Aeronautical Information Management (AIM) Training Development Guidance Manual

A Competency-Based Model for ANSPs

Acknowledgements

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CANSO would like to thank the Members who produced this *AIM Training Development Guidance Manual.*

Foreword

New technologies and procedures mean that air navigation is rapidly changing, enabling the transformation of global air traffic management (ATM) performance. The way that aeronautical information is provided is also changing, with traditional aeronautical information services (AIS) transitioning to the broader, data-centric concept of aeronautical information management (AIM). This results in a more sophisticated method of providing and managing information, dedicated to developing and sharing quality data. This manual assists ANSPs to prepare for these important changes.

High quality aeronautical information is a prerequisite for the new technologies and tools that aircraft and ATM systems will use to provide more services to more aircraft in the same airspace at the same time. We are witnessing the early stages of this new mode of operation with today's performance-based navigation (PBN) and area navigation (RNAV) programmes, which rely on the ready availability of quality-assured data.

Across the aviation industry, many organisations need to update their training programmes to reflect this rapidly changing aeronautical environment. Nowhere is this truer than in the aeronautical information service (AIS), where experts are required to meet the challenges of an evolving aeronautical information management (AIM) capability, including end user expectations of ready access to the data they need, when they need it. Meeting these new challenges and expectations requires AIS personnel to develop new competencies. This *CANSO Aeronautical Information Management (AIM) Training Development Guidance Manual* uses a competency-based approach to give AIS organisations a framework to develop new training programmes to enable their personnel to successfully transition to the AIM environment.

The Civil Air Navigation Services Organisation (CANSO) developed this manual to help Members transition from AIS to a new, network-centric aeronautical information management (AIM) environment. The manual supports cooperation between air navigation service providers (ANSP) in the transition from AIS to AIM and drives continuous improvement.

CANSO Members will find this manual to be a useful addition to their training activities. It is intended as guidance material only, and is not intended to replace existing or future Standards and Recommended Practices issued by ICAO. It addresses the need for training in AIS and AIM; providing guidance for training development rather than a formal training programme. We recommend that training and course providers use it as guidance when developing AIS/AIM related training courses/programmes. CANSO will update the manual and complement it with additional training guidance as the AIM functions continue to mature.

Executive Summary

Effective management of aeronautical information is key to the safe and efficient operation of aviation, as providing corrupt, erroneous, or incomplete aeronautical information and aeronautical data can affect the safety and efficiency of air navigation. Recognising this increasing reliance on quality assured information and data, the *ICAO Global Air Traffic Management Operational Concept*, Doc. 9854, requires aeronautical information services (AIS) to transition to the broader, data-centric concept of aeronautical information management (AIM). This constitutes a much more sophisticated method of information provision and management, dedicated to the development and sharing of quality data.

In order for AIS personnel to successfully bring about the transition to the new AIM environment, new competencies will be required. A new AIM training programme developed around these needed competencies will ensure existing AIS personnel successfully navigate the transition, and new personnel are recruited, assessed and trained in appropriate areas.

This guidance document therefore supports CANSO Members in the implementation of competency management in AIM. This requires establishing competency inventory information and organisational data, along with organisation policies, standards, roles, responsibilities, forms and procedures. The guidelines contained in this document are applicable to any AIM organisation and provide guidance in developing competency-based training for AIM staff at various levels of responsibility and performance. This document provides the foundation for the development of an organisation's AIM staff.

This 'Competency Framework' is aligned with the general principles of AIS and the ICAO *Roadmap for the Transition from AIS to AIM* (2009) and is based on a systematic approach whereby:

— Knowledge, skills, and abilities and their standards are defined
— Performance is measured against the standards
— Training is based on the gaps between the required competency and current performance
— Assessment tools for these competencies are developed to determine whether these competencies have been achieved after the training has been conducted (See Figure 1, Job Competence Continuum).

The taxonomy included in this guide contains the mapping between the classification of training objectives to different training levels enabling an organisation to refine job descriptions, performance expectations, training plans and career progression on an individual level.

Following the establishment of training objectives, this manual provides further guidance on the development of a training curriculum, course development and competency assessment.

Using a competency-based approach to training allows an organisation to identify the gaps in the knowledge, skills, and abilities of their staff performing the AIS/AIM functions and to address performance expectations. This approach allows for maximum flexibility, recognising the complex and diverse nature of AIS and AIM services worldwide.

1
Introduction

This manual provides guidance on how to develop a competency-based training curriculum.

Throughout this manual, the term 'knowledge' is considered information that is directly applied to perform a function. 'Skill' is an observable competence to perform a task. 'Ability' is the competence to perform an observable behaviour or a behaviour that results in an observable outcome.

The competency-based approach to training has already been introduced in other areas of aviation activities, such as flight crew training and licensing. This approach uses performance as the measurement to identify the opportunity for competency-based training and how it can address gaps in performance. This evaluation and training ensures that staff member competencies are fully developed and maintained.

This manual will provide:
— Guidance to the AIS/AIM organisations that are developing, implementing, and/or providing training to attain optimal job performance of staff members through a targeted competency-based training model.
— Specific guidance for training providers and course developers
— Pre-identified competencies that need to be developed to support the transition from AIS to AIM as discussed in the *Roadmap for the Transition from AIS to AIM* (2009).
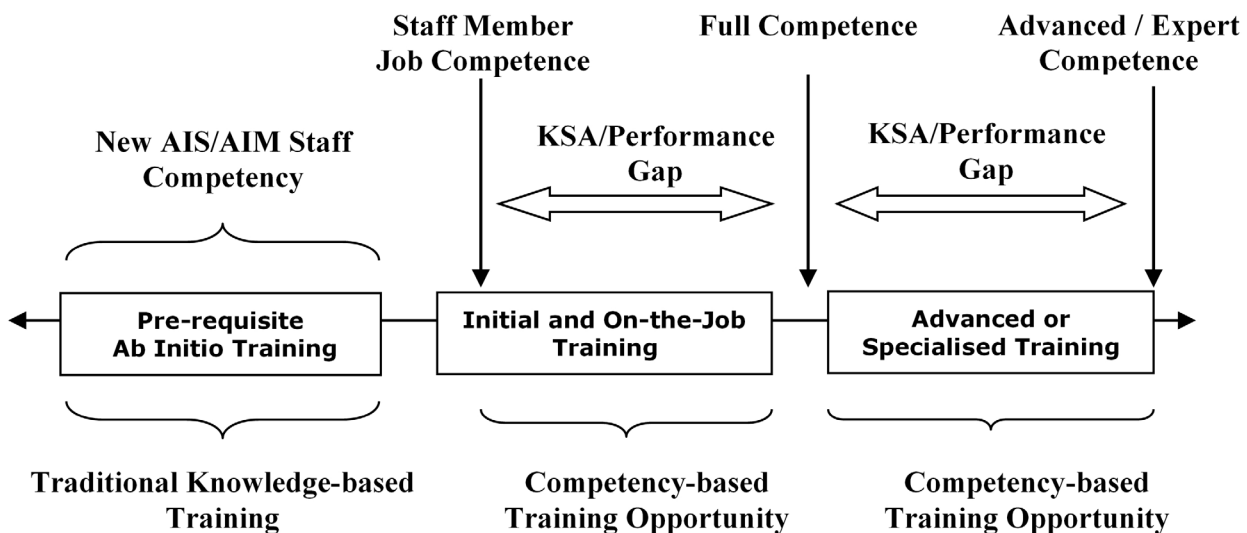

Figure 1 Job Competence Continuum

The role and importance of aeronautical information and aeronautical data has changed significantly with the implementation of RNAV, PBN, airborne computer-based navigation systems, and data link systems.

Target Audience - The audience for this competency-based *AIM Training Development Guidance Manual* includes CANSO Member ANSPs, CANSO Member organisations that develop and/or provide training courses/programmes, and aviation related organisations (such as regulatory authorities)

AIS/AIM staff generally includes those who are responsible for the functions undertaken by the AIS/AIM provider as well as other functions based on the internal organisational structure. This may include:
— Data and information management
— Static data information
— Dynamic data information
— Additional products
— Pre- and post-flight information
— Air traffic services (ATS) Reporting Office (ARO) functions.

This manual focuses on the methodology for developing training to address gaps in an individual staff member's performance. It is designed to assist in identifying the gap between the competencies and required performance and to develop training by addressing the associated gap in knowledge, skills, or abilities.

The goal of all training is to have as an outcome, a specific change in the behaviour and performance of the trainee following completion of training.

Regulators - A regulator may use this manual as a guideline to:
— Establish criteria for a training course/ programme conducted by training providers

— Establish its own training course/ programme
— Evaluate potential courses
— Facilitate audits

Regulators that intend to approve a training programme may use this manual as a part of their approval of the training process. For instance, they can establish training standards in which the proposed training is developed, implemented, and evaluated in accordance with a competency-based approach such as provided in the CANSO *AIM Training Development Guidance Manual*.

At present, ICAO Standards and Recommended Practices (SARPs) do not provide AIS/AIM personnel certification criteria. Therefore, it is beyond the scope of this manual to provide guidance on this matter.

Aviation-Related Organisations - Organisations that rely on an outside training provider should utilise this manual as a guideline to evaluate the training providers' courses or to develop training courses/programmes that focus on certain competencies as identified in Appendix 1 AIS/AIM Competency Framework.

Assumptions – In creating this training manual, the following assumptions are made:
— The AIS/AIM organisation:
  – Has specific job descriptions/ profiles for staff performing AIS/ AIM functions (regardless of whether the individuals are employees, contractors, or other named providers)
  – Can clearly define who (person or organisation) provides each of the required services and whether they take place within their AIS/AIM organisation or elsewhere
  – Has access to the appropriate physical training facilities and

   appropriate technological support
   needed to deliver the training

  – Has implemented a quality
   management system that includes
   standard operating procedures (and/
   or documented work instructions)

  – Will develop (or has available) a
   training programme that includes
   the specified training courses,
   assessments, and associated records

  – Has access to the services for
   competency-based course
   developers and competent
   instructors.

  – Will provide on-the-job training,
   following a training course, in
   order for a trainee to apply and/or
   reinforce the training objectives

— Trainees will have a basic understanding
 of aviation fundamentals that are not
 addressed by this manual.

2

The Basics of Competency-Based Training

2.1.   Governance

Annex 15 to the *Convention of the International Civil Aviation Organization* specifies that each contracting State shall provide an "aeronautical information service". Annex 15 also specifies, "Each Contracting State shall take all necessary measures to ensure that the aeronautical information/data it provides relating to its own territory, as well as areas in which the State is responsible for air traffic services outside its territory, is adequate, of required quality and timely. This shall include arrangements for the timely provision of required aeronautical information and aeronautical data to the aeronautical information service by each of the State services associated with aircraft operations."

Annex 15 and the ICAO *Aeronautical Information Services Manual* (Doc 8126) further cite the need for each State to establish a quality system and put in place a quality management system. Quality management should be applicable to the entire aeronautical data chain from origination to distribution to the next intended user. "Within the context of the established quality management system, the skills and knowledge required for each function shall be identified, and personnel assigned to perform those functions shall be appropriately trained. States shall ensure that personnel possess the skills and competencies required to perform specific assigned functions, and appropriate records shall be maintained so that the qualifications of personnel can be confirmed."[1]

2.2.   Overview

The guidance provided in this manual is intended to be one component to aid an AIS/AIM organisation to meet the stated objectives through training the workforce to become and remain competent in the roles and responsibilities that they have been assigned. The training should focus on each workforce member's performance, knowledge, skills, and abilities (KSAs) to meet the quality objectives in all functional areas of AIS/AIM. Since training is one of the most important elements of quality management, each organisation must establish standards for the required competency level for the workforce. When the standards are identified, then training can be an effective component that has a direct result on the performance level of individual members within the workforce.

Members of the workforce may have a variety of backgrounds such as air traffic or commercial aviation and, as a result, bring different levels of knowledge, skills and abilities to the organisation. Others come with very specific skills such as charting or information technology where they will need to learn about AIS/AIM more generally in order to be most effective in their role. The skills of all staff members need ongoing refresher and recurrent training as AIS/AIM organisations evolve and technology changes.

2.3.   What is a Competency?

A competency is a range of capabilities (knowledge, skills, and abilities) that enable one to carry out a specific activity or achieve a function to an agreed standard or requirement. Often people refer to an individual's knowledge, skills, and abilities as the attributes required to perform a job. They are generally demonstrated through qualifying service, education, or training. More specifically:
— Knowledge is generally considered as information that is applied directly to the performance of a function
— Skill is an observable competence to perform a task
— Ability is the competence to perform an observable behaviour or a behaviour that results in an observable outcome.

Competencies are generally behaviours that can be observed as individuals perform their work

[1] Refer to ICAO Annex 15 Chapter 3, 3.2 Quality Management System

and can be measured against their performance. These competencies are the applied knowledge, skills and abilities that enable an individual to perform a job. Therefore, individuals who have and use the appropriate competencies will achieve the requirements of the job as evidenced by their performance.

A competency statement for a job description should consist of the following:

— Action verb (observable or measurable activity related to the job)
— Content (subject matter, type of performance, specific task)
— Context (limitations or conditions)

2.4.   Competency-Based Training

Training generally focuses on obtaining a change in an individual's behaviour. The goal of competency-based training is to focus training to specific competencies that an individual has not yet attained and to see evidence of a change in their behaviour and performance following training. Change in behaviour should be evidenced as a progression from the pre-training status to a post-trained status where a more advanced competency level has been attained and ultimately reflected in a change in job performance.

Competency-based training provides specific training that:

— Is AIS/AIM organisation specific
— Neither over-trains nor under-trains an individual, ensuring an effective use of time and resources
— Keeps the trainee motivated during the training period and subsequently on the job

2.4.1.   Competency Units

The following competency units are comprised of elements that describe the knowledge, skills and abilities required by each competency unit. These have been identified within the AIS/AIM Competency Framework described in section 2.7.1 AIS/AIM Competency Units and in Appendix 1 AIS/AIM Competency Framework.

— Data and Information Management
— Static Data Information
— Dynamic Data Information
— Additional Products
— Pre- and Post-flight Information
— Air Traffic Services Reporting Office (ARO) functions
— Business Continuity

2.4.2.   Competency Elements

Each Competency Element within a Competency Unit has associated Terminal Objectives that link to performance on the job. A Terminal Objective describes performance within Appendix 1 AIS/AIM Competency Framework.

2.4.3.   Terminal Objectives

A Terminal Objective is a statement that describes the performance standard and is used to develop Learning Objectives. It may also be referred to as 'performance criteria'.

2.4.4.   Enabling Objectives

Enabling Objectives are those sub-sets of knowledge, skills and abilities that are required to accomplish the Terminal Objectives. For example, Enabling Objectives could include the ability to utilise a software programme in a specific way, know the production cycle, etc. The training provider/course developer is responsible for developing and identifying the Enabling Objectives associated with each Terminal Objective for each course.

Competency Unit			
	Competency Element		
		Terminal Objective (Performance Criteria)	
			Enabling Objectives

Table 1 Framework Objective Template

Competency Unit: Static Data Information		
	Competency Element: Generate AIP Amendment	
	Terminal Objective (Performance Criteria)	
		Enabling Objectives: Prepare Content

Table 2 Terminal Objective Example

An example from the framework is as follows: The Terminal Objective, 'Prepare Content' for the Aeronautical Information Publication (AIP) Amendment, has been identified as a competency gap for a staff member. The Competency Framework is applied as indicated in the example below. (See Appendix 1 AIS/AIM Competency Framework).

An AIS/AIM organisation, through the process of developing or identifying the training need (competency), is responsible for identifying the associated Enabling Objectives based on local practices and standard operating procedures.

An example of Enabling Objectives for this specific Terminal Objective describe the processes required for preparing content for the generation of the AIP Amendment. Trainees are tested on their ability to 'Prepare Content' for an AIP Amendment.

After a competency gap has been identified, training will need to be developed. In order to develop the training, Learning Objectives (KSAs) must be defined.

2.4.5.   Learning Objectives

Learning Objectives are derived from Terminal Objectives. They are statements that indicate what the trainee is expected to be able to do after the training and they can be measured.

In our example, a Learning Objective might be: 'At the end of this training the trainee will be able to generate content for the AIP Amendment'. Learning Objectives are developed by the training provider and are not included in Appendix 1 AIS/AIM Competency Framework. The Learning Objective needs to describe the associated performance in a measureable way.

Competency Unit: Static Data Information		
	Competency Element: Generate AIP Amendment	
	Terminal Objective (Performance Criteria)	
		Enabling Objectives: Prepare Content
		Learning Objective KSAs: — Text Management — Table Management — Chart Management — Content Analysis — Content Verification — ICAO Abbreviations and Codes

Table 3 Learning Objective Example

2.5.   Taxonomy

The purpose of the taxonomy in this training manual is to classify training objectives into different levels.

The reason for various levels of training include situations where competencies need to build over time from Level 1 (beginner) to Level 4 (advanced) as experience is gained; therefore, limiting training to a specific level is appropriate. Another reason for various training levels is that competency levels may be different based on the job responsibilities of the individual. For example, a Level 1 may be all that is required for one competency for a new staff member, yet a Level 3 is required for someone who is an experienced practitioner or specialist.

2.5.1.   Training Levels

Four levels are identified, numbered 1 to 4, and an initial level of pure information (named 0). These levels are similar to the phases of training in their progression of required ability. Each learning objective should have an associated training level identified (more fully explored in the Curriculum Development section).

The Training Levels are defined as follows:

Training Levels	Description
Level 0	To be aware of the subject
Level 1	Requires a basic knowledge of the subject. It is the ability to remember essential points; the learner is expected to memorise, describe or locate information.
Level 2	Requires an understanding of the subject sufficient to enable the learner to explain certain objects and events.
Level 3	Requires a thorough knowledge of the subject and the ability to apply it with accuracy. The learner should be able to make use of his or her repertoire of knowledge to develop plans and activate them. This involves the integration of known applications in a familiar situation.
Level 4	Requires a thorough knowledge of the subject and the ability to resolve a problem or the ability to analyse a complex problem and apply a relevant solution. The defining feature is that the situation is qualitatively different to those previously met, requiring judgment and evaluation of options.

Table 4 Training Level Descriptions

NOTE: Action Verbs – performance objectives contain an action verb to ensure that the outcome is observable and that the difficulty level is stated according to a defined taxonomy.

Training can be further defined into phases from beginner to advanced by the course developer or training organisation; however, since KSAs vary between individuals, and job requirements often change, training may not always be delivered sequentially for all trainees. For example, it is perfectly reasonable to expect that as a new technology is introduced to an organisation, the first training provided might be initial training for some, whereas for others it might be provided at an advanced phase.

A more detailed taxonomy for each training level is available in Appendix 2 Taxonomy.

2.6.   Competency-Based Training Steps

Step One - Analyse/identify the job responsibilities and associated performance criteria from the Competency Framework

The first step in designing training is to determine the competencies of a fully competent staff member. Items that may be needed to perform this analysis could include:
— The specific job or position description or summary
— Specific AIS/AIM organisation performance requirements or competencies (if already identified)
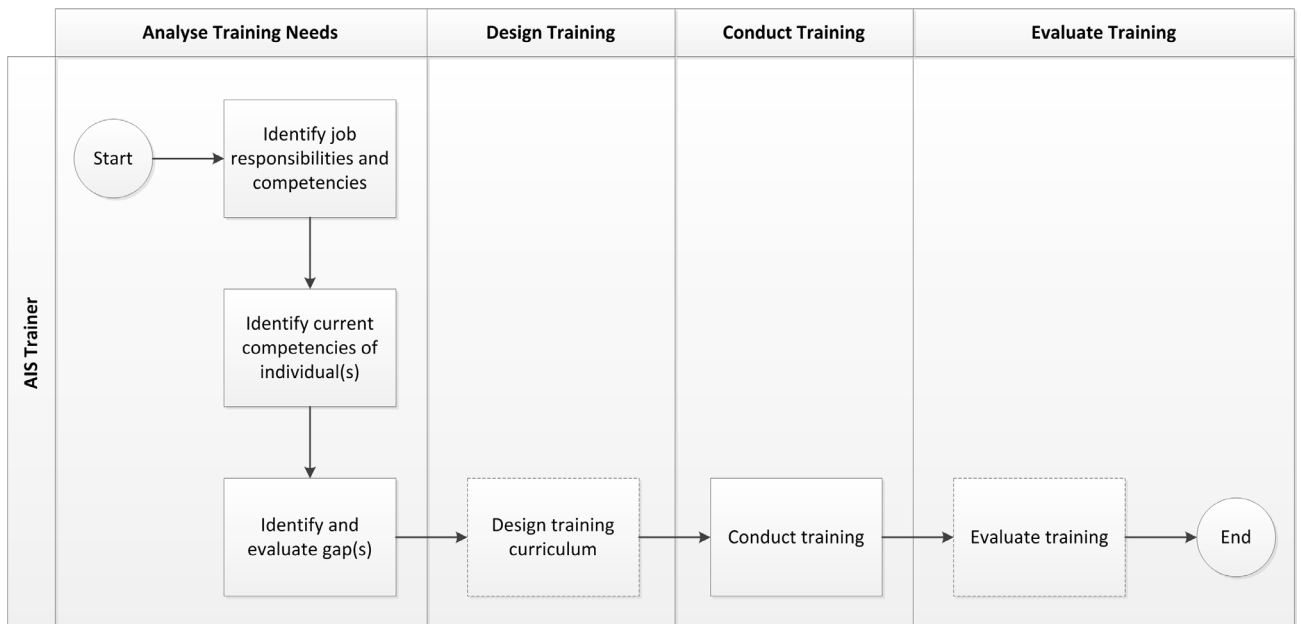— List of experience required as documented in a job advertisement or vacancy notice

Figure 2 Training Development Process

— Organisation performance evaluation form
— Standard operating procedures and work instructions from the quality system that apply to an individual's position or responsibilities

After thoroughly analysing the job responsibilities and expected performance, it is important to identify the associated competency elements and Terminal Objectives that the gap requires. These are extracted from the Competency Framework for each competency unit in Appendix 1 AIS/AIM Competency Framework.

Step Two - Identify and document the staff member's competencies

In Step Two, we need to analyse the competencies a staff member can perform.

Step Three - Identify and document the gaps between actual and expected performance

Now that we know what competencies are required for a fully competent performer for a specific position by completing Steps One and Two, we are ready to identify and document the competency gaps.

An assessment will need to take place to establish the type of training required for a new staff member or a staff member anticipating specialised or advanced training for a new role or expanded responsibilities.

The current competence of the individual against current and future competencies should be identified by testing or by evaluating previous performance evaluations so that appropriate training can be provided. Depending on the organisation, those competencies may already be pre-defined and therefore identifying the gap may be significantly easier.

EXAMPLE

Background: Andrew is a new staff member. He is a former flight dispatcher and has been hired as an AIS/AIM Specialist.

Step One: Obtain Andrew's job description. Obtain a copy of the performance evaluation form that will be used for his first performance evaluation and any documented standard operating procedures for which Andrew may be responsible for executing.

Using the collected information, identify and document the Terminal Objectives for Andrews' position.

EXAMPLE

Step Two: Evaluate Andrew's background on his resume (or previous performance evaluations if available) and identify his competencies using the Competency Framework. If possible, also obtain any previous training records that Andrew might have available.

EXAMPLE

Step Three: Compare Andrew's competencies (Step Two) against the competencies required and identified (Step One).

For this example, we will state that, upon completion of the analysis, Andrew does not have the competency 'Prepare content' in order to 'generate the AIP Amendment (See Appendix1) and develop training for this competency'.

Step Four - Design the training to address the gaps through the development of the Learning Objectives for each Terminal Objective that has been identified

Each competency should include Learning Objectives that clearly outline the KSAs that are needed to master this competency. It is at this step that the type (initial vs. advanced) and level (0 – 4)

of training should be addressed. Step Four requires the identification of the Learning Objectives and then the design of the curriculum.

Step Five - Conduct the Training

For training to be most effective, it is important for all parties in the training process to work together and coordinate all aspects of the training experience. Depending on the organisation, this may include a training manager, course developer, classroom instructor, subject matter expert, and an on-the-job trainer or mentor. Those involved in training need to ensure that the trainee has the opportunity to put classroom knowledge (theory) into practice. It is critical to ensure that the instructor and/or course developer understands the difference between ab initio training topics and delivering AIS/AIM initial, specialised, advanced, recurrent, and refresher training.

The details of curriculum development and how the training should be conducted are discussed in Section 3. Curriculum Design.

Step Six - Evaluate the training and outcomes against performance on the job

This last step in training determines whether the training has been successful. There are two phases to training evaluation.

The first phase identifies whether the trainee achieved the Learning Objectives, demonstrated through a performance assessment. This can be assessed during and at the end of the training period by a variety of methods including verbal testing, quizzes, essays, or other evaluation methods. The type and method of assessment is determined during curriculum development as described in Chapter 2 of this manual.

The second phase of assessment occurs after the completion of the training, when the staff member is able to demonstrate the application of the Learning Objectives on the job.

EXAMPLE

Step Six: Andrew returns from training to a formal on-the-job training period where his knowledge, skills, and abilities will be assessed in the work environment with a coach, mentor, or peer.

2.7. The AIS/AIM Framework

The competency units and elements required for a staff member will vary by organisation, based on the staff members' responsibilities and the organisational structure. In general, the Competency Framework will cover the main competency units for which an organisation is responsible, either directly or indirectly.

2.7.1. AIS/AIM Competency Units
Data and Information Management - Describes those competency elements that are common to static and dynamic information, will support the evolution from traditional product-centric aeronautical information services to the enlarged scope of data-centric aeronautical information management, and satisfy new requirements arising from the ICAO *Global Air Traffic Management Operational Concept*.[2]

This unit includes the competency elements and performance criteria related to pre-processing data, processing data, database operations, producing data sets, and maintaining data/information.

Static Data - The competency elements for the Static Data unit recognise the traditional products provided by an AIS as outlined in Annex 15 and Annex 4 of the ICAO *Convention on International Civil Aviation* and other related documents, regardless of whether they are provided in paper or in electronic form.

Static Data competency elements address the generation of the AIP, AIP Amendment, AIP

Supplement, Aeronautical Information Circular (AIC) and chart production.

Dynamic Data - The competency elements for the Dynamic Data competency unit recognise the traditional products provided by AIS as outlined in Annex 15 and other related documents.

This unit includes competency elements related to NOTAM, checklist of valid NOTAM, SNOWTAM, and ASHTAM regardless of whether they are traditional or digital.

Additional Products and Services - Provides general performance competency standards and is unique to each organisation. It recognises that some AIS/AIM organisations provide non-traditional services and products such as datasets and files to its stakeholders.

Pre- and Post-Flight Information - Addresses pre- and post-flight information provided by aerodrome AIS units as outlined in Annex 15 and other related documents. Pre- and post-flight information is stated in Annex 15 as one of the AIS functions; however, it has been separated because it is often executed by the Air Traffic Services Reporting Office (ARO). This competency unit is provided to assist in the development of appropriate training for staff members involved in execution of this function.

ARO - The competency elements in this unit include processing Flight Plan (FPL) and coordination activities.

While not part of Annex 15, many organisations include the ARO function within their AIS/AIM organisational unit. Stakeholders have specifically requested that information regarding ARO be included in the Competency Framework, as there are currently no ICAO documents that address competency elements for this function.

The learning and Enabling Objectives required for each level of performance as described by the Terminal Objective within the framework will be determined by each organisation when developing or approving training.

Business Continuity - Focuses on those elements related to local business continuity procedures specific to AIS/AIM functions, such as data and information management, static and dynamic data, additional products and services, pre- and post-flight information, and ARO.

3

Curriculum Design

Once the need for training has been established, the specific curriculum development needs to be designed. There are different yet interdependent types of training. Therefore, when planning the most effective and efficient training path, training providers and other stakeholders need to bear in mind the interdependence of these different types of training. Each organisation will achieve training effectiveness and efficiency in different ways.

3.1. Types of Training

Each type of training may have prerequisites. One type of training is not necessarily dependent on another type of training, and all may be taken on an as-needed basis.

There is an assumption that all staff members will have a basic level of knowledge in the following areas and their relationship to the aviation industry:
— International, regional, and national aviation regulation

— Air traffic management (ATM)
— Aerodromes
— Aircraft operations and characteristics
— Meteorology
— Geography/cartography
— Communication, navigation, and surveillance (CNS)
— Quality management systems
— Safety management systems
— Human factors
— Aeronautical information management concepts, strategies
— Information technology

These basics should be covered in ab initio training and not with competency-based training.

3.1.1. Ab Initio Training

The purpose of ab initio training is to harmonise trainees' entry competencies. Before conducting initial training, the competencies and KSAs of the trainees should be assessed to
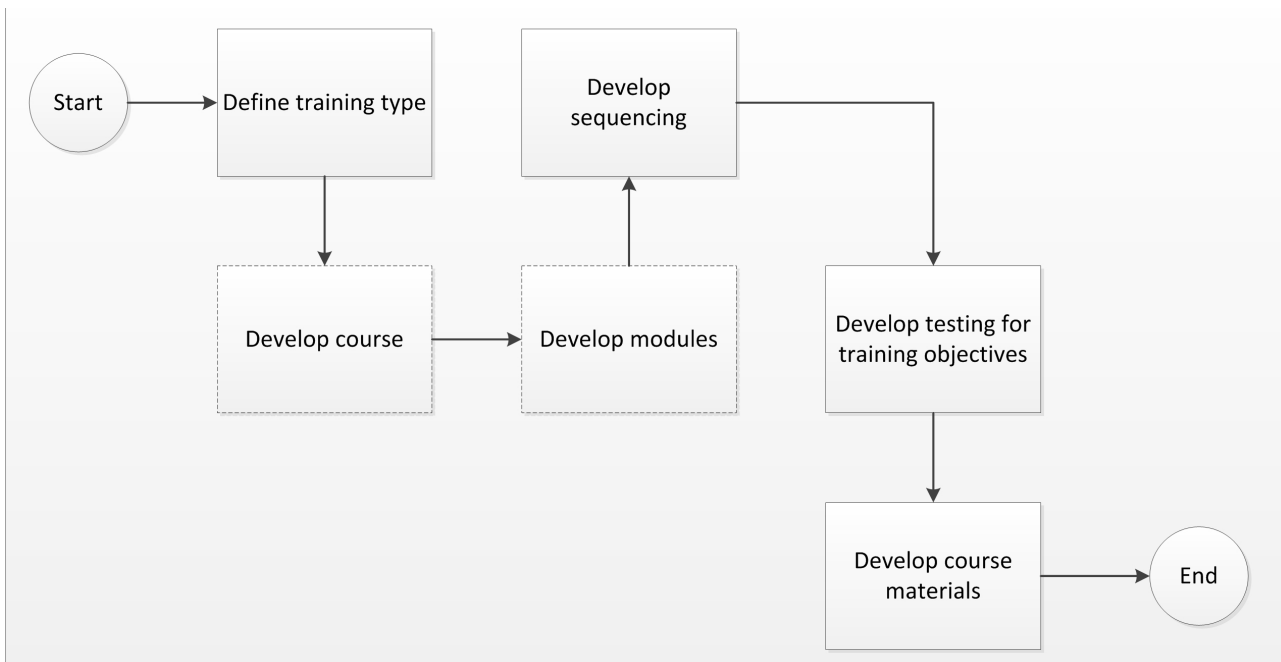

Figure 3 Curriculum Design Process

identify any needed training. Ab initio training covers beginner level knowledge and skills that needs to be mastered prior to commencing initial training, and may or may not cover AIS/AIM-specific knowledge. Examples of ab initio training might include entry level skills for certain software programmes, English-proficiency, cartography, aviation basics, etc. Ab initio training is designed to meet the prerequisites required by initial training. The programme for ab initio training should not be developed from the Competency Framework.

The responsibility for defining this training may be defined by the appropriate aviation authority/regulator or the service provider. Materials for training another aviation specialisation (pilot, air traffic controller, etc.) may apply or be modified for an AIS/AIM specialist. Training may also be available internally or from an external training institute.

3.1.2.   Initial Training

Initial training is the first phase of training where specific AIS/AIM topics and criteria are addressed. The purpose of initial training is to provide knowledge and skills for newly acquired staff for whom a gap analysis has been completed, who have no previous AIS/AIM experience, and who already have a basic understanding of the topic through experience or completion of ab initio training. The curriculum of initial training is derived from the Competency Framework.

Training providers may be required to deliver some level of ab initio training to ensure that trainees meet the prerequisites (it is understood that each organisation should define all specific job requirement prerequisites). Not attending ab initio training may affect a trainee's ability to meet initial training objectives.

3.1.3.   On-The-Job Training

On-the-job training (OJT) may coincide with or follow initial training to ensure that the acquired KSAs are appropriately applied. While OJT cannot be considered a specific training course in the formal sense, it is an essential phase in a training programme. Its purpose is to reinforce the formal training and support the achievement of competency performance standards. Similar to initial training, the OJT curriculum will be derived from the Competency Framework and driven by Learning Objectives. OJT phases may follow any type of training whether it is initial, specialised, advanced, recurrent, or refresher training.

3.1.4.   Advanced and/or Specialised Training

The purpose of advanced or specialised training is to augment the skills and knowledge of staff members in dealing with more specific, complex, or wider breadth of issues. The curriculum should be derived from the Competency Framework and may include OJT.

3.1.5.   Recurrent Training

The purpose of recurrent training is to address changes in the available criteria and regulations. It is essential that staff members update their KSAs and competencies in accordance with the latest requirements, technologies, legislation, organisational structure, and best-practice benchmarks. Regular recurrent training should be planned accordingly. The curriculum should be derived from the Competency Framework and may include OJT.

3.1.6.   Refresher Training

The purpose of refresher training is to strengthen knowledge and skills that have weakened through disuse and the passage of time. Given the safety-related nature of AIS/AIM, it is strongly recommended that all staff be part of identifying KSAs that weaken with the passage of time or are rarely used, and that refresher training is planned accordingly. The refresher-training curriculum should be derived from the Competency Framework, and may include OJT.

3.2.   Considerations

The individual or training provider

responsible for delivering the curriculum should address, but not be limited to, the following considerations when developing a course:
— Duration
— Cost
— Facilities
— Training media
— Language of training delivery
— Class size
— Trainee profiles
— Feedback
— Automation
— Organisational structure
— Complexity of the State airspace
— Resources
— Regulatory requirements
— Institutional requirements

3.2.1. Roles and Responsibilities

Course developers are responsible for the development and production of all course materials. Their goal is to produce training packages that meet the identified competency gap(s) and are performance based.

Course instructors are responsible for delivery of course content and instructional events. Instructors have to demonstrate their instructional skills and their knowledge, skills and abilities in the subject matter to be effective.

Trainees are responsible for being actively engaged in training and the successful completion of all course module activities and assessment materials, as required. In order for trainees to be successful on the job, they will go through different modules of training based on the gap identified between their level of competence and job performance requirements. There may be several courses of training for each level or set of required competencies.

The OJT trainer or mentor is responsible to work with the instructor to ensure that the trainee has an effective on-the-job experience that reinforces the classroom knowledge.

All training will involve a course development process.

3.3. Course Development

Components and processes needed to develop a course curriculum include:
— Evaluating the existing competencies of the trainees (pre-training)
— Design – deriving Terminal Objectives and the associated Learning Objectives from the Competency Framework
— Identification of KSAs – for each terminal and enabling objective
— Grouping Learning Objectives into course modules
— Sequencing Learning Objectives
— Trainee assessment (following training)
— Course materials

3.3.1. Evaluating the Existing Competencies

Before conducting training, the KSAs of the trainees must be ascertained. Staff may be recruited with or without prior aviation knowledge or experience. Consequently, trainees KSAs may vary and therefore the level of training needed. For example, trainees who have no prior knowledge of aeronautical information may be required to complete ab initio training.

It is the responsibility of the training provider or course developer to establish and assess pre-requisites for training. The pre-requisite skills identified refer to KSAs and competencies required of the trainee prior to commencing training. Prerequisites vary depending on whether training providers offer specialised, advanced, and recurrent or refresher training as open courses where participants come from a variety of backgrounds or as tailored courses aimed at a specific client where staff members have similar expertise.

Training providers are encouraged to offer ab initio training covering the prerequisites that are

necessary to ensure that the length of training is optimised.

3.3.2. Language

In order to progress through competency-based training, trainees need to demonstrate their ability to achieve the Terminal Objective related to the competency elements. Since training courses are generally time-limited, it is important that trainees learn the material within the time allocated. For this reason, proficiency in the language in which training will be delivered (instruction and training materials) is essential.

It is recommended that staff members have an appropriate level of proficiency in the English language. The required level of proficiency is specific to the responsibilities of the job. For example, staff that edit or translate in to or from English will be required to have a higher level of proficiency than others who may only need to understand or use the spoken word.

3.3.3. Training Objectives

Training and course providers must develop training objectives for all courses offered, and are comprised of three parts:
— Conditions of performance
— Terminal objectives (performance criteria)
— Standards by which the performance is measured

Conditions of Performance

When creating the training objective, describing the situation or conditions (constraints) that may be in place when the performance must be demonstrated is necessary. The conditions set the stage for what happens next and prepare the trainees for what they might expect on the job and how to proceed. For example, conditions of performance for a requirement to 'Generate NOTAM' for Dynamic Data could be 'information received from a data originator'.

Terminal Objective (Performance Criteria)

Expected behaviour or performance as described in the learning objective requires that the associated Terminal Objective be identified from Appendix 1 AIS/AIM Competency Framework. The performance criterion is the measurement of whether the learning objective that describes the expected behaviour to accomplish the Terminal Objective has been achieved.

For example, the performance criteria for the Terminal Objective of 'prepare content' for the 'Generate NOTAM' competency element could be 'prepare the content required for the generation of NOTAM content within the specified standard'. Each Terminal Objective also has very specific supporting or Enabling Objectives that together, accomplish the Terminal Objective. A Terminal Objective may also be described as a specific task. Enabling Objectives are those subsets of knowledge, skills and abilities that are required to accomplish the Terminal Objectives. To continue our example, Enabling Objectives could include the ability to utilise a specific software program in a specific way, 'correctly apply the ICAO Doc 8400 Abbreviations and Codes', etc.
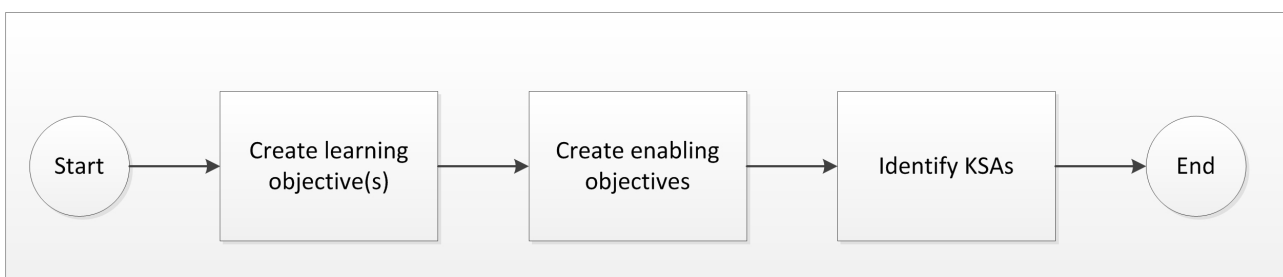

Figure 4 Performance Criteria Development Process

KSA Identification

It is important when identifying the terminal and Enabling Objectives, that the supporting KSAs are also identified. Taking this step allows for a consistent level of knowledge across all trainees and ensures their success with both understanding and performing the Enabling Objectives that allow them to achieve the Terminal Objective and associated learning objective. Sometimes, the KSAs identified for an enabling objective for a Terminal Objective may be the ability to complete a Terminal Objective of another competency element. Referring to Appendix 1 AIS/AIM Competency Framework for example, a KSA for our 'Prepare Content' Terminal Objective (Framework 3.1.1) for NOTAM generation (Framework 3.1) may be the ability to 'Pre-process Data' which is a Terminal Objective (Framework 1.1) from the Data and Information Management competency unit (Framework Unit 1).

When a training provider or course developer has established training objectives for a course, it will be necessary to identify pre-requisite requirements for that course in order to assure that the objectives can be achieved in the time given. Training objectives, course length, and prerequisite KSAs are always directly related.

Note: Course content, scope and course length in the following examples are not meant to be all encompassing.

Training providers are invited to state the prerequisites of the respective courses referring to the mastery of competency elements and performance criteria as outlined in Appendix 1 AIS/AIM Competency Framework.

TRAINING EXAMPLE	
Course goal/ Training Objective	Generate NOTAM (Framework 3.1)
Target population	NOTAM Office Trainee
Course duration	16 hours
Pre-requisite KSAs	— Appropriate English language proficiency — Familiarity with ICAO Annex 15, Chapters 5 and 6, Appendices 5 and 6 — Familiarity with ICAO Doc 8126 and Doc 8400 — Intermediate PC proficiency

Table 5 Training Example - KSA Identification

Standard

The standard for each training objective may or may not be the same within the training environment as on the job. The standard is defined by each organisation according to local standard operating procedures and regulations.

Referring to Appendix 1 AIS/AIM Competency Framework for example within the Competency Framework, Competency Unit 3 NOTAM, we find Competency Element 3.1, 'Generate NOTAM'.

A Terminal Objective can be identified as follows:

TRAINING EXAMPLE CONTINUED	
Training objective	Generate NOTAM
Conditions of performance	Complete task accurately and timely without assistance or supervision when NOTAM proposal is received
Expected performance behaviour / learning objective	Terminal Objective #1: Prepare Content Recognise a NOTAM proposal and understand the local procedures required to generate the NOTAM
Standard	— Appropriate English language proficiency — Familiarity with ICAO Annex 15, Chapters 5 and 6, Appendices 5 and 6 — Familiarity with ICAO Doc 8126 and Doc 8400

Table 6 Training Example – Terminal Objective

The trainee will then undergo a module of training and be required to perform the Terminal Objective as formulated in a comprehensive assessment at the end of it (see3.6 Comprehensive Assessment).

In order to achieve the Terminal Objective, there are several Enabling Objectives that the trainee needs to master. Enabling Objectives may be derived from performance criteria. Referring to Appendix 1 AIS/AIM Competency Framework for example, for Framework Competency Element 3.1, Generate NOTAM, Performance Criteria 3.1.1 states, 'Prepare content'. One enabling objective of the module would be 'apply ICAO Doc 8400 Abbreviations and Codes' another might be the Framework Terminal Objective 1.1 'Pre-process Data'.

TRAINING EXAMPLE CONTINUED	
Training objective	Generate NOTAM
Terminal objective	Prepare content
Conditions of performance	Use standard software and pre-processing of dynamic data
Expected behaviour / Performance Criteria	Enabling Objective #1: Pre-process Data
Standard	Prepare NOTAM content with 100 percent accuracy within the particular NOTAM timeframe as required by the type of NOTAM.

Table 7 Training Example – Enabling Objective

To be able to achieve this enabling objective, the trainee will require specific knowledge, skills, and abilities. For example, the trainee is required to possess the following knowledge, skills and abilities:

TRAINING EXAMPLE CONTINUED	
Training objective	Generate NOTAM
Terminal objective	Prepare content
Enabling objective	Pre-process data
Knowledge (Information applied to performance)	Enabling Objective #1: Pre-process Data
Standard	Appropriate source documents (e.g. list of data originators, AIP, ICAO documents, existing NOTAMs, local procedures)
Skills (observable competence to perform a task)	— Receive and record raw data (internal and/or external) — Identify if there is a need for translation and/or coding of the raw data — Verify the quality of the raw data — Identify any discrepancies, duplication and misinterpretations of the data
Ability (competence to perform an observable behaviour or behaviour that results in an observable outcome)	— Evaluate whether the raw data is from an authorised source — Analyse the appropriateness of the data — Analyse the data for completeness, coherence, abbreviation and ambiguity — Coordinate with data source — Execute corrective action

Table 8 – Training Example Identify KSAs

Establishing OJT Training Objectives

Generally, the purpose of OJT is to consolidate and apply the knowledge and skills acquired during training. Training objectives for OJT must be established from the Competency Framework. The difference between the training objectives and the OJT objectives is the standard that trainees should achieve to demonstrate that they have mastered the competency.

Often it is not possible to achieve full mastery of a competency through classroom training alone. Experience and practice on the job are required to meet the full performance standard stated in the Competency Framework. When deriving training objectives, especially for initial training, the course developer should determine the performance standard they expect trainees to achieve in the classroom. The course developer, with input from subject matter experts, should discuss the acceptable number and types of errors. Some errors, even during training, may not be acceptable because they indicate a lack of knowledge, skills, or ability. There may be types of errors that are acceptable during training.

OJT objectives need to be as close or equivalent to the expected job performance. Therefore, the standards for OJT objectives should be more demanding than the standards for the classroom training objectives.

3.4. Modules

In order to optimise training time, it may be appropriate to group similar or sequential competency elements from the same or different competency units. The grouping of training objectives together forms a training module.

3.4.1. Module Design

The structure of each module must take into consideration the KSAs necessary to perform the stated objective(s). Module design should identify any prerequisites necessary for trainees to reach the optimum level of performance of the stated objective(s). Course modules and all learning materials should be developed using a systematic approach.

3.4.2. Instructional Criteria

The following instructional criteria should be used throughout the course module for each enabling objective:
— Presentation of the objective
— Performance measurement criteria
— Context to the Terminal Objective, competency element, and unit
— Presentation of content
— Clarification of and emphasis on main points
— Provision of a practice opportunity or reinforcement
— Provision of feedback for participants (progress assessment, etc.)
— Performance of the objective and assessment of the achievement

Course objective(s) and a description of required performance (standard/performance expectations) should be introduced at the beginning of the course module. This allows trainees to know exactly what is expected and how they will be evaluated at the end of the course. This may also reduce the level of anxiety for trainees and help keep instruction focused on the desired level of performance. At a minimum, the introduction should include:
— The presentation of terminal or end-of-module objectives and the comprehensive assessment
— Intermediate objectives
— Activities provided in the module
— Any reference material on the subject matter
— Intended length of time of the module

During the presentation of the module, it may be useful to provide a brief demonstration or

example of the desired performance or outcome. This may help motivate trainees and provide relevant context for expected levels of proficiency. The relevance of the content being presented could be identified in several different ways. One way is to ask trainees – 'What will happen if this is done?'

Presentation of content should be divided into manageable pieces of information with course modules sequenced in a logical and interesting manner. The main points of module content should be clarified immediately after the elements of content have been presented. Activities and practice items should be provided to support the successful achievement of training objective(s). Trainees must be provided with several opportunities to review and practice the knowledge and skills being covered before assessment. This will help to ensure trainees have mastered all Enabling Objectives leading to the desired performance of a Terminal Objective. Once critical Enabling Objectives are completed, a progress assessment may be appropriate.

3.5.   Sequencing

Different training courses can be divided into modules. The flexibility of a modular approach allows training providers to:

— Adjust for the varying knowledge and experience of trainees
— Establish the most effective duration for the course
— Address individual learning styles and characteristics
— Measure results on job performance

The grouping of the objectives into modules and the sequencing of the modules define the training plan. The objectives will describe what the trainees must be able to do after training. Objectives should be expressed in terms of measurable performance, i.e. competency elements, which are derived from the competency unit of the framework.

A given module can have several Terminal Objectives, and each Terminal Objective will have several Enabling Objectives that describe the desired performance derived from performance criteria. Finally, OJT objectives describe what the trainee should be able to do after a defined period of practice on the job.

Each module should be designed to ensure that trainees are capable of performing the objectives to the standard required at the end of the module. The training plan for each module should contain the following:

— Learning Objectives (and associated Enabling Objectives, and training level)
— Performance measurement criteria
— Trainee practice (test environment, exercises, projects, etc.) and feedback
— Performance assessment

A variety of instructional techniques can be used to achieve training objectives including lectures, guided group discussions, case studies/ projects, supervised practice, group exercises, field visits, e learning, tutorials and on-the-job practice. For each training technique, there are usually several alternative media for presenting information to the trainees, and these should be selected to suit the training objectives.

3.6.   Comprehensive Assessment

It is important to be able to assess a trainee to ensure that they have mastered the training objective and consequently there is a measurable change in behaviour and on the job performance. The comprehensive assessment is to ensure that the trainee has mastered the training objective (Terminal Objectives). The progress assessment is designed to ensure that the trainee has mastered the Enabling Objectives.

All trainees must be assessed (tested) on their level of proficiency of the Terminal Objectives
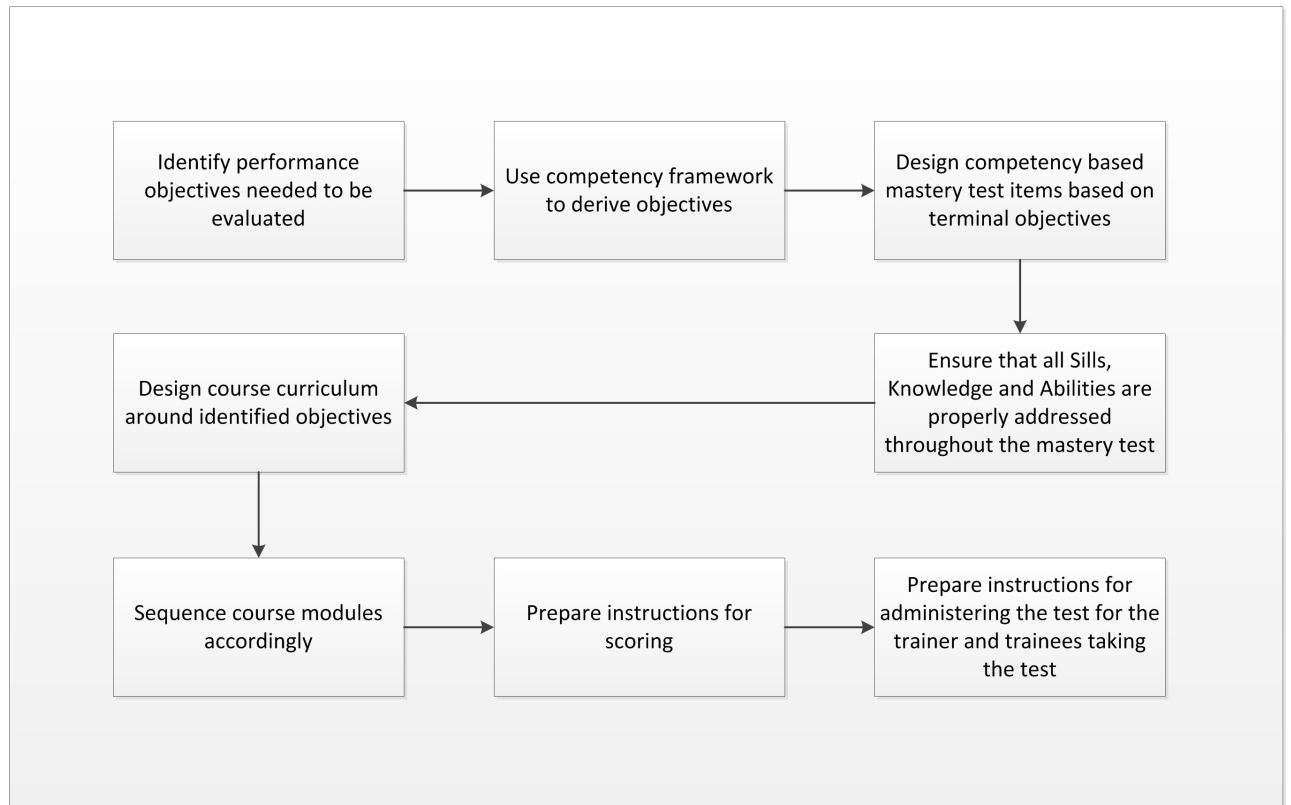
Figure 5 Mastery Test Design Process

(Learning Objectives) and Enabling Objectives identified throughout the course. As much as possible, tests should match conditions, behaviours and standards the trainee will experience on the job.

It is important to remember that trainees are being evaluated on their ability to perform specific training objectives that are related to job performance. By designing tests before the curriculum is delivered, their focus should be on the 'need to know/perform' rather than the 'nice to know' thereby ensuring an efficient and effective use of training time.

3.6.1. Progress Assessment

The purpose of progress assessments is to measure a trainee's ability to meet key Enabling Objectives. It provides immediate feedback to trainees regarding their ability to meet Enabling Objectives. It is not feasible or advisable to measure proficiency for every enabling objective. However, the administration of progress

assessments should be considered for Enabling Objectives that are key (difficult or critical) to the successful achievement of Terminal Objectives.

Progress assessments can be administered in a variety of ways; for example, verbal discussion, written quizzes, tests, etc. Each evaluation should be appropriate to the required level of knowledge, skill, and ability as stated by the key objective(s) and should be clearly stated and unambiguous.

3.6.2. Validity and Reliability

The most important requirements of an evaluation are that it must be valid and reliable. A valid assessment should reproduce the conditions, behaviour and standards identified by the objectives and cover all KSAs required to achieve these.

A reliable assessment refers to the capability of yielding the same scores with different people scoring the test. The test should also yield comparatively similar results when administered

at different points in time to equally competent trainees. It is important that instructions are always complete, clear and unambiguous.

3.6.3.   Test Format

Ideally, tests will reproduce the conditions of job performance. Simulations and case scenarios are good examples of a testing format that reproduces these conditions; however, it may not always be possible to design tests in these formats. Multiple choice or short-answer tests can be designed in such a way as to present a case in which the ability to perform given objectives can be demonstrated. There are advantages and disadvantages to the various types of tests a training provider chooses to administer.

A test should be based on the objectives covered throughout the course. Developers must describe the context in which observable and measurable outcomes are identified. For each desired level of performance, training programmes must structure testing materials based on the Competency Framework, as appropriate.

Tests should:
— Be balanced so that the distribution of items reflects the relative importance of the objectives being covered
— Be efficient so delivery of the test is not too time-consuming; it should allow for quick and efficient scoring and processing of results
— Include a scoring key and/or answer

sheet so that a minimum amount of interpretation is needed when scoring the trainee's responses. It is also advisable to include a reference for each answer from the training material

3.6.4.   Test Design

For a given objective, trainees will undergo training and assessment. During the assessment, the trainee will be required to achieve the objective. Terminal Objectives are outlined in the Competency Framework, and the course instructor will provide the associated learning objective and Enabling Objectives. Assessments may be conducted through testing, discussion, or other assessment methods that allow the instructor to assess the progress of the trainee.

Based on the context of each training environment, it is up to the training provider to establish appropriate items for testing.

Before writing a test item, the following questions should be answered:
— In what context is the Terminal Objective being carried out?
— What conditions are being stated for the trainee to complete the objective?
— What is the expected behaviour for this objective?
— To what standards should the behaviour be carried out?

Below is a sample test question:

Example Terminal Objective: Prepare NOTAM Content

Conditions. Trainee is provided with raw data text for a NOTAM.

Behaviour. Trainee is able to use the ICAO Doc 8400 to review text to check and/or apply the abbreviations and codes.

Training standard. Trainee will have corrected any abbreviations and applied any abbreviations or codes to un-abbreviated raw text in accordance with the ICAO Doc 8400 Abbreviations and Codes.

3.7. Production and Development of Course Materials

In order to validate the complete training process, subject matter experts should verify the technical accuracy of all training materials; this helps to assure that all information presented to the trainee is accurate and current. This subject matter review will provide further assurance that the training materials meet the standards of the objective(s) trainees will eventually perform on the job.

Upon completion of the development of course materials, it is recommended to validate the content before delivery to trainees. This can be accomplished by offering the training to a sample of individuals using a draft version of the instructional materials. The feedback from this process may be used to address any issues in course design or materials.

Presenting instructional events can vary depending on the content, materials or the learning styles of the trainees themselves. Regardless, instructional events should be described and documented. To ensure a more consistent delivery of AIS/AIM course content, course developers should design content that is material-dependent to ensure that training is delivered in a consistent and reliable manner. This allows the instructor to focus on the facilitation aspects of training.

Course Material Content	Considerations
Documentation	— Course materials — Evaluation forms — Assessments/Tests — Competencies and Standards – Language for training delivery and training and reference materials — Take-home materials
Reference	— Reference materials such as articles, texts, web pages, etc.
Media	— Print (printed materials, flip charts, etc.) — Electronic (Computer-based, CD, flash drives, USB, video, projector, etc.)
Records	— Training — Assessment — Course Completion

Table 9 Course Material Considerations

Attached in Appendix 5 Training Plan and Course Curriculum is a high level example of a training plan with an abbreviated training course curriculum to aid further understanding of a competency-based training programme.

Appendix 1

AIS/AIM Competency Framework

COMPETENCY FRAMEWORK		
X	COMPETENCY UNIT	
X.X	COMPETENCY ELEMENT	
X.X.X	Terminal Objective (Performance Criteria)	Standard[3]
1	DATA AND INFORMATION MANAGEMENT	
1.1	PRE-PROCESS DATA	
1.1.1	Receive and record raw data (internal and/or external)	Local procedures
1.1.2	Evaluate whether the raw data is from an authorised source	ICAO Annex 15, Chap. 7 and Appendix 1; Doc 8126; Local procedures
1.1.3	Evaluate whether the data meets protection requirements	Local procedures
1.1.4	(reserved)	(reserved)
1.1.5	Identify if there is a need for translation and/or coding of the raw data	ICAO Doc 9713, Doc 8400
1.1.6	Analyse the appropriateness of the data	ICAO Annex 15; Local procedures
1.1.7	Verify the quality of the raw data	ICAO Annex 15, Chap. 3; Local procedures
1.1.8	Analyse the data for completeness, coherence, abbreviation and ambiguity	ICAO Doc 8400; Local procedures
1.1.9	Identify any discrepancies, duplication and misinterpretations of the data	ICAO Annex 15, Chap. 4 through 7
1.1.10	Coordinate with data source	Local procedures
1.1.11	Execute corrective action	Local procedures
1.2	PROCESS DATA	
1.2.1	Perform storage of raw data	Local procedures
1.2.2	Assess the impact of the data on existing publications, the significance and complexity of the data, and its temporality.	Local procedures
1.2.3	Coordinate with other relevant parties	Local procedures
1.2.4	Select the means of publication	Local procedures
1.2.5	Schedule the publication process, taking into consideration the main milestones, proposed publication/effective date and the AIRAC cycle	ICAO Annex 15 and Local procedures, Doc 8126
1.2.6	Perform calculations e.g. data conversions	Local procedures
1.2.7	Apply appropriate data formatting rules	Local procedures
1.2.8	Enter data into application	Local procedures
1.2.9	Assemble statistical data	Local procedures
1.2.10	Make data available	Local procedures
1.3	OPERATE DATABASE(S)	
1.3.1	Apply database maintenance operations	Local procedures

[3] The standards listed in this Framework are consider representative and not exhaustive.

1.3.2	Identify faults in the operation of the database and apply fault reporting procedures	Local procedures
1.3.3	Operate application(s)	Local procedures
1.4	PRODUCE DATA SETS/FILES	
1.4.1	Select the required data	Local procedures
1.4.2	Compile data sets/files (e.g. terrain and obstacle, PIB, List of Valid NOTAM, etc.)	ICAO Documents and/or Local procedures
1.4.3	Coordinate with other authorities as necessary	Local procedures
1.4.4	Verify data sets/files	Local procedures
1.4.5	Obtain approval	Local procedures
1.4.6	Make data sets/files available	Local procedures
1.5	MAINTAIN DATA/INFORMATION AND LIBRARY (INTERNAL AND EXTERNAL)	
1.5.1	Maintain publications (e.g. AIP)	Annex 15 and Local procedures
1.5.2	Maintain data (static and/or dynamic)	Local procedures
1.5.3	Maintain records	Local procedures
2	STATIC DATA	
2.1	GENERATE AIP/AIP AMENDMENT	
2.1.1	Prepare content (text, tables, charts, and other elements)	ICAO Annex 15, Annex 4, Doc 8126, Doc 8400, Doc 8697, Local procedures
2.1.2	Coordinate with other relevant parties	Local procedures
2.1.3	Translate text into appropriate language	Local procedures
2.1.4	Verify content	Local procedures
2.1.5	Obtain approval of content	Local procedures
2.1.6	Compile product	Local procedures
2.1.7	Obtain approval of compiled product	Local procedures
2.1.8	Make AIP/AIP Amendment available (paper and/or electronic form)	Annex 15 Section 3.3, ICAO 9855 (use of internet) and Local procedures
2.2	GENERATE AIP SUPPLEMENT	
2.2.1	Prepare content (text, tables, charts, and other elements)	Local procedures
2.2.2	Coordinate with other relevant parties	Local procedures
2.2.3	Translate text into appropriate language	Local procedures
2.2.4	Verify content	Local procedures
2.2.5	Obtain approval of content	Local procedures
2.2.6	Compile and verify content	Local procedures
2.2.7	Obtain approval of compiled product	Local procedures

2.2.8	Make AIP Supplement available (paper and/or electronic form)	Annex 15 Section 3.3, ICAO Doc. 9855, and Local procedures
2.3	GENERATE AERONAUTICAL INFORMATION CIRCULAR (AIC)	
2.3.1	Prepare content (text, tables, charts, and other elements)	Local procedures
2.3.2	Coordinate with other relevant parties	Local procedures
2.3.3	Translate text into appropriate language	Local procedures
2.3.4	Verify content	Local procedures
2.3.5	Obtain approval of text	Local procedures
2.3.6	Compile and verify content	Local procedures
2.3.7	Obtain approval of compiled product	Local procedures
2.3.8	Make AIC available (paper and/or electronic form)	Annex 15 Section 3.3, ICAO Doc 9855 and Local procedures
2.4	PRODUCE CHARTS	
2.4.1	Prepare charts	ICAO Annex 4, Doc 8697; Doc 9674; Local procedures
2.4.2	Coordinate with other relevant parties	Local procedures
2.4.3	Translate elements into appropriate language	Local procedures
2.4.4	Verify content	Local procedures
2.4.5	Obtain approval of chart	Local procedures
2.4.6	Make charts available (paper and/or electronic form)	Annex 15 Section 3.3; ICAO Doc 9855; and Local procedures
3	DYNAMIC DATA	
3.1	GENERATE NOTAM	
3.1.1	Prepare content (series, number, Q line, E field, etc.)	ICAO Annex 15 Chap. 5, ICAO Doc 8126
3.1.2	Coordinate with other relevant parties	Local procedures
3.1.3	Translate text into appropriate language	Local procedures
3.1.4	Verify content	Local procedures
3.1.5	Make NOTAM available	ICAO Annex 15 Chap. 5.3, Annex 10 Vol 2 Chap 4 ; Doc 8126; Doc 7910; Doc 8400; Local procedures
3.2	GENERATE CHECKLIST OF VALID NOTAM	
3.2.1	Prepare Checklist of Valid NOTAM	Local procedures
3.2.2	Coordinate with other relevant parties	Local procedures
3.2.3	Verify content	Local procedures
3.2.4	Make Checklist of Valid NOTAM available	ICAO Annex 15 Chap. 5.3, Annex 10 Vol 2 Chap 4 ; Doc 8126; Doc 7910; Doc 8400; Local procedures
3.3	GENERATE SNOWTAM	

3.3.1	Prepare SNOWTAM	ICAO Annex 15 Chap. 5, ICAO Doc 8126
3.3.2	Coordinate with other relevant parties	Local procedures
3.3.3	Verify content	Local procedures
3.3.4	Make SNOWTAM available	ICAO Annex 15 Chap. 5.3, Annex 10 Vol 2 Chap 4 ; Doc 8126; Doc 7910; Doc 8400; Local procedures
3.4	GENERATE ASHTAM	
3.4.1	Prepare ASHTAM	Annex 15 Chap. 5, ICAO Doc 8126
3.4.2	Coordinate with other relevant parties	Local procedures
3.4.3	Verify content	Local procedures
3.4.4	Make ASHTAM available	ICAO Annex 15 Chap. 5.3, Annex 10 Vol 2 Chap 4 ; Doc 8126; Doc 7910; Doc 8400; Local procedures
4	ADDITIONAL PRODUCTS & SERVICES	
4.1	GENERATE ADDITIONAL PRODUCTS & SERVICES	
4.1.1	Prepare additional products – data sets/files – (e.g. business products and services, VFR guide), and other customised products for stakeholders	Local procedures
4.1.2	Coordinate with other relevant parties	Local procedures
4.1.3	Verify content	Local procedures
4.1.4	Obtain approval	Local procedures
4.1.5	Make additional products available	Local procedures
5	PRE- AND POST-FLIGHT INFORMATION	
5.1	PRE-FLIGHT INFORMATION	
5.1.1	Provide or make available pre-flight information e.g. AIP, PIB, etc.	ICAO Annex 15, Doc 8126, Doc 9855; Annex 10, Vol 2 Chap 4; and local procedures
5.1.2	Assist stakeholders in the pre-flight phase	Local procedures
5.2	POST-FLIGHT INFORMATION	
5.2.1	Receive post-flight data/information	ICAO Annex 15, Doc 8126, and local procedures
5.2.2	Assist stakeholders in the post-flight phase	Local procedures
5.2.3	Process post-flight data/information	Local procedures
5.2.4	Distribute post-flight data/information to the relevant parties	local procedures
6	ARO	
6.1	PROCESS FPL	

6.1.1	Receive the FPL proposal	ICAO Doc 4444; Local procedures
6.1.2	Process the FPL (Verify FPL for compliance with format and data conventions, and for completeness and accuracy)	Local procedure
6.1.3	Receive, create and process associated /supplementary messages	Local procedures
6.1.4	Execute corrective action	Local procedures
6.1.5	Transmit FPL	ICAO Annex 10 Vol 2 Chap 4., Doc 4444; Local procedures
6.2	COORDINATION ACTIVITIES	
6.2.1	Assist stakeholders in the pre-flight and post-flight phase	Local procedures
6.2.2	Coordinate with ATS	Local procedures
6.2.3	Coordination with Search and Rescue Coordination Centre	Local procedures
6.2.4	Coordinate with other relevant parties	Local procedures
7	BUSINESS CONTINUITY	
7.1	KNOWLEDGE REGARDING LOCAL CONTINGENCY PROCEDURES	
7.1.1	Data and Information Management	Local procedures
7.1.2	Static Data Information	Local procedures
7.1.3	Dynamic Data Information	Local procedures
7.1.4	Pre- Post-Flight Information	Local procedures
7.1.5	Additional Products and Services	Local procedures
7.1.6	ARO	Local procedures
7.2	EXECUTE LOCAL CONTINGENCY PROCEDURES	
7.2.1	Data and Information Management	Local procedures
7.2.2	Static Data Information	Local procedures
7.2.3	Dynamic Data Information	Local procedures
7.2.4	Pre- Post-Flight Information	Local procedures
7.2.5	Additional Products and Services	Local procedures
7.2.6	ARO	Local procedures

Appendix 2

Taxonomy

Level 1: Requires a basic knowledge of the subject. It is the ability to remember essential points; the trainee is expected to memorise data and retrieve it		
Verb	**Definition**	**Example**
Define	State what it is, State the definition	Define the purpose of AIS
Draw	Produce a picture, diagram or pattern	Draw a specified chart symbol
List	Say one after the other	List the order of sections in the AIP
Name	Give name of objects	Name who is responsible for authorising changes to the data
Quote	Repeat what is written or said	Quote the ICAO definition of an AIS Service
Recognise	To know what it is because you have seen it before	Recognise the information depicted on a NOTAM
State	Say or write in a formal way	State who is the approver of a certain piece of information

Level 2: Requires an understanding of the subject sufficient to enable the trainee to discuss intelligently. The individual is able to represent for themselves certain objects and events in order to act upon them		
Verb	**Definition**	**Example**
Appreciate	To understand a situation	Appreciate the criticality of the condition. Appreciate the necessity for coordination
Assist	Help somebody do a job by doing part of it	Handle the operational HMI assist in the tuning of the screen
Characterise	To describe the quality of features in	Characterise the consequences of an operating system upgrade Characterise the consequences of an operating system upgrade
Consider	To think carefully about	Consider institutional issues and service provider responsibilities
Decode, Encode	Decipher or turn into plain language. Put into code or cipher	Decode a given ICAO Abbreviation. Encode a term used in the AIP
Demonstrate	Describe Logically provide the truth about a statement and explain;	Demonstrate how to maintain the traceability in the data chain. Demonstrate how to issue a NOTAM

Level 2: Requires an understanding of the subject sufficient to enable the trainee to discuss intelligently. The individual is able to represent for themselves certain objects and events in order to act upon them.		
Describe	Say what it is like or what happened	Describe the architecture of the AFTN system. Describe the architecture of the AFTN system.
Differentiate	Show the difference between things	What is the difference between an AIC and an AIP Supplement? Differentiate between the various relevant charts
Explain	Give details about something or describe so that it can be understood	Explain the principles of the quality management system. Explain the purpose and function of ICAO
Input	Enter into a system	Input data
Monitor	Keep under observation	Monitor the AFTN connection
Operate	Conduct work, carry out a function	Operate the AIM equipment, transfer a file from one system to another
Pass	Move, cause to go, transmit	Pass information to a colleague
Relay	Forward, provide	Relay a message to the office manager
Report	Give an account, provide a detailed statement about an occurrence or situation	Report on the performance of a maintenance task
Scan	Continuously observe in order to extract appropriate data	Scan the list of pending NOTAM proposals
Take account of	Take into consideration before deciding	Take into account the NOTAM selection criteria (NSC) before issuing a NOTAM
Transfer	Handover	Transfer a message to the appropriate recipient

Level 3: Requires a thorough knowledge of the subject and the ability to apply it with accuracy. The trainee should be able to make use of their knowledge to develop plans and activate them.		
Verb	**Definition**	**Example**
Acquire	Gain by oneself, obtain after research	Acquire a specific data file
Act	Carry out, execute	Transmit the NOTAM using AFTN
Adjust	Change to a new position, value or setting	Adjust the information to reflect a change
Analyse	Examine the constitution of	Analyse the information received from the sponsor
Apply	Use something in a situation or activity	Apply the appropriate model to the analysis of a relevant AIM system.
Appreciate	To understand a situation and know what is involved in a problem solving situation, to state a plan without applying it	Appreciate criticality of the condition. Appreciate the necessity for coordination
Check	Make sure the information is correct	Check the integrity of the data
Choose	Decide to do one thing rather than another	Choose the appropriate NOTAM Selection Criteria (NSC) for a NOTAM proposal
Collect	Assemble, accumulate	Compile the information from various sources
Comply	Act in accordance with	Comply with ICAO SARPS
Conduct	Lead, guide	Conduct coordination with appropriate authority
Confirm	Establish, corroborate	Confirm the status of the data
Design	Conceive a plan	Design a chart according to a specified requirement
Detect	Discover the existence of	Detect inconsistencies in a publication
Execute	Perform an action	Deliver the data to the next intended user
Extract	Copy out, deduce	Extract data from the database
Identify	Establish the identity	Locate a problem with the data
Inform	Advise, tell	Inform the appropriate authority in accordance with a written process
Initiate	Begin, commence, originate	Initiate a coordination procedure
Interpret	Decide on the meaning or significance when there is a choice	Consider the possible options available to place new information into the AIP

Issue	Set forth, publish	Issue a NOTAM
Maintain	Carry on, keep up, refresh	Maintain the check list of pages
Notify	Make known, announce, report	Inform the appropriate office of a change to the AIP text
Obtain	Acquire from a known source	Obtain aeronautical information
Organise	Give orderly structure to	Organise the separate information into a logical order
Perform	Carry out, execute	Performa a proof reading activity, perform co-ordination
Record	Register, set down	Record information in the appropriate file
Relate	Establish link	Relate the connection between an AIP amendment and an AIP Supplement
Resolve	Solve, clear up, settle	Resolve the matter of duplication in the document
Respond	Answer, reply	Respond to the message from the operator
Review	Survey, look back on	Review impact of including new information to previous changes
Select	Pick out, select a suitable option	Select the most appropriate placeholder for new information
Update	Refresh, make up to date	Refresh the text in the document

Level 4: Requires an ability to follow correct chronology and resolve a problem situation. It involves the integration of known applications in a familiar situation. Demonstrates ability to apply one or other relevant approaches to solve new or more complex problems requiring judgment and evaluation of options.

Verb	Definition	Example
Allocate	Assign, devote	Allocate the responsibility for compiling the AIP to a colleague
Appraise	Evaluate, determine the benefit	Appraise the content of a NOTAM
Assess	Estimate the value or difficulty	Assess the work involved in delivering a data set
Assign	Allot as a share, apportion	Assign a part of the process to an individual
Coordinate	Bring part into proper relation	Coordinate activities between two parties
Delegate	Commit authority, assign	Delegate responsibility for issuing a NOTAM
Ensure	Make safe, Make certain	Ensure that an agreed action takes place
Evaluate	Ascertain an amount	Evaluate the workload involved in producing a new product
Imagine	Conceive, form a mental picture	Imagine possible actions as a result of changes to a document
Integrate	Combine into a whole	Integrate individual components into a publication
Manage	Handle, conduct	Manage the data received from a sponsor
Solve	Find an answer to	Solve problems in the document
Verification	Confirm	Verify the data received from the sponsor

Appendix 3

Abbreviations

AFTN	Aeronautical fixed telecommunication network
AIC	Aeronautical information circular
AIM	Aeronautical information management
AIP	Aeronautical information publication
AIRAC	Aeronautical information regulation and control
AIS	Aeronautical information service
AIP	Aeronautical information publication
ANSP	Air navigation service provider
ARO	Air Traffic Services Reporting Office
ASHTAM	Ash advisory NOTAM
ATM	Air traffic management
ATS	Air traffic service
CANSO	Civil Air Navigation Services Organisation
CNS	Communication navigation surveillance
FPL	Filed flight plan
GANP	Global Air Navigation Plan (ICAO Doc 9750)
ICAO	International Civil Aviation Organization
ISO	International Organization for Standardization
KSA	Knowledge, skills and abilities
METAR	Meteorological aviation report
NOTAM	Notice to airmen
NSC	NOTAM selection criteria
OJT	On the job training
PBN	Performance-based navigation
RNAV	Area navigation
QMS	Quality management system
SARPS	(ICAO) Standards and Recommended Practices
SNOWTAM	Snow advisory NOTAM
SIGMET	Significant Meteorological Information

Appendix 4

Definitions

When the following terms are used in the ICAO *Standards and Recommended Practices* for aeronautical information services, they have the following meanings:

Accuracy. A degree of conformance between the estimated or measured value and the true value.

NOTE: For measured positional data the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aeronautical data. A representation of aeronautical facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing.

Aeronautical information. Information resulting from the assembly, analysis and formatting of aeronautical data.

Aeronautical Information Circular (AIC). A notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters.

Aeronautical Information Management (AIM). The dynamic, integrated management of aeronautical information services — safely, economically, and efficiently — through the provision and exchange of quality assured digital aeronautical data in collaboration with all parties.

Aeronautical Information Publication (AIP). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.

Aeronautical Information Service (AIS). A service established within the defined area of coverage responsible for the provision of aeronautical information and aeronautical data necessary for the safety, regularity and efficiency of air navigation.

AIP Amendment. Permanent changes to the information contained in the AIP.

AIP Supplement. Temporary changes to the information contained in the AIP that are published by means of special pages.

AIRAC. An acronym (aeronautical information regulation and control) signifying a system aimed at advance notification based on common effective dates, of circumstances that necessitate significant changes in operating practices.

AIS product. Aeronautical information and aeronautical data provided in the form of the elements of the IAIP including aeronautical charts, or in the form of suitable electronic or digital media.

Application. Manipulation and processing of data in support of user requirements (ISO 19104*). * All ISO Standards are listed at the end of this chapter.

ASHTAM. A special series NOTAM notifying by means of a specific format change in activity of a volcano, a volcanic eruption and/or volcanic ash cloud that is of significance to aircraft operations.

Assemble. A process of merging data from multiple sources into a database and establishing a baseline for subsequent processing.

NOTE: The assemble phase includes checking the data and ensuring that detected errors and omissions are rectified

Chart or Cartographic map. A representation of a portion of the Earth, its culture and relief, with properly referenced terrain, hydrographic, hypsometric and cultural data depicted on a sheet of paper.

Competency. A combination of knowledge, skills and abilities required to perform an objective to the prescribed standard.

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

Competency element. An action that constitutes an objective that has a triggering event and a terminating event that clearly defines its limits, and has an observable outcome.

Competency Framework. A Competency Framework consists of competency units, competency elements, Terminal Objectives (performance criteria), evidence and assessment guide and range of variables. Competency units, competency elements and Terminal Objectives (performance criteria) are derived from job and objectives analyses of AIS/AIM personnel and describe observable outcomes.

Competency unit. A discrete function consisting of a number of competency elements.

Database. A collection of data stored in structured digital format so that it may be retrieved and updated by appropriate applications.

NOTE: This primarily refers to digital data

(accessed by computers) rather than files of physical records.

Data product. Data set or data set series that conforms to a data product specification (ISO 19131*).

Data quality. A degree or level of confidence that the data provided meets the requirements of the data user in terms of accuracy, resolution and integrity.

Data set. Identifiable collection of data (ISO 19101*).

Enabling objective. A training objective derived from performance criteria in the Competency Framework. In order to achieve Enabling Objectives, a trainee requires skills, knowledge and attitudes.

Error. An action or inaction that leads to deviations from criteria.

Error management. The process of detecting and responding to errors with countermeasures that reduce or eliminate the errors or the consequence of errors.

Information. Data that has been verified to be accurate and timely, is specific and organised for a purpose, is presented within a context that gives it meaning and relevance, and which leads to increase in understanding and decrease in uncertainty. The value of information lies solely in its ability to affect a behavioural decision or outcome.

Information Management. The management of resources and the processes for the timely collection, integration, exchange and delivery of quality assured data, information and services.

Integrated Aeronautical Information Package

(IAIP). A package which consists of the following elements:

- — AIP, including amendment service
- — Supplements to the AIP
- — NOTAM and PIB
- — AIC
- — Checklists and lists of valid NOTAM.

Integrity (aeronautical data). A degree of assurance that aeronautical data has not been lost or altered since the data origination or authorised amendment.

International NOTAM Office (NOF). An office designated by a State for the exchange of NOTAM internationally.

Knowledge, Skills, Abilities (KSA). The skills/knowledge/abilities and attitudes are what an individual requires to perform an enabling objective derived from Terminal Objectives (performance criteria). A skill is the behaviour used to perform an activity that contributes to the effective completion of an objective. Knowledge is specific information required for the trainee to develop the skills and abilities for the effective accomplishment of objectives. Ability is what the individual is capable of performing. Attitude is the mental state of a person that influences behaviour, choices and expressed opinions.

Notice to Airmen (NOTAM). A notice distributed by means of telecommunication or electronic methods containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

Performance criteria. A simple, evaluative statement on a required outcome of the competency element and a description of the criteria used to judge if the required level of performance has been achieved. Several performance criteria can be associated to a competency element.

Performance-based navigation (PBN). Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

NOTE: Performance requirements are expressed in navigation specifications (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

Progress assessment. An evaluation that measures a trainee's ability to meet key Enabling Objectives.

Pre-flight information bulletin (PIB). A presentation of current NOTAM information of operational significance, prepared prior to flight.

Quality. Degree to which a set of inherent characteristics fulfils requirements (ISO 9000*).

NOTE 1: The term 'quality' can be used with adjectives such as poor, good or excellent.

NOTE 2: 'Inherent', as opposed to 'assigned', means existing in something, especially as a permanent characteristic.

Quality assurance. Part of quality management focused on providing confidence that quality requirements will be fulfilled (ISO 9000*).

Quality control. Part of quality management focused on fulfilling quality requirements (ISO 9000*).

Quality management. Coordinated activities to direct and control an organisation with regard to quality (ISO 9000*).

Requirement. Need or expectation that is stated, generally implied or obligatory (ISO 9000*).

NOTE 1: 'Generally implied' means that it is custom or common practice for the organisation, its customers and other interested parties, that the need or expectation under consideration is implied.

NOTE 2: A qualifier can be used to denote a specific type of requirement, e.g. product requirement, quality management requirement, customer requirement.

NOTE 3: A specified requirement is one which is stated, for example, in a document.

NOTE 4: Requirements can be generated by different interested parties.

SNOWTAM. A special series NOTAM notifying the presence or removal of hazardous conditions due to snow, ice, slush or standing water associated with snow, slush and ice on the movement area, by means of a specific format.

Stakeholder. An individual or party with vested interests in AIS data and products.

Terminal objective (performance criteria). Part of a training objective derived from a competency element in the Competency Framework which a trainee will achieve when successfully completing training.

Training objective. A clear statement that is comprised of three parts, i.e. the desired performance or what the trainee is expected to be able to do at the end of particular stages of training (Terminal Objective), the performance standard that must be attained to confirm the trainee's level of competence and the conditions under which the trainee will demonstrate competence.

Training provider. In the context of this manual, a body that provides AIS/AIM personnel training.

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (ISO 9000*[4]).

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (ISO9000*).

NOTE 1: The term 'verified' is used to designate the corresponding status.

NOTE 2: Confirmation can comprise activities such as:
   — *Performing alternative calculations*
   — *Comparing a new design specification with a similar proven design specification*
   — *Undertaking tests and demonstrations*
   — *Reviewing documents prior to issue*

Appendix 5

Training Plan and Course Curriculum

FOR THIS EXAMPLE, THE ASSUMPTIONS ARE AS FOLLOWS:

An AIM organisation has expanded its staff. It has employed an individual with a background in aviation and the ARO, to take on the role of an aeronautical information specialist with primary responsibility for developing and maintaining airport data information within the central AIM database. This organisation has a quality management system and integrates new staff by training them to the specific standard operating procedures and processes defined at the local level.

Using this training development manual as a guide, on the following pages you will find a working example of:
— Steps of competency-based training (for purposes of this example, only steps one through four are included).
— High-level competency-based curriculum design for initial training.

Training Programme Plan Template

Trainee: <u>(Name)</u>
Manager: <u>(Name)</u>
Trainer: <u>(Name)</u>
OJT Lead Name: <u>(Name)</u>

Summary: Trainee should be fully functional in all aspects of his or her performance criteria at Level 3 within six months after the completion of the training program. Trainee is responsible for Airport Data within AIM.

Training Phases

Phase One: Airports Data Business Process(es), Level 3 and successful completion of OJT
Phase Two: Airspace Data Business Process(es), Level 3 and successful completion of OJT

Training Completion Date(s)   Assessment Date and Score:

Phase One Classroom: (date, from - to)   _____   _____

Phase One OJT: (date, from - to)   _____   _____

Phase Two Classroom: (date, from - to)   _____   _____

Phase Two OJT: (date, from - to)   _____   _____

Part One Expanded Example: Competency Based Training Steps

Example assumptions: An employee has recently transferred to the AIS department and a training plan needs to be developed to ensure that the employee will be able to meet his or her performance objectives as stated by the manager. Based on the specific team organisation, it has been decided to train the employee in competencies required by a specific set of Standard Operating Procedures and Work Instructions.

Step One	Analyse/identify the job responsibilities and associated performance and measurement criteria
Position	AIS Specialist for Airport Data
Activities Checklist:	— Obtain Job Description
	— Obtain Performance Evaluation Form
	— Obtain trainee's resume and previous training records
	— Obtain Annual Goals from Manager for the employee, and trainees specific training needs
	— Interview manager/supervisor regarding training program
	— Identify OJT lead — Obtain Standard Operating Procedures and Work Instructions relating to specific position requirements — Use the Competency Framework to identify the required competencies

COMPETENCY UNIT		
COMPETENCY ELEMENT		
TERMINAL OBJECTIVE		STANDARD
1	DATA AND INFORMATION MANAGEMENT	
1.1	PRE-PROCESS DATA	
1.1.1	Receive and record raw data (internal and/or external)	Local procedures
1.1.2	Evaluate whether the raw data is from an authorised source	ICAO Annex 15, Chap. 7 and Appendix 1; Doc 8126; Local procedures
1.1.3	Evaluate whether the data meets protection requirements	Local procedures
1.1.5	Identify if there is a need for translation and/or coding of the raw data	ICAO Doc 9713, Doc 8400
1.1.6	Analyse the appropriateness of the data	ICAO Annex 15; Local procedures
1.1.7	Verify the quality of the raw data	ICAO Annex 15, Chap. 3; Local procedures
1.1.8	Analyse the data for completeness, coherence, abbreviation and ambiguity	ICAO Doc 8400; Local procedures
1.1.9	Identify any discrepancies, duplication and misinterpretations of the data	ICAO Annex 15, Chap. 4 through 7
1.1.10	Coordinate with data source	Local procedures
1.1.11	Execute corrective action	Local procedures
1.2	PROCESS DATA	
1.2.1	Perform storage of raw data	Local procedures
1.2.2	Assess the impact of the data on existing publications, the significance and complexity of the data, and its temporality.	Local procedures
1.2.3	Coordinate with other relevant parties	Local procedures
1.2.4	Select the means of publication	Local procedures
1.2.5	Schedule the publication process, taking into consideration the main milestones, proposed publication/effective date and the AIRAC cycle	ICAO Annex 15 and Local procedures, Doc 8126
1.2.6	Perform calculations e.g. data conversions	Local procedures
1.2.7	Apply appropriate data formatting rules	Local procedures
1.2.8	Enter data into application	Local procedures
1.2.9	Assemble statistical data	Local procedures
1.3	OPERATE DATABASE(S)	
1.3.1	Operate application(s)	Local procedures
1.5	MAINTAIN DATA/INFORMATION AND LIBRARY (INTERNAL AND EXTERNAL)	
1.5.2	Maintain data (static and/or dynamic)	Local procedures
1.5.3	Maintain records	Local procedures

2	STATIC DATA	
2.1	GENERATE AIP/AIP AMENDMENT	
2.1.1	Prepare content (text, tables, charts, and other elements)	ICAO Annex 15, Annex 4, Doc 8126, Doc 8400, Doc 8697, Local procedures
2.1.2	Coordinate with other relevant parties	Local procedures
2.1.4	Verify content	Local procedures
2.1.5	Obtain approval of content	Local procedures
2.1.6	Compile product	Local procedures
2.1.7	Obtain approval of compiled product	Local procedures
2.2	GENERATE AIP SUPPLEMENT	
2.2.1	Prepare content (text, tables, charts, and other elements)	Local procedures
2.2.2	Coordinate with other relevant parties	Local procedures
2.2.4	Verify content	Local procedures
2.2.5	Obtain approval of content	Local procedures
2.2.6	Compile and verify content	Local procedures
2.2.7	Obtain approval of compiled product	Local procedures
7	BUSINESS CONTINUITY	
7.1	KNOWLEDGE REGARDING LOCAL CONTINGENCY PROCEDURES	
7.1.1	Data and Information Management	Local procedures
7.1.2	Static Data Information	Local procedures
7.2	EXECUTE LOCAL CONTINGENCY PROCEDURES	
7.2.1	Data and Information Management	Local procedures
7.2.2	Static Data Information	Local procedures

Step Two   Identify and Document Trainees Competencies

Following review of the items collected from Step One, complete the analysis using a similar chart as shown below, entering the expected competency level of the trainee.

1	DATA AND INFORMATION MANAGEMENT	
1.1	PRE-PROCESS DATA	
1.1.1	Receive and record raw data (internal and/or external)	2
1.1.2	Evaluate whether the raw data is from an authorised source	2
1.1.3	Evaluate whether the data meets protection requirements	2
1.1.5	Identify if there is a need for translation and/or coding of the raw data	2
1.1.6	Analyse the appropriateness of the data	2
1.1.7	Verify the quality of the raw data	2
1.1.8	Analyse the data for completeness, coherence, abbreviation and ambiguity	2
1.1.9	Identify any discrepancies, duplication and misinterpretations of the data	2
1.1.10	Coordinate with data source	2
1.1.11	Execute corrective action	1
1.2	PROCESS DATA	
1.2.1	Perform storage of raw data	2
1.2.2	Assess the impact of the data on existing publications, the significance and complexity of the data, and its temporality.	1
1.2.3	Coordinate with other relevant parties	2
1.2.4	Select the means of publication	2
1.2.5	Schedule the publication process, taking into consideration the main milestones, proposed publication/effective date and the AIRAC cycle	2
1.2.6	Perform calculations e.g., data conversions	3
1.2.7	Apply appropriate data formatting rules	1
1.2.8	Enter data into application	1
1.2.9	Assemble statistical data	1
1.3	OPERATE DATABASE(S)	
1.3.3	Operate application(s)	2
1.5	MAINTAIN DATA/INFORMATION AND LIBRARY (INTERNAL AND EXTERNAL)	
1.5.2	Maintain data (static and/or dynamic)	1

1.5.3	Maintain records	2
2	STATIC DATA	
2.1	GENERATE AIP/AIP AMENDMENT	
2.1.1	Prepare content (text, tables, charts, and other elements)	2
2.1.2	Coordinate with other relevant parties	2
2.1.4	Verify content	2
2.1.5	Obtain approval of content	2
2.1.6	Compile product	1
2.1.7	Obtain approval of compiled product	1
2.2	GENERATE AIP SUPPLEMENT	
2.2.1	Prepare content (text, tables, charts, and other elements)	2
2.2.2	Coordinate with other relevant parties	2
2.2.4	Verify content	2
2.2.5	Obtain approval of content	2
2.2.6	Compile and verify content	1
2.2.7	Obtain approval of compiled product	1
7	BUSINESS CONTINUITY	
7.1	KNOWLEDGE REGARDING LOCAL CONTINGENCY PROCEDURES	
7.1.1	Data and Information Management	1
7.1.2	Static Data Information	1
7.2	EXECUTE LOCAL CONTINGENCY PROCEDURES	
7.2.1	Data and Information Management	1
7.2.2	Static Data Information	1

Step Three   Identify the gap between the current performance level and the expected performance level for the required competencies

Because of the trainee's experience and previous job responsibilities, no ab initio training has been scheduled and it is expected that only initial training will be required. Any refresher or recurrent training needed will be identified during initial and on-the-job training.

1	DATA AND INFORMATION MANAGEMENT		
1.1	PRE-PROCESS DATA	CURRENT	EXPECTED
1.1.1	Receive and record raw data (internal and/or external)	2	3
1.1.2	Evaluate whether the raw data is from an authorised source	2	3
1.1.3	Evaluate whether the data meets protection requirements	2	3
1.1.5	Identify if there is a need for translation and/or coding of the raw data	2	3
1.1.6	Analyse the appropriateness of the data	2	3
1.1.7	Verify the quality of the raw data	2	3
1.1.8	Analyse the data for completeness, coherence, abbreviation and ambiguity	2	3
1.1.9	Identify any discrepancies, duplication and misinterpretations of the data	2	3
1.1.10	Coordinate with data source	2	3
1.1.11	Execute corrective action	1	3
1.2	PROCESS DATA		
1.2.1	Perform storage of raw data	2	3
1.2.2	Assess the impact of the data on existing publications, the significance and complexity of the data, and its temporality.	1	3
1.2.3	Coordinate with other relevant parties	2	3
1.2.4	Select the means of publication	2	3
1.2.5	Schedule the publication process, taking into consideration the main milestones, proposed publication/effective date and the AIRAC cycle	2	3
1.2.6	Perform calculations e.g., data conversions	3	3
1.2.7	Apply appropriate data formatting rules	1	3
1.2.8	Enter data into application	1	3
1.2.9	Assemble statistical data	1	3
1.3	OPERATE DATABASE(S)		
1.3.3	Operate application(s)	2	3
1.5	MAINTAIN DATA/INFORMATION AND LIBRARY (INTERNAL AND EXTERNAL)		
1.5.2	Maintain data (static and/or dynamic)	1	3

1.5.3	Maintain records	2	3
2	STATIC DATA		
2.1	GENERATE AIP/AIP AMENDMENT		
2.1.1	Prepare content (text, tables, charts, and other elements)	2	3
2.1.2	Coordinate with other relevant parties	2	3
2.1.4	Verify content	2	3
2.1.5	Obtain approval of content	2	3
2.1.6	Compile product	1	3
2.1.7	Obtain approval of compiled product	1	3
2.2	GENERATE AIP SUPPLEMENT		
2.2.1	Prepare content (text, tables, charts, and other elements)	2	3
2.2.2	Coordinate with other relevant parties	2	3
2.2.4	Verify content	2	3
2.2.5	Obtain approval of content	2	3
2.2.6	Compile and verify content	1	3
2.2.7	Obtain approval of compiled product	1	3
7	BUSINESS CONTINUITY		
7.1	KNOWLEDGE REGARDING LOCAL CONTINGENCY PROCEDURES		
7.1.1	Data and Information Management	1	3
7.1.2	Static Data Information	1	3
7.2	EXECUTE LOCAL CONTINGENCY PROCEDURES		
7.2.1	Data and Information Management	1	3
7.2.2	Static Data Information	1	3

Step Four   Design the training to address the gaps through the development of the Learning Objectives for each Terminal Objectives that has been identified

As part of this expanded example, we need to evaluate the following as described in Curriculum Design:

— Types of Training
— Considerations
— Course Development
 – Modules
 – Sequencing
 – Training Assessment
 – Course Materials

TYPES OF TRAINING

Based on our assessment of our trainee, we have identified that the trainee needs Initial Training. For our example, we have decided that no specific refresher training is required at this time and as the trainee is new to the AIS organisation, no recurrent, advanced or specialised training is required. On-the-job training will be required following completion of the initial classroom training.

CONSIDERATIONS

— Initial Training for our example will make use of classroom training utilising lecture-based, computer-based, and homework assignments
— Small classrooms or conference rooms with computers are available, so no additional costs will need to be incurred
— AIM Specialists work together in one location so no travel will be required and all training will be done in English
— Team leads will handle the on-the-job training and be considered the subject matter experts. Team members not involved in training will be expected to handle the extra workload when team members involved in training are not able to complete their regular work responsibilities because of the additional time designated to training the new team member.

COURSE DEVELOPMENT

In Part One, steps 1-3, we went through the process of evaluating the competencies required, the competencies the trainee already possesses, and the gap between for which we are developing training. We can use those gaps to identify the training, terminal, and Enabling Objectives for the course.

For our example, our training objective is as follows:

Training Objective

At the end of the training period, the trainee will be able to complete the Airports Data Process(es) without error, and be able to proceed to on-the-job training in a production environment using the training aids and resources provided.

Our target population is our trainee who is new to the AIM organisation.

Duration of classroom training: 28 hours

Pre-requisite KSAs: Level 2 knowledge and experience for these Terminal Objectives.

Modules and Sequencing

Since the Terminal Objective is to complete a specific business process, the process is divided into modules that are in the same sequence as the process. The process modules are divided as follows:

Module One   Introduction to the Airports Data Business Process and begin with the first part of the process 'Acquire Data or Data Change Request'

This module will introduce the airports data business process, the standards, the familiarity with the basics of the tools available to complete the process. It will then move to the first step of the process and address how and when data requests may be provided. It will cover the appropriate methods of request and the timing of those requests, and address competencies 1.1.1.

Module Two   Analyse Data Request
This module will address the remainder of the competencies in 1.1 including how to determine a valid source and next steps when the data is or is not from a valid source. It will also cover how to verify the data itself and determine if the data is valid, how to reject the data, how to compare the data to existing data, and how to request additional information.

Module Three   Transcribe Data
Within this module, the trainee will review the portion of the process that includes the competencies outlined in 1.2 Process Data and 1.3 Operate Database. This includes how to complete the data entry (if necessary), and the notification process.

Module Four   Review and Store Data
This module outlines the quality control process for data verification at the local level. Further, it includes the ability to support the competencies required and associated with 2.1 Generate AIP/Amendment, 2.2 Generate AIP Supplement, 2.3 Generate AIC and 7 Business Continuity.

Module Five   Overview
This module addresses the process in full and its inter-relationship with other AIM functions at the local level.

Note: In this example, the AIP is auto-generated and review is handled electronically. Printing is outsourced and not within the responsibility of this AIS Specialist.

Terminal Objectives and KSAs

1	DATA AND INFORMATION MANAGEMENT	
1.1	PRE-PROCESS DATA	REQUIRED KNOWLEDGE SKILLS AND ABILITIES
1.1.1	Receive and record raw data (internal and/or external)	— Familiarity with the standard — Understand the Airports Data Business Process, sub-processes, and work instructions — Capable of using associated systems (databases, software, email, phone, email, fax) — Familiarity with organizational data standards — Familiarity with appropriate regulations and departmental policies — Understand quality management system policy, objectives, procedures and tools for data integrity
1.1.2	Evaluate whether the raw data is from an authorised source (ICAO Annex 15, Chap. 7 and Appendix 1; Doc 8126; Local procedures)	
1.1.3	Evaluate whether the data meets protection requirements	
1.1.4	Identify if there is a need for translation and/or coding of the raw data	
1.1.5	Analyse the appropriateness of the data	
1.1.6	Verify the quality of the raw data	
1.1.7	Analyse the data for completeness, coherence, abbreviation and ambiguity	
1.1.8	Identify any discrepancies, duplication and misinterpretations of the data	
1.1.9	Coordinate with data source	
1.1.10	Execute corrective action	
1.2	PROCESS DATA	
1.2.1	Perform storage of raw data	— Familiarity with the standard — Understanding the Airports Data Business Process, sub-processes, and work instructions — Capable of using associated systems (databases, software, email, phone, email, fax) — Familiarity with organisational data standards — Familiarity with appropriate regulations and departmental policies — Understand quality management system policy, objectives, procedures and tools for data integrity
1.2.2	Assess the impact of the data on existing publications, the significance and complexity of the data, and its temporality.	
1.2.3	Coordinate with other relevant parties	
1.2.4	Select the means of publication	
1.2.5	Schedule the publication process, taking into consideration the main milestones, proposed publication/effective date and the AIRAC cycle	
1.2.6	Perform calculations e.g. data conversions	
1.2.7	Apply appropriate data formatting rules	
1.2.8	Enter data into application	
1.2.9	Assemble statistical data	

1.3	OPERATE DATABASE(S)	
1.3.3	Operate application(s)	— Ability to complete the work instruction as specified — Understand quality management system procedures and tools for data integrity
1.5	MAINTAIN DATA/INFORMATION AND LIBRARY (INTERNAL AND EXTERNAL)	
1.5.2	Maintain data (static and/or dynamic)	— Familiarity with the quality management system, departmental, and regulatory procedures for record maintenance — Understand quality management system procedures and tools for data integrity
1.5.3	Maintain records	
2	STATIC DATA	
2.1	GENERATE AIP/AIP AMENDMENT	
2.1.1	Prepare content (text, tables, charts, and other elements)	— Be able to execute the airport data business process, sub-process, and work instructions — Familiarity with the international, domestic, and AIM standards — Understand the difference between submissions related to the airport data business process and those that are not. — Have clear understanding and be able to determine what to do with non-airport data business process content — Have familiarity with the AIM departmental structure and general roles and responsibilities within local AIM — Understand resources and reference materials and where they are located — Understand quality management system policy, objectives, procedures and tools for data integrity
2.1.2	Coordinate with other relevant parties	
2.1.4	Verify content	
2.1.5	Obtain approval of content	
2.1.6	Compile product	
2.1.7	Obtain approval of compiled product	

2.2	GENERATE AIP SUPPLEMENT	
2.2.1	Prepare content (text, tables, charts, and other elements)	— Be able to execute the airport data business process, sub-process, and work instructions — Familiarity with the international, domestic, and AIM standards — Understand the difference between submissions related to the airport data business process and those that are not — Have clear understanding and be able to determine what to do with non-airport data business process content — Have familiarity with the AIM departmental structure and general roles and responsibilities within local AIM — Understand resources and reference materials and where they are located. — Understand quality management system policy, objectives, procedures and tools for data integrity
2.2.2	Coordinate with other relevant parties	
2.2.4	Verify content	
2.2.5	Obtain approval of content	
2.2.6	Compile and verify content	
2.2.7	Obtain approval of compiled product	
7	BUSINESS CONTINUITY	
7.1	KNOWLEDGE REGARDING LOCAL CONTINGENCY PROCEDURES	
7.1.1	Data and Information Management	— Understand local AIM specific business continuity and contingency procedures
7.1.2	Static Data Information	
7.2	EXECUTE LOCAL CONTINGENCY PROCEDURES	
7.2.1	Data and Information Management	— Clarify, review and execute specific responsibilities within local AIM
7.2.2	Static Data Information	

OJT Training Objectives

The objectives for the OJT training for this example will be to complete the Airports Data Business process in the live production environment with the assistance of another designated team member. This team member will gradually allow the trainee to experience, first by watching then by doing, the airports data business process in the live production environment. When the trainee is confident and able to complete the process on his or her own, without error, on a regular and routine basis, the OJT period will end and a final comprehensive assessment will be completed. OJT will be conducted with a one-on-one experienced and designated team member and be highly individualised because of the nature of the process. The one and only objective is for the trainee to be able to complete the entire process without error.

ASSESSMENT

Comprehensive Assessment

A comprehensive assessment should be completed at the end of the classroom training. For purposes of this example, the comprehensive assessment would be to provide the trainee with a set of data that he or she would need to evaluate and determine if it is appropriate data to initiate the Airports Data Business process. The trainee would need to complete that process with a completion rate of at least 85 percent for those applicable data sets provided. The trainee would be able to use any materials and resources normally available while on the job to complete the comprehensive test.

Progress Assessment

During the classroom training, the trainee would be provided with multiple-choice tests, verbal quizzing, as each module of the Airports Data Business Process is completed. Opportunities would be provided to ask questions and interact with other trainees. At the completion, an overall progress assessment may be applied.

COURSE MATERIALS

(For the purposes of this example, the following materials should be made available by the AIS organisation)

— Syllabus
— Login identification and passwords for all systems required for use in class and at the work site
— Video
— Presentations
— Standard Operating Procedures/ Processes and Work Instructions
— Computers with web access

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— Civil Aviation Department (CAD Hong Kong)
— Civil Aviation Regulatory Commission (CARC)
— COCESNA
— Croatia Control Ltd
— DCA Myanmar
— Department of Airspace Control (DECEA)
— Department of Civil Aviation, Republic of Cyprus
— DFS Deutsche Flugsicherung GmbH (DFS)
— Dirección General de Control de Tránsito Aéreo (DGCTA)
— DSNA France
— Dubai Air Navigation Services (DANS)
— Dutch Caribbean Air Navigation Service Provider (DC-ANSP)
— ENAV S.p.A: Società Nazionale per l'Assistenza al Volo
— Empresa Argentina de Navegación (EANA)
— ENAIRE
— Estonian Air Navigation Services (EANS)
— Federal Aviation Administration (FAA)
— Finavia Corporation
— General Authority of Civil Aviation (GACA)
— Ghana Civil Aviation Authority (GCAA)
— HungaroControl Pte. Ltd. Co.
— Instituto Dominicano de Aviacion Civil (IDAC)
— Israel Airports Authority (IAA)
— Irish Aviation Authority (IAA)
— ISAVIA Ltd
— Japan Air Navigation Service (JANS)
— Kazaeronavigatsia

— Kenya Civil Aviation Authority (KCAA)
— Latvijas Gaisa Satiksme (LGS)
— Letové prevádzkové Služby Slovenskej Republiky, Štátny Podnik
— Luchtverkeersleiding Nederland (LVNL)
— Luxembourg ANA
— Maldives Airports Company Limited (MACL)
— Malta Air Traffic Services (MATS)
— National Airports Corporation Ltd.
— National Air Navigation Services Company (NANSC)
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— NAV CANADA
— NAV Portugal
— Naviair
— Nigerian Airspace Management Agency (NAMA)
— Office National de LÁviation Civile (OFNAC)
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