies (competency-based training, evidence-based training and increased use of simulation) and that are not an obstacle to industry best practices; and the need to define competencies for all aviation activities affecting safety in order to facilitate, through the use of internationally agreed upon standards and assessment practices, the free-flow of professionals.

The effective performance of the air traffic management (ATM) system depends on competent and qualified air traffic management professionals. The ATM system is evolving towards a globally integrated and collaborative system. Air traffic controllers (ATCOs) managing and operating this system must have a shared understanding of what is expected of them in terms of performance wherever they may work in order to support a globally interoperable system and to achieve optimum capacity within acceptable safety limits. Similarly, those training the ATCOs in live traffic situations are also obligated to ensure the appropriate balance between capacity and safety while providing an optimal learning environment. An on-the-job training instructor (OJTI) provides this training.

In February 2015, procedures for the implementation of competency-based training and assessment for ATCOs were included in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868). These procedures provide States, air navigation service providers (ANSPs) and training providers with guidance on how to structure their approach to training and assessment of controllers. The procedures provide a flexible framework that stakeholders can adapt to their local operational context and requirements. Subsequent amendments to Part IV of the PANS-TRG reviewed the ICAO competency framework for air traffic controllers and developed new provisions (see PANS-TRG, Part IV) on the ICAO competency framework for ATC OJTIs.

Some of the provisions included in the PANS-TRG are of a generic nature and can apply to all aviation functions including ATM personnel. The purpose of this manual is to provide additional guidance to the provisions of the PANS-TRG and support stakeholders in the successful implementation of competency-based training and assessment for ATC OJTIs.

The division of the *Manual on Air Traffic Controller Competency-based Training and Assessment* (Doc 10056) into Volume I — *Air Traffic Control (ATC)* and Volume II — *On-the-job Training Instructor (OJTI)* was accomplished in 2021 as a result of the work conducted by the ICAO Competency-based Training and Assessment Task Force (CBTA-TF). Prior to 2021, all Doc 10056 material was contained in a single document. Since then, the material contained therein has been updated for publication as the second edition of Volume I, which provides guidance to support the implementation of competency-based training and assessment for air traffic control officers (ATCOs) and expands on the procedures included in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868). Volume II of Doc 10056 focuses on OJTIs, and provides guidance on how to identify the OJTI competencies necessary for their environment and how to design the training and assessment needed for OJTI development.

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GLOSSARY

DEFINITIONS

Adapted competency model. A group of competencies with their associated description and performance criteria adapted from an ICAO competency framework that an organization uses to develop competency-based training and assessment for a given role.

Assessment (evidence) guide. A guide that provides detailed information in the form of evidence that an instructor or an evaluator can use to determine whether a candidate meets the requirements of the competency standard.

Competency. A dimension of human performance that is used to reliably predict successful performance on the job. A competency is manifested and observed through behaviours that mobilize the relevant knowledge, skills and attitudes to carry out activities or tasks under specified conditions.

Competency-based training and assessment. Training and assessment that are characterized by a performance orientation, emphasis on standards of performance and their measurement, and the development of training to the specified performance standards.

Competency standard. A level of performance that is defined as acceptable when assessing whether or not competency has been achieved.

Conditions. Anything that may qualify a specific environment in which performance will be demonstrated.

ICAO competency framework. A competency framework, developed by ICAO, is a selected group of competencies for a given aviation discipline. Each competency has an associated description and observable behaviours.

Observable behaviour. A single role-related behaviour that can be observed and may or may not be measurable.

Performance criteria. Statements used to assess whether the required levels of performance have been achieved for a competency. A performance criterion consists of an observable behaviour, condition(s) and a competency standard.

ABBREVIATIONS AND ACRONYMS

ADDIE	Analyse, design, develop, implement, evaluate
ANSP	Air navigation services provider
ATC	Air traffic control
ATCO	Air traffic controller
ATM	Air traffic management
ATO	Approved training organization
ATS	Air traffic service
CPDLC	Controller–pilot data link communications
EFPS	Electronic flight progress strips
FCS	Final competency standard
ICS	Interim competency standard
KSA	Knowledge, skills and attitudes

II-(x)

OB	Observable behaviour
OJT	On-the-job training
OJTI	On-the-job training instructor
PANS-TRG	<i>Procedures for Air Navigation Services — Training</i> (PANS-TRG, Doc 9868)
SRA	Surveillance radar approach
TWR	Tower (aerodrome control)

PUBLICATIONS

(referred to in this manual)

Annexes

Annex 1 — Personnel Licensing

Annex 10 — Aeronautical Telecommunications

Volume II — Communication Procedures including those with PANS status

Annex 11 — Air Traffic Services

Procedures for Air Navigation Services (PANS)

Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868)

Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444)

Manuals

Manual on Air Traffic Controller Competency-based Training and Assessment

— Volume I — Air Traffic Control (ATC) (Doc 10056)

Chapter 1

INTRODUCTION

1.1 GENERAL

1.1.1 In air traffic control (ATC), there are a number of different types of instructors who perform their duties during the various phases of air traffic controller (ATCO) training. One of the most challenging phases occurs during operational (live) training. An on-the-job training instructor (OJTI) provides this training.

1.1.2 ATCOs are employed and trained because they have demonstrated that they have the aptitude to be competent controllers. Some of these controllers will later go on to become instructors and are then also required to demonstrate competence as effective teachers and/or coaches.

1.1.3 The on-the-job-training (OJT) phase is recognized as being extremely challenging for the OJTIs. It requires them to enable a trainee to integrate the learning from the previous phases of training into the live operational environment. The learning challenges that the trainee encounters during OJT tend to be more difficult to identify due to the nature of complex cognitive skills development.

1.1.4 This manual provides ATC approved training organizations (ATOs), air navigation service providers (ANSPs) and/or operational units with guidance on how to identify the OJTIs' competencies necessary for their environment and how to design the training and assessment needed for their development.

1.1.5 Since it is well recognized that ICAO regions, Member States and operational ATC units have differing regulatory, operational, technical and organizational environments, this manual does not prescribe a "one-size-fits-all" training programme. Instead, it describes how to develop an adapted competency model and an OJTI training/development programme that is appropriate for each specific environment.

1.1.6 Annex 1 — *Personnel Licensing* requires that ATCOs who are providing OJT in the operational environment shall be appropriately qualified as OJTIs. The *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) supports this requirement with an ATC OJTI competency framework that may be used to establish the competencies required to become a qualified ATC OJTI.

1.2 STATUS

While Annex 1 requires ATC OJTIs to be qualified, the manner in which this is achieved may vary among organizations. One method may be through a competency-based approach. This manual provides guidance on how to design a local competency-based training and assessment programme specifically for ATC OJTIs. Implementation of competency-based training and assessment for ATC OJTIs is optional. However, should ANSPs and/or ATOs choose to implement such training, the relevant procedures in the PANS-TRG, Doc 9868, supported by this manual, should be used.

1.3 INTENDED USERS

1.3.1 This manual is intended for personnel who are responsible for the design of ATC OJTI training and development programmes. This includes:

- a) designers who are creating a completely new training system;
- b) designers who already have an established training system and who intend to evolve their system towards a competency-based approach; and
- c) any other personnel involved in OJTI training.

1.3.2 It is expected that the personnel listed above will be familiar with the ATC sections of Annex 1 — *Personnel Licensing, the Procedures for Air Navigations Services — Training* (PANS-TRG, Doc 9868) and the *Manual of Air Traffic Controller Competency-based Training and Assessment* (Doc 10056) — Volume I — *Air Traffic Control (ATC)*.

1.4 STRUCTURE OF THE MANUAL

Note.— For simplicity, ATC OJTI, OJTI and on-the-job training instructors are used interchangeably throughout the text of this manual and have the same meaning unless otherwise specified.

This manual contains five chapters, as follows:

Chapter 1 provides an overview of the regulatory requirements for OJTI training, an overview of competency-based OJTI training, the competency framework, the organization of OJTI training, and how to use this manual.

Chapter 2 considers the organizational environment of the ANSP or ATO, the learning principles that are applicable to the training of ATCOs in that learning environment, and the expectations of the ANSP regarding the role of the OJTI. It elaborates on some of the issues that are particular to learning in the ATC operational environment and that should be considered when developing training and/or development programmes for OJTIs. This chapter also considers the various roles that an OJTI may be required to perform and elaborates on the competencies that are included in the PANS-TRG ATC OJTI competency framework. This chapter will be of benefit to any organization establishing an OJTI training and/or development programme, irrespective of whether the training is competency-based.

Chapter 3 describes, in detail, the step-by-step process for analysing and designing competency-based training for OJTIs.

Note that since some of the fundamental aspects of successful competency-based training and assessment are carried out during the “Develop”, “Conduct” and “Evaluate” workflows, this chapter also highlights these specific aspects. However, for these last three workflows, the chapter does not provide a complete process, as most of the information is of a more general nature and details can be found in many instructional design documents. Only the aspects of OJTI competency-based training and assessment that are particular to these workflows are highlighted.

Chapter 4 is a direct copy of the section in the *Manual of Air Traffic Controller Competency-based Training and Assessment* (Doc 10056) — Volume I — *Air Traffic Control (ATC)* that deals with the general and specific requirements for instructors and assessors who are performing their duties in a competency-based training and assessment environment.

Chapter 5 elaborates on factors to consider when designing development programmes for OJTIs, in order to acquire, maintain and enhance their instructing competencies.

1.5 REGULATORY REQUIREMENTS

1.5.1 Annex 1 makes it clear that before an ATC licence is issued, a number of criteria must be met. Some of these criteria relate directly to the training of an ATCO. These include the knowledge, skills and practical experience requirements for all controllers and the specific requirements for each of the ratings.

1.5.2 In addition, Annex 1 states that, "The applicant shall have completed an approved training course and demonstrated the required competence, having accomplished not less than three months of satisfactory service engaged in the actual control of air traffic under the supervision of an air traffic control (ATC) on-the-job training instructor (OJTI)."¹

1.5.3 It further elaborates that, "an air traffic controller acting as an air traffic control on-the-job training instructor shall hold an appropriate rating and be qualified as an air traffic control on-the-job training instructor."² In addition, the PANS-TRG (Doc 9868) states that, "On-the-job training shall be performed under the supervision of a qualified ATC on-the-job training instructor who has been authorized to provide instruction in the area for which the rating shall be issued and be conducted under the SMS of the ANSP."³

1.5.4 Annex 1 does not detail training and experience requirements or recommended practices on how the training of ATC OJTIs should be carried out so that they may be issued with an OJTI qualification. Consequently, Member States, along with their ATOs and operational units, are able to structure and conduct their ATC OJTI training programmes in a manner that is appropriate to their regulatory contexts and their operational, technical and organizational environments.

1.5.5 PANS-TRG (Doc 9868) contains an ATC OJTI competency framework that may be adapted and used as the basis for determining that an ATCO is competent to perform the duties of an ATC OJTI. This manual explains how to adapt the ATC OJTI competency framework to a local environment and develop a training programme for OJTIs.

1.6 COMPETENCY-BASED OJTI TRAINING

1.6.1 Developing competency-based training

1.6.1.1 This manual describes a systematic approach for identifying the OJTI competencies and performance criteria that are relevant for a particular organization. The training and/or development programme is then based on the competencies that were identified, and a process for assessment is developed to ensure that the identified competencies have been achieved.

1.6.1.2 Unlike the ATCO training described in Volume I of this manual, Volume II does not structure OJTI training into identifiable "phases", but rather encourages the ANSP to decide how to structure the OJTI training and development programme to suit the OJTIs' needs and regulatory requirements. It does, however, acknowledge that:

- a) all trainee OJTIs need some form of foundational training or development that will enable them to progress into providing OJT (under supervision initially) in the live operational environment;
- b) once qualified, OJTIs need support to maintain their instructional competencies; and

1. Annex 1, 4.4.1.3.1.

2. Annex 1, 4.4.1.3.2.

3. PANS-TRG (Doc 9868), Third edition, Part IV, Chapter 2, 2.3.2.

- c) there are significant benefits for organizations to embark on a programme designed to enhance OJTI performance.

Note.— The term “trainee” is used throughout this manual. It is a generic term for a person performing a learning activity without any reference to the person’s status. Unless otherwise specified, within this manual, the term “trainee” means an ATCO acquiring a new qualification as an OJTI or an OJTI performing a learning activity to maintain or enhance the OJTI’s instructing performance.

1.6.2 Benefits

The key benefits to organizations that implement a competency-based training programme include:

- a) Assurance that OJTIs can demonstrate sufficient expertise

A competency-based approach supports OJTIs in achieving a level of performance that enables them to consistently provide effective training and support to their trainees in the live operational environment while maintaining safe and efficient operations.

- b) Ongoing performance evaluation of ATC OJTIs

An important feature of competency-based approaches is the identification and collection of assessment evidence, which supports decision-makers/managers in monitoring the ongoing competence of ATC OJTIs.

- c) Early identification of performance gaps, and design of more effective training to close any OJTI performance gaps

Accurate identification of performance gaps can be challenging in OJTI training given the complex cognitive nature of the competencies required. Using well-defined performance criteria to identify gaps can ensure that the training is targeted and effective.

- d) Training to meet individual needs

Meeting the learning needs of the OJTI means recognizing that a “one-size-fits-all” training approach will not lead to success. Being able to identify and address specific learning gaps and specific needs will ensure the development of the required competencies in each OJTI.

- e) Development of effective selection tools

With a clear definition of the competencies that are required for the job, selection programmes can be tailored to identify individuals who already possess aptitudes in specific areas.

- f) Improvement of the ATCO training success rate

Competent OJTIs enable trainee ATCOs the best opportunity to succeed.

1.6.3 ICAO competency framework for ATC OJTIs

1.6.3.1 The PANS-TRG ICAO competency framework for ATC OJTIs describes competencies and observable behaviours. This information is used to develop adapted competency models that address the duties and proficiency levels existing in an organization and which are appropriate for the situation within which these models will be applicable.

1.6.3.2 These models are then used to design the training and assessment and/or development programmes necessary to achieve the defined competencies. The design of the adapted competency model and the associated training and assessment must take into account the regulatory, operational, technical and organizational environment within which the ATC OJTIs will perform their tasks.

Note.— Definitions of competency, competency standard, conditions, observable behaviour, performance criteria and adapted competency models are provided in the Glossary located at the beginning of this manual.

1.6.3.3 The ICAO competency framework for ATC OJTIs is a generic, high-level structure that has been designed to apply to air traffic controllers who are providing instruction in the live operational environment. This framework has not considered the competencies required for instructing in a simulated air traffic environment; although it is acknowledged that many of the competencies are similar.

1.6.3.4 To develop an adapted competency framework, the ICAO competency framework for ATC OJTIs should be used in combination with a regional and/or national task analysis of OJTI functions, and a clear understanding of the local environment.

1.7 PREREQUISITES FOR ESTABLISHING OJTI COMPETENCY-BASED TRAINING AND ASSESSMENT

1.7.1 The personnel responsible for establishing and overseeing ATC OJTI competency-based training and assessment should have knowledge and understanding of the:

- a) regulations relating to ATCOs and OJTIs in Annex 1 — *Personnel Licensing*, Chapter 4;
- b) general provisions relating to competency-based training and assessment methodology described in the PANS-TRG (Doc 9868), Chapter 2;
- c) provisions associated with ATC OJTI competency-based training and assessment as described in the PANS-TRG (Doc 9868), Part IV; and
- d) contents of this document (Doc 10056, Volume II).

1.7.2 In addition, it would be useful to be familiar with the:

- a) provisions associated with ATCO competency-based training and assessment as described in the PANS-TRG (Doc 9868), Part IV; and
- b) contents of the *Manual on Air Traffic Controller Competency-based Training and Assessment* (Doc 10056) — Volume I — *Air Traffic Control (ATC)*.

Chapter 2

ON-THE-JOB INSTRUCTOR (OJTI) AND THE LEARNING ENVIRONMENT

2.1 GENERAL

2.1.1 Prior to adapting the ICAO ATC OJTI competency framework and creating a local OJTI competency model, it is helpful to consider the organizational environment of the ANSP or training organization, the learning principles that are applicable to the training of ATCOs, and the expectations the ANSP has regarding the role of the OJTI in the learning environment. If these issues have been considered, then the competency framework that is developed for the OJTIs is likely to support the organization's training philosophy and goals.

2.1.2 Consequently, this chapter considers some of the issues to consider prior to implementing or modifying an OJTI training programme. As some of the competencies in the OJTI competency framework may not have been considered before, this chapter also elaborates on the rationale behind these competencies.

Note.— Where this manual uses terminology in a particular way, or has focused the terminology on ATCO training, this is explained. These terms may not be applied in exactly the same way in other learning environments.

2.2 UNDERSTANDING THE LEARNER POPULATION

2.2.1 Understanding the target audience that the OJTIs train is vital for ensuring that the OJTIs are adequately prepared and fully capable of making use of the set of tools, techniques and methods that are available to them. Their training should enable them to call on the competencies required to deliver training that is appropriate for the phase of training and tailored to each trainee's individual learning needs.

2.2.2 In an ATC operational environment, there are many different circumstances where some form of training is required and, likewise, the personnel who require this training may have varying learning profiles. Trainees in their early twenties, who are most likely to be starting their first professional job and gaining their first ATC rating, will bring with them a particular approach to learning and their expectations of the support they will receive from the organization and instructors. The trainees may, for example, have come from a learning environment that promotes group collaboration and inclusive interactions, where they may have been encouraged to challenge authority and are therefore keen to suggest "improvements" such as how training is conducted, or how procedures and regulatory requirements are delivered. Conversely, trainees may come from a learning environment where they have not been considered academically mature enough to have valid opinions and therefore have been studying and analysing the views of experts only. Other trainees may come from environments that have placed a strong emphasis on individual performance with limited collaboration.

2.2.3 OJTIs who have an understanding of the learning environment that their trainees have come from and have an adequate set of tools and techniques to work with, will be able to take advantage of the positive aspects of the trainees' learning backgrounds. The OJTIs will also be flexible enough to adapt their instructing styles to help trainees achieve the performance objectives they are required to demonstrate.

2.2.4 However, trainees are not necessarily all young or new to the ATC environment. There are likely to be many occasions when the OJTIs will be training more mature ATCOs who may have moved from one sector or unit to another, or may be undertaking refresher training or remedial training. While intergenerational factors have an influence on interaction with instructors, these learners are likely to bring with them the learning behaviours of the ATCO training environments to which they were previously exposed. This may include instructor-dominated practical teaching interactions and a heavy emphasis on assessment, but could also include a high level of self-directed support learning.

2.2.5 When analysing the background of the population that the OJTIs will be required to instruct, it may be helpful to consider the following:

- a) What kind of learning environment are the trainees accustomed to?
- b) What role did the trainees play in their previous learning?
- c) What was the role of the instructor?
- d) What knowledge, skills and attitudes (KSA) does the trainee already have?
- e) What is the trainee's educational background?
- f) Where are the trainees coming from (i.e. same country/many countries or different regions of same country)?
- g) What is the age range of the learner population?

2.2.6 An example checklist, that may be used to facilitate the learner analysis is contained in Appendix A.

2.3 THE LEARNING ENVIRONMENT

2.3.1 Having a clear understanding of the learning philosophy inherent in an organization, as well as of the beliefs and norms in the training environment, will help the designer to develop an OJTI competency model and an associated training/development programme that are appropriate for the environment where the instruction will take place.

2.3.2 At this early stage, it may be useful to also reflect on the organization's long-term training goals to make sure that the OJTIs are given the tools and techniques they will need to enable these goals. An understanding of the current training challenges faced by the ATCO training section and how the OJTIs are evolving will help the designer to develop a programme that addresses some of these challenges.

Example

A unit that traditionally had OJTIs who believed that new trainees must come in and prove themselves before being accepted as a team member. Consequently, the entire team, including the OJTIs, exclude or distance themselves from the trainees. This has been recognized as a limiting factor for the development/progress of trainees, therefore the organization wishes to evolve to a more inclusive, coaching environment. As a result, the ANSP develops a session on understanding biases and uses examples from the operational environment to challenge perceptions and attitudes within the unit.

2.3.3 When considering the current learning philosophy and beliefs about how training should be carried out, it may be useful to ask the following questions:

- a) What roles do you expect the OJTI to carry out (e.g. teacher, coach, mentor, assessor, motivator of the trainee centred model)?
- b) What is the role of the trainee in the learning process (e.g. committed partner, self-advocate, receptive learner, self-aware trainee, resilient, professional)?
- c) How best is the training instructor or trainee led (e.g. trainee-centred, instructor-led, coachdriven, self-study)?
- d) Who else within the organization contributes to a trainee's success (e.g. supervisor, manager, members of the unit, support programmes, wellness programmes, educational specialists, peers)?
- e) Do you believe that a trainee in the operational environment should be exposed to as many OJTIs as possible, or should the trainee have a limited number of OJTIs, or should this vary (e.g. primary instructor or team approach)?
- f) Are the OJTIs responsible for the social integration of the trainee into the team/unit (e.g. trainee onboarding, guidance through administrative processes, mentor, advisor regarding rules and etiquette)?
- g) Do the personnel involved in training have a positive approach towards trainees and their success (e.g. awareness of impact on trainee, understanding of own role in the learning environment, influenced by developmental bias)?

2.4 LEARNING IN THE OPERATIONAL ENVIRONMENT

2.4.1 The OJTI competency framework was developed from the belief that OJTIs are working in a time- and safety-critical environment where both the training demands and the operational requirements are complex. As such, it is important that OJTIs understand how learning takes place in this environment, what factors influence this learning and what competencies are necessary to provide training in this context. Factors that may affect or influence the operational learning environment are considered below.

2.4.2 Simulated versus operational training

2.4.2.1 Simulation training is able to replicate the tools, procedures and traffic flows of the live operational environment to varying degrees of realism. Synthetic training devices, however, are not able to fully replicate the complex nature of the live operational environment, including the social and psychological environment and the dynamics of real operational interpersonal communications within a team. Therefore, it becomes important for the OJTI to recognize that live operational training is the place where a new trainee is first going to experience these pressures and dynamics and needs to be prepared to support the trainee.

2.4.2.2 However, OJTIs should also be aware that the simulated operational environment has invaluable benefits compared to the live operational environment. It provides a controlled and individually tailored learning environment where certain deficiencies in the trainee's performance could be addressed without any risk to operations. Often, when trainees have consistent deficiencies in some skills and techniques or lose confidence, it becomes very difficult to achieve any progress when training them in a live operational environment. It is a lot more productive to temporarily remove such trainees from this environment and address these confidence and/or skill issues in a more controlled simulated operational environment. Then, when trainees are ready and regain their confidence, they can return to the live operational environment. For more details about simulator use, see Appendix B.

2.4.3 Maintaining a safe environment

2.4.3.1 The responsibility to maintain operational safety rests with the OJTIs. Recognition should be given to the fact that the OJTIs have to maintain a safe operational environment and provide training at the same time, which may not always be possible. The OJTIs may elect to stop the training for a period of time during the shift and take full control of the traffic from the trainees. This choice may not be driven by the relative lack of the trainees' competencies, but rather by the OJTIs' self-assessments of their own abilities to maintain situational awareness, understand the intentions of the trainees, and simultaneously ensure safe operations.

2.4.3.2 An OJTI should ensure that training is provided in a way that enables the trainee to continue to manage the traffic safely. Examples of this may include:

- a) the possibility for the OJTI to request a sector or tower position to be split so that the trainee can continue training and the OJTI can retain the ability to maintain a safe environment;
- b) choosing sectors that are commensurate with the trainee's competence level;
- c) coordinating with adjacent sectors to manage the flow of incoming traffic; and
- d) starting a session with the trainee on a less busy sector and if performance is high, merge with another sector to increase complexity and/or traffic levels.

2.4.4 Learning through mistakes, errors and/or misjudgments

2.4.4.1 It is common knowledge that the value of learning is often through the mistakes, errors and misjudgments that we make. However, this approach to learning needs to be carefully managed by the OJTI in the operational environment, primarily due to it being a safety-critical environment but also potentially due to a focus on providing an efficient service. The challenge for the OJTI is to achieve a balance between allowing the trainee time to recognize and self-correct mistakes and misjudgments and the OJTI maintaining safety and an acceptable level of efficiency through timely intervention.

Examples

1. **Trainee ATCO issues a climb clearance to an aircraft that is head on to opposite direction traffic in a clearly unsafe position:** in this situation, the OJTI decides not to correct the trainee, having immediately determined that the traffic complexity is low and there is sufficient time to intervene before the situation becomes dangerous. The OJTI then asks the trainee to identify conflicts the trainee is currently monitoring. From the trainee's answer, it is clear that the trainee has not identified the climb conflict. The OJTI further prompts the trainee to determine the rate of climb of the aircraft that will cause the conflict. At this point, the trainee identifies the climb conflict and turns the climbing aircraft away from the oncoming traffic.
2. **Trainee ATCO issues a climb clearance to an aircraft that is head on to opposite direction traffic in a clearly unsafe position:** in this situation, the OJTI decides not to correct the trainee having immediately determined that the traffic complexity is low and there is sufficient time to intervene before the situation becomes dangerous. The OJTI then asks the trainee to identify conflicts they are currently monitoring. From the trainee's answer, it is clear that they have not identified the climb conflict. The OJTI further prompts the trainee to determine the rate of climb of the aircraft that will cause

the conflict. At this point, the trainee has still not identified the climb conflict and the OJTI determines that, if the situation runs for much longer, it will become unsafe and so identifies the conflict to the trainee. The trainee then turns the climbing aircraft away from the oncoming traffic.

3. **ATCO trainee misjudges the arrival sequence:** in this situation, the ATCO trainee has chosen an arrival sequence that will not be the most efficient and will increase the workload considerably. The OJTI determines that the situation remains safe, that the extra track miles to touchdown for some aircraft will not be excessive and that none of the aircraft will be positioned so that they are at risk of an unstabilized approach. Consequently, the OJTI does not correct the trainee but rather works with the trainee to achieve the sequence. After the sequence has been achieved, the trainee comments that it has become “really busy” and that the trainee needs to work extra hard to make the sequence work. The OJTI agrees and suggests that for the next sequence the trainee should concentrate on ways to manage the traffic that will reduce the workload and be more efficient for the aircraft. After the session, the OJTI and trainee discuss why the first sequence created so much workload and how it could have been performed differently.

2.4.4.2 OJTIs should also recognize that no one performs correctly 100 per cent of the time. A more realistic reflection of ATCO performance would be to recognize that ATCOs are constantly making decisions and revising them as the traffic situation evolves. A trainee ATCO may need to revise decisions more frequently than a qualified ATCO simply due to a lack of experience. These “revisions” can sometimes be evaluated as mistakes or proof of ATCO trainee deficiencies; OJTIs should be careful to differentiate between genuine mistakes and adjustments based on an evolving traffic situation.

2.4.5 Visual and auditory cues that aid the OJTI

Many ATC units operate with technology that automates various controlling actions. This influences the number of visual and auditory cues available to the OJTIs to maintain their situational awareness and their understanding of what the trainee is thinking and planning. When the cues change, it makes it far more difficult for the OJTI to know what the trainee is aware of and how the trainee might be thinking. Consequently, when new technology is implemented, it is necessary to reflect on the resulting impact it has on the OJTI's ability to maintain situational awareness. Teaching and coaching strategies have to be adapted accordingly.

Examples

1. **A unit is implementing electronic flight progress strips (EFPS) or transitioning to a stripless environment:** in an environment where control is accomplished by using paper strips, controllers, traditionally, would record warnings on the strips, highlight (cock or tilt) the strip when an immediate action is required, and/or rearrange the sequence of strips to align with the planned sequence. In an environment where there are no paper strips and, instead, an electronic strips display is used (or all the required information is displayed on the data tag), it might be challenging for the OJTIs to know how the trainees are prioritizing their work. For instance, in an EFPS environment, it can be difficult to see what strips the trainee is manipulating, or what notes the trainee is writing down on the strips, or what strips are highlighted as requiring immediate action, or simply what strips are missing/left on the board.

2. **A unit is implementing an ATS system where routes are electronically presented to the controller and/or frequencies are displayed at the time of doing a transfer:** without visual aids on the controller screen, trainees are required to know where the waypoints, NAVAIDs, air routes, etc., are located, so that they have a mental picture of where aircraft are crossing and where conflicts are likely to occur. They are also required to memorize the frequency/sector pairing and potentially much more information. With ATM systems that have the ability to display dynamically to the controller the routes, frequencies, NAVAIDs, etc., it may be challenging for the OJTI to know whether the trainees have a mental picture of the required information or if they simply rely on the visual aids displayed on the screen. Therefore, it may be required to:
 - a) question the trainee on these elements; and/or
 - b) ask the trainee to point out on the screen certain elements without using the automated functions of the ATM system; and/or
 - c) from time to time, work without certain elements of the system to check the capacity of the trainee to work without these automated functions.
3. **A unit starts using CPDLC:** as a result, the OJTI struggles to see precisely what the trainees are typing/inputting as an instruction/clearance. To mitigate this, the OJTI asks the trainees to verbalize what they are inputting.

2.4.6 Current learning is not a guarantee of future learning

2.4.6.1 It is well recognized that trainees have very different learning trajectories. Some trainees are able to maintain a positive learning curve throughout their training. However, it is more typical that trainees will have periods where they plateau before climbing again. In some instances, the trainee's learning trajectory may even take a slight downward turn before it begins to rise again. OJTIs are usually well aware of this phenomenon and are able to support the trainee through the plateaus. The challenge for the OJTI is to determine if the slowdown in learning is simply because the trainees' need some time to consolidate lessons, or if it is an expected levelling-off in relation to the progress, based on a "normal" learning curve, or if it is a result of gaps in their skill sets that need to be addressed. OJTIs must be able to differentiate between a normal decrease in the rate of progress, a plateau in progress, and regression.

2.4.6.2 However, there may be situations where a trainee's learning plateaus for a considerably longer period than is typical or takes a significant downturn. The danger in these situations is that the OJTIs may conclude that the trainee is not capable of reaching competence and stop putting effort into enabling the trainee to improve performance. OJTIs should be aware that current performance might not always be indicative of future performance and continue to support the trainee.

Example

After demonstrating moderate and sustained progression, the trainee's performance begins to plateau. As the OJTI works to implement strategies to resume the learning progression, the trainee begins to make repeated mistakes and shows little insight. The OJTI reports that the trainee has few resolutions for resolving challenges and suspects that the trainee has plateaued and is now at risk of regression. Following an analysis of the learning progression made by the OJTI team, the trainee is provided with two weeks of leave. Upon return, the trainee is assigned to a quieter sector for the first few shifts and works with a very experienced OJTI who is skilled at building up trainees' confidence. When the trainee shows

a progressive upward trend, the trainee is reallocated to busier sectors and returns to regular OJTIs. The trainee's learning progression rapidly accelerates and the trainee is able to complete training successfully.

2.5 OJTI ROLES

2.5.1 As considered in 2.3, it is important to understand the ANSPs learning culture, but it is equally important to understand the ANSPs expectations of how the OJTIs will perform when engaged with trainees. These expectations can arise from the belief that an OJTI should be an effective teacher, human factors expert, a mentor and, at times, a part-time “psychologist”. The reality is that the OJTIs are seldomly formally educated in any of these fields and their expertise will come from the training and development activities that are provided by the ANSP.

2.5.2 Expectations of what OJTIs are capable of delivering should be based on an understanding of the factors that influence learning in the operational environment and the roles that the OJTIs are expected to play in managing these factors. Their roles in operational training are challenging, therefore investment in developing the competencies that OJTIs require is critical to their success as instructors.

2.5.3 At the same time, the organization needs to recognize that even when OJTIs have been appropriately trained and prepared, there is no guarantee that all trainees will progress through the training successfully.

2.5.4 The competencies in the OJTI competency framework enable an OJTI to perform various roles in the training environment. These roles may include that of the teacher/instructor, coach, mentor and/or assessor.

2.5.5 Training organizations are responsible for determining which roles their OJTIs carry out and whether these roles are combined or carried out by separate individuals.

Examples

ANSP 1 has decided that their OJTIs should be competent to deliver instruction to all trainees, irrespective of where they are in the training progression. In this case, the OJTIs will perform the roles of teacher/instructor for new trainees and coach for the more experienced trainees or trainees who are in the later stages of their training. The OJTIs are also required to fulfil the role of mentor to some trainees in the team who are progressing towards competence. These OJTIs are also capable of delivering OJT to any validated controller, who, for whatever reason, requires a period of OJT, e.g. when returning after a long absence. They have, however, decided that the role of assessor is separate from that of the OJTI and they have a dedicated pool of ATC competence assessors.

ANSP 2 has a lengthy training programme for trainees who are doing their first validation at the area control centre and they have decided that their OJTIs are going to specialize. Some OJTIs carry out the primary teaching/instructing role that is required in the earlier stages of training, while another group of OJTIs are specialized coaches who take over the training towards the end of the programme. These OJTIs are also considered to be assessors and can determine if a trainee has demonstrated the performance required to be declared competent.

ANSP 3 is obliged by national regulations to ensure that personnel responsible for determining if a trainee is competent, are not the same personnel who provide the instruction. Consequently, this ANSP has split the teacher/instructor and coach roles from the assessor role. Furthermore, this ANSP assigns each trainee a mentor who is not involved in the day-to-day training activities.

2.5.6 When developing the training programme(s) for OJTIs, the designer must have a clear understanding of how these roles have been assigned within an ANSP. This information is typically captured during the completion of the training specification (which is detailed in Chapter 3).

2.5.7 The different roles that the OJTI may perform are described below. Please note that a training organization or ANSP may already have an understanding of these roles and that these may differ slightly from how they are described in this manual. Organizations are free to adapt the competencies and associated observable behaviours to match their understanding of these roles.

2.5.8 Teacher/Instructor

In the operational environment, the OJTI who is teaching/instructing, is engaged in explaining to a trainee how the trainee should do or achieve something and then actively ensures that decisions are made and actions are carried out as anticipated. The OJTI may engage the trainee with questions or prompts but the engagement is largely in one direction: from OJTI to trainee. OJTIs who carry out the teaching role typically have been trained in pedagogical techniques and understand cognitive processes.

2.5.9 Coach

OJTIs typically carry out a set of activities that are aimed at guiding and supporting a trainee's progress to independent performance. This includes enabling a trainee to refine already acquired competencies to transitioning to integrated and independent performance. Confidence, as a coach, is acquired when the OJTI has a clear understanding of the operational environment and the ability to predict the likely consequences and outcomes of a trainee's actions in that environment.

2.5.10 Mentor

OJTIs may perform the role of a mentor to encourage and support trainees in developing positive attitudes and behaviours towards their training and integration into the team and wider professional environment. This role may be assigned to a person who is not providing instruction.

2.5.11 Assessor

2.5.11.1 The assessor evaluates performance to determine if required competency standards are met.

2.5.11.2 Although this section has separated out the role of teacher/instructor and coach, it should be evident that during an OJT session, the OJTI may use both instructing and coaching depending on the context at the time and the actions of the trainee.

2.6 THE OJTI COMPETENCIES

2.6.1 When an organization develops an OJTI competency model, consideration should be given to how relevant the competencies described in the ICAO competency framework for ATC OJTIs are to the organization; to help with these considerations, this section describes some of the rationale behind the competencies and how they may be relevant to the OJT environment.

2.6.2 Situational Awareness

2.6.2.1 One of the key competencies for an ATCO is situational awareness, but for an OJTI, this competency extends further than situational awareness in relation to only the traffic situation. An OJTI should have the additional capacity to maintain situational awareness in relation to the impact the trainee's performance is having on the surrounding sectors and/or units.

2.6.2.2 More importantly, OJTIs should be aware of their trainee's current mental and emotional state so that the OJTIs can take timely steps to prevent cognitive overload or extreme stress reactions. As such, the OJTI should be able to recognize the early signs of cognitive overload and unhealthy stress.

2.6.3 Safety and Efficiency Management

2.6.3.1 As part of the learning process, it can be beneficial for trainees to observe the outcome of the decisions that they have made. These outcomes may be either positive or negative but both types provide an opportunity for the trainees to learn something about their performances. This may include, for example, situations where the trainee has set up an arrival sequence or an in-trail sequence, or decided on a particular method to separate aircraft, or determined how to prioritize a multitude of competing tasks.

2.6.3.2 When an outcome is likely to yield a positive result (e.g. an efficient arrival sequence or resolution of a conflict with a few well-chosen instructions that resulted in minimal delay to aircraft), the OJTI may use this learning event to reinforce positive behaviours and encourage self-confidence.

2.6.3.3 However, when the outcome may not be optimal or desirable, the OJTI has to balance the potential for the trainee to learn from the situation by letting it "run", against safety and efficiency considerations. The OJTI has to determine when and for how long it is appropriate to allow an undesirable situation to develop; this includes taking into account the ability of the OJTI to recover the situation before safety is compromised.

2.6.3.4 Safety is without a doubt a determining factor in deciding when to intervene with a trainee's actions but what may be less clear for an OJTI, is when to intervene if efficiency is compromised but there is no safety risk. In this case, the OJTI should be aware of the organization's efficiency goals.

2.6.4 Mentoring

2.6.4.1 In non-operational environments, mentoring has traditionally been seen as an activity that takes place separately from any training activity (e.g. teaching, instructing and coaching). Usually a mentor is assigned to trainees to support them as they develop in their careers. Mentors encourage the trainees to self-reflect with the purpose of improving performance, helping them to stay motivated during challenging events, providing practical advice on how to navigate the workplace and develop goals for the future. The mentor would not normally be involved in the day-to-day training of the trainee.

2.6.4.2 In ATCO training, a mentor may be an OJTI who is not actively involved in providing OJT for that trainee. In some ANSPs, the mentor may not be an ATCO.

2.6.4.3 Regardless of the way in which an ANSP assigns the mentoring role, there are some mentoring behaviours the OJTI should display that will enhance a trainee's learning experience. These include, promoting positive working relationships and a positive approach to training and helping the trainees build confidence in the workplace. If the trainee is assigned to a team, all the team members could play a mentoring role for the trainee.

2.6.5 Teaching/Instructing and Coaching

2.6.5.1 The notions of teaching/instructing and coaching have been included in this competency because in the ATC operational training environment, these notions are typically used interchangeably by the OJTI depending on the needs of the trainees at any particular point in their training. This competency recognizes that the OJTI provides different levels of learning support at different stages of training. During the early stages of operational OJT, the trainee may be learning routines and traffic flows with active teaching from the OJTI. It may be appropriate, at this stage, for the OJTI to provide clear and positive instructions to the trainee on, for example, what to prioritize and how to manage certain situations, with reflection coming later during the debriefing. As the trainee gains confidence, the OJTI enables the trainee to start controlling independently through various coaching techniques. Towards the end of the training, the OJTI is primarily monitoring and facilitating the trainees' self-reflection on their individual performances.

2.6.5.2 The switching between active teaching/instructing and coaching is not necessarily linear. As trainees encounter new or novel situations, technologies, or procedures during the life cycle of their training, the OJTI may be required to revert to active teaching techniques until such time as the trainees have automated the required behaviours.

2.6.5.3 The coach often displays behaviours that are also associated with mentoring.

2.6.6 Communication

2.6.6.1 The ATCO competency dealing with communication is focused on the communication with flight crew and other ATC units; whereas this competency, in the context of the OJTI, is associated with effective communication with a trainee.

2.6.6.2 Communicating in an operational training context can be a complex activity. Not only do the OJTIs need to consider what they are saying to the trainees and how, but also if it is the right time. The OJTIs also need to take into account the way in which the message or question is delivered so as to convey the appropriate amount of concern or urgency.

Example

A trainee's performance has been less than optimal for the previous three weeks. The trainee is losing confidence and this is having an additional negative impact on the trainee's performance. During a moderately busy shift, the OJTI observes that the trainee is setting up an arrival sequence that is going to be very difficult to achieve and likely to increase the trainee's workload to unmanageable levels. The OJTI wants the trainees to determine for themselves that the sequence is not going to work and develop an alternative plan.

Whichever coaching techniques the OJTI elects to use, the OJTI will also have to consider how to communicate during this interaction. The OJTI may need to consider whether it is more appropriate to speak calmly so as not to further stress the trainee, or to speak more urgently conveying that it is important to find a new plan soon. The OJTI needs to figure out

how much information the trainee can absorb at that moment because a long explanation may act as a distraction and become counter-productive. The OJTI may decide that a few pointed questions will be enough to help the trainee identify the problem with the arrival sequence.

Furthermore, the OJTI will need to figure out a way to later explain to the trainee how the the trainee might think about the planning process for arrival sequences. Additionally, the OJTI will need to consider the right tone for dealing with this interaction, knowing that the trainee is already under confident.

2.6.7 Assessment

2.6.7.1 This competency is related to both formative and summative assessments.

2.6.7.2 In the context of formative assessments, the observable behaviours are focused on evaluating a trainee's performance for learning purposes. OJTIs should be able to analyse a trainee's performance so that they can determine if the trainee is competent, or if not, the root cause of performance issues and then work out the actions required to overcome those issues.

2.6.7.3 Within an ANSP, the conduct of the summative assessments may be formalized as a separate assessor role. In this case, the assessor would be responsible for determining if a trainee meets the final competency standard (FCS).

2.6.8 Collaboration

2.6.8.1 Within an ANSP, there are a number of contributors to the eventual success of a trainee. Some of these contributors, such as OJTIs and the training team, are in routine contact with the trainee and have a significant role to play in enabling the trainee to achieve competence. Collaborating with this team to ensure that the trainee gets the best possible training experience, improves the likelihood of a successful training outcome.

2.6.8.2 However, it is not only the training team and OJTIs that play a role. Human factors specialists, mentors, resilience coaches and learning specialists are just some of the personnel who can contribute to the success of the trainee. For an OJTI, knowing who else in the organization can help, and, as the frontline support for the trainee, knowing when such assistance is necessary, ensures that the trainee is given every opportunity to succeed.

2.6.9 Self-assessment

2.6.9.1 Reflective competence is recognized as a strong trait of an effective OJTI and the behaviours described in this competency are focused on self-assessment to improve the OJTIs instructional capabilities.

2.6.9.2 Self-assessment is a key motivator for continuous learning and professional growth. All highly skilled instructors engage in regular self-assessment and continuous education aimed at developing the OJTIs' instructional capacity to better serve the learning needs of trainees.

2.6.10 Ethics and Integrity

2.6.10.1 This competency is focused on ensuring that OJTIs give a trainee a fair and honest opportunity to succeed. Rules regarding privacy and confidentiality may be derived from both national regulations and organizational policies and the OJTI needs to be aware of these rules.

2.6.10.2 Some of the observable behaviours may be driven by the organization's code of conduct (or equivalent); however, other behaviours such as "managing professional relationships with the appropriate role boundaries" may be culturally driven. If such observable behaviours are included in the OJTI competency model, then it must be clear to the OJTI what this behaviour means in terms of the relationship with trainees. To make this clear, an evidence guide may provide statements and examples of acceptable behaviour.

Chapter 3

DESIGN OF COMPETENCY-BASED TRAINING AND ASSESSMENT

3.1 GENERAL

This chapter provides a step-by-step guide for organizations intending to establish OJTI competency-based training and assessment that is specific to the organization's environment and requirements. It makes use of the ICAO competency framework for ATC OJTIs and the ADDIE (analyse, design, develop, implement and evaluate) instructional design model.

Note.— Readers who are already familiar with Doc 10056, Volume I, Chapter 2, will recognize that the descriptions of the components (3.2) and the workflows (3.3) in this volume are similar. From 3.4 onward the method has been tailored to the OJTI training and development considerations.

3.2 THE COMPONENTS OF COMPETENCY-BASED TRAINING AND ASSESSMENT

3.2.1 The aim of competency-based training and assessment for OJTIs is to develop competent instructors to guide trainees in the live operational environment for the purpose of trainees attaining their professional qualifications.

3.2.2 To achieve this aim various components are necessary. These components appear in Figure II-3-1.

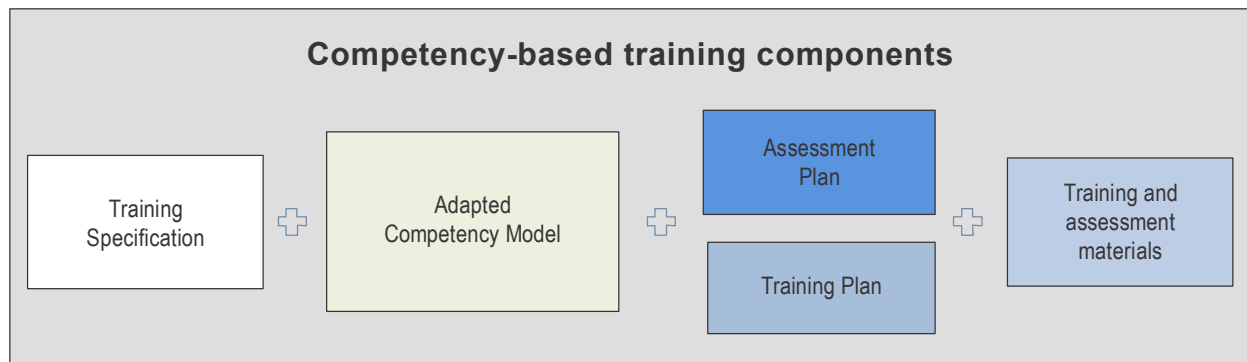


Figure II-3-1. Components of competency-based training

<i>Training Specification</i>	The document that describes the purpose of the training, the task list and the requirements that shall be fulfilled when designing the training.				
<i>Adapted Competency Model</i>	A group of competencies with their associated description and performance criteria adapted from an ICAO competency framework that an organization uses to develop competency-based training and assessment for a given role. The components of an adapted competency model are: <table border="0"> <tr> <td><i>Competencies</i></td><td>The competencies required to be achieved by the end of training.</td></tr> <tr> <td><i>Performance criteria</i></td><td>Statements used to assess whether the required levels of performance have been achieved for a competency. A performance criterion consists of an observable behaviour, condition(s) and a competency standard.</td></tr> </table>	<i>Competencies</i>	The competencies required to be achieved by the end of training.	<i>Performance criteria</i>	Statements used to assess whether the required levels of performance have been achieved for a competency. A performance criterion consists of an observable behaviour, condition(s) and a competency standard.
<i>Competencies</i>	The competencies required to be achieved by the end of training.				
<i>Performance criteria</i>	Statements used to assess whether the required levels of performance have been achieved for a competency. A performance criterion consists of an observable behaviour, condition(s) and a competency standard.				
<i>Assessment Plan</i>	The document that details the assessment events and tools (evidence guide, competency checklist, competency assessment form) that will be used to determine if competence has been achieved.				
<i>Training Plan</i>	The document used for structuring, developing and delivering the training.				
<i>Training and assessment materials</i>	All the materials used to deliver the training in accordance with the training plan. These may include course programme, training notes, manuals, presentations, simulated exercises, etc.				

3.3 OVERVIEW OF COMPETENCY-BASED TRAINING WORKFLOWS



3.3.1 The first two workflows, ANALYSE (i.e. analyse training need) and DESIGN (i.e. design local competency-based training and assessment), establish the training specification, the adapted competency model, the assessment plan and the training plan that will be used to DEVELOP and IMPLEMENT the training course. The EVALUATE the course workflow reviews the effectiveness of the training and assessment conducted and recommends improvements, as appropriate.

3.3.2 This chapter focuses on the Analyse and Design workflows.

3.3.3 An overview of the remaining workflows is provided at the end of the chapter to highlight the important issues directly related to competency-based training and assessment.

3.3.4 A stepped approach is worked through for each of the Analyse and Design workflows and details:

- a) the inputs required;
- b) the process to be worked through; and
- c) the outputs achieved on completion of each process.

3.3.5 Note that the “Analyse” output becomes one of the inputs for the “Design” workflow.

3.4 WORKFLOW 1: ANALYSE TRAINING NEED

3.4.1 The need to train/develop OJTIs, maintain their competencies, and enhance their performances, may be triggered in various ways and have differing requirements based on the regulatory environment and/or the organization's needs. Once a request has been received, the first step is to carry out a training needs analysis. During the training needs analysis, the purpose of the training is considered as it relates to these requirements. A training specification describes, among other things, the end state to be achieved.