

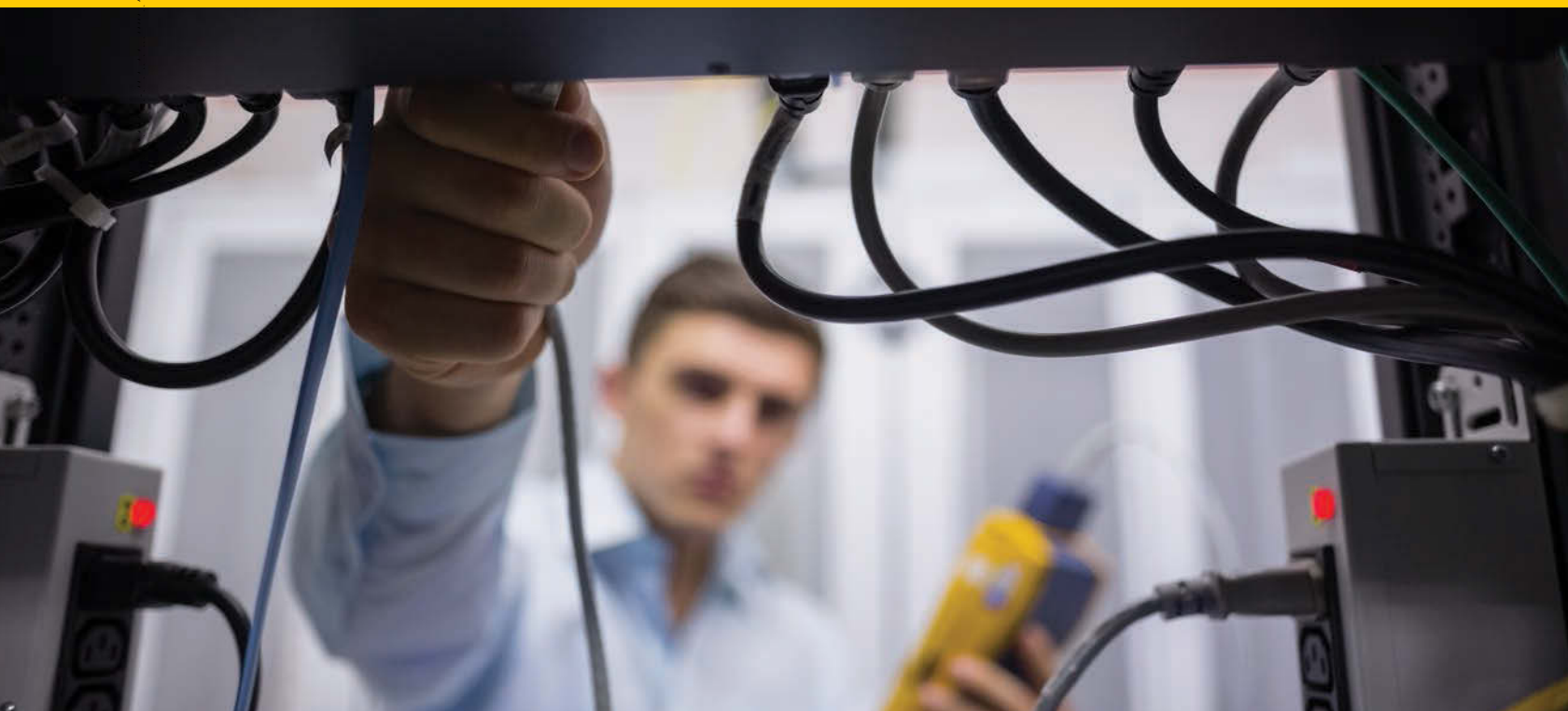


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Doc 10057

Manual on Air Traffic Safety Electronics Personnel Competency-based Training and Assessment

Second Edition, 2020



Approved by and published under the authority of the Secretary General

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Published in separate English, Arabic, Chinese, French, Russian
and Spanish editions by the
INTERNATIONAL CIVIL AVIATION ORGANIZATION
999 Robert-Bourassa Boulevard, Montréal, Quebec, Canada H3C 5H7

For ordering information and for a complete listing of sales agents
and booksellers, please go to the ICAO website at www.icao.int

Second edition, 2020

**Doc 10057, *Manual on Air Traffic Safety Electronics
Personnel (ATSEP) Competency-based Training and Assessment***
Order Number: 10057
ISBN 978-92-9258-942-4

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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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TABLE OF CONTENTS

	<i>Page</i>
Foreword	(vii)
Glossary	(ix)
Acronyms	(xi)
Publications	(xiii)
Chapter 1. Introduction	1-1
1.1 Purpose	1-1
1.2 Context	1-1
1.3 ATSEP training phases	1-3
1.4 ATSEP training paths	1-4
1.5 Certificates of competence	1-4
Chapter 2. Developing a competency-based training and assessment programme for ATSEP	2-1
2.1 Introduction	2-1
2.2 Prerequisites: ATSEP scope, profiles and tasks in an organization	2-2
2.3 ADDIE model workflows	2-3
2.4 Workflow 1 – Analyse training needs	2-4
2.5 Workflow 2 – Design local competency-based training and assessment	2-5
2.6 Workflow 3 – Develop the training and assessment materials	2-11
2.7 Workflow 4 – Implement the course in accordance with the training and assessment plans	2-11
2.8 Workflow 5 – Evaluate the course, including the training and assessment plans	2-12
Chapter 3. Initial training phase	3-1
3.1 Introduction	3-1
3.2 Basic training module	3-1
3.3 Qualification training modules	3-2
Chapter 4. Unit training phase	4-1
4.1 Introduction	4-1
4.2 Training plan	4-1
4.3 Assessment plan	4-2
4.4 Unit training modules	4-2
Chapter 5. Continuation training	5-1
5.1 Introduction	5-1
5.2 Refresher training	5-1

5.3	Emergency training	5-2
5.4	Conversion training	5-3
Chapter 6.	Development training	6-1
Appendix A.	Developing ATSEP competency-based training and assessment: examples	App A-1
Appendix B.	Recommended training objectives for initial training	App B-1
Appendix C.	Training objectives taxonomy	App C-1
Appendix D.	Development training scenarios	App D-1

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:

- a) 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
- b) 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 ATM professionals. The ATM system is evolving towards a globally integrated and collaborative system. Air traffic safety electronics personnel (ATSEP) involved in the installation, operation and maintenance of the communication, navigation, surveillance/air traffic management (CNS/ATM) 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. This shared understanding becomes critical when considering the increasing traffic and the growing complexity and interconnectedness of the systems involved. As controller-pilot and system-to-system interfaces evolve, the ATSEP installing, operating and managing the CNS/ATM system need common competencies and practices to ensure seamless operations.

In February 2015, procedures for the implementation of competency-based training and assessment for ATSEP 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 ATSEP. The procedures provide a flexible framework that stakeholders can adapt to their local operational contexts and requirements.

Some of the provisions already 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 ATSEP.

Comments concerning the manual should be addressed to:

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GLOSSARY

DEFINITIONS

Activities. A group of related tasks.

Approved training. Training conducted under special curricula and supervision approved by a Contracting State.

Assessment (evidence) guide. A guide that provides detailed information (e.g. tolerances) 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 combination of skills, knowledge and attitudes required to perform a task to the prescribed standard.

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.

Observable behaviour (OB). 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.

Task. Any action that is performed with a particular objective, in support of a defined activity.

Unit training. Training that addresses theoretical and practical issues from equipment-specific and/or site-specific perspectives. It includes on-the-job training.



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ACRONYMS

The following abbreviations are used in this document:

ACC	area control centre
ADDIE	analyse, design, develop, implement and evaluate
ADS-B	automatic dependent surveillance — broadcast
ADS-C	automatic dependent surveillance — contract
AIP	aeronautical information publication
ANS	air navigation services
ANSP	air navigation service provider
ASR	airport surveillance radar
ATC	air traffic control
ATCO	air traffic controller
ATM	air traffic management
ATS	air traffic services
ATSEP	air traffic safety electronics personnel
CNS	communication, navigation, surveillance
COM	communication
DF	direction finder
DME	distance measuring equipment
EMI	electro-magnetic interference
FAT	factory acceptance test
FIR	flight information region
GBAS	ground-based augmentation system
GNSS	global navigation satellite system
GPS	global positioning system
HHI	human-human interaction
HMI	human-machine interaction
IEEE	Institute of Electrical and Electronic Engineers
ILS	instrument landing system
IMS	integrated management system
LR	logging and reporting
LRM	lowest replaceable module
MLS	microwave landing system
MSSR	monopulse secondary surveillance radar
NavAid	navigation aid
NDB	non-directional beacon
OB	observable behaviour
OJT	on-the-job training
PO	position operation
PSR	primary surveillance radar
QMS	quality management system
RF	radio frequency
RR	release and restoration
R/T	receiver/transmitter
S/E	system/equipment
SAT	site acceptance test

(xii)

SMC	system monitoring and control
SMS	safety management system
SS	site specific SMC task
SSR	secondary surveillance radar
SUR	surveillance
TFI	technical flight inspector
TRM	team resource management
UAC	upper area control centre
UAT	universal access transceiver
UHF	ultra high frequency
VHF	very high frequency
VOR	very high frequency omnidirectional radio range

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PUBLICATIONS

(referred to in this manual)

Annexes to the Convention on International Civil Aviation

Annex 1 — *Personnel Licensing*
Annex 3 — *Meteorological Service for International Air Navigation*
Annex 10 — *Aeronautical Telecommunications*
Annex 11 — *Air Traffic Services*
Annex 14 — *Aerodromes*
Annex 19 — *Safety Management*

Procedures for Air Navigation Services (PANS)

Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444)
Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868)

Manuals

Aeronautical Surveillance Manual (Doc 9924)
Global Navigation Satellite System (GNSS) Manual (Doc 9849)
Human Factors Training Manual (Doc 9683)
Manual on Testing of Radio Navigation Aids (Doc 8071)
Performance-based Navigation (PBN) Manual (Doc 9613)
Safety Management Manual (SMM) (Doc 9859)

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Chapter 1

INTRODUCTION

1.1 PURPOSE

1.1.1 This manual provides guidance to air navigation service providers (ANSPs) and training organizations on the development of air traffic safety electronics personnel (ATSEP) competency-based training and assessment programmes.

1.1.2 This chapter introduces concepts underlying the development of ATSEP competency-based training and assessment programmes.

1.2 CONTEXT

1.2.1 Regulatory environment

1.2.1.1 ATSEP are personnel proven competent in the installation, operation and/or maintenance of a communications, navigation, surveillance/air traffic management (CNS/ATM) system. It is the responsibility of the ANSP to define the scope of ATSEP activities (*Procedures for Air Navigation Services — Training* [PANS-TRG, Doc 9868] refers).

1.2.1.2 ATSEP play a significant role in the safe operation of CNS/ATM systems. All those involved in the development of competency-based training and assessment programmes for ATSEP should have a detailed understanding of the regulatory environment in which they work.

1.2.1.3 ATSEP training programmes should be clearly linked to ATSEP activities taking into consideration the ANSP's safety management and quality assurance systems as well as any security concerns.

1.2.1.4 National regulations may define the requirements with respect to age, knowledge, experience, skills and attitudes of ATSEP.

1.2.2 Scope of ATSEP activities

1.2.2.1 ATSEP may perform activities on a wide variety of CNS/ATM systems and equipment requiring a wide range of competencies, expertise, knowledge and skills in disciplines such as electronics, computer sciences and networks.

1.2.2.2 Figure 1-1 illustrates the possible scope of ATSEP activities using as a basis the engineering life cycle from system conception through design, operation and, lastly, decommissioning.

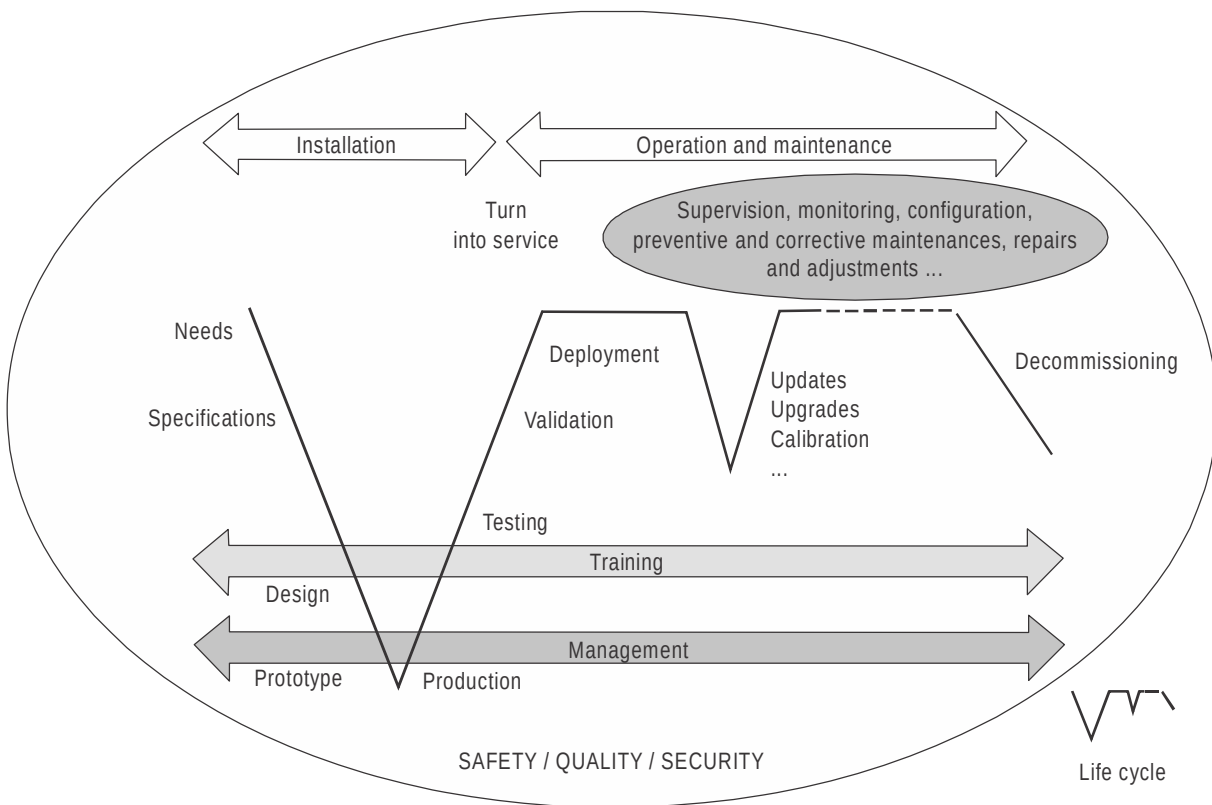


Figure 1-1. Scope of ATSEP activities

1.2.2.3 The ANSP is responsible for determining the scope of its ATSEP activities by selecting the activities from within the cycle depicted in Figure 1-1:

- a) **Scope of operational activities.** Supervision, monitoring, control and reporting in real time of technical services, supported by electronic systems and/or equipment for CNS/ATM.
- b) **Scope of maintenance activities.** Preventive maintenance, corrective maintenance and/or modification and updates of supporting electronic systems and/or equipment for CNS/ATM.
- c) **Scope of installation activities.** Project management, specification, conception, validation, integration, test and acceptance, safety assessment, calibration, certification, optimization and upgrade of supporting electronic systems and/or equipment for CNS/ATM, engineering activities.

1.2.2.4 In addition to technical activities, others may be added related to management, teaching or assessment, safety management, security management (e.g. networks) and quality management.

1.2.2.5 The degree of responsibility given to ATSEP varies among States and ANSPs. In all cases, the ATSEP must be proven competent to work on CNS/ATM systems or equipment ensuring safety and quality through a documented process.

1.2.2.6 Once an ANSP has determined the scope of ATSEP activities, it can establish ATSEP job profiles comprised of identified tasks.

1.2.2.7 With the introduction of new technologies, maintenance methods and design processes, States and ANSPs should regularly review the scope of ATSEP activities to ensure that ATSEP maintain competencies appropriate to their current tasks and with an eye to future tasks. Training programmes should be focused on the specific tasks assigned to ATSEP within an ANSP.

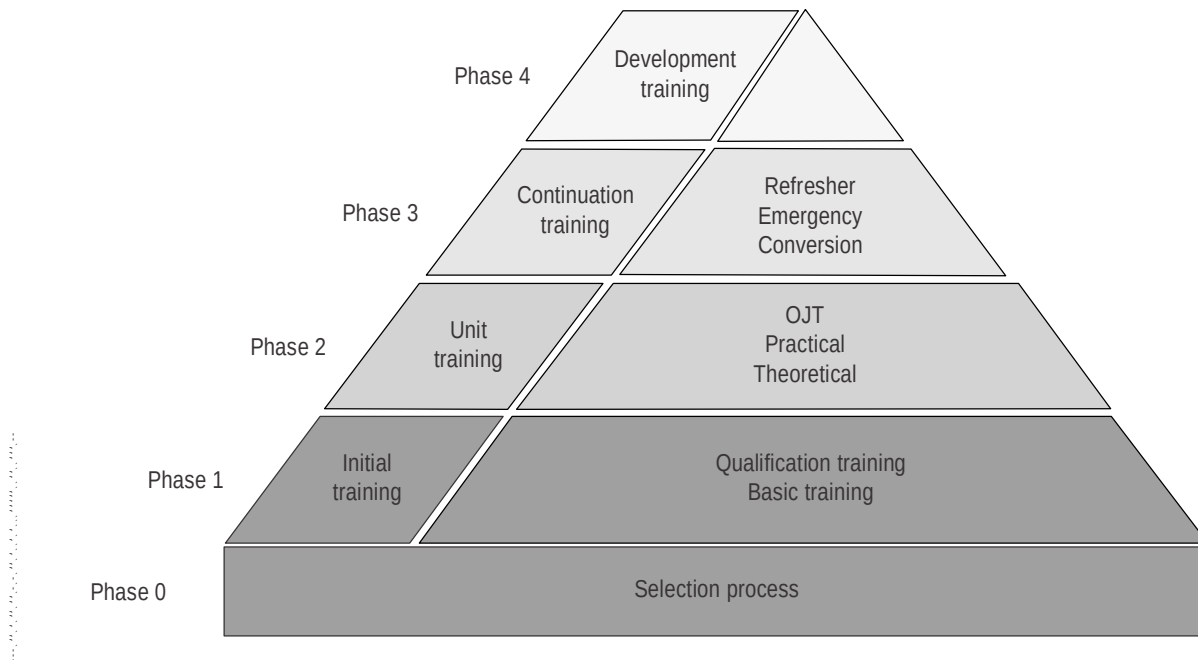


Figure 1-2. ATSEP training phases

1.3 ATSEP TRAINING PHASES

1.3.1 It is recommended that ATSEP training be organized in the phases illustrated in Figure 1-2, which will also facilitate global standardization for ATSEP training. The phases are outlined as follows:

a) **Phase 0: Selection**

The selection process is not a training phase. However, the ANSP will select candidates in line with its ATSEP profiles and activities.

b) **Phase 1: Initial training**

Initial training is designed to provide underpinning knowledge and skills and is delivered in two parts: basic training applicable to all ATSEP and qualification training specific to ATSEP profiles.

c) **Phase 2: Unit training**

After successfully completing the initial training phase, ATSEP undergo unit training. This phase is oriented to the tasks an ATSEP will perform in a specific environment. Unit training addresses theoretical and practical issues from equipment-specific and/or site-specific perspectives. It includes on-the-job training (OJT). It is in this phase that ATSEP competencies are developed and assessed.

d) **Phase 3: Continuation training**

The continuation training phase is designed to maintain competencies and prepare for system upgrades and/or modifications. It includes refresher, emergency and conversion training.

e) **Phase 4: Development training**

This phase focuses on the development of additional competencies required by a change to or an evolution of an ATSEP's profile.

1.3.2 The ATSEP competency framework can be found in the PANS-TRG.

1.4 ATSEP TRAINING PATHS

1.4.1 ATSEP will go through training at different points in their careers. Typically, ATSEP will progress from the selection phase to the completion of the unit training phase. In order to maintain competency, they will go through the continuation training phase. Additionally, an ATSEP will require training when:

- a) There is a change within a system on which the ATSEP is already working. This is addressed through continuation training (see Chapter 5).
- b) The ATSEP changes domains (e.g. from navigation to surveillance). This is addressed through either initial training or unit training (see Chapter 3, 4).
- c) A change of activities and associated competencies (e.g. change from maintenance operations to system implementation) is addressed through development training (see Chapter 6).
- d) Any additional system to be operated by an ATSEP is addressed through unit training (see Chapter 4).

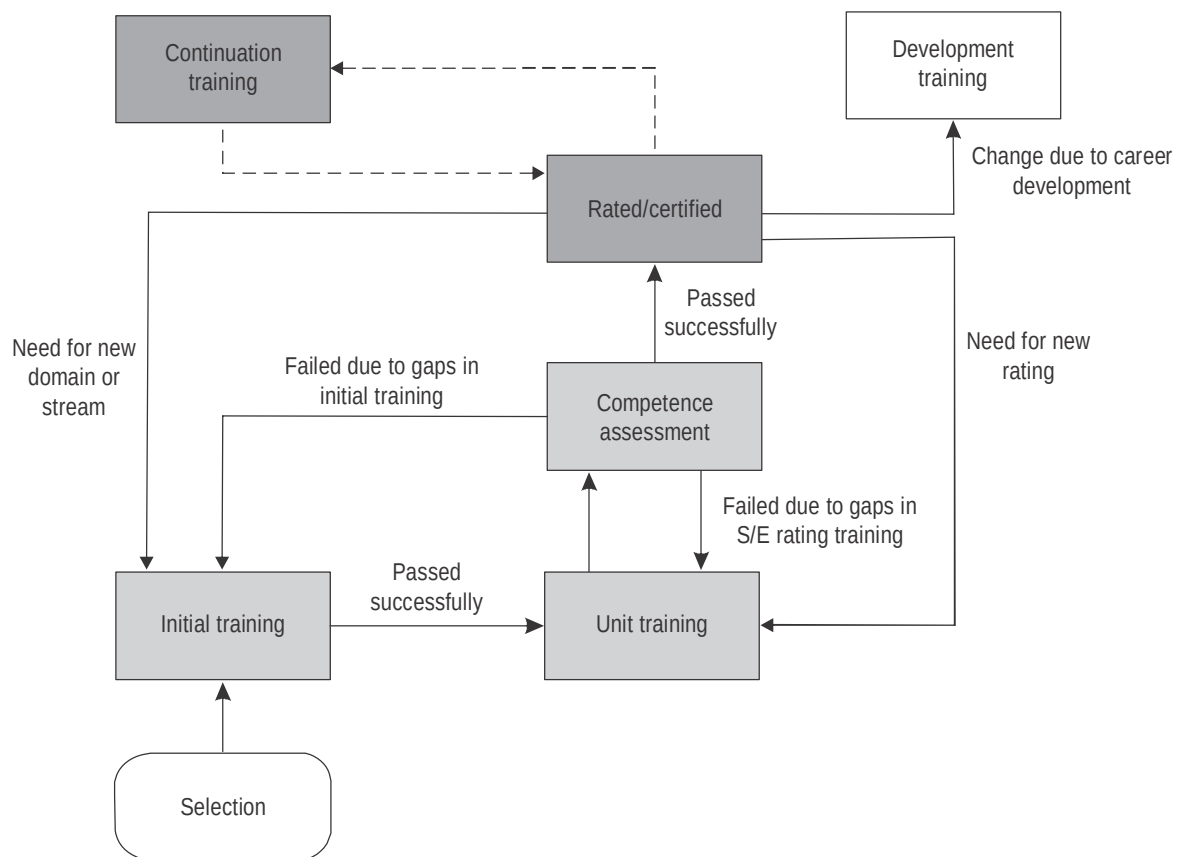
1.4.2 The progression through ATSEP training is illustrated in Figure 1-3.

1.5 CERTIFICATES OF COMPETENCE

1.5.1 Certificates of competence can take several forms such as:

- a) a license delivered by an authority;
- b) a certificate delivered by an ANSP or training organization/academy; and/or
- c) a diploma/academic degree delivered by an accredited educational institution.

1.5.2 Certificates of competence may be valid for a predetermined period. An ANSP should collect and maintain evidence that its ATSEP are competent to perform the activities assigned to them.

**Figure 1-3. ATSEP training progression**

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Chapter 2

DEVELOPING A COMPETENCY-BASED TRAINING AND ASSESSMENT PROGRAMME FOR ATSEP

2.1 INTRODUCTION

2.1.1 PANS-TRG describes procedures for the design of a competency-based training and assessment programme including those for ATSEP. It makes use of the ICAO competency framework and the analyse, design, develop, implement and evaluate (ADDIE) model.

2.1.2 The aim of competency-based training and assessment is to provide a competent workforce for the provision of safe and efficient CNS/ATM engineering ATSEP services. To achieve this, various components are necessary. They are listed in Table 2-1:

Table 2-1. Components of a competency-based training and assessment programme

<i>Component</i>	<i>Description</i>
Training specification	The document that describes the purpose of the training, the task list and the requirements that must be fulfilled when designing the training.
Adapted competency model	A group of competencies with their associated descriptions, 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: • competencies: the competencies that are required to be achieved by the end of training; • 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 (OB), condition(s) and a competency standard.
Assessment plan	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.
Training plan	The document used for structuring, developing and delivering the training.
Training and assessment materials	All the materials used to deliver the training in accordance with the training plan. These may include the course programme, training notes, manuals, presentations and simulated exercises.

2.2 PREREQUISITES: ATSEP SCOPE, PROFILES AND TASKS IN AN ORGANIZATION

2.2.1 A prerequisite for developing a competency-based training and assessment programme for ATSEP is to deconstruct the ATSEP scope and tasks as described in section 1.2. In this process, an ANSP should:

- a) define the scope of ATSEP in its organization (paragraph 1.2.2.3 refers);
- b) create job profiles (1.2.2.6 (optional) refers); and
- c) identify ATSEP tasks (1.2.2.6 refers).

2.2.2 Scoping ATSEP in the organization is described in section 1.2. Scoping needs to be documented as a starting point for establishing a competency-based training and assessment programme.

2.2.3 The nature and distribution of job profiles are determined by the needs and requirements of the ANSPs. In small ANSPs,¹ there may be a single ATSEP profile, while in large ANSPs there may be several ATSEP profiles. An ANSP may also choose not to create job profiles and identify ATSEP tasks directly.

2.2.4 Tasks can be derived from operations manuals, equipment manuals and/or manufacturers' documentation, if available. Also, best practices and other sources may serve for the identification of ATSEP tasks.

2.2.5 The deconstruction of the scope of ATSEP in the organization by means of job profiles and/or tasks depends on the organizational structure and processes of the individual ANSP (e.g. the size of the ANSP, work distribution, and work organization within the ANSP or relevant national rules and regulations). Thus, it is the ANSP that must define these structures. In this process, the ANSP must ensure that the combination of all job profiles and/or tasks fully defines the scope of ATSEP in its organization.

2.2.6 An example of an ATSEP job profile, including tasks, is given in Table 2.2.

Table 2-2. Example of an ATSEP job profile, including tasks

<i>Job profile</i>	
<i>Item</i>	<i>Description</i>
Job title	System monitoring and control (SMC) ATSEP at regional airport ABC
Job objective	Supervise, monitor and configure the related equipment (VOR, DF, R/T system, ASR)
Entry level	Technician with four years of previous job experience (minimum) or a bachelor's degree in engineering with initial job experience
General nature of the job	Responsible execution of activities for the supervision, monitoring and configuration of the related equipment
Key responsibilities	• Operational availability of the related equipment • Compliance with regulatory requirements • Compliance with internal procedures

1. See Appendix A, Example 1.

Job profile	
Item	Description
List of tasks	a) Monitors, operates, controls and checks relevant equipment b) Releases from and returns into operations ATS/CNS systems c) Documents activities in electronic log d) Reconfigures equipment e) Triggers external support (e.g. from the manufacturer), if needed f) Supports maintenance activities carried out by third parties g) Takes care of own qualification and currency

2.3 ADDIE MODEL WORKFLOWS

2.3.1 This section builds on the prerequisites detailed in section 2.2 and focuses on the application of the ADDIE model. The remainder of this chapter provides guidance to ANSPs and training organizations on five steps, or “workflows”, that serve as the basis for developing an ATSEP competency-based training and assessment programme. The five workflows are as follows:

- a) Workflow 1 — *Analyse* training needs;
- b) Workflow 2 — *Design* local competency-based training and assessment;
- c) Workflow 3 — *Develop* the training and assessment materials;
- d) Workflow 4 — *Implement* the course in accordance with the training and assessment plans; and
- e) Workflow 5 — *Evaluate* the course, including the training and assessment plans.

2.3.2 Appendix A provides detailed examples of these workflows for two different fictitious ANSPs.

2.3.3 The first two workflows, *analyse* (analyse training needs) and *design* (design local competency-based training and assessment), establish the training specification, adapted competency model, assessment plan and training plan used to *develop* and *implement* the training course (Workflows 3 and 4). The *evaluate* workflow (evaluate the course, including the training and assessment plans) reviews the effectiveness of the training and assessment conducted and recommends improvements, as appropriate.

2.3.4 This chapter focuses primarily on the *analyse* and *design* workflows. An overview of the remaining workflows is also provided (see sections 2.6, 2.7 and 2.8) to highlight important issues directly related to competency-based training and assessment.

2.3.5 A stepped approach is used for 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.

It should be noted that the output of the *analyse* workflow becomes one of the inputs for the *design* workflow.

2.4 WORKFLOW 1 — ANALYSE TRAINING NEEDS

2.4.1 The need to develop training may be established in various ways; however, the training designer typically receives some form of training request that provides details on what should be trained and why it is necessary.

2.4.2 The first step in developing a competency-based training and assessment programme is to conduct a training needs analysis in which the purpose of the training is considered in relation to the operational, technical, regulatory and organizational requirements of the ATSEP training course that will eventually be delivered. This must be based on the identified tasks of the individuals who will undergo the training (see section 2.2). The outcome of Workflow 1 is a training specification that details the requirements that need to be fulfilled when designing the course.

2.4.3 The training specification should provide sufficient detail to answer the questions listed in Table 2-3.

Table 2-3. Information to be included in the training specification

<i>Purpose</i>	
What is the purpose of the training?	This is taken directly from the training request. There is considerable variation in the amount of detail that is provided in a training request, but typically it will indicate the purpose of the training as a minimum.
State the phase(s) of training.	Initial, unit, continuation and development training.
What qualification, if any, will the trainee achieve on successful completion of the training?	In some instances, a formal qualification will be achieved at the end of the training (e.g. in-depth or second-level maintenance on system ABC). In other instances, this may not be the case (e.g. after routine refresher or conversion training).
<i>Tasks</i>	
Describe the tasks associated with the purpose of the training.	For the purposes of defining the training specification, only a task list is required. This task list may be extracted from a completed job and task analysis, or may be taken from the operations manual that has listed the various roles and responsibilities in the operations environment. In some instances, this task list may need to be developed (see section 2.2 for more information).
<i>Operational requirements</i>	
Which operational procedures will be applied?	In the case of unit training, this refers to the local operating documentation (e.g. manual of engineering, local operating procedures, letters of agreement). In the case of initial training, the local operating documentation may not apply at this stage, but will be introduced later during the unit training phase. For the purposes of the training specification, the source documents that will be used for developing these procedures should be listed (e.g. ICAO Annex 10 — <i>Aeronautical Telecommunications</i>).
Describe the operational environment in which the training will take place.	Training may take place in a simulated environment, for example a training laboratory or facility. This environment must be properly designed and documented to ensure that it sufficiently re-creates the real-world environment and serves the purpose of the training. If the training is to take place in a real operational environment, it is sufficient to reference the operational

	documentation that describes the environment.
Which non-routine situations are necessary for successful completion of the training?	These could include emergency or unusual situations or degraded modes of operation.
<i>Technical requirements</i>	
List any specific operational (or simulated operation) systems and/or equipment that are necessary to achieve the purpose of the training.	These could include primary and secondary systems, peripheral systems and interface with the primary system.
<i>Regulatory requirements</i>	
Which rules and regulations are applicable?	These may include international, regional or national regulations. This information is recorded in the training specification to ensure that rules and regulations are taken into consideration during the training design. Typical regulatory requirements may include the minimum number of hours of experience in the operational environment under supervision, the minimum list of knowledge subjects to be covered, etc. Consideration should be given to whether any regulatory requirements affect the following aspects of the training design: a) duration; b) content; c) assessment procedures; d) course approval; or e) other (equipment, qualifications of instructors, trainee-to-instructor ratios, etc.).
<i>Organizational requirements</i>	
Describe any organizational requirements that may impact the training.	In some instances, an organization may wish to achieve additional objectives that are required to be included or emphasized in the training (e.g. strategic objectives such as reducing delays or increasing customer focus).
<i>Other requirements</i>	
Describe any other requirements that may impact the training.	This question captures any other requirements that may not have been covered in the previous questions (e.g. two languages to be used).

2.5 WORKFLOW 2 — DESIGN LOCAL COMPETENCY-BASED TRAINING AND ASSESSMENT

2.5.1 The objectives of Workflow 2 are: to establish an adapted competency model that addresses the training specification identified in Workflow 1; design an assessment plan that will be used to assess the competence of trainees; and design a training plan that will enable the development and delivery of the training course. It can be considered in two parts:

Part 1: Designing the adapted competency model

2.5.2 To design an adapted competency model, ICAO's ATSEP competency framework is adapted to meet the organizational competency requirements using the information contained in the training specification developed in Workflow 1.

2.5.3 ANSPs and training organizations can find ICAO's ATSEP competency framework in the PANS-TRG and should use it as a starting point and reference for this workflow. ICAO's competency framework should be adapted to the ATSEP tasks identified by the ANSP. These are structured in terms of competencies, competency descriptions and observable behaviours. See Appendix A for detailed examples. Adaptation may comprise of using, enhancing, changing or omitting elements of ICAO's competency framework at all levels, and should relate clearly to the local environment of the ANSP. For every ATSEP task, the competencies necessary to perform the task should be specified.

2.5.4 The competency standards must then be determined. Competency standards apply to all observable behaviours and relate to the standards, procedures, rules and regulations contained in national regulations, operations manuals, policies, procedures manuals and other documents.

2.5.5 Finally, the training specification developed in Workflow 1 is used to identify conditions specific to the environment in which performance will be demonstrated. These conditions relate to the nature and complexity of the operational and environmental context, tools, systems or equipment, and the amount of support or assistance a trainee can expect from the instructor/assessor. Conditions include:

- a) whether the performance takes place in an offline/simulated or live operational environment;
- b) the complexity of the system used for the training;
- c) the use of artificially generated distractions;
- d) the intentional use of erroneous data;
- e) more active coaching or teaching provided by instructors to trainees at early stages of training; and
- f) an approach whereby instructors adopt a more passive role, giving occasional advice on how to improve efficiency or intervening in instances where safety may be compromised, if trainees are progressing towards the final competency standard and are gaining confidence in performing independently.

2.5.6 Most of the conditions will apply generally to all of the observable behaviours that have been identified as part of the adapted competency model. However, in very few instances, specific conditions may be associated with some observable behaviours. As part of the progression towards the final competency standard, it may be necessary to establish interim competency standards. The way in which the conditions are modified to establish interim competency standards is covered in Appendix A.

2.5.7 Once part 1 of Workflow 2 is completed, ANSPs and training organizations will have identified and adapted the relevant competencies and observable behaviours required for the ATSEP to perform their tasks, and established the performance criteria used to assess whether the required levels of performance have been achieved. With all of these elements, the ANSPs will have a clear view of what competencies the ATSEP should demonstrate in the operational environment.

Part 2: Designing the assessment and training plans

Issues to consider before developing assessment and training plans

2.5.8 Part 2 of Workflow 2 includes the design of the assessment and training plans. When developing the assessment and training plans, it is important to consider the principles of competency-based training, typical assessment methods, the concept of milestones and final and interim competency standards. The relationship between the adapted competency model and the training and assessment plans should also be understood (see section 4.3). At the completion of this step, ANSPs and training organizations will have developed a training plan based on the tasks as well as an assessment plan based on the performance criteria identified previously.

2.5.9 An assessment and training plan for each ATSEP job profile should be developed.

2.5.10 Table 2-4 describes the principles that should drive competency-based assessments.

Table 2-4. Principles of competency-based assessments

<i>Clear performance criteria are used to assess competence.</i>	The adapted competency model establishes these performance criteria.
<i>An integrated performance of the competencies is observed.</i>	The trainee undergoing assessment must demonstrate all competencies and their seamless interaction with each other.
<i>Multiple observations are undertaken.</i>	To determine whether or not a trainee has achieved the interim and/or final competency standard, multiple observations must be carried out.
<i>Assessments are valid.</i>	All of the components that comprise the adapted competency model must be assessed. There must be sufficient evidence to ensure that the trainee meets the competency specified by the interim and/or final competency standard. The trainee must not be asked to provide evidence for, or be assessed against, activities that are outside the scope of the adapted competency model.
<i>Assessments are reliable.</i>	All assessors should reach the same conclusion when performing an assessment. All assessors should be trained and monitored to achieve and maintain an acceptable level of inter-rater reliability.

Assessment methods

2.5.11 Assessment is an integral part of the competency-based training process. For the ATSEP, assessments provide incentive and motivation, and confirm that learning and competence have been achieved. From the instructor's point of view, assessment demonstrates if training objectives have been met. Performance during assessments also indicates whether the instruction methods used are effective or should be improved. The sole purpose of assessments is to measure whether or not the ATSEP trainee has achieved the training objectives and the relevant competencies.

2.5.12 ATSEP should always be informed as to how they will be assessed. The information should include the conditions that will exist during the assessment, the performance that is expected from the ATSEP and the standards of accomplishment that have to be met. ANSPs and/or authorities should have in place processes to deal with assessment

failures. ATSEP should be informed of the result of their assessments, and instructors should offer feedback on how to correct a mistaken response or unsatisfactory practical performance.

2.5.13 The assessment plan should describe the process and tools that will be used to determine how an ATSEP's performance compares to the performance criteria. This evidence is needed to demonstrate that the ATSEP has attained the required knowledge, skills or competencies and also to provide feedback for process improvement. Tools such as periodic training reports or checklists on achievements of performance and competencies may be useful to document this process.

2.5.14 A checklist may be used to record evidence of multiple observations at different milestones during training. A sufficient number of checklists should be collected to ensure that the trainee demonstrates a consistent and integrated performance of competencies. The assessment outcome is *competent* or *not competent* for the assessment undertaken.

2.5.15 An evidence guide provides practical examples of what can be observed for a given competency and performance criteria in certain conditions. The evidence guide also provides the criteria for assessment for the interim or final competency standard. It ensures that instructors and assessors interpret performance criteria consistently and that valid and reliable evidence is gathered. In addition, the evidence guide can be used as a checklist to document the training progression. Appendix A provides an example of an evidence guide.

2.5.16 The training provider can use a variety of assessment methods. Each assessment method should be selected according to the training objective, the competence to be achieved, and its impact on safety and/or quality. Each assessment method can be applied using a formative or summative approach. Possible assessment methods are:

- a) multiple choice questionnaire;
- b) written and/or oral examination;
- c) practical examination (demonstration);
- d) examination on position; and
- e) examination in simulation.

2.5.17 This list of methods is not intended to be restrictive. Any suitable supplemental method for assessing competence may be used. Other methods may include projects and group assignments.

2.5.18 The assessment method should take into account the taxonomy level related to the training objective. The taxonomy levels are described in Appendix C.

Assessment plan

2.5.19 The purpose of the assessment plan is to detail how competence is going to be determined. It supports the principles of assessment in a competency-based environment. The assessment plan details:

- a) the final competency standard associated with the final milestone (if applicable);
- b) the interim competency standard associated with each milestone (if required);
- c) the list of assessments (formative and summative assessments, examinations, oral assessments, etc.) required for each defined milestone;

- d) the timing of the assessments;
- e) the tools to be used to collect evidence during practical assessment;
- f) the pass marks for projects, examinations or oral assessments;
- g) if required, the minimum number of formative assessments to be undertaken prior to starting summative assessments; and
- h) the number of observations required to assess performance for the interim and final competency standard.

2.5.20 For ATSEP, competency-based assessment does not fully apply to initial training modules, which usually provide training for knowledge and skills only. Therefore, a competency cannot be assessed until the training is conducted at a unit level, where competencies can be observed. When assessing knowledge and skills during initial training, the relevant parts of the assessment plan must be documented.

2.5.21 ANSPs or training organizations should have a training and procedures manual that describes the administrative procedures relating to:

- a) which personnel may conduct assessments, and their qualifications;
- b) roles and responsibilities of personnel during the conduct of assessments;
- c) assessment procedures (preparation, conduct and post-assessment);
- d) conditions under which the assessment is undertaken;
- e) record-keeping; and
- f) actions to be taken when a trainee fails to meet the competency standard(s) of the assessment.

Training plan

2.5.22 The training plan is a document used for structuring, developing and delivering training. The purpose of the training plan is to detail the following:

- a) the composition and structure of the training course;
- b) the syllabus;
- c) the milestones (if required);
- d) the modules, training events and their delivery sequence; and
- e) the course schedule.

Note.— Comparable terminology may be used in practice; for example, “lesson” can be used for a training event, “subject” can be used for a module, and a number of subjects can constitute a “training course”.

2.5.23 Depending on the number, type and complexity of the training objectives, it may be helpful to further subdivide the training plan into modules (within an entire course or within all or some milestones, if milestones are required).

2.5.24 Whichever substructure is determined as appropriate (course, milestones or modules), training events are developed to support the substructure. Training events are the smallest units of learning and may include classroom-based lessons, simulator exercises, web-based training exercises, case studies, etc. Training events should contain the following information:

- a) which objectives are grouped and taught together;
- b) the number of periods needed to teach each group of objectives;
- c) which method(s) should be used (lessons, case studies, individual simulation, briefing, self-study, etc.);
- d) which media are used (e.g. simulators, visual aids or textbook);
- e) the learning rate (e.g. self-paced, time-restricted or real-time); and
- f) whether the training is delivered to individuals or in groups.

2.5.25 The course schedule indicates how the training events and assessments fit together into the total duration of the course.

2.5.26 Recommended basic and qualification training modules are detailed in Appendix B. An ANSP or training organization should use the ATSEP job profile as a starting point and identify which training modules in Appendix B apply (see Chapter 3 for more details). The knowledge and skills acquired through the initial training modules should be clearly linked with the tasks the ATSEP will perform and the competencies they will need to demonstrate on the job.

2.5.27 In unit training, the training plan should identify the relevant training objectives for the task that the ATSEP will perform on the system or equipment of the operational unit. For identical activities, the training plan may be reused for different ATSEP. Where an ANSP has a generic ATSEP job profile, training plans become generic as well but may be adapted taking into account prerequisite knowledge, skills, competencies and experience. This phase combines training specific to the system or equipment and will usually include site and on-the-job training. In unit training, trainees have to demonstrate the successful performance of the tasks, including:

- a) knowledge of the local environment and relevant procedures;
- b) practical skills related to the local environment, system and equipment; and
- c) competencies identified as necessary for the ATSEP job profile or ATSEP tasks for each training module.

2.5.28 On successful completion of unit training, trainees will have achieved the final competency standard. They will have successfully completed all the required training and assessments that have been determined as necessary to demonstrate the competencies and meet the performance criteria as described in the competency framework of the ATSEP.

2.5.29 When the duration or the complexity of unit training is such that it makes sense to check that a trainee is progressing towards competence at an acceptable pace, the course may be divided into milestones. Milestones are cohesive building blocks of learning that are organized into a logical sequence that generally progresses from the simple

to the complex. Each milestone is comprised of both training and assessment(s). Milestones build on one another; therefore, a trainee would need to successfully complete the training and assessment for the first milestone before proceeding to the next one.

2.5.30 If unit training has been divided into milestones, it will be necessary to define an interim competency standard for each milestone. For practical assessments, this may be achieved by:

- a) modifying the conditions and/or standards of accomplishment; and
- b) stating the degree of achievement expected for each performance criterion.

2.5.31 An interim competency standard is achieved when all the required assessments for that milestone have been successfully achieved.

2.5.32 Once an ATSEP has demonstrated the required performance, it is necessary to maintain this level of performance and therefore maintain competency. Continuation training is a mechanism for ensuring competencies are maintained, and therefore a continuation training plan is required. The plan will be influenced by many factors (e.g. activity exposure, technical developments, new procedures or changes in the profile). Depending on the nature of the continuation training (e.g. contingency simulations or practical exercises), the structure and elements of the continuation

training plan may vary significantly when compared to a training plan developed for classroom-based continuation training. Chapter 5 contains more information about continuation training.

2.5.33 Regardless of the type of training plan established (basic, qualification, unit, continuation), a process to benchmark, maintain and improve the efficiency and quality of training is required as part of a safety and/or quality management system. A continuous feedback system gathering data from trainees, instructors, assessors, ANSPs and organizations should be implemented. The feedback system may use different methods (e.g. written feedback, moderated feedback) and technologies (e.g. handwritten, electronic). Any feedback should be documented and traceable.

2.6 WORKFLOW 3 — DEVELOP THE TRAINING AND ASSESSMENT MATERIALS

2.6.1 During this workflow, all the training and assessment materials are developed based on the adapted competency model and the training and assessment plans. Training and assessment materials include, but are not limited to, training notes, exercise briefings, practical exercises, case studies, presentations, video clips, self-test quizzes, examinations, assessments and assessment tools. On completion of Workflow 3, the outputs should include all training and assessment materials, schedules and any other applicable training resources.

2.7 WORKFLOW 4 — IMPLEMENT THE COURSE IN ACCORDANCE WITH THE TRAINING AND ASSESSMENT PLANS

2.7.1 Workflow 4 consists of the process of conducting the course in accordance with the training and assessment plans developed in previous workflows.

2.8 WORKFLOW 5 — EVALUATE THE COURSE, INCLUDING THE TRAINING AND ASSESSMENT PLANS

2.8.1 At the end of a training period, feedback regarding on-the-job performance from trainees, instructors, assessors and employers is collected to determine the effectiveness of the course in supporting the progression of learning towards competence in the workplace. This should culminate in a course report. Evaluation of the training and assessment plans may lead to improvements being made to the course.

Chapter 3

INITIAL TRAINING PHASE

3.1 INTRODUCTION

3.1.1 The purpose of this chapter is to describe the modules considered necessary for initial training. Initial training provides underpinning knowledge and skills and is delivered in two parts: basic training applicable to all ATSEP and qualification training specific to ATSEP profiles as described in Chapters 1 and 2.

3.1.2 During this phase, ATSEP acquire the knowledge and skills required to subsequently undertake unit training. Initial training materials can be enhanced by including examples to illustrate real-life situations and using available systems and equipment. Training objectives can be added as required.

3.1.3 Section 3.2 describes the components of the basic training module and section 3.3 focuses on the components of the qualification training modules. Proposed training objectives for these modules can be found in Appendix B.

3.1.4 The training organization should ensure that ATSEP successfully achieve all basic training objectives before proceeding to the qualification training modules. The training organization should also ensure that ATSEP successfully achieve all relevant qualification training objectives before proceeding to the unit training modules. This can be achieved by:

- a) establishing a set of assessment questions associated with each training objective;
- b) defining a mechanism to select assessment questions for an individual assessment; and
- c) defining a pass mark for the assessment.

3.2 BASIC TRAINING MODULE

3.2.1 All ATSEP should successfully complete basic training. At the end of basic training, trainees should have acquired general knowledge regarding:

- a) international and national organizations and standards;
- b) air traffic services, airspace standards, aeronautical information systems, meteorology and altimetry;
- c) CNS/ATM concepts; and
- d) human factors.

International and national organizations and standards

3.2.2 CNS/ATM systems operations are regulated by international organizations that provide rules and standards to ensure the safe operation and interoperability of air navigation services (ANS) worldwide. Among these organizations are ICAO, the European Civil Aviation Conference (ECAC), the European Aviation Safety Agency (EASA) and the Institute of Electrical and Electronics Engineers (IEEE). Achievement and maintenance of safety and efficiency in air navigation operations depend on the standardization of operational practices for international services. The syllabus should give a general view on aviation regulations as adopted by ICAO and implemented in international ANS operations.

Air traffic services, airspace standards and meteorology

3.2.3 CNS/ATM systems are vital to the safe, reliable and efficient delivery of air traffic services. ATSEP perform critical tasks on CNS/ATM systems or equipment, which impact users. In order for ATSEP to fully understand the impact of their work on these systems, they must have a sound knowledge of the ATM operational environment. The consequences of system outages and their negative impact on users (i.e. pilots, air traffic controllers) may result in unsafe situations or cause excessive delays in airline operations.

CNS/ATM concepts

3.2.4 The ATSEP's main activities are to maintain, modify, repair and develop CNS/ATM systems, while keeping them fully operational and safe. The consequences of system outages and their direct impact on the users (i.e. pilots, air traffic controllers) may result in unsafe situations or cause excessive delays in airline operations. The syllabus gives a general view of these concepts, including power distribution.

Human factors

3.2.5 Lapses in human performance are cited as causal factors in the majority of accidents. A better understanding and knowledge of human factors in ATSEP work can potentially decrease the accident rate. This module introduces ATSEP to fundamental human factors concepts in ANS.

3.3 QUALIFICATION TRAINING MODULES

3.3.1 Following the successful completion of basic training, ATSEP will require qualification training relevant to the ATSEP profile for a given ANSP.

3.3.2 At the completion of the qualification modules, ATSEP must be able to explain the purpose of each system, each piece of equipment and its technical specifications. They must also be able to explain the effect and impact on the service when these systems or equipment are being worked on.

3.3.3 The training objectives for the qualification modules listed below are described in Appendix B. The training plan should include, as appropriate, a laboratory environment, exposure to specific equipment as well as access to appropriate training materials, reference documentation, test equipment and tools.

3.3.4 Finally, on completion of the qualification training modules, ATSEP should understand the impact of their work on the users and on the overall ANS system.

Communication module

3.3.5 Communication systems provide a means of relaying essential information for the safe and orderly operation of the ANS. Communication involves much more than radio transmitters and receivers; it also includes communication protocols, networks, types of media, recorders and safety aspects.

Navigation module

3.3.6 Radio navigation systems provide a means of relaying essential information for the safe and orderly operation of the ANS. Radio navigation systems can be located anywhere on the airport, in its vicinity, at a great distance from the airport, or can be satellite-based systems.

Surveillance module

3.3.7 An aeronautical surveillance system provides the aircraft position and other essential information to ATM and/or airborne users to assist their safe and orderly operation. Surveillance systems can be located anywhere on the airport, in its vicinity, or at a great distance from the airport.

Data processing/automation module

3.3.8 Data processing/automation systems provide the means of relaying essential information for the safe and orderly operation of ANS. Data processing/automation includes a combination of hardware platforms and operating system software. Proper hardware and software configurations are essential for a safe and orderly ANS. Data processing/automation systems can be located anywhere at the area control centre (ACC), on the airport, or in its vicinity, or remote from the ACC or airport.

System monitoring and control (SMC) module

3.3.9 The implementation of CNS/ATM systems and equipment has led to new ways of providing SMC. Most ANSPs have centralized the SMC functions within a geographical area, typically the flight information region (FIR) or the area of responsibility. Many ACCs/upper area control centres (UACs) have an SMC suite or position staffed by qualified SMC ATSEP. In other cases, SMC suites or positions for CNS systems and equipment are centralized. Both options may co-exist. The SMC ATSEP are responsible for the day-to-day operation (normally 24 hours per day, 7 days per week) of all operational systems and equipment within their area of responsibility. The SMC ATSEP ensure a quick response to malfunctions or failures by diagnosing the problem, activating fall-back procedures and initiating the repair. The SMC ATSEP coordinates between the operational air traffic controller (ATCO) supervisor and the operational CNS/ATM ATSEP within the area of responsibility. The SMC ATSEP also coordinates between those responsible for different areas.

3.3.10 Training for the SMC ATSEP should emphasize the requirement to communicate appropriately with all relevant stakeholders such as the ATCO supervisor, rescue units, military units or others. Thus, training should address team resource management (TRM), human-machine interaction (HMI) and human-human interaction (HHI) skills.

Infrastructure module

3.3.11 Infrastructure equipment and systems play a vital role in the operation of CNS/ATM systems and consequentially in the safe and orderly operation of ANS. The integrity and reliability of CNS/ATM systems depend on the quality, availability, capacity and reliability of electrical power supply sources, equipment and systems.

Engineering module

3.3.12 States may have regulatory requirements for ensuring that CNS/ATM systems and equipment are specified, researched, designed, developed, tested, validated and installed by qualified ATSEP. Generally, ANSPs establish a distinct group of specialized engineers or ATSEP who are responsible for the engineering and the installation of all CNS/ATM systems and equipment.

3.3.13 The engineering module will be developed, implemented and delivered in compliance with the ATSEP profile and activities required by an ANSP. The trainees shall perform their tasks in accordance with approved local and/or national standards and procedures.

Chapter 4

UNIT TRAINING PHASE

4.1 INTRODUCTION

4.1.1 The purpose of this chapter is to provide additional guidance regarding Workflow 2, Part 2, described in Chapter 2, section 2.5, on developing training and assessment plans for unit training.

4.1.2 After successfully completing the initial training phase, ATSEP undergo unit training. This phase is oriented to the activities and competencies an ATSEP will perform in a specific technical and operational environment as defined in Workflow 2, Part 1 (Chapter 2, section 2.5).

4.1.3 Unit training addresses theoretical and practical issues specific to the equipment and site of an operations unit. Unit training includes OJT. It is in this phase that ATSEP competencies are developed and assessed.

4.2 TRAINING PLAN

4.2.1 In principle, the training plan for unit training can be organized in three modules:

- a) technical and operational environment;
- b) system/equipment; and
- c) OJT.

4.2.2 Training content should address:

- a) functionality of the system/equipment;
- b) actual and potential impact of ATSEP actions on the system/equipment; and
- c) impact of the system/equipment on the operational environment.

4.2.3 Unit training builds on the theoretical knowledge and skills learned during the initial training phase. In addition, training objectives in the areas of human factors and teamwork should also be considered relevant in unit training.

4.2.4 The level of training must be appropriate to the ATSEP profile but would not normally go beyond the replacement of the lowest replaceable module (LRM) or electronic boards of the system and equipment. Normally, unit training should not cover repair of LRMs or boards. If required, training for repairs should be conducted outside the scope of unit training.

4.2.5 Unit training can be implemented at a specialized training centre, at the factory, on site or a combination thereof. However, OJT should be conducted on site in the operational environment.

4.2.6 Unlike initial training, detailed training objectives are not provided for the unit training phase because unit training is specific to an ATSEP job, a system or equipment for a given ANSP. Thus, only generalized training objectives can be provided.

4.2.7 Each training objective should be associated with a condition and a standard of accomplishment. A condition refers to anything that may qualify performance in the local environment. The standard of accomplishment relates to the taxonomy level identified for the training objective. The taxonomy levels are described in Appendix C.

4.2.8 Before new systems become fully operational, a sufficient number of ATSEP must be available to maintain the systems and should therefore have completed the relevant unit training. ATSEP initially qualified to start operation should participate in the factory acceptance test (FAT) and/or the site acceptance test (SAT) prior to receiving a manufacturer's training course.

4.3 ASSESSMENT PLAN

During unit training, competencies for an ATSEP profile are developed as identified in Workflow 2, Part 1. The assessment plan for the unit training phase should describe the specific process and tools that will be used to determine how an ATSEP's performance compares to the training plan and to the competencies that have been identified in the ATSEP profile. Evidence is collected through a variety of assessment methods and tools to document an ATSEP's progression towards achieving competence. The assessment plan for unit training should comply with the principles outlined in Table 2-4 in Chapter 2. (For an example of an evidence guide, see Appendix A.)

4.4 UNIT TRAINING MODULES

Technical and operational environment module

4.4.1 ATSEP trainees should have detailed knowledge of the technical and local operational environment that can directly influence ANS, such as facilities, maintenance procedures, and quality, safety and security policies. At the end of this module and in accordance with the ATSEP profile, the trainee will be able to:

- a) describe the infrastructure environment and system and equipment involved in the ANS;
- b) apply rules for circulation (e.g. access to shelters, driving certificate, technical rooms, security rules);
- c) identify facilities (power supply, air-conditioning, etc.);
- d) use the proper vocabulary relative for communication with other services; and
- e) apply safety rules and maintenance procedures.

4.4.2 For ATSEP with prior experience in the operational environment, unit training should address only the areas where a gap has been identified.

System/equipment module

4.4.3 Trainees should be familiar with the specific system or equipment for the unit, in particular with the principles of its design, the different hardware and software elements and their interactions and functionality.

4.4.4 This module builds on what was learned during qualification training and is specific to the equipment type on which the ATSEP will work.

4.4.5 At the end of this module and in accordance with the ATSEP profile, the trainee will be able to:

- a) identify and explain the details of the different components of the system;
- b) describe the protocols used and the data flow;
- c) explain the different functionalities and the performance of the system;
- d) explain the significance of the parameters and error messages;
- e) explain the functionality of the HMI and SMC and their operation; and
- f) use appropriate action in installation and/or maintenance and/or operation activities.

On-the-job training module

4.4.6 The purpose of this module is to develop, consolidate and assess the competencies, knowledge and skills gained within the operational environment and on the specific system/equipment required for the rating or certification.

4.4.7 During OJT, the trainee will perform the activities for the job in the operational environment (e.g. operations, supervision, troubleshooting exercises, replacement, installations, testing of faulty modules, calibration). The trainee will also apply procedures for installation, maintenance and/or operation particular to the measurement, testing and restarting of the system or equipment in order to certify that it meets the standards.

4.4.8 This module includes practical exercises on systems and/or equipment where the trainee works on live equipment under the supervision of an experienced ATSEP or instructor.

4.4.9 At the end of this module and in accordance with the ATSEP tasks, the trainee will be able to perform relevant tasks from the following list, depending on the job profile:

- a) follow the logistic processes and apply the safety procedures (access to the station, power supply, air-conditioning, safety rules, etc.);
- b) operate the system or equipment, perform the necessary control and monitoring functions (periodic measurement, start or restart, configuration, etc.), including the HMI and SMC;
- c) run all available built-in tests, diagnostics and checks on the system or equipment;
- d) troubleshoot the system/equipment in the operational environment by:
 - 1) analysing the warnings, errors, alarms or failure messages or indications;
 - 2) identifying problem areas and faulty unit or LRM;
 - 3) performing replacement of unit or LRM;
 - 4) calibrating or reconfiguring the system if required;
 - 5) restoring the system or equipment to an operational mode; and

6) conducting installation activities.

4.4.10 After the successful completion of unit training and competency assessment, the ATSEP will obtain certification and/or a rating of competence (proven competent status).



Chapter 5

CONTINUATION TRAINING

5.1 INTRODUCTION

5.1.1 This chapter provides guidelines to States and ANSPs in the preparation and provision of continuation training for ATSEP. The objective of continuation training is to ensure that the ATSEP maintains up-to-date operational competence.

5.1.2 Maintaining ATSEP competence is part of an integrated management system (IMS) in place in each ANSP. An IMS is composed of a quality management system (QMS) and a safety management system (SMS) with a risk analysis and mitigation process. This last process takes into account all changes (minor or major) made by the ANSP. Gathering evidence on the maintenance of ATSEP competence is therefore vital from an IMS point of view and should comply with the principles identified in Table 2-4 (Chapter 2).

5.1.3 There are three types of continuation training:

- a) refresher training which reviews or reinforces existing competencies;
- b) emergency training which includes training for unusual situations; and
- c) conversion training (system/equipment changes, upgrade and/or changes in procedures).

5.2 REFRESHER TRAINING

5.2.1 Refresher training is designed to review or reinforce existing ATSEP competencies. It should be site-specific, conducted on a regular basis and related to the rating and/or certification of the ATSEP. It should cover theoretical knowledge as well as practical skills that can be acquired through simulations or practical exercises.

5.2.2 Refresher training can be designed in a number of ways. It can be system-specific, domain-based or role-based training. For example:

- a) ATSEP who hold only a single rating/certification should receive refresher training specific to that rating/certification.
- b) ATSEP who hold ratings/certifications for a number of systems or equipment within the same unit could receive specific refresher training for each system or piece of equipment or follow a global training course covering all relevant systems and equipment.
- c) In the case of multi-rated/multi-certified ATSEP (e.g. COM, NAV, SUR, SMC), refresher training specific to that rating/certification is likely to be most effective. However, a generic course to cover a number of ratings/certifications could be designed and provided to such ATSEP.
- d) For ATSEP who are project managers in system installation or requirements engineering, role-based refresher training may be appropriate.

5.2.3 The ANSP should determine the frequency and duration of refresher training. It should be scheduled periodically for all ATSEP. The frequency of refresher training will depend on:

- a) activity exposure;
- b) complexity of the system/equipment/activity; and
- c) impact of the loss of the system/equipment on the service provision.

5.2.4 Refresher training may be carried out either on-site or off-site, whichever is the most appropriate. Where possible, it is advantageous that part of the training be carried out on representative systems or equipment (e.g. on a spare system).

5.3 EMERGENCY TRAINING

5.3.1 Emergency training refers to training for the management of non-routine situations. It is linked to the “management of non-routine situations” competency and the subsequent observable behaviours.

5.3.2 Non-routine situations can be described by the following characteristics:

- a) can be immediate or short term; and/or
- b) engage or endanger human life; and/or
- c) involve major degradation of service provision.

5.3.3 Training for these situations is aimed at dealing with causal factors impacting safety, such as, but not limited to:

- a) natural events (e.g. earthquakes, tornado, flood, fire);
- b) security breach (e.g. terrorism, cyberattack, sabotage); and
- c) technology breach (e.g. major system failure, power failure).

5.3.4 Training for management of non-routine situations can be facilitated in a number of ways, including, but not limited to:

- a) recurrent training or exercises based on written procedures;
- b) roundtable discussion dealing with a hypothetical scenario;
- c) lessons-learned exercises based on experience; and
- d) debriefing after major events, incidents or accidents to enhance safety and/or security.

5.4 CONVERSION TRAINING

5.4.1 Conversion training should be triggered by a change to an existing system that impacts operations. Triggers for setting up conversion training include:

- a) updates on reference material from relevant regulatory provisions and from aeronautical information publications (AIPs);
- b) new maintenance procedures;
- c) new standards and operating procedures;
- d) new factors affecting system performance;
- e) system monitoring and control changes;
- f) system modification (hardware, software, firmware);
- g) new monitoring, calibrating and measuring equipment available for ATSEP; and
- h) organizational changes leading to the identification of new competencies.

5.4.2 Conversion training is system- or equipment-specific. It should be provided to all impacted ATSEP prior to the change being deployed. The ATSEP profile and competencies as well as other phases of training (e.g. unit training, refresher training) should be adjusted in accordance with the change.

5.4.3 Conversion training should be designed to familiarize the ATSEP with any change or update in the system, equipment, procedure or practice that may have occurred since the last training session. Training objectives should be derived from the difference between the current situation and the situation after deploying the change.

5.4.4 Typically, conversion training is related to a specific planned change and is scheduled once. The duration is dependent on the nature of the change and the ATSEP affected.

5.4.5 Conversion training can be delivered through various means ranging from dedicated training sessions to briefings, operational instructions, information papers or others. It may be carried out either on-site or off-site, whichever is the most appropriate. Where relevant, it is advantageous that part of the training be carried out on representative systems or equipment (e.g. on a spare system).

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Chapter 6

DEVELOPMENT TRAINING

6.1 Development training consists of developing the additional competencies required when taking on new activities. Typically, this is initiated as a result of career progression.

6.2 These new activities may include:

- a) carrying out a training function (e.g. OJT instructor);
- b) managing staff;
- c) writing requirements;
- d) validating and testing equipment or systems;
- e) managing quality, safety or security; and
- f) auditing.

6.3 If a significant change of activities is identified, initial or unit training may be required. The process described in Chapter 2 to set up competency-based training also applies to development training provided that the ANSP considers these new activities as part of the ATSEP profile.

6.4 A number of examples for development training are outlined in Appendix D.



Appendix A

DEVELOPING ATSEP COMPETENCY-BASED TRAINING AND ASSESSMENT: EXAMPLES

In this appendix, two examples are given for the application of the workflows for developing ATSEP competency-based training and assessment as described in Chapter 2. The organizational structures used are examples. ANSPs may choose organizational structures that are different from those represented. The purpose of the examples is to describe in more detail how ATSEP competency-based training and assessment can be developed for a given organizational structure of an ANSP.

EXAMPLE 1: SMALL ANSP “ABC” OPERATING AT SEVERAL REGIONAL AIRPORTS

In this example, ANSP ABC operates CNS services at a number of regional airports in a country. The number of staff is small and, to limit costs, employees are generalists and not specialized. ATSEP have to serve several systems so that the number of staff is optimized. The ANSP’s strategy is to concentrate on core activities and to procure support from external providers — mainly manufacturers — for in-depth maintenance activities.

Prerequisites: ATSEP scope, profiles and tasks in ANSP ABC

Within ANSP ABC, the ATSEP activities are scoped as supervision, monitoring and configuration. Specifically, the ATSEP is designated to work at the regional airport SMALLAIRPORT, servicing a VOR, a DF, an R/T system and an ASR.

Creating the job profile

ANSP ABC creates a job profile containing the key responsibilities and related tasks of the ATSEP, as indicated in Table A-1:

Table A-1. Job profile for ATSEP within ANSP ABC (example)

<i>Job profile</i>	
<i>Item</i>	<i>Description</i>
Job title	SMC ATSEP at regional airport ABC
Job objective	Supervise, monitor and configure the related equipment (VOR, DF, R/T system, ASR)
Entry level	Technician with four years of previous job experience (minimum) or bachelor’s degree in engineering with initial job experience

Job profile	
Item	Description
General nature of the job	Responsible execution of activities for supervision, monitoring and configuration of the related equipment
Key responsibilities	- Operational availability of the related equipment - Compliance with regulatory requirements - Compliance with internal procedures
List of tasks	a) Monitor the following systems: VOR, DF, R/T and ASR b) Receive and forward error messages c) Initiate maintenance activities based on error messages received d) Relate to manufacturer for maintenance activities e) Inform customers (airport) on status of troubleshooting process f) Document and report

The related job profile for the ATSEP at ANSP ABC can be depicted in the ATSEP scope diagram provided in section 1.2, which is presented here in Figure A-1 (see dotted rectangle):

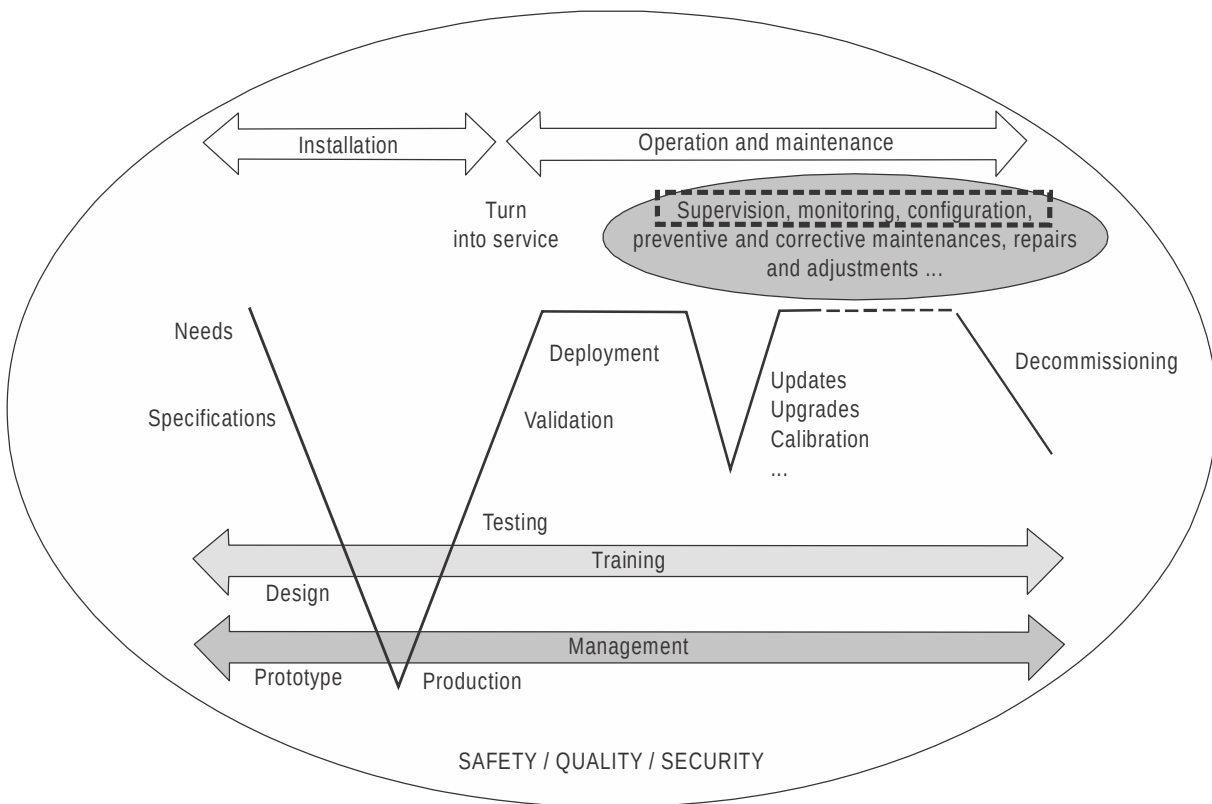


Figure A-1. ATSEP scope within ANSP ABC (example)