GUIDANCE ON AIS/AIM TRAINING DEVELOPMENT

USING A COMPETENCY-BASED MODEL

DRAFT 1.0

FOREWORD
<mark>(TO BE DEVELOPED)</mark>

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INTRODUCTION

OVERVIEW

This manual has been created to provide guidance in developing competency based training for Aeronautical Information Services (AIS)/Aeronautical Information Management (AIM) staff members at various responsibility and performance levels and address global diversity. The competency-based approach in this manual has been developed to address the need for flexibility in the levels of training required.

The development of competency based training and assessment 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; and assessment tools for these competencies are developed to determine whether these competencies have been achieved after the training is conducted (See Figure 0.1). Throughout this manual, the term "knowledge" is generally considered to be 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. The competency-based approach to training has already been introduced in other fields of aviation activities such as flight crew training and licensing. The underlying principle for this approach uses *performance* as the measurement for identifying the need for training and how the training can address gaps in *performance*. This evaluation and training is needed to ensure that staff members competencies are fully developed and maintained.
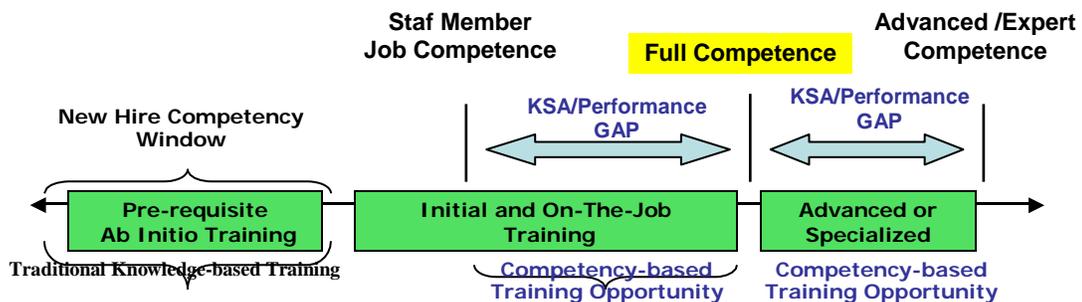
Figure 0.1 The Job competence Continuum

GOALS OF THE MANUAL

The manual was developed for those who will be developing or delivering training and the key goals are to:
- provide guidance to the AIS/AIM organizations that are developing training plans, implementing and/or providing training to attain optimal job performance of staff members through the use of a targeted competency-based training model;
- provide AIS/AIM organizations with pre-identified competencies that need to be developed to support the transition from AIS to AIM; and/or
- Identify specific training needs to be developed by external training providers.

Since training will be specific to an identified performance need, the approval and acceptance of externally provided or developed training programs will be based on whether the training follows the competency-based approach.

TARGET AUDIENCE OF THE MANUAL

AIS/AIM staff generally includes anyone who is responsible for the functions undertaken by the AIS/AIM provider as well as other functions based on the organizational structure. This may include:
- Data and Information Management
- Static Data Output
- Dynamic Data Output
- Additional Products,
- Pre- and Post-Flight Information, and
- ATS Reporting Office (ARO).

To ensure quality, it is essential to provide competency-based training and assessment for all stakeholders. This training manual focuses on the methodology for developing training to address gaps in staff member competency requirements. This manual is designed to assist in identifying the gap(s) between the competencies and required work performance; and, to develop training by addressing the associated gap in knowledge, skills or abilities. While attitudes are also important for job performance, it is understood that training cannot fully address changes in attitude. The goal of all training is to have as an outcome, a specific change in the behaviour and resulting change in performance following completion of training.

Activities of AIS/AIM staff are essential to the safe and efficient operation of aviation as the provision of erroneous or incomplete data/information has direct consequences for the users.

The role and importance of aeronautical information/data has changed significantly with the implementation of area navigation (RNAV), performance-based navigation (PBN), airborne computer-based navigation systems and data link systems. Corrupt or erroneous aeronautical information/data can potentially affect the safety and efficiency of air navigation.

The audience for this competency-based AIS/AIM training guidance manual should be broad enough to include members of any aviation related organization such as regulatory authorities and organizations/institutes that develop and/or provide training courses/programs[1].

Regulators

A regulator may use this manual as a guideline to:
- establish criteria for a training course/program conducted by training providers,
- establish its own training course/program, or
- evaluate potential courses.

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

Regulators that intend to approve a training course/program may use this manual as a part of their approval of the training process. For instance, they can establish standards which state that: "The proposed training shall be developed, implemented and evaluated in accordance with a competency-based approach." It should be noted that this use of the manual is not its primary goal.

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[1] This statement does not imply that the State authority must approve/certify the training course/program

Training and Course Providers

Training providers can use the manual as a guideline to develop their training courses/programs.

Aviation Related Organizations

Organizations that send staff members to a training provider can utilize the manual as a guideline to evaluate training providers' courses, or to develop more specific training courses/programs.

ASSUMPTIONS

In creating this training guidance manual, the following assumptions have been made:
- The AIS/AIM organization:
  - has specific job descriptions/profiles for staff performing providing AIS/AIM functions (regardless of whether the individuals are employees, contractors, or other named providers);
  - can clearly define who (person or organization) provides each of the required services, and whether they take place within their AIS/AIM organization or elsewhere;
  - has access to the appropriate physical training facilities (to include the appropriate technology support) needed to deliver the training;
  - has implemented a quality management system that includes standard operating procedures (or documented work instructions);
  - will develop (or has available) an organization-wide training program that includes for example, the specified training courses, assessments, and the associated records;
  - has access to the services for competency-based course developers and/or competent instructors; and
  - that in some cases, will need to accommodate the need for an on-the-job training requirement in order for a trainee to effectively complete a course.
- The competency framework is aligned with the general principles of AIS as well as the ICAO Roadmap for the Transition from AIS to AIM.
- While this manual provides guidance on how to develop a competency-based training curriculum specifically for staff members, it should not be used or considered as a textbook on course content identification but rather as guidance on how to develop targeted training.
- The ICAO Next Generation of Aviation Professionals Task Force (NGAPTF) will provide further guidance regarding course development considerations.

Recruiting requirements may be different than specific job requirements or pre-requisites, depending on the State organization.

Competency-based training assumes that trainees will have a basic understanding of aviation fundamentals that are not addressed by this manual; however, more information is available on page 18.

STRUCTURE OF THE MANUAL

The manual is divided into the following sections:

PART ONE: COMPETENCY BASED TRAINING BASICS

- Overview
- Competencies
- Competency-Based Training

PART ONE: THE BASICS OF COMPETENCY BASED TRAINING

GOVERNANCE

Annex 15 to the Convention on 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 information/data to the aeronautical information service by each of the State services associated with aircraft operations."

Annex 15 and the 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 information/data chain from data origination to distribution to the next intended user, taking into consideration the intended use of the data.[2]

OVERVIEW

The guidance provided in this manual has been developed to be one component to aid an AIS/AIM organization 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 each workforce members' knowledge, skills and abilities (KSAs) that allow for quality provisions in all functional areas of AIS/AIM. Since training is one of the most important elements of quality assurance, each State must establish standards for the required competency level for the workforce. When the standards are identified, then training can be one effective component that has a direct result on the performance level of individual members within the workforce.

Members of the workforce may come from 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 organization. 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 organizations evolve and technology changes.

COMPETENCIES

Competency Definitions

A competency is "any underlying characteristic of a person which results in an effective and/or superior performance in a job" (Boyzatis 1982.)

A combination of observable and measurable skill, knowledge, performance behaviour and personal attributes that continue to enhance employee performance and organization success (World at Work.)

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

A range of capabilities (skills, knowledge or abilities) that enables one to carry out a specified activity or achieve a function to an agreed standard or requirement.

What is a competency?

Often people refer to an individuals' knowledge, skills, 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 to be 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. Training generally focuses on obtaining a change in an individual's behaviour.

Competencies are generally behaviours that can be observed as individuals perform their work which can be measured against their performance. These competencies are the applied skills, knowledge 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 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)

COMPETENCY-BASED TRAINING

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 that training. That 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 organization specific,
- neither over-trains nor under-trains an individual, ensuring an effective use of time and resources, and
- keeps the individual being trained motivated in the training period and subsequently on the job.

Competency Units

The following competency units have been identified within the AIS/AIM competency framework described on page 13 "AIS/AIM Competency Units" and Appendix 1:
- Data and Information Management
- Static Data Output
- Dynamic Data Output
- Additional Products
- Pre- and Post-flight Information, and
- ARO.

Each of these units is comprised of competency elements that further describe the knowledge, skills, and abilities required by each competency unit.

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 the framework (Appendix 1).

Terminal Objectives

A Terminal Objective is a statement that describes performance and used to develop Learning Objectives.

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 utilize a specific software program in a specific way, know the publishing 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	
		Performance Criteria (Terminal Objective)
		Enabling Objectives

An example from the framework is as follows:

A supervisor has identified the competency gap for "Prepare Content as part of generating the AIP Amendment" for a staff member. The competency framework is applied as indicated in the example below. (See Appendix 1 for the full AIS/AIM competency framework)

Example:

Competency Unit: *Static Data Output*		
	Competency Element:	
	Generate AIP Amendment	
		Performance Criteria (*Terminal Objective*)*)
		Prepare Content

The AIS/AIM organization through the process of developing or identifying the training need (competency), is responsible to identify the associated enabling objectives based on local practice and standard operating procedures.

An example of enabling objectives for this specific terminal objective would be to describe the processes required for preparing content for the generation of the AIP Amendment. Trainees would be 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 will need to be defined.

Learning Objectives

Learning objectives are derived from terminal objectives. They are types of 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 the framework in Appendix 1. The learning objective needs to describe the performance associated with that learning objective in a measureable way.

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 5 (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 4 is required for someone who is an experienced practitioner or specialist.

Training Levels

Five levels are identified, numbered 1 to 5, 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 or learning objective should have and associated training level identified (more fully explored in Part 2 of this manual in curriculum development.)

The training levels are defined as follows:

Training Levels	Description
Level 0	'To be aware of'
Level 1	Requires a basic knowledge of the subject. It is the ability to remember essential points; the learner is expected to memorize, 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 repertoire of knowledge to develop plans and activate them.
Level 4	The ability to establish a line within a unit of known applications following the correct chronology and the adequate method to resolve a problem situation. This involves the integration of known applications in a familiar situation.
Level 5	The ability to analyze new situations in order to elaborate and apply one or other relevant strategy to solve a complex problem. The defining feature is that the situation is qualitatively different to those previously met, requiring judgment and evaluation of options.

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.

A more detailed taxonomy for each training level is available in Appendix 3.

FROM COMPETENCIES TO CURRICULA TO TRAINING

A high-level summary is as follows:
- Step One: Analyze/Identify the job responsibilities and associated performance and measurement criteria
- Step Two: Identify and document the competencies to meet the job responsibilities and performance expectations/standards
- Step Three: Identify and document the gaps between actual and expected competencies (performance) to the standards
- Step Four: Design the training to address the gaps through the development of the learning objectives for each competency that needs to be addressed (generally 4 – 5)
- Step Five: Conduct the Training
- Step Six: Evaluate the training and outcomes against performance on the job

Training can be further defined into phases from beginner to advanced by the course developer or training organisation; however, since KSAs vary from individual to individual 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 AIS/AIM organization, the first training provided might be Initial Training for some, where for others it might be provided at an advanced phase.
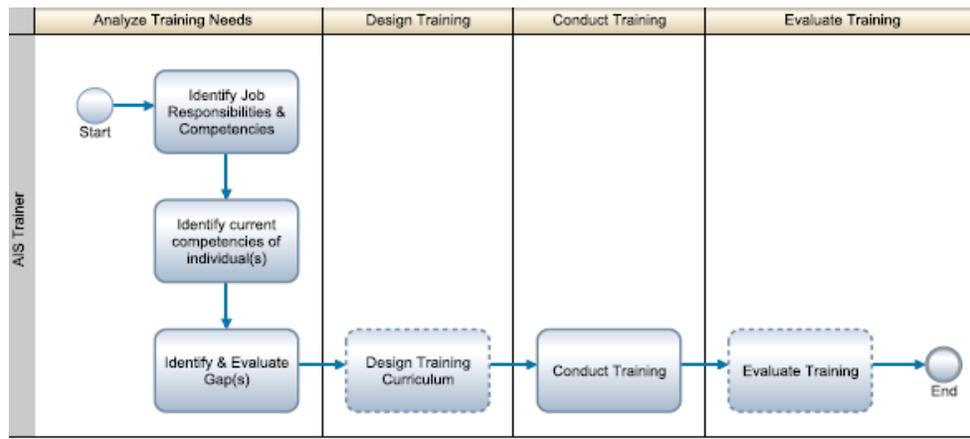
Figure 1.0 Training Development Process

COMPETENCY-BASED TRAINING STEPS

Step One

Analyze/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 organization performance requirements or competencies (if already identified),
- list of experience required as documented in a job advertisement or vacancy notice,
- organization performance evaluation form, and
- standard operating procedures and work instructions from the quality system that apply to an individual's position or responsibilities.

After thoroughly analyzing the job responsibilities and expected performance, it is important to identify the associated competency elements and terminal objectives that the gap requires. These should be extracted from the competency framework for each competency unit in Appendix 1.

EXAMPLE

Background: Andrew is a new staff member. He is a former air traffic controller and he has been hired as an AIS/AIM Specialist

Step One: As a course developer, obtain the job description for the position for which Andrew has been hired. 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, from identify and document the terminal objectives for Andrews position.

Step Two

Identify and document the required competencies mastered by the staff member.

In Step Two, we need to analyze the competencies a staff member has mastered and cross-reference those to the ones identified in Step Two. In Step Three we will analyze the differences to identify the training gap.

EXAMPLE CONTINUED

Step Two: In this step we would evaluate Andrew's background on his resume (or previous performance evaluations if available) against the competencies required and identified in Step One. If possible, we would also obtain any previous training records that Andrew might have available.

Step Three

Identify and document the gaps between actual and expected performance to the standards

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 of a staff member.

An assessment will need to take place to establish the type of training required for a new staff member or a staff member anticipating specialized 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 previous performance evaluations so that appropriate training can be provided. Depending on the organization, those competencies may already be pre-defined and therefore identifying the gap may be significantly easier.

EXAMPLE CONTINUED

Step Three: In this step we would evaluate Andrew's background on his resume (or previous performance evaluations if available) against the competencies required and identified in step two. If possible, we would also obtain any previous training records that Andrew might have available.

Upon completion of the analysis, one of the competencies we identify that Andrew does not have, is "Prepare content in order to Generate the AIP Amendment" and decide to 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 needs to be addressed

Each competency should include learning objectives that clearly outline the KSAs that are needed to master this competency at it is at this step that the phase of training (initial vs. advanced for example) and level should be addressed.

Step four requires the identification of the learning objectives and then the design of the curriculum.

EXAMPLE CONTINUED

STEP FOUR: In our example for Andrew, we have identified the competency "Prepare content" as part of the competency element "Generate the AIP Amendment" and need to identify the learning objective. (The curriculum and training methods will be discussed in Part 2 of this manual). To ensure we have properly identified Andrew's KSAs, any of Andrew's previous training records should be reviewed, if available.

Competency Unit: Static Data Output
    Competency Element: Generate AIP Amendment
        Performance Criteria: Prepare Content

            Learning Objective: *At the end of the training, Andrew should be able to prepare the content for the AIP Amendment.*

Enabling Objectives: (This is an illustrative example and not exhaustive of what may be required at a local organization)
> Comply with local organization standard operating procedure documentation and/or work instructions
> Receive content components (text, charts, and tables)
> Compile content

*Note that curriculum development that is required for learning objectives is discussed in Part 2 of this manual.

Step Five

Conduct the Training

The details of curriculum development and how the training should be conducted are discussed in Part 2 of this manual.

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.

First, did the trainee master the learning objectives? This can be tested 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 testing is determined during curriculum development as described in Part 2 of this manual.

The second phase of evaluation occurs after the completion of the training, when the staff member is able to demonstrate the application of the learning objectives on the job.

In the example, Andrew, will return from training to a formal on-the-job training period where his knowledge will be tested in a real environment with a coach, mentor, or peer.

COMPETENCY UNITS, ELEMENTS AND PERFORMANCE CRITERIA

THE FRAMEWORK

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

AIS/AIM COMPETENCY UNITS

Data and Information Management

The unit competencies describe those that are common to static or dynamic output and 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 global ATM operational concept[3].

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 Output

The competencies recognize the traditional products provided by an AIS as outlined in Annex 15, Annex 4 and other related documents regardless of whether they are provided in paper or in electronic form.

Static data competencies address the generation of the AIP, AIP Amendment, AIP Supplement, AIC, and chart production.

Dynamic Data Output

The competencies recognize the traditional products provided by an AIS as outlined in Annex 15 and other related documents.

The competency unit for dynamic data output include competencies related to NOTAM, Checklist of Valid NOTAM, SNOWTAM, and ASHTAM.

Pre and Post Flight Information

The competencies addresses pre-flight 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 ARO. This competency unit has been provided to assist in the development of appropriate training for staff members involved in execution of this function.

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[3] ICAO Doc. 9854

Additional Products

This competency unit is unique to each organization and recognizes that some AIS/AIM organizations provide non-traditional products to customers.

This competency unit provides general performance that should be trained specifically for organizations that provide special products such as VFR flight guides etc.

ARO

The competency elements in this unit include processing FPL and coordination activities.

While not part of Annex 15, many organizations include the ARO function within their AIS/AIM organizational unit. Stakeholders have specifically requested that information regarding ARO be included in the competency framework as there are no ICAO documents available 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.

The Competency Framework is attached in Appendix 1.

PART TWO: COMPETENCY-BASED CURRICULUM DESIGN

Once the need for training has been established, the specific curriculum development needs to occur. The following paragraphs describe different types of training. All types are interdependent. 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 organization will achieve training effectiveness and efficiency in different ways.
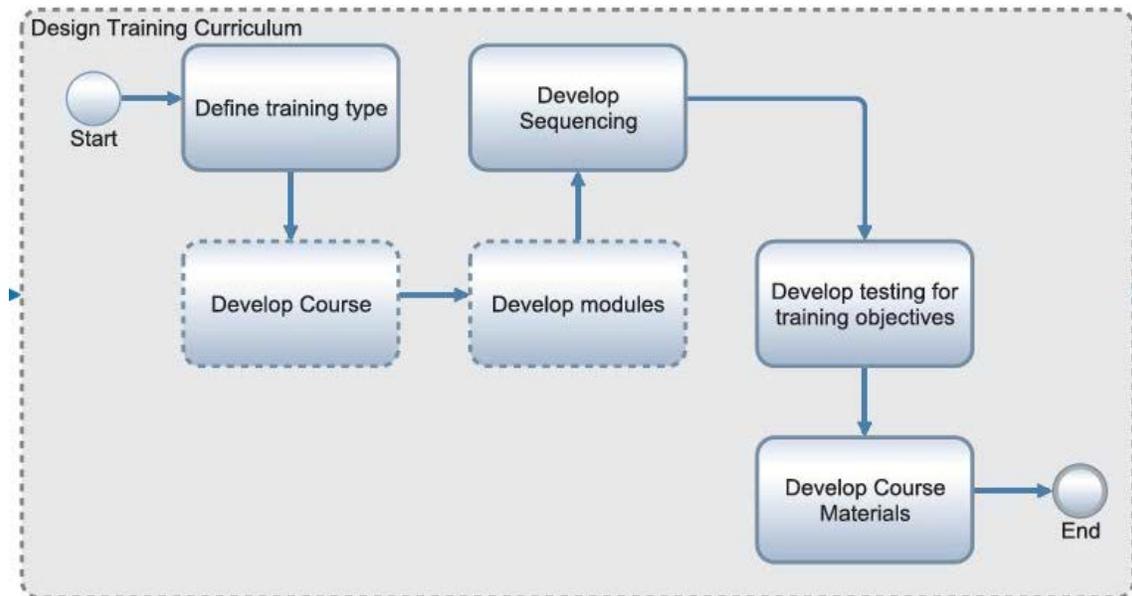
Figure 2.0 Curriculum Design Process

TYPES OF TRAINING

Training for purposes of this document has been defined into the types as described below. Each type of training may have pre-requisites and may be taken on an as-needed basis. One type of training is not necessarily dependent on another type of training.

A note about general knowledge: 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;
- Communication, Navigation, and Surveillance (CNS);
- Quality Management Systems;
- Safety Management Systems,
- Human factors;
- Aeronautical Information Management (AIM) concepts, strategies; and
- Information Technology.

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

Ab-Initio Training

The purpose of Ab Initio Training is to harmonize trainees' entry competencies. Before conducting Initial Training, the competencies and KSAs of the trainees should be assessed to identify any needed training. This will ensure that trainees will successfully complete Initial Training. Ab Initio Training will cover beginner level skills and knowledge that need 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 programs, English-proficiency, aviation basics, etc. The program for Ab Initio Training should not be developed from the competency framework.

Initial Training

Initial Training is the first phase of training where specific AIS/AIM topics and criteria are covered. The purpose of Initial Training is to provide basic skills and knowledge to staff members who have been recruited or transferred from another non-AIS/AIM position. The curriculum of Initial Training is derived from the competency framework.

Staff members that require Initial Training need to meet the pre-requisite requirements. Training providers may be required to deliver Ab Initio Training to ensure that trainees meet the entry prerequisites (it is understood that each organization should define all specific job requirement pre-requisites.) Ab Initio Training is designed to meet the pre-requisites required by Initial Training. Not attending Ab Initio Training may affect a trainee's ability to meet Initial Training objectives.

On-the-job training (OJT) may be coincident 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 program. Its purpose is to reinforce the formal training and support the achievement of competency standards. Similar to Initial Training, the OJT curriculum will be derived from the competency framework and driven by learning objectives. OJT phases can also follow any type of training whether it is initial, specialized, advanced, and recurrent or refresher training.

Advanced and/or Specialized Training

The purpose of advanced or specialized training is to augment the skills and knowledge of staff members in dealing with either more specific, complex problems or a wider breadth of issues. The curriculum should be derived from the competency framework.

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, organization structure and benchmarks identified as best practiced. Regular recurrent training should be planned accordingly. The curriculum should be derived from the competency framework.

Refresher training

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

CONSIDERATIONS

Considerations for course development are not part of this guidance. 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;
- Organizational structure;
- Complexity of the State airspace;
- Resources;
- Regulatory requirements; and
- Institutional requirements.

Roles and Responsibilities

Course instructors are responsible for delivery of all course content and instructional events. They are responsible for completing all activities involved in the instructional process including guiding and counselling trainees.

Trainees are responsible to be actively engaged in training and the successful completion of all course module activities and assessment materials, as required.

It will be up to each training provider or course developer to establish a balance between the factors described above while ensuring the quality and effectiveness of training. Course developers, course instructors and trainees are all stakeholders in the instructional process. 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.

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. These phases or levels of training were described in Part One of this manual. The training required will also be dependent on the trainee's existing KSAs. All training will involve a curriculum development process.

COURSE DEVELOPMENT

Components and processes needed to develop a course curriculum include:

- Assessing the pre-existing competencies of the trainees;
- 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; and
- Course materials.

Assessing the pre-existing competencies of the trainees

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

It should be noted that it is the responsibility of the training provider or course developer to establish and assess prerequisites for training. The prerequisite skills discussed refer to KSAs and competencies required of the trainee prior to commencing training. Such prerequisites can vary depending on whether training providers offer specialized, 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 homogeneous expertise.

Training providers are encouraged to offer Ab Initio Training covering the prerequisites that should be met by the trainee to ensure that the length of the training can be optimized.

Language

In order to progress through the competency-based training outlined above, trainees need to demonstrate their ability to achieve the terminal objective related to the competency elements. As training will be delivered within a certain timeframe, 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. Note: Training may be delivered in the local language as appropriate, or in accordance with local organization policy and procedure.

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 into or from English will be required to have a higher level of proficiency than others that may only need to understand or use the spoken word.) Minimum requirements may be specified by ICAO.

Training Objectives

Training and course providers must develop training objectives for all courses offered and are comprised of three parts:
- conditions of performance,
- expected behavior which includes the learning objectives related to the terminal objectives, and
- a standard.

Conditions of Performance

When creating the training objective, describing the situation or conditions 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 "prepare content" for the AIP amendment could be "information received from a data originator".

Figure 3.0 Performance Criteria Development Process

Performance Criteria

Expected behaviour or performance as described in the learning objective requires that the associated terminal objective be identified from the competency framework. The performance criterion is the measurement of whether the learning objective that describes the expected behaviour that accomplishes the terminal objective has been achieved.

For example, the performance criteria for the terminal objective of "prepare content" for the "Generate the AIP amendment" competency element could be "prepare the content required for the generation of the AIP amendment 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 sub-sets of knowledge, skills and abilities that are required to accomplish the Terminal Objectives. To continue our example, Enabling Objectives could include the ability to utilize a specific software program in a specific way, know the publishing cycle, etc.

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. 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.

For example: (Course content, scope and course length in the following example are not meant to be all encompassing.)

(Need to work example)

Course goal	TBD
Target population	TBD
Course duration	TBD
Prerequisites KSAs	TBD

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, the Competency   Framework.

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 organization according to local standard operating procedures and regulations.

For example: Within the Competency Framework, Competency Unit 2 Static Data Output (the Competency Framework can be found in Appendix 1), we find Competency Element 2.1, "Generate the AIP Amendment". A terminal objective can be identified as follows:

Conditions of performance	Information from the data originator
Expected performance behaviour/Learning Objective	The trainee will be able to produce the AIP amendment.
Standard	ICAO Annex 15, Doc 8126, Local procedures

The trainee will then undergo a module of training, and at the end of it, will be required to perform the terminal objective as formulated in a mastery test (see page 22 "Testing".)

In order to achieve the terminal objective, there are several enabling objectives the trainee needs to master. Enabling objectives may be derived from performance criteria. For example: for competency element 2.1, Performance Criteria 2.1.1 states, "Prepare content". One enabling objective of the module on the "Generate the AIP Amendment" would be:

Conditions of performance	TBD
Expected behaviour / Performance Criteria	TBD
Standard	TBD

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

Skills	TBD
Knowledge	TBD
Ability	TBD

Establishing OJT Training Objectives

Generally, the purpose of OJT is to consolidate 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 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. The course developer with input from subject matter experts should discuss the acceptable number and type of errors. Some errors, even during training, may not be acceptable because they indicate a lack of skill, knowledge or ability. There may be types of errors that are acceptable in Initial Training.

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

MODULES

In order to optimize 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.

Considerations in designing modules and course materials

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 systematic approach.

Instructional Criteria.   The following instructional criteria should be used throughout the course module for each enabling objective:
- presentation of the objective;
- performance measurement criteria (testing)
- context to the terminal objective and 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 test, etc.); and
- performance of the objective and assessment of the achievement.

Course objective(s) and a description of required performance should be introduced at the beginning of the course module. This allows trainees to know exactly what is expected of them and how they will be evaluated at the end of the course. This will also reduce the level of anxiety for trainees but also help to 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 mastery test;
- intermediate objectives;
- activities provided in the module; and
- any reference material on the subject matter and 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 participants and provide relevant context for expected levels of proficiency. The relevance of the content being presented could be identified several different ways. One way is to ask participants: "What will happen if this is done?"

Presentation of content should be divided into manageable pieces of information. Course modules should be 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 objectives(s). Trainees must be provided with several opportunities to review and practice the skills and knowledge being covered before taking a mastery or progress test. This will help to ensure trainees have mastered all enabling objectives leading to the desired performance of a terminal objective. Once critical enabling objective are completed, a progress test may be necessary. Not in every situation will a course instructor need to test for the trainee's progress.

SEQUENCING

The 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, and
- 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 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 (laboratory exercises, projects, etc.) and feedback; and
- performance test

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.

TESTING

Mastery Test

It is important to be able to test a trainee to ensure that they have mastered the training objective and it results in a change in behaviour and performance on the job. The comprehensive test to ensure that the trainee has mastered the training objective (terminal objectives) is sometimes called a mastery test. The interim testing to ensure that the trainee has mastered the enabling Objectives is called a progress test.

All trainees must be tested on their level of mastery of terminal objectives (learning objectives) and enabling objectives identified throughout the course. As much as possible, tests should match conditions, behaviours and standards.

It is important to remember that trainees are being tested on their ability to perform specific objectives on the job. By designing tests before the curriculum is delivered, tests can focus on

the "need to know/perform" rather than the "nice to know" thereby ensuring an efficient and effective use of training time.

Figure 4.0 Mastery Test Design Process.
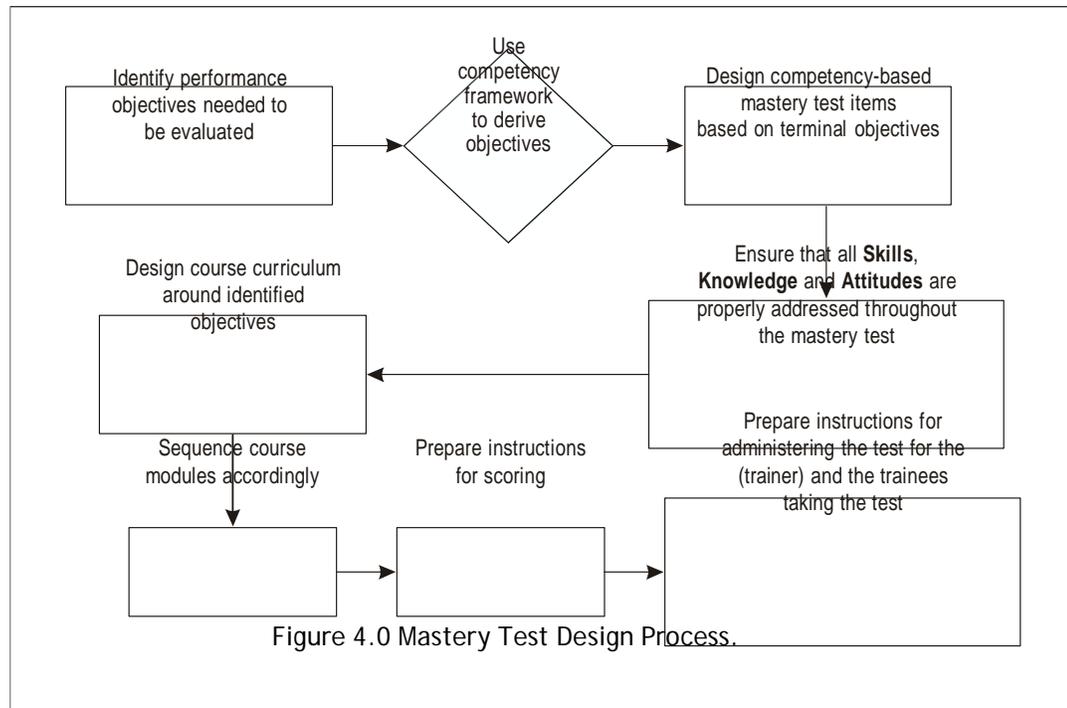
Progress Testing

The purpose of interim testing 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. This is sometimes called a progress test.

It is not feasible or advisable to administer interim testing for every enabling objective. However, the administration of interim testing should be considered for enabling objectives that are key (difficult or critical) to the successful achievement of terminal objectives.

Interim testing can be administered in a variety of ways, for example verbal, written, on-line, etc. Each test should be appropriate to the required level of knowledge, skill and ability as stated by the key objective(s), and individual test items should be clearly stated and unambiguous.

Validity and Reliability

The most important requirements of a test are that it must be valid and reliable.

A valid test should reproduce the conditions, behaviour and standards identified by the objectives and cover all KSAs required to achieve these.

A reliable test 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 test instructions are always complete, clear and unambiguous.

Test Format

Ideally, tests would reproduce the conditions of job performance. Simulations and case scenarios are a good example of a test 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 test 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 but efficient scoring and the processing of results; and
- include a scoring key and a framework answer (if appropriate) so that a minimum amount of interpretation is needed when scoring the trainee's responses.

Test Design

For a given objective, trainees will undergo training and a test at the end of the training. During the test, 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.

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

Terminal objective /Learning Objectives:

Given valid sets of data, the trainee will be able to <Insert Example TBD>

Before writing a test item for this objective, 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 behavior for this objective?
- To what standards should the behavior be carried out?

<Insert Example TBD>

Conditions.

Behaviour.

Training standard.

COURSE MATERIALS

Production and Development of Material

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 is not only accurate but also 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.

A sample of individuals from the target population should be trained using a draft version of the instructional materials. The feedback from this validation delivery will be used to address any major flaws in course design and correct materials. All instruction and module terminology should be clearly defined and closely matched with the learning styles of trainees.

Presenting instructional events can vary depending on the content, materials or the trainees themselves. Regardless, instructional events should be described and documented. For example, specific instructions should be provided on how instructors summarize discussions, how to organize a role-playing situation, or how to administer a mastery or progress test. When designing course modules, materials can be instructor-dependent or material-dependent. To ensure a more consistent delivery of course content, course developers should design content that is material-dependent. Material-dependent courses are courses where the instructor requires minimum interpretation of course content. In this situation, the materials dictate instruction. This focuses the instructor's work on course facilitation. Instructor-dependent courses are courses where the instructional process is not documented. In this case, an inexperienced or new instructor will need to interpret and adapt the course materials. Material-dependent courses ensure that training is delivered in a consistent and reliable manner.

Course Material Content	Considerations
Documentation	- Course materials - Evaluation forms - Take-home materials - Defined standard - Language for training delivery and materials
Reference	Reference materials such as articles, texts, web pages, etc.
Media	- Computer-based - Projectors - CDs - Thumb drives - Videos
Records	- Training records - Certificates for training completion - Electronic vs. paper

Example of an AIS Training Program <To be developed>

SECTION THREE — APPENDICIES

APPENDIX 1:   AIS/AIM COMPETENCY FRAMEWORK

X	COMPETENCY UNIT			
	X.X	COMPETENCY ELEMENT		
		X.X.X	Performance Criteria	Standard
1	DATA AND INFORMATION MANAGEMENT			
	1.1	PRE-PROCESS DATA		
		1.1.1	Receive and record raw data	Local procedures
		1.1.2	Evaluate whether the raw data is from an authorized source	ICAO Annex 15, Chap. 7 and Appendix 1; Local procedures, Doc 8126
		1.1.3	Evaluate whether the data meets the protection requirements	Local procedures
		1.1.5	Identify if there is a need for translation of the raw data	ICAO Doc 9713
		1.1.6	Analyze the appropriateness of the data	Local procedures
		1.1.7	Verify the quality of the raw data	ICAO Annex 15, Chap. 3; Local procedures
		1.1.8	Analyze the data for completeness, coherence and ambiguity	Local procedures
		1.1.9	Identify any discrepancies, duplication and misinterpretations of the data	ICAO Annex 15, Chap. 4 to 7
		1.1.10	Execute corrective action	Local procedures
		1.1.11	Coordinate with data sources	Local procedures
		1.1.12	Receive external data	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

X	COMPETENCY UNIT			
	X.X	COMPETENCY ELEMENT		
		X.X.X	Performance Criteria	Standard
		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		
		1.3.1	Apply database maintenance operations.	Local procedures
		1.3.2	Identify faults in the operation of the database and apply fault reporting procedures	Local procedures
		1.3.3	Operate the database	Local procedures
	1.4	PRODUCE DATA SETS/FILES		
		1.4.1	Select the required data (internal and external sources)	Local procedures
		1.4.2	Compile data sets/file (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/file	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		
		1.5.1	Maintain external publications (e.g. AIP)	Annex 15 and Local procedures
		1.5.2	Maintain external data (static and/or dynamic)	Local procedures
		1.5.3	Maintain records	Local procedures
2	STATIC DATA OUTPUT			
	2.1	GENERATE AIP/AIP AMENDMENT		
		2.1.1	Prepare content (text, tables, diagrams, and other elements)	ICAO Annex 15, Doc 8126, Local procedures
		2.1.2	Coordinate with other authorities as necessary	Local procedures
		2.1.3	Translate text into appropriate language	Local procedures
		2.1.4	Verify content	Local procedures

X	COMPETENCY UNIT			
	X.X	COMPETENCY ELEMENT		
		X.X.X	Performance Criteria	Standard
		2.1.5	Obtain approval of text	Local procedures
		2.1.6	Compile and verify content (text, charts and other elements)	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 (use of internet) and Local procedures
	2.2	GENERATE AIP SUPPLEMENT		
		2.2.1	Prepare content (text, tables, diagrams, and other elements)	Local procedures
		2.2.2	Coordinate with other authorities as necessary	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 text	Local procedures
		2.2.6	Compile and verify content (text, charts and other elements)	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, diagrams, and other elements)	Local procedures
		2.3.2	Coordinate with other authorities as necessary	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 (text, charts and other elements)	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		

X	COMPETENCY UNIT			
	X.X	**COMPETENCY ELEMENT**		
		X.X.X	**Performance Criteria**	**Standard**
		2.4.1	Prepare charts	Local procedures
		2.4.2	Coordinate with other authorities as necessary	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)	Local procedures
3	DYANMIC DATA OUTPUT			
	3.1	**GENERATE NOTAM**		
		3.1.1	Prepare content (number, series, Q line, E field, etc.)	Annex 15 Chap. 5, ICAO Doc 8126
		3.1.2	Coordinate with other authorities as necessary	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	Annex 15 Chap. 5.3, ICAO Doc 8126
	3.2	**GENERATE CHECKLIST OF VALID NOTAM**		
		3.2.1	Prepare Checklist of Valid NOTAM	Local procedures
		3.2.2	Coordinate with other authorities as necessary	Local procedures
		3.2.3	Verify content	Local procedures
		3.2.4	Make Checklist of Valid NOTAM available	Annex 15 Chap. 5.3, ICAO Doc 8126
	3.3	**GENERATE SNOWTAM**		
		3.3.1	Prepare SNOWTAM	Annex 15 Chap. 5, ICAO Doc 8126
		3.3.2	Coordinate with other authorities as necessary	Local procedures
		3.3.3	Verify content	Local procedures
		3.3.4	Make SNOWTAM available	Annex 15 Chap. 5.3, ICAO Doc 8126
	3.4	**GENERATE ASHTAM**		
		3.4.1	Prepare ASHTAM	Annex 15 Chap. 5, ICAO Doc 8126
		3.4.2	Coordinate with other authorities as necessary	Local procedures
		3.4.3	Verify content	Local procedures

X	COMPETENCY UNIT			
	X.X	COMPETENCY ELEMENT		
		X.X.X	Performance Criteria	Standard
		3.4.4	Make ASHTAM available	Annex 15 Chap. 5.3, ICAO Doc 8126
4	ADDITIONAL PRODUCTS			
	4.1	GENERATE ADDITIONAL PRODUCTS		
		4.1.1	Prepare additional products (e.g., business products, VFR flight guide)	Local procedures
		4.1.2	Coordinate with other authorities as necessary	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 PREPARATION		
		5.1.1	Provide or make available pre-flight information e.g., AIP, PIB etc	Annex 15, Doc 8126 and local regulations
	5.2	POST-FLIGHT PREPARATION		
		5.2.1	Receive and process data/information from other sources	Annex 15, Doc 8126 and local regulations
		5.2.2	Process post-flight data queries	Local procedures
		5.2.3	Distribute post-flight information to the appropriate authority	local regulations and procedures
6	ARO			
	6.1	PROCESS FPL		
		6.1.1	Receive and process the FPL proposal	Local procedures
		6.1.2	Verify FPL for compliance with format and data conventions, and for completeness and accuracy	Local procedures
		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, including to any regional processing systems	Local procedures
	6.2	COORDINATION ACTIVITIES		
		6.2.1	Assist the pilot 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 Center	Local procedures
		6.2.4	Coordinate with other organizations	Local procedures

APPENDIX 2 -- ABBREVIATIONS AND DEFINITIONS

<mark>(Ed note: To be finalized after the model and framework has been finalized.)</mark>

Abbreviations

AI	Aeronautical Information
AD	Aeronautical Data
AIC	Aeronautical Information Circular
AIM	Aeronautical Information
AIP	Aeronautical Information Publication
AIRAC	Aeronautical information regulation and control
AIS	Aeronautical Information Service
ANSP	Air Navigation Service Provider
ARO	Airport Reporting Office
ARP	Aerodrome reference point
ATC	Air traffic control
ATM	Air traffic management
ATS	Air traffic services
CNS	Communication, Navigation and Surveillance
IAIP	Integrated Aeronautical Information Package
ICAO	International Civil Aviation Organization
IELTS	International English language testing system
ISO	International Organization for Standardization
KSA	Knowledge, skill and ability
NGAPTF	ICAO Next Generation of Aviation Professionals Task Force
NOTAM	Notice to airmen
OJT	On-the-job training
PBN	Performance-based navigation
QMS	Quality Management System
RNAV	Area navigation (also, random area navigation)
RNP	Required navigation performance
SARPS	ICAO Standards and Recommended Practices

Definitions

<To be finalized following completion of the manual>

When the following terms are used in the 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 formalized 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 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 Personnel. Anyone who is generally responsibility for any of or all of the functions required by the AIS or AIM provider as a general part of their employment.

Aeronautical information service (AIS). A service established within the defined area of coverage responsible for the provision of aeronautical information/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 which 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.

Air defense identification zone (ADIZ). Special designated airspace of defined dimensions within which aircraft are required to comply with special identification and/or reporting procedures additional to those related to the provision of air traffic services (ATS).

Air traffic management (ATM). A generic term relating to the management of air traffic services (ATS).

AIS product. Aeronautical information provided in the form of the elements of the Integrated Aeronautical Information Package (except NOTAM and PIB), including aeronautical charts, or in the form of suitable electronic 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.

Area navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Note. — Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.

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

ATS surveillance service. Term used to indicate a service provided directly by means of an ATS surveillance system.

ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.

Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

Automatic dependent surveillance — broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.

Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

Note. — The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

Automatic terminal information service (ATIS). The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof:

Data link-automatic terminal information service (D-ATIS). The provision of ATIS via data link.

Voice-automatic terminal information service (Voice-ATIS). The provision of ATIS by means of continuous and repetitive voice broadcasts.

Bare Earth. Surface of the Earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects.

Calendar. Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*).

Canopy. Bare Earth supplemented by vegetation height.

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 skills, knowledge and abilities required to perform an objective to the prescribed standard.

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

Competency 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*, *performance criteria*, *evidence and assessment guide* and *range of variables.* Competency units, competency elements and performance criteria are derived from job and Objectives analyses of AIS personnel and describe observable outcomes.

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

Competency framework. A competency framework consists of *competency units*, *competency elements*, *performance criteria*, *evidence and assessment guide* and *range of variables.* Competency units, competency elements and performance criteria are derived from job and Objectives analyses of AIS personnel and describe observable outcomes.

Controller-pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications.

Culture. All man-made features constructed on the surface of the Earth, such as cities, railways and canals.

Cyclic redundancy check (CRC). A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

Danger area. An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

Database. One or more files of data so structured that appropriate applications may draw from the files and update them.

Note.— This primarily refers to data stored electronically and accessed by computer rather than in files of physical records.

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

Data product specification. Detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party (ISO 19131*).

Note. — A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a data set. It may be used for production, sales, end-use or other purpose.

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*).

Data set series. Collection of data sets sharing the same product specification (ISO 19115*).

Datum. Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104*).

Digital Elevation Model (DEM). The representation of terrain surface by continuous elevation values at all intersections of a defined grid, referenced to common datum.

Note.— Digital Terrain Model (DTM) is sometimes referred to as DEM.

Direct transit arrangements. A special arrangement approved by the public authorities concerned by which traffic that is pausing briefly in its passage through the Contracting State may remain under their direct control.

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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 by an AIS staff member 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.

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Feature. Abstraction of real world phenomena (ISO 19101*).

Feature attribute. Characteristic of a feature (ISO 19101*).

Note. — A feature attribute has a name, a data type and a value domain associated with it.

Feature operation. Operation that every instance of a feature type may perform (ISO 19110*).

Note. — An operation upon the feature type dam is to raise the dam. The result of this operation is to raise the level of water in the reservoir.

Feature relationship. Relationship that links instances of one feature type with instances of the same or a different feature type ISO 19101*).

Feature type. Class of real world phenomena with common properties (ISO 19110*).

Note. — In a feature catalogue, the basic level of classification is the feature type.

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Geodesic distance. The shortest distance between any two points on a mathematically defined ellipsoidal surface.

Geodetic datum. A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

Geoid. The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.

Note. — The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.

Geoid undulation. The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

Note. — In respect to the World Geodetic System — 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84ellipsoidal height and orthometric height represents WGS-84 geoid undulation.

Gregorian calendar. Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108*).

Note. — In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months.

Height. The vertical distance of a level, point or an object considered as a point, measured from a specific datum.

Heliport. An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Information. Data in context.

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; and

— checklists and lists of valid NOTAM.

Integrity (aeronautical data). A degree of assurance that an aeronautical data and its value have not been lost or altered since the data origination or authorized amendment.

International airport. Any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

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 performance criteria. A skill is the ability 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 attitudes 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 behavior, choices and expressed opinions.

Logon address. A specified code used for data link logon to an ATS unit.

Mastery test. A test that evaluates a trainee's ability to perform a terminal objective. A mastery test should match as closely as possible the conditions, behaviors and standards of terminal objectives.

Manoeuvring area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Metadata. Data about data (ISO 19115*).

Note. — Data that describes and documents data.

Minimum en-route altitude (MEA). The altitude for an en-route segment that provides adequate reception of relevant navigation facilities and ATS communications complies with the airspace structure and provides the required obstacle clearance.

Minimum obstacle clearance altitude (MOCA). The minimum altitude for a defined segment of flight that provides the required obstacle clearance.

Movement area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

Navaid data. Data relating to both ground-based and space-based navigational aids including service volume, frequency, identification, transmission power and limitations of operation.

Navigation specification. A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

Required navigation performance (RNP) specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

Note 1. — The Performance-based Navigation (PBN) Manual (Doc 9613), Volume II, contains detailed guidance on navigation specifications.

Note 2. — The term RNP, previously defined as "a statement of the navigation performance necessary for operation within a defined airspace", has been removed from this Annex as the concept of RNP has been overtaken by the concept of PBN. The term RNP in this Annex is now solely used in the context of navigation specifications that require performance monitoring and alerting, e.g. RNP 4 refers to the aircraft and operating requirements, including a 4 NM lateral performance with on-board performance monitoring and alerting that are detailed in Doc 9613.

Notice to Airman (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.

Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

a) are located on an area intended for the surface movement of aircraft; or

b) extend above a defined surface intended to protect aircraft in flight; or

c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

Obstacle data. Any man-made fixed or temporary object which has vertical significance in relation to adjacent and surrounding features and which is considered as a potential hazard to the safe passage of aircraft, or man-made fixed or temporary objects that extend above a defined surface intended to protect aircraft in flight.

Obstacle/terrain data collection surface. A defined surface intended for the purpose of collecting obstacle/terrain data.

Orthometric height. Height of a point related to the geoid, generally presented as an MSL elevation.

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.

Portrayal. Presentation of information to humans (ISO 19117*).

Position (geographical). Set of coordinates (latitude and longitude) referenced to the mathematical reference ellipsoid which define the position of a point on the surface of the Earth.

Post spacing. Angular or linear distance between two adjacent elevation points.

Progress test. A test that measures a trainee's ability to meet key enabling objectives.

Precision. The smallest difference that can be reliably distinguished by a measurement process.

Note. — In reference to geodetic surveys, precision is a degree of refinement in performance of an operation or a degree of perfection in the instruments and methods used when taking measurements.

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

Prohibited area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

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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 organization with regard to quality (ISO 9000*).

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Radio navigation service(RNAV). A service providing guidance information or position data for the efficient and safe operation of aircraft supported by one or more radio navigation aids.

Range of variables (conditions). The conditions under which the competency units must be performed.

Recognized source. A source of data that is either recognized by the State or a source that has professional credentials to provide a specific type of data.

Relief. The inequalities in elevation of the surface of the Earth represented on aeronautical charts by contours, hypsometric tints, shading or spot elevations.

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 organization, 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.

Resolution. A number of units or digits to which a measured or calculated value is expressed and used.

Restricted area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

Route stage. A route or portion of a route flown without an intermediate landing.

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.

Station declination. An alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated.

Terminal objective. Part of a training objective derived from a competency element in the competency framework which a trainee will achieve when successfully completing training.

Terminating event. A cue or indicator that a task has been completed.

Terrain. The surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles.

Note.— In practical terms, depending on the method of data collection used, terrain represents the continuous surface that exists at the bare Earth, the top of the canopy or something in-between, also known as "first reflective surface".

Terrain data. Data pertaining to the natural surface of the Earth excluding man-made obstacles, and can be represented as a cartographic map, an electronic raster map, an electronic vector data map or an electronic Digital Elevation Model (DEM).

Traceability. Ability to trace the history, application or location of that which is under consideration (ISO 9000*).

Note. — When considering product, traceability can relate to the:
▪ origin of materials and parts;
▪ processing history; and
▪ distribution and location of the product after delivery.

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 personnel training.

Triggering event. A cue or indicator that a task should be initiated.

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

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; and

reviewing documents prior to issue.

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* ISO Standard

9000 — Quality Management Systems — Fundamentals and Vocabulary

19101 — Geographic information — Reference model

19104 — Geographic information — Terminology

19108 — Geographic information — Temporal schema

19109 — Geographic information — Rules for application schema

19110 — Geographic information — Feature cataloguing schema

19115 — Geographic information — Metadata

19117 — Geographic information — Portrayal

19131 — Geographic information — Data product specification

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APPENDIX 3 – TAXONOMY

Level 1: Requires a basic knowledge of the subject. It is the ability to remember essential points; the trainee is expected to memorize 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 authorizing changes to the Data
Quote	Repeat what is written or said	Quote the ICAO definition of an AIS Service
Recognize	To know what it is because you have seen it before	Recognize 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
Characterize	To describe the quality of features in	Characterize the consequences of an operating system upgrade. Characterize various items of AIS equipment
Consider	To think carefully about	Consider institutional issues and service provider responsibilities
Demonstrate	Describe and explain; Logically provide the truth about a statement	Demonstrate how to maintain the traceability in the data chain. Demonstrate how to issue a NOTAM
Describe	Say what it is like or what happened	Describe the architecture of the AFTN system. Describe the methods by which quality assurance is maintained
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
Report	Give an account, provide a detailed statement about an occurrence or situation	Report on the performance of a maintenance task
Take account of	Take into consideration before deciding	Take into account the NOTAM selection Criteria (NSC) before issuing a NOTAM

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**
Act	Carry out, execute	Transmit the NOTAM using AFTN
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
Assist	Help somebody do a job by doing part of it	Handle the operational HMI assist in the tuning of the screen
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
Conduct	Lead, guide	Conduct coordination with appropriate authority
Confirm	Establish, corroborate	Confirm the status of the data
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
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
Input	Enter into a system	Input data
Issue	Set forth, publish	Issue a NOTAM
Maintain	Carry on, keep up, refresh	Maintain the check list of pages
Monitor	Keep under observation	Monitor the AFTN connection
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

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.

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
Perform	Carry out, execute	Performa a proof reading activity, perform co-ordination
Record	Register, set down	Record information in the appropriate file
Relay	Forward, provide	Relay a message to the office manager
Respond	Answer, reply	Respond to the message from the operator
Scan	Continuously observe in order to extract appropriate data	Scan the list of pending NOTAM proposals
Transfer	Handover	Transfer a message to the appropriate recipient
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.

Verb	Definition	Example
Acquire	Gain by oneself, obtain after research	Acquire a specific data file
Adjust	Change to a new position, value or setting	Adjust the information to reflect a change
Allocate	Assign, devote	Allocate the responsibility for compiling the AIP to a colleague
Analyze	Examine the constitution of	Analyze the information received from the sponsor
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
Comply	Act in accordance with	Comply with ICAO SARPS
Delegate	Commit authority, assign	Delegate responsibility for issuing a NOTAM
Design	Conceive a plan	Design a chart according to a specified requirement
Detect	Discover the existence of	Detect inconsistencies in a publication
Ensure	Make safe, Make certain	Ensure that an agreed action takes place
Integrate	Combine into a whole	Integrate individual components into a publication
Manage	Handle, conduct	Manage the data received from a sponsor

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.		
Organize	Give orderly structure to	Organize the separate information into a logical order
Relate	Establish link	Relate the connection between an AIP amendment and an AIP Supplement

Level 5: Requires an ability to analyze new situations in order to apply one or other relevant strategy to solve a complex problem; requiring judgment and evaluation of options.		
Verb	**Definition**	**Example**
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
Discuss	Investigate by reasoning or argument	Discuss the impact of new regulation
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
Interpret	Decide on the meaning or significance when there is a choice	Consider the possible options available to place new information into the AIP
Resolve	Solve, clear up, settle	Resolve the matter of duplication in the document
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
Solve	Find an answer to	Solve problems in the document
Validate	Make valid, ratify, confirm	Validate the data received from the sponsor

APPENDIX 4 – BIBLIOGRAPHY

<mark>DEVELOP</mark>

APPENDIX 5 – EVALUATION

<mark>DEVELOP</mark>