



DANGEROUS GOODS PANEL (DGP)

TWENTY-SEVENTH MEETING

Montréal, 16 to 20 September 2019

Agenda Item 2: Managing air-specific safety risks and identifying anomalies

2.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2021-2022 Edition

2.3: Develop proposals, if necessary, for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2021-2022 Edition

REPORT OF THE WORKING GROUP ON TRAINING

(Presented by the Chairman of the Working Group on Training)

SUMMARY

This information paper provides an update on the work of the Dangerous Goods Panel Working Group on Training which met face-to-face from 21 to 22 July 2019 in Dubai, United Arab Emirates.

1. INTRODUCTION

1.1 The DGP Working Group on Training (DGP-WG/Training) met in Dubai, United Arab Emirates on 21 and 22 July 2019 and at ICAO Headquarters on 9 and 10 September 2019. The purpose of the meeting was to:

- a) finalize guidance on competency-based training contained in Attachment 4 to the Technical Instructions;
- b) develop amendments to guidance on competency-based training for State employees contained in the Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284SU) to align with revised provisions in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) introduced through Amendment 5;

- c) consider whether specific guidance on State safety management responsibilities required by Annex 19 as it pertains to dangerous goods State employees should be included in the dangerous goods training provisions contained the Supplement; and
- d) develop provisions to clarify the need for State employees to be competently trained to develop and implement processes and procedures for the granting of approvals and exemptions.

1.2 The meeting was hosted by Hamad Al Muhairi on behalf of His Excellency, Mr. Saif Mohammed Al Suwaidi, Director General of the UAE General Civil Aviation Authority (DGCAA) at the Emirates Aviation College in Dubai. The following participated under the chairmanship of Teun Muller:

NAME	NOMINATED BY
Khaled Al Belooshi	United Arab Emirates
Charles Betts	United States
Michaela Boehm	France
Hermann Brockhaus	Germany
Martial Cosset	Austria
Mohamed Ebrahim	United Arab Emirates
Eric Gillett	United Kingdom
Trevor Howard	United Arab Emirates
Alexandra Jimenez	International Air Transport Association (IATA)
Shair Ahmed Khan	United Arab Emirates
Kevin Leary	United States
Lynn McGuigan	Secretariat
Teun Muller	Netherlands
Micheline Paquette	Canada
Ejan Petrie	United States
William Quade	United States
Katherine Rooney	Secretariat
Ahmed Wagih	United Arab Emirates (Chairman)

1.3 The meeting expressed its appreciation to the DGCAA for hosting the meeting and to Emirates for providing the venue.

2. AMENDMENTS TO TRAINING GUIDANCE CONTAINED IN ATTACHMENT 4 TO THE TECHNICAL INSTRUCTIONS

2.1 Need

French approach to Competency-Based Training for dangerous goods

2.1.1 The meeting was given a follow-up presentation on measures taken by the French Direction générale de l'Aviation civile (DGAC) to prepare for the implementation and oversight of the

new competency-based dangerous goods training and assessment provisions that had been described to the 2019 DGP Working Group Meeting (DGP-WG/19, Montréal, 1 to 5 April 2019) (see paragraph 3.2.2.6 of the DGP-WG/19 Report). Guidance material on competency-based training and tools to support it developed by the DGAC had been provided to DGP-WG/19, which at the time was available only in French but had since been translated into English. DGP-WG/Training was provided an overview of it. The DGAC concluded that the guidance material in the Technical Instructions was very helpful but could be strengthened in the following areas:

- a) improvement of existing guidance on assessment;
- b) improvement of existing guidance on instructor qualifications;
- c) new guidance on issuing certificates; and
- d) new guidance on proficiency levels.

2.1.2 With regard to certificates, it was acknowledged that issuing training certificates was a common practice in many States even though it wasn't a requirement. Guidance on a consistent method for indicating the areas for which individuals had been successfully trained and assessed would therefore be helpful. With regard to level of proficiency, it was suggested that this was an important component that needed to be taken into account, but that there was no guidance on it. It was noted that the PANS-TRG did not refer to proficiency levels but rather to level of performance.

IATA guidance material on Implementing Competency-Based Training

2.1.3 Suggested revisions to the competency-based training provisions included in Attachment 4 of the Instructions had been presented to DGP-WG/19 (see paragraph 3.2.2.7 of the DGP-WG/19 Report). It was agreed that DGP-WG/Training would take a closer look at the material and consider what could be incorporated in the Instructions while ensuring a balance between providing helpful guidance without being too prescriptive. Further revisions had been made since DGP-WG/19, which were presented to DGP-WG/Training. Efforts had been taken to incorporate a benchmark system to replace the existing table of subject matter for which various categories of personnel should be trained (Table 1-4) while also incorporating suggested levels of proficiency. Similar areas in need of improvement that were identified by the French DGAC were identified, i.e. assessment, instructor qualifications, certificates and proficiency levels.

2.2 Amendment considerations

2.2.1 DGP-WG/Training developed the following new guidance material for inclusion in the guidance material with the intent of strengthening the areas identified as needing improvement:

- a) new provisions that address different levels of proficiency with respect to knowledge, skills and attitudes and descriptions from the PANS-TRG of what was meant by each of these elements (knowledge, skills, attitudes) were added to the document, along with specific dangerous goods examples of each;
- b) a recommendation for what should be included on training records when used; and
- c) elements that should be considered when developing an assessment plan and inclusion of more detailed assessment guidance from the PANS-TRG.

2.2.2 DGP-WG/Training concluded that the reference already included in the guidance material to instructor competencies in the PANS-TRG provided sufficient guidance for instructor qualifications.

2.2.3 DGP-WG/Training added text to further emphasize that the dangerous goods task list is intended as an indicative list which may not include all tasks performed in a given operation and that it needed to be customized to the specific needs of the organization.

2.2.4 The guidance material was restructured in line with ICAO competency-based training and assessment guidance material developed for other aviation disciplines. DGP-WG/Training concluded that material from the PANS-TRG should be replicated in this document for completeness. In doing so, the need for further amendments to address dangerous-goods specific entities was identified and addressed.

3. AMENDMENTS TO GUIDANCE MATERIAL ON TRAINING CONTAINED IN PART S-1;5 OF THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS

3.1 The text in Part S-1;5 of the Supplement was modified for the sake of alignment with revised competency-based training provisions contained in the PANS-TRG by converting the existing competency framework for State employees into a task list, and developing an ICAO competency model by extracting relevant competencies from the *Manual on the Competencies of Civil Aviation Safety Inspectors* (Doc 10070). Additional guidance was also developed based on material in the *Safety Oversight Manual, Part A — The Establishment and Management of a State Safety Oversight System* (Doc 9734), Doc 10070, PANS-TRG and the *Safety Management Manual (SMM)* (Doc 9859).

3.2 DGP-WG/Training considered how safety management responsibilities could be incorporated in the State employee task list using guidance from Doc 9859. A revised list was developed based on State safety management guidance contained in Chapter 8 of that document and, more specifically, the integrated State safety programme components outlined in Figure 8-1 of that chapter. The new task list elaborates on these components as they pertain to dangerous goods State employees, such as granting exemptions and approvals. Further guidance to support the elements in the task list may need to be considered as future work.

4. AMENDMENTS

4.1 Finalized guidance on competency-based training and assessment is contained in Appendix A to this working paper, and draft guidance for State employees is contained in Appendix B.

APPENDIX A

**FINALIZED GUIDANCE ON COMPETENCY-BASED DANGEROUS GOODS
TRAINING AND ASSESSMENT**

FOREWORD

A safe and efficient air transport system is dependent on a competent workforce. ICAO has recognized that this can be achieved through the implementation of a competency-based approach to training and assessment. The *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284, “Technical Instructions”) require that employers ensure personnel are competent to perform any function for which they are responsible prior to performing it. A competency-based approach to training and assessment is an effective way to ensure this requirement is met.

This document provides guidance in implementing a competency-based approach to dangerous goods training and assessment for personnel involved in the transport of cargo, mail, passengers and baggage by air. The *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) contains greater detail on competency-based training and assessment.

BENEFITS OF COMPETENCY-BASED TRAINING AND ASSESSMENT FOR THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

The main benefit of a competency-based approach to training and assessment is its potential to encourage and enable personnel to reach their highest level of capability while ensuring a basic level of competence as a minimum standard. It does this by:

- a) targeting specific training needs;
- b) supporting continuous learning and performance improvement;
- c) gearing towards learning rather than simply passing a test;
- d) ensuring the integration of the knowledge, skills and attitudes needed to perform effectively; and
- e) establishing sufficient, well-trained and competent instructors.

Ensuring personnel are able to perform their functions competently is critical to any organization. A competent workforce reduces cost caused by poor performance or miscommunication of job expectations. The consequences of an incompetent dangerous goods workforce can be especially damaging. It could result in costs and delays in shipment, and even more critically, it could result in the introduction of safety risks. As an example, identifying, classifying, packing, marking, labelling and documenting dangerous goods for transport are critical to the safe transport of dangerous goods by air. The operator depends on these functions being performed competently by those preparing and offering a consignment for transport so that they are aware of the hazards posed and can take the necessary steps to mitigate the risk to the aircraft and its occupants. If personnel performing these functions are not trained to competently perform them, unknown risks may be introduced into air transport. Accepting dangerous goods for air transport requires an operator to verify that dangerous goods are properly prepared for transport through the use of a checklist. If personnel accepting dangerous goods are not trained to competently perform this function, they may accept improperly prepared shipments of dangerous goods into air transport thereby putting the aircraft and its occupants at risk. Alternatively, they may unnecessarily reject properly prepared shipments thereby delaying shipments and increasing costs to the shipper and the operator.

A competency-based approach to training and assessment ensures that trainees know what they are expected to competently perform and evaluators know what performance to assess..

FUNCTION-SPECIFIC TRAINING

The Technical Instructions state that personnel must be trained commensurate with the functions for which they are responsible. These responsibilities are determined by the specific functions personnel perform and not by their job titles. Concentrating on functions and responsibilities rather than a job title or description ensures that a person is competent to perform the function in compliance with the Technical Instructions. For example, entities such as ground handling companies and freight forwarders may need personnel to perform some functions that are typically performed by shippers or operators. Ground handling and freight forwarder personnel would need to be trained to perform these functions competently regardless of their job title.

In smaller operations, personnel may perform many functions such as accepting dangerous goods and loading and securing dangerous goods on board an aircraft. They would need to be trained to perform all of these functions competently. In larger operations, personnel may perform only a small number of functions. They would only need to be trained to perform those specific functions competently.

The depth of training each person receives should be appropriate to the functions performed. This could range from a familiarization level to an expert level for certain personnel.

Comments concerning this document should be addressed to:

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GLOSSARY

ACRONYMS AND ABBREVIATIONS

ANC	Air Navigation Commission
CAA	Civil Aviation Authority
COMAT	Company Material
SRM	Safety Risk Management

DEFINITIONS

When the following terms are used in this manual, they have the following meanings:

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

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

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

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

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

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

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

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

Chapter 1

INTRODUCTION

1.1 GENERAL

1.1.1 This document provides guidance in implementing a dangerous goods competency-based training and assessment programme for personnel involved in the transport of cargo, mail, passengers and baggage by air.

1.1.2 Since ICAO regions and member States have differing regulatory, operational, technical and organizational environments, it does not prescribe a “one-size-fits-all” training programme. Instead, it provides generic tools to develop dangerous goods training programmes that can be adapted for specific needs. It is based on the more detailed material provided in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868).

1.2 COMPETENCY-BASED TRAINING AND ASSESSMENT CONCEPTS

The goal of competency-based training and assessment is to produce a competent workforce by providing focused training. It does so by identifying key competencies that need to be achieved, determining the most effective way of achieving them and establishing valid and reliable assessment tools to evaluate their achievement. Competency-based training is a concept and methodology that was developed during the 1950s and entered the mainstream sometime in the 1980s. Competency-based training has been applied in many different contexts and professions and, therefore, it is understandable that there are many different definitions of “competence” and “competency-based training”. This section elaborates the competency concepts as they are used in this document.

1.2.1 What is a competency?

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

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

1.2.2 Knowledge, skills and attitudes

1.2.2.1 Developing knowledge, skills and attitudes (KSA) required to perform a task is a critical feature of competency-based training and assessment.

1.2.2.2 **Knowledge.** Knowledge is specific information required to enable a learner to develop and apply the skills and attitudes to recall facts, identify concepts, apply rules or principles, solve problems, and think creatively in the context of work. Knowledge is an outcome of the learning process, whether learning occurs in formal or informal settings. There are different types of knowledge: declarative (e.g. facts and raw data), procedural (e.g. categorized/contextualized

and application of conditional if-then rules), strategic (e.g. synthesis, inference to guide resource allocation for decision making, problem solving and behavioural action), and adaptive (e.g. generalization, innovation. and invention).

1.2.2.3 **Skills.** A skill is an ability to perform an activity or action. It is often divided into three types: motor, cognitive and metacognitive skills. A motor skill is an intentional movement, involving a motor or muscular component, that must be learned and voluntarily produced to proficiently perform a goal-oriented task. A cognitive skill is any mental skill used in the process of acquiring knowledge, such as reasoning, perception and intuition. A metacognitive skill relates to the ability of learners to monitor and direct their own learning processes (“thinking about thinking”); for example, planning how to approach a given learning task, monitoring comprehension and evaluating progress toward the completion of a task.

1.2.2.4 **Attitudes.** Attitude is a persistent internal mental state or disposition that influences an individual’s choice of personal action toward some object, person or event and that can be learned. Attitudes have affective components, cognitive aspects and behavioural consequences. To demonstrate the “right” attitude, a learner needs to “know how to be” in a given context.

1.2.2.5 Examples of KSA applicable to dangerous goods personnel include:

Knowledge	<ul style="list-style-type: none"> — The nine classes of dangerous goods — Information required on the dangerous goods transport document — Components of an acceptance check
Skills	<ul style="list-style-type: none"> — How to determine if the substance/material is dangerous goods — How to complete the dangerous goods documentation — How to check a package (e.g. can it be accepted for transport)
Attitude	<ul style="list-style-type: none"> — Being motivated to ensure safety and to comply with applicable regulations — Wanting to adhere to regulations in asking relevant and effective questions — Appreciating feedback from team members (e.g. adapts when faced with situation where no guidance or procedure exists)

1.2.2.6 Performing a dangerous goods task may require different levels of KSA, depending on the complexity of the specific task and the operational environment. A level of proficiency is a means to determine how critical knowledge, a skill or an attitude is for the successful completion of a task. If used, the concept of a level of proficiency can be very useful in determining the main areas to focus on during training and assessment. In order to determine the level of proficiency of knowledge, a skill or an attitude, the employer should take into account the complexity of the task or sub-task, its criticality and the employee’s autonomy in performing it. KSAs may be developed over time and with practice, thus enabling qualified personnel to take on more difficult tasks with greater responsibility.

1.2.3 Principles of competency-based training and assessment

A competency-based approach to training and assessment is based on the following principles:

- a) relevant competencies are clearly defined for a particular role;
- b) there is an explicit link between competencies and training, required performance on the job, and assessment;
- c) competencies are formulated in a way that ensures they can be trained for, observed and assessed consistently in a wide variety of work contexts for a given role;
- d) trainees successfully demonstrate competency by meeting the associated competency standard;

- e) each stakeholder in the process including the employer (e.g. shipper, freight forwarder, ground handling agent and operator), instructor, trainee, training organization and regulator has a common understanding of the competency standards;
- f) clear performance criteria are established for assessing competence;
- g) evidence of competent performance is valid and reliable;
- h) instructors' and assessors' judgements are calibrated to achieve a high degree of inter-rater reliability;
- i) assessment of competencies is based on multiple observations across multiple contexts; and
- j) to be considered competent, an individual demonstrates an integrated performance of all the required competencies to a specified standard.

1.2.4 ICAO competency framework, adapted competency model and task list

1.2.4.1 Traditional approaches to training development involve the decomposition of jobs into tasks. For each task there is a related objective, an assessment and associated elements in a training plan. A limitation of this approach is that each task must be taught and assessed. In complex systems, or when jobs evolve rapidly, it may not be possible to teach and assess each task. Moreover, learners may demonstrate the ability to perform tasks in isolation without being competent in their job. Competency-based training and assessment is based on the concept that competencies are transferable. In the design of a competency-based training and assessment programme, the purpose of the training and tasks associated with this purpose are identified and a limited number of competencies are defined. In the design of training and assessments, tasks and activities are incorporated because they are useful for facilitating, developing or assessing a competency or competencies. Typically, a task will involve several competencies, and competencies may apply across a variety of tasks and settings. Specific tasks may be used to develop specific competencies. The lack of specific competencies may be identified as a root cause of failure in the performance of a task. A generic, high-level list of tasks ("task list") typically performed by dangerous goods personnel is provided in Chapter 4 to this document. Employers may use this list as a tool for developing specific training specifications for its personnel. The training and assessment record required by the Technical Instructions should detail the task(s) and sub task(s) from the task list for which competency has been demonstrated in order to facilitate verification that appropriate training and assessment has been completed.

1.2.4.2 A competency model provides a means of defining competencies by identifying those needed for a given role, describing them, and providing criteria for each. Generic, high-level competency frameworks for aviation personnel have been developed by ICAO and included in PANS-TRG and various ICAO documents. They are intended as a framework on which customized competency models can be developed. An ICAO competency framework for dangerous goods personnel is provided in Chapter 3 to this document. It provides a set of competencies that are typically needed to perform the dangerous goods tasks identified in the task list provided in Chapter 4. Employers may adapt this framework into competency models that meet the regulatory, operational, technical and organizational environments within which their personnel perform their tasks. This customized model is identified as an *adapted competency model*, which is then used to develop competency-based training and assessment for a given role. Guidance on developing an adapted competency model is provided in Chapter 2.

1.3 DEVELOPING COMPETENCY-BASED TRAINING AND ASSESSMENT

Instructional systems design (ISD) is a systematic process for designing and developing training. Several valid ISD models exist which may be used to design competency-based training and assessment. The analyse, design, develop,

implement and evaluate (ADDIE) framework is generic to all ISD models. Chapter 2 provides guidance for designing dangerous goods competency-based training and assessment using the ICAO competency framework for dangerous goods personnel and the ADDIE model.

1.4 ROLES AND RESPONSIBILITIES IN A COMPETENCY-BASED APPROACH TO TRAINING

1.4.1 Employer

1.4.1.1 A training programme includes elements such as design methodology, initial and recurrent training, assessment, instructor qualifications and competencies, training records and evaluation of its effectiveness. Employers need to determine the purpose and objective of the competency-based training programme based on the functions for which their personnel are responsible. Employers should ensure that training is designed and developed to establish clear links among the competencies to be achieved, the learning objectives, assessment methods, and course materials.

1.4.1.2 The employer must study the target population (future trainees) with a view to identifying the knowledge, skills and attitudes that they already possess, to collect information on preferred learning styles, and on the social and linguistic environments of prospective trainees. The target population may be a mixture of experienced and newly recruited personnel, groups differing in age, etc. All these components could have an impact on the design of the training. Employers must also consider the domestic and international regulatory requirements that apply to their operations.

1.4.1.3 Some employers may utilize third parties for assistance. This approach may be the most suitable for employers who do not have the resources to train their personnel in house. While utilizing third parties may be cost effective, the deciding factor in selecting a third party should be whether or not the training needs are being addressed, and not costs alone. The potential for third parties to cater to the training needs of multiple employers and not address all required competencies of each specific employee needs to be taken into account. Employers remain responsible for ensuring their personnel are competent to perform their functions prior to performing them even if certain aspects of the training programme have been delegated to third parties.

1.4.1.4 Employers should liaise directly with the regulator to ensure that the latter's requirements are taken into account prior to proceeding with the development of competency-based training,

1.4.2 Instructor

In competency-based training, the instructor facilitates the trainee's progression towards the achievement of competencies. Instructors also support continuous improvement by collecting information about the effectiveness of the training materials. Examples of instructor competencies can be found in Part I, Chapter 3 of the PANS-TRG.

1.4.3 Trainee

In competency-based training, trainees are active participants in their learning process and in the achievement of competencies, as opposed to being passive recipients of knowledge. The competency-based training programme provides them with a clear idea of their learning path towards competency through the training programme and beyond. The competency-based training should directly contribute to improving their performance on the job. The trainees' feedback is essential to ensure that competency-based training is effective.

1.4.4 Regulator

1.4.4.1 There are important differences between the ways the regulator would oversee a traditional training programme versus a competency-based training programme. In a traditional training programme, the regulator may assess the course components and final test against knowledge elements and not on the competencies that need to be acquired. The fact that all knowledge components are addressed or appear to be included in a course and that all trainees have passed the required test does not necessarily mean that they can competently perform their assigned functions.

1.4.4.2 Where competency-based training has been implemented, regulators should oversee the training programme to ensure that it actually produces personnel who can perform the functions for which they are responsible in a specific operational setting and in compliance with the national regulatory framework. The *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) provides guidance on overseeing dangerous goods training programmes.

1.5 RELATIONSHIP BETWEEN COMPETENCY-BASED TRAINING AND ASSESSMENT AND SAFETY MANAGEMENT

1.5.1 Before delving into competency-based training and assessment, it is important to understand its relationship to safety management. Safety is ICAO's guiding and most fundamental strategic objective. Annex 19 contains Standards and Recommended Practices (SARPs) dedicated to safety management. The foundation of safety management is the implementation of a State safety programme (SSP) by States and safety management systems (SMS) by service providers listed in 3.3.2 of Annex 19, which includes operators of aeroplanes or helicopters authorized to conduct international commercial air transport. An operator's SMS addresses the aviation activities that are related to the safe operation of the aircraft in accordance with Annex 6, Part I or Part III. These aviation activities include the carriage of dangerous goods. States may also recommend that other entities involved in air transport such as freight forwarders and ground handling agents develop and implement SMS. Other entities may also voluntarily implement SMS.

1.5.2 Implementing SMS requires that all personnel understand the safety philosophy and embrace a disciplined and standardized approach for SMS. Personnel need to know their roles and responsibilities and have the requisite competencies to perform their functions within the SMS. To ensure that personnel have the knowledge, skills and abilities to support SMS, training activities should follow the competency-based approach. Other entities in the dangerous goods transport chain should be encouraged to implement a similar safety system.

1.5.3 The "Swiss-Cheese" Model of accident causation proposes that complex aviation systems are extremely well defended by layers of defences, making single-point failures rarely consequential in such systems (see paragraph 2.3 of the *Safety Management Manual (SMM)* (Doc 9859)). The model illustrates that accidents involve successive breaches of multiple system defences and that all accidents include a combination of both active conditions (actions or inactions that have an immediate adverse effect) and latent conditions (conditions that exist in the aviation system well before a damaging outcome is experienced). Doc 9859 identifies training as one of the three main groups of defences in aviation and identifies deficiencies in training as a latent condition.

1.5.4 Continuous improvement is a component of both safety management and competency-based training and assessment. The use of data from different sources should be utilised to enhance the training programme and address any deficiencies. For entities that also have an SMS, their competency-based training and assessment programme should be integrated with the continuous improvement cycle of their SMS.

Chapter 2

DEVELOPMENT AND IMPLEMENTATION OF COMPETENCY-BASED DANGEROUS GOODS TRAINING AND ASSESSMENT PROGRAMMES

2.1 GENERAL

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

2.2 COMPONENTS OF A COMPETENCY-BASED TRAINING AND ASSESSMENT PROGRAMME

2.2.1 The goal of competency-based dangerous goods training and assessment is to provide a competent workforce for the safe and efficient transport of dangerous goods by air. The following components, which are illustrated in Figure 1-1, are essential to achieving this goal:

- a) a training specification that describes the purpose of training, the task list and the requirements that must be fulfilled when designing the training;
- b) a competency model adapted from the ICAO competency framework for a given role;
- c) an assessment plan providing the process and tools for gathering valid and reliable evidence at different stages during training;
- d) a training plan describing the training required to achieve the competencies. It includes but is not limited to a syllabus (including knowledge, skills and attitudes (KSA), milestones, lesson plans and schedules); and
- e) training and assessment materials and human, material and organizational resources needed to implement training and assessment plans.

The remainder of this chapter focuses on the development of these components through the ADDIE instructional design model.



Figure 1-1. Competency-based training components

2.3 BUILDING A COMPETENCY-BASED DANGEROUS GOODS TRAINING AND ASSESSMENT PROGRAMME USING THE ADDIE MODEL

2.3.1 General

The ADDIE model is a generic process traditionally used by instructional designers and training developers to build effective training tools. It consists of five phases: analysis, design, development, implementation, and evaluation. PANS-TRG refers to these phases as “workflows” as illustrated in Figure 2-1. This section provides a detailed overview of the first two workflows (ANALYSE and DESIGN) and a general overview of the remaining three (DEVELOP, IMPLEMENT and EVALUATE).



Figure 2-1. Competency-based training and assessment workflows

2.3.2 Workflow 1 — Analyse training need

2.3.2.1 The first phase in the development and implementation of a competency-based training programme is to determine what the training needs are specific to the employer’s environment and requirements through a training needs analysis. Figure 2-2 illustrates a detailed overview of this workflow. The output of this workflow is a training specification, which includes the purpose of the training and the detailed operational, technical, regulatory and organizational requirements that need to be fulfilled when designing the training. PANS-TRG lists a number of questions that should be answered to ensure the training specification provides sufficient detail (see PANS-TRG, Chapter 2, Attachment C). Some of these questions are specific to flight training, but most would also apply to dangerous goods training.

2.3.2.2 This phase includes the development of a task list. A generic list of tasks and sub-tasks typically performed by personnel performing dangerous goods functions is provided in Chapter 4. A complementary flowchart illustrating the typical processes of performing these tasks is provided in the appendix to Chapter 4. The employer may need to adapt the task list in Chapter 4 to reflect the specific tasks performed by its personnel.

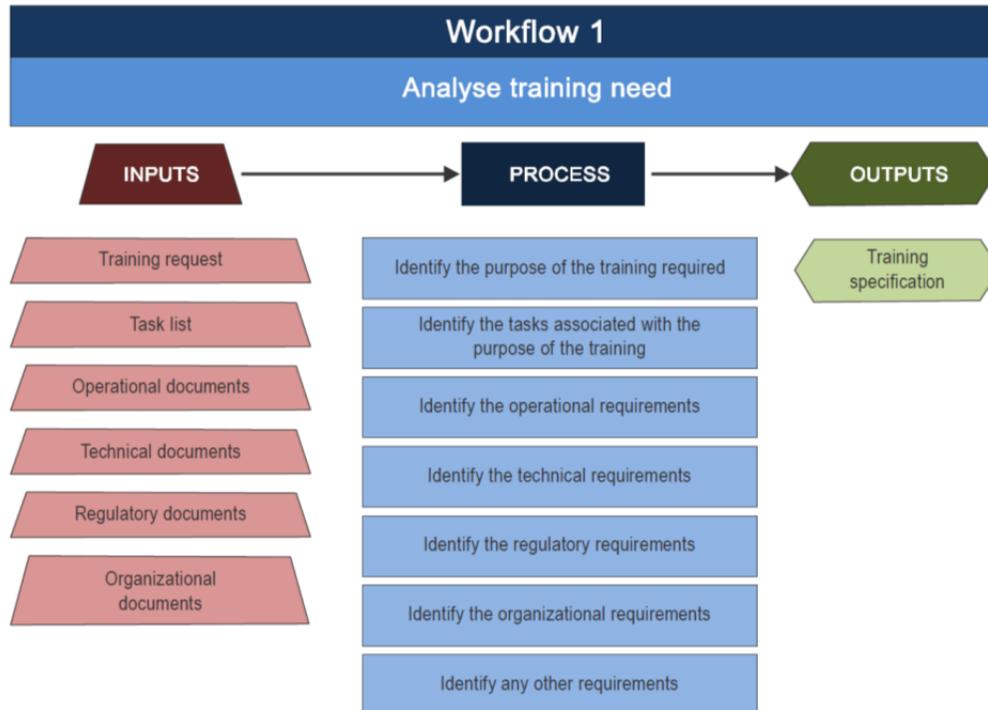


Figure 2-2. Workflow 1 — Analyse training need

2.3.3 Workflow 2 — Design local competency-based training and assessment

2.3.3.1 The second phase in the development and implementation of a local competency-based training and assessment programme is its design. This is done taking into account the training specifications identified in Workflow 1 and will involve:

- a) establishing an adapted competency model that addresses the training specification identified in Workflow 1;
- b) designing an assessment plan that will be used to assess the competence of trainees; and
- c) designing a training plan that will enable the development and delivery of the training course.

Figures 2-3 and 2-4 illustrates this workflow in two Parts: Part 1 (Figure 2-3) deals with the design of the adapted competency model and Part 2 (Figure 2-4) deals with the design of the assessment and training plan.

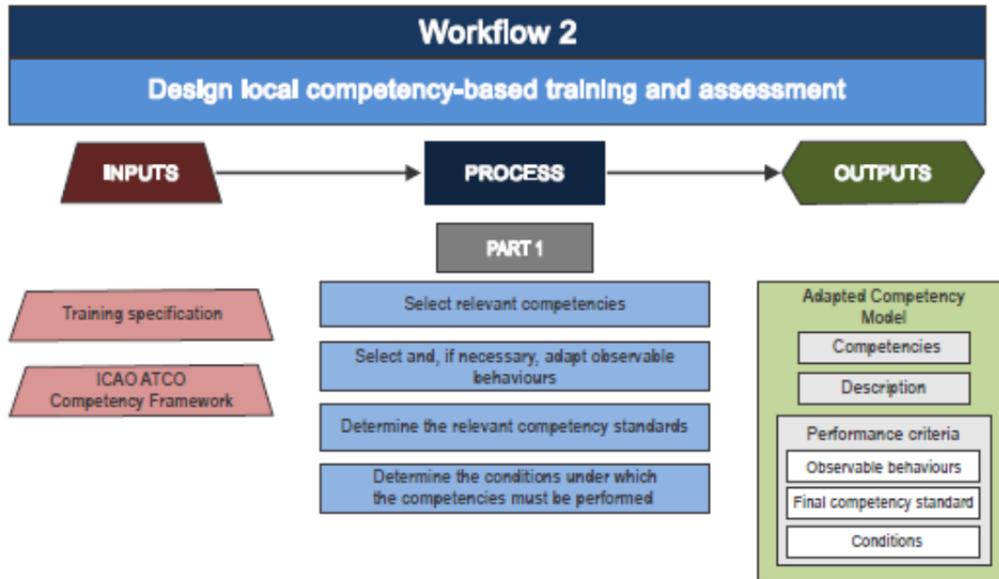


Figure 2-3. Workflow 2, Part 1 — Design local competency-based training

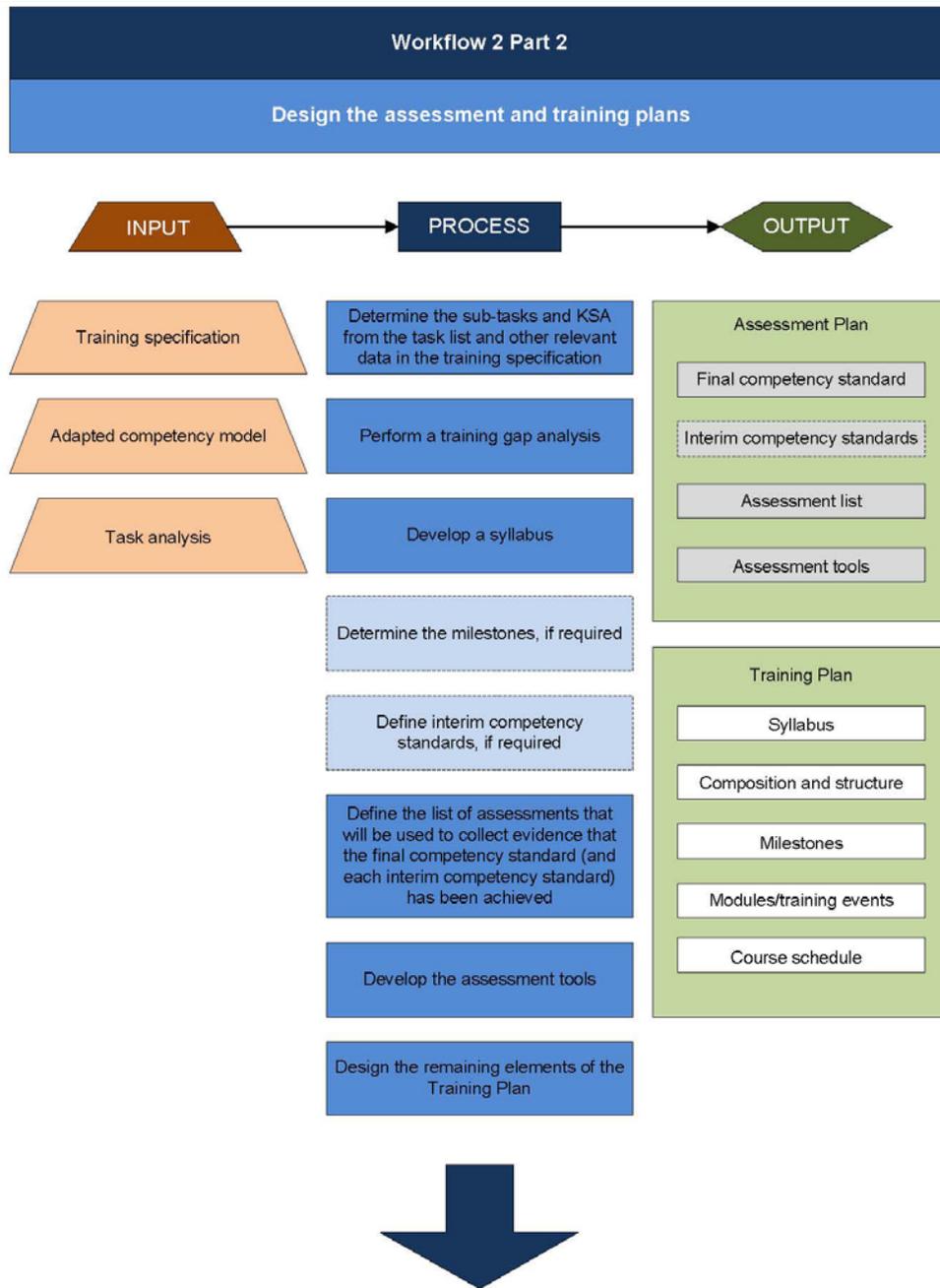


Figure 2-4. Workflow 2, Part 2 — Design local competency-based training

2.3.3.2 Designing the adapted competency model

A dangerous goods competency model should be adapted from the generic ICAO competency framework provided in Chapter 3 to meet the organizational competency requirements using the information contained in the training specification. The adapted model should include the following elements (Table 2-1 may be used as a template for an adapted competency model):

- a) *A list of competencies and a description of each.* A generic ICAO competency framework provides a set of competencies that would typically be needed to perform the dangerous goods tasks listed in the task list that was developed when analysing the training needs (Workflow 1). The vast majority of adapted competency models will contain similar lists of competencies, but there may be a need to add or remove a competency depending on the employers' own operational and organizational environments.
- b) Performance criteria for assessing competency including:
 - 1) *Observable behaviours for each competency.* The generic ICAO competency framework provides a comprehensive list of observable behaviours associated with each of the competencies. Appropriate observable behaviours may be selected from it, adapted from it, or added.
 - 2) *Competency standards and conditions used to assess competency.* Competency standards apply to all observable behaviours and relate to compliance with the standards and procedures and rules and regulations as described in relevant documents (e.g. national rules, the Technical Instructions, local operations manuals). In some instances, there may be specific standards associated with a particular observable behaviour. Conditions that are specific to the environment in which performance will be demonstrated may need to be considered in relation to the competency standard. These include the nature and complexity of the tasks, conditions relating to tools and systems or equipment, and conditions relating to the level of support or assistance a trainee can expect from the instructor or assessor. During the early stages of training, trainees may expect active coaching and teaching from the instructor. However, as the trainee progresses towards the final competency standard and gains more confidence in performing independently, the instructor takes on a more passive role and may only give occasional advice on how to improve efficiency or intervenes in instances where safety may be compromised. Consequently, the condition description of the final competency standard might be that the trainee would be expected to be performing independently without assistance from the instructor. As part of the progression towards the final competency standard, it may be necessary to establish interim competency standards.

Table 2-1. Template for an adapted competency model

<i>Adapted competency</i>	<i>Description</i>	<i>Performance criteria</i>		
		<i>Observable behaviour</i>	<i>Competency assessment</i>	
<i>Adapted competency 1</i>	Description 1	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		
<i>Adapted competency 2</i>	Description 2	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		
<i>Adapted competency 3</i>	Description 3	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		

2.3.3.3 Designing an assessment plan

2.3.3.3.1 Competency-based training requires assessment of the trainees' progress until they are competent to perform their assigned function. A trainee's assessment may be completed using a variety of tools including observation of job performance, tests or other practical exercises. In order for assessment tools to be effective, they must be valid and reliable both in terms of being an appropriate measure of the competency being assessed and of obtaining consistent results when administered by different raters and ratings.

2.3.3.3.2 The purpose of the assessment plan is to detail how competence is going to be determined. Prior to developing the assessment and training plans, it is important to consider:

a) The following principles of competency-based assessment:

- 1) *Clear performance criteria are used to assess competence.* The adapted competency model establishes these performance criteria.
- 2) *An integrated performance of the competencies is observed.* The trainee undergoing assessment must demonstrate all competencies and their seamless interaction with each other.
- 3) *Multiple observations are undertaken.* To determine whether or not a trainee has achieved the interim and/or final competency standard, multiple observations must be carried out.

- 4) *Assessments are valid.* All of the components that comprise the adapted competency model must be assessed. There must be sufficient evidence to ensure that the trainee meets the competency specified by the interim and/or final competency standard. The trainee must not be asked to provide evidence for or be assessed against activities that are outside the scope of the adapted competency model.
 - 5) *Assessments are reliable.* All assessors should reach the same conclusion when performing an assessment. All assessors should be trained and monitored to achieve and maintain an acceptable level of inter-rater reliability.
- b) *Typical assessment methods.* The primary method for assessing performance is the conduct of practical assessments, because the focus is on an integrated performance of competencies. Practical assessments can be formative, whereby instructors provide feedback to trainees on their progress toward the interim or final competency standard, or summative, whereby trainees demonstrate competence at defined points during the training which may include or be the end of training. It may be necessary to supplement practical assessments with other forms of evaluation such as examinations, oral assessments, projects or simulation. Detailed guidance on typical assessment methods is provided in PANS-TRG, Attachment C to Chapter 2.
 - c) *The concept of milestones.* When the duration or the complexity of a course is such that it makes pedagogic sense to check that a trainee is progressing towards competence at an acceptable pace, the course may be divided into milestones. Milestones are cohesive building blocks of learning that are organized into a logical sequence that generally progress from the simple to the complex. Each milestone is comprised of both training and assessment(s). Milestones build on one another; therefore, a trainee would need to successfully complete the training and assessment for the first milestone before proceeding to the next one. An example of milestones might be training in a classroom as one and training as part of on-the-job training as a second.
 - d) *Final competency standard and interim competency standards.* If training has been divided into milestones, it will be necessary to define interim competency standards for each milestone.
 - e) The relationship between the adapted competency model and the training and assessment plans. This relationship is described in 2.3.3.5.

2.3.3.3.3 The assessment plan details:

- a) the final competency standard associated with the final milestone;
- b) the interim competency standard associated with each milestone (if required);
- c) the list of assessments (formative and summative assessments, examinations, oral assessments, etc.) required for each of the milestone(s) that have been defined;
- d) when assessments should take place;
- e) the tools to be used to collect evidence during practical assessment;
- f) the pass marks for projects, examinations or oral assessments;
- g) if required, the minimum number of formative assessments to be undertaken prior to starting summative assessments; and
- h) the number of observations required to assess performance for the interim and final competency standards.

2.3.3.3.4 Additional administrative procedures may be necessary in the implementation of the assessment plan in relation to: who is authorized to perform a specific task or assessment, roles and responsibilities of personnel during the

conduct of assessments, assessment procedures (preparation, conduct and post-assessment), conditions under which assessments are to be undertaken, record-keeping, and actions to be taken if a trainee fails a competency assessment. Normally these procedures are described in a training and procedures manual.

2.3.3.3.5 The assessment of dangerous goods personnel can be accomplished in a variety of ways. Some common examples to accomplish an assessment would be to utilize a written test, online test, oral test, observed practical exercises, online practical exercises and observation of on-the-job performance by fully trained personnel. An employer of personnel performing dangerous goods functions might choose to utilize one assessment method or a combination of assessment methods, as long as the assessment confirms that the personnel have acquired the necessary competencies to perform the assigned dangerous goods functions. The employer therefore establishes the assessment plan with all the specific details that would need to be accomplished to determine whether competence has been achieved by the trainee.

2.3.3.3.6 Employers electing to send personnel to third-party training providers also need to establish an assessment plan for ensuring that competence has been achieved by the trainee. The employer may incorporate the third-party provider's assessment into its established assessment plan. Even if the employer does not deliver any of the training itself, it can still choose to assess the trainees in the workplace to ensure they can perform their assigned tasks competently and incorporate that process into the assessment plan.

2.3.3.4 **Designing a training plan**

2.3.3.4.1 The purpose of the training plan is to detail:

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

2.3.3.4.2 The training plan will be used by the training designer(s) to create the training and assessment materials.

2.3.3.5 **Relationship between the adapted competency model and the assessment and training plans**

2.3.3.5.1 The training specification developed in Workflow 1 (see 2.3.2) serves as the common basis for the development of the adapted competency model and the training and assessment plans. The task list is generally used to aid the selection of the observable behaviours from the generic competency framework provided in Chapter 3. The operational, technical, regulatory and organizational requirements aid the development of the conditions and standards that will apply to the competencies and observable behaviours.

2.3.3.5.2 The same task list and requirements are used to develop the training plan. The training plan is used to prepare the trainees to undertake assessment to determine if they are competent in accordance with the adapted competency model. The adapted competency model and the training plan are used to develop the assessment plan.

2.3.3.5.3 The syllabus in the training plan is composed of training objectives derived from tasks and sub-tasks as well as the underlying knowledge, skills and attitudes necessary to perform them. The knowledge, skills and attitudes are determined on the basis of the task list in conjunction with operational, technical, regulatory and organizational requirements. Chapter 5 provides a generic task/knowledge matrix table that can be used as a tool to map out the knowledge necessary to perform specific tasks. Tasks corresponding to the list provided in Chapter 3 are listed across the columns of the table and subject matter (knowledge) is listed down the rows. The employer should indicate what

knowledge is needed for a particular task within the organization with a check mark at the point at which the task element and the knowledge element intersect. To facilitate this process, some knowledge components have been blacked out if they are considered to be completely irrelevant to specific tasks. The level of knowledge and/or skills necessary will differ depending on the task. For example, the person accepting dangerous goods will not require the same level of knowledge and/or skills related to classification as someone who is classifying dangerous goods.

2.3.3.5.4 When assessing whether competence has been achieved, the adapted competency model, not the syllabus, is referenced. Consequently, the performance criteria are used to assess if competence has been achieved, and the tasks/sub-tasks that are carried out by the trainee are the “vehicle” for enabling the assessment to be conducted. Figure 2-5 illustrates the relationship between Workflows 1 and 2.

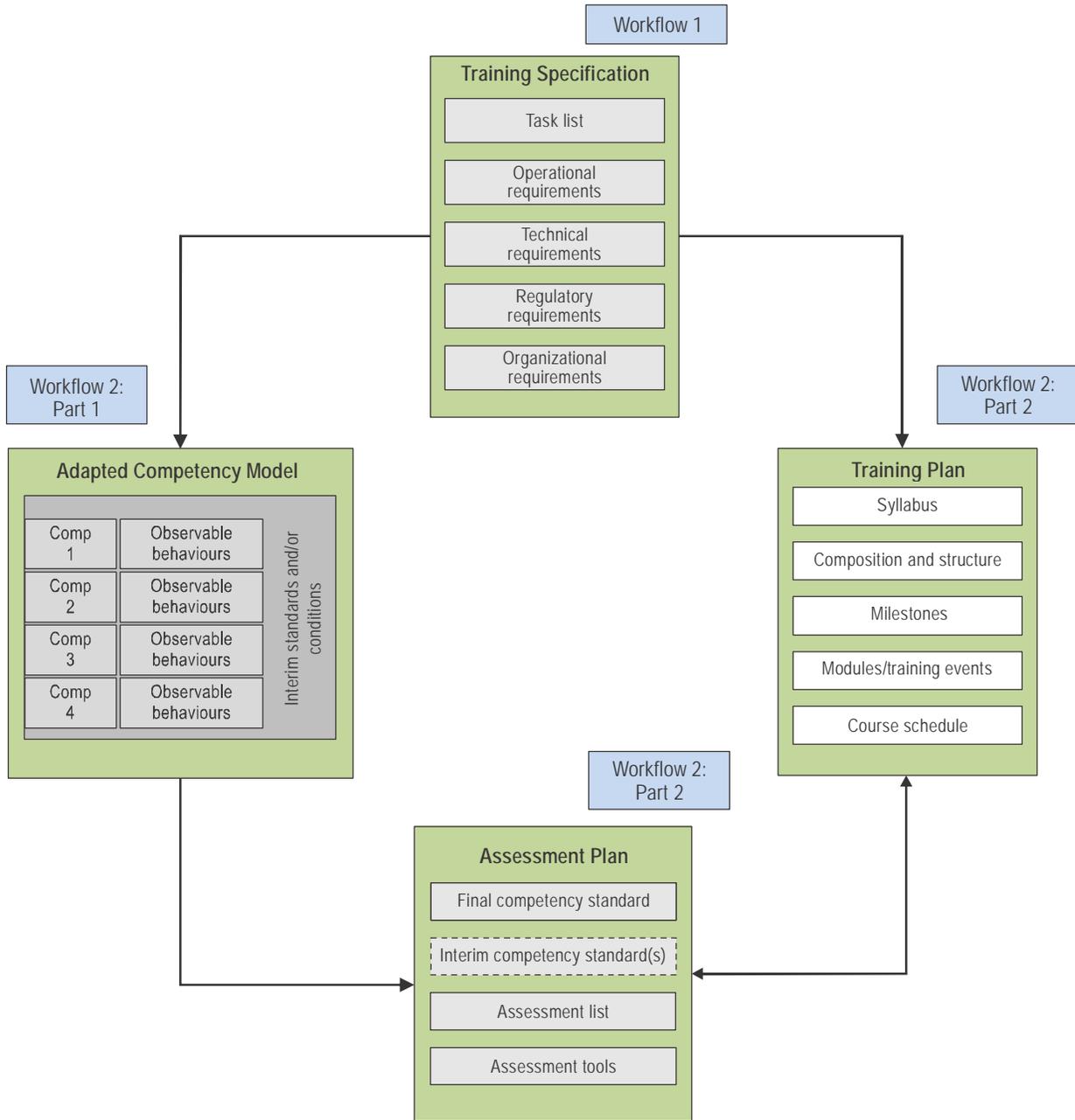


Figure 2-5. Relationship between Workflow 1 and Workflow 2

2.3.4 Workflow 3 — Develop the training and assessment materials

The third phase in the development and implementation of a competency-based training and assessment programme is the development of the training and assessment materials. Development is based on the adapted competency model and the training and assessment plans. Training and assessment materials include but are not limited to training notes, exercise briefings, practical exercises, case studies, presentations, video clips, self-test quizzes, examinations, assessments and assessment tools. Figure 2-6 illustrates a detailed overview of this workflow.

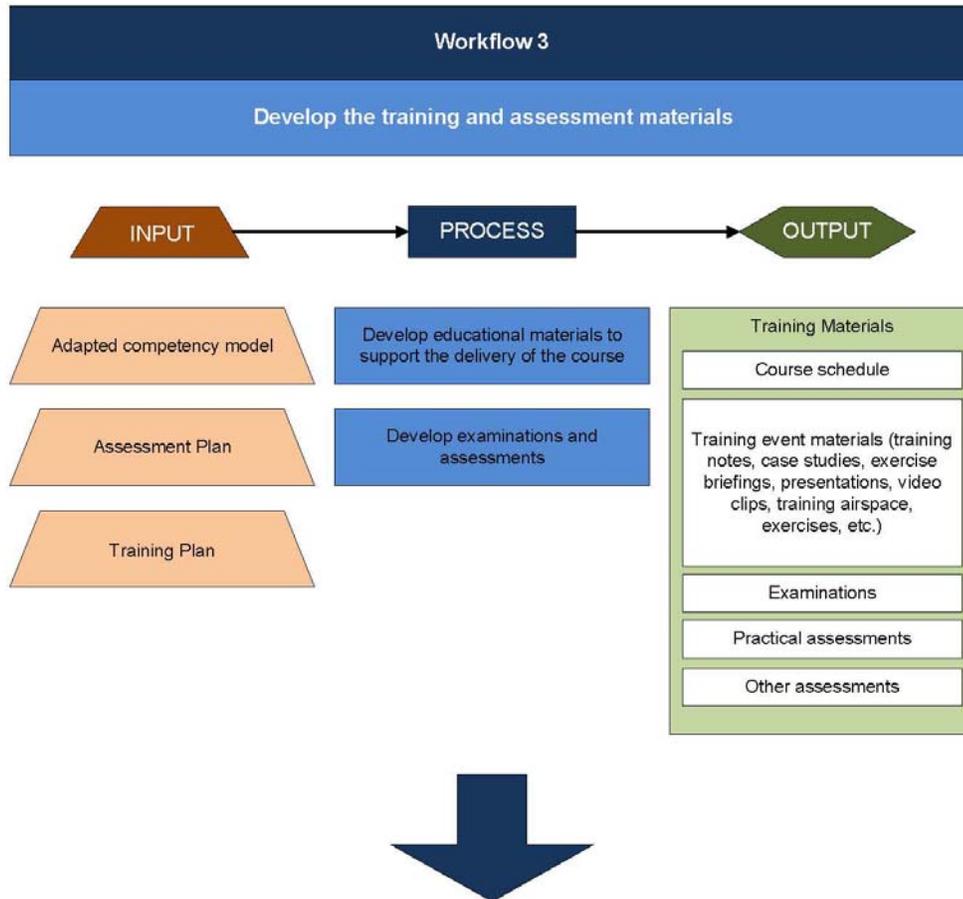


Figure 2-6. Workflow 3 — Develop the training and assessment materials

2.3.5 Workflow 4 — Conduct the course in accordance with the training and assessment plans

The fourth phase in the development and implementation of a competency-based training and assessment programme is conducting the course in accordance with the training and assessment plans. This involves delivering the training; monitoring the progress of the trainees; providing timely and continuous feedback on their performance; diagnosing deficiencies in the training and addressing them in a timely manner; and carrying out assessments according to the assessment plan. The goal of this phase is a competent employee. Figure 2-7 illustrates a detailed overview of this workflow.

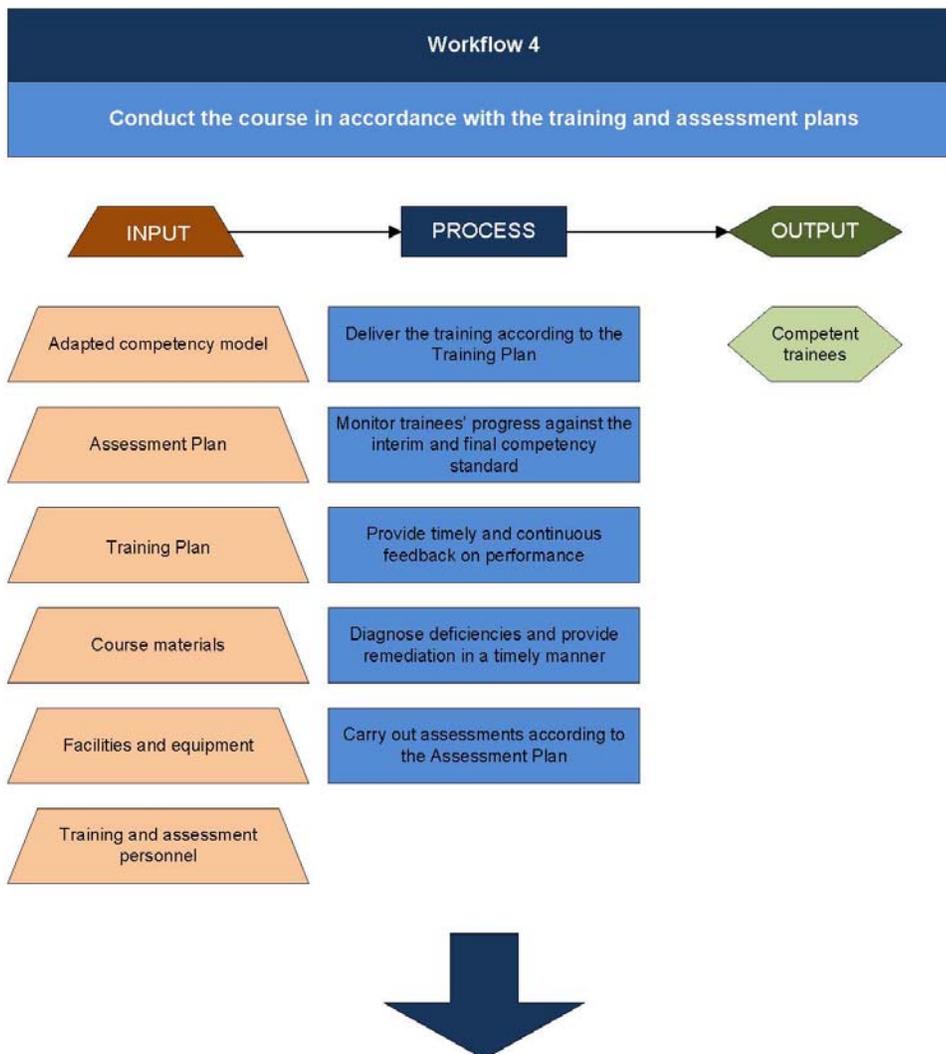


Figure 2-7. Workflow 4 — Conduct the course in accordance with the training and assessment plans

2.3.6 Workflow 5 — Evaluate the course including the training and assessment plans

The employer is responsible for ensuring the effectiveness of the training programme. At the end of a period of training, feedback on performance on the job from trainees, instructors, assessors and employers should be gathered to determine the effectiveness of the training and assessment in supporting the progression of learning towards competence in the workplace. Evaluation of the training should be based on valid and reliable evidence such as course results, trainee feedback, instructor feedback, audit reports, and occurrence reports. This evaluation may lead to changes or improvements being made to the competency-based training and assessment design. Figure 2-8 illustrates a detailed overview of this workflow.

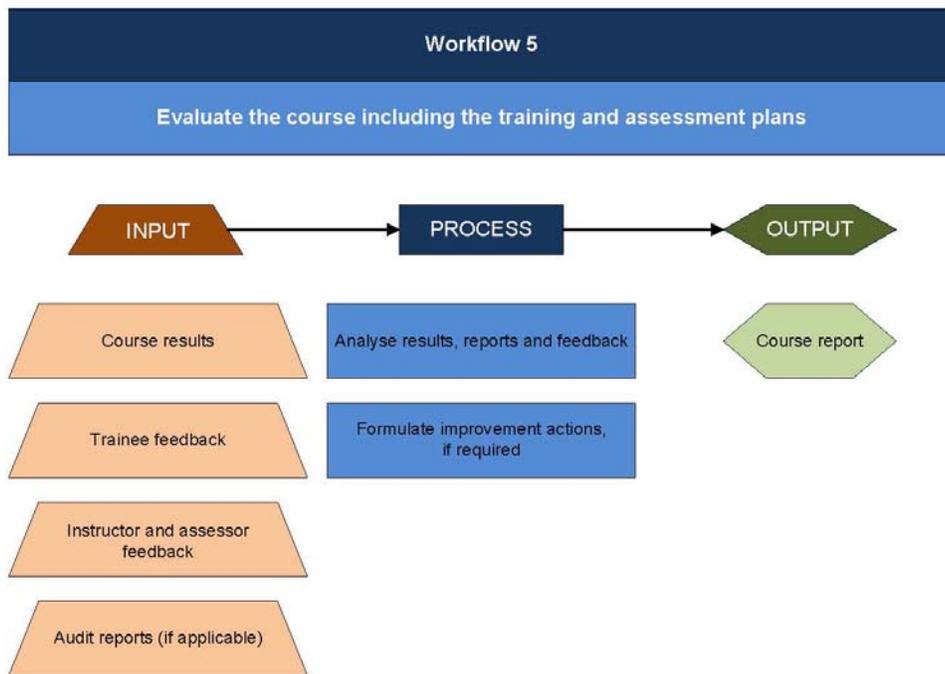


Figure 2-8. Workflow 5 — Evaluate the course including the training and assessment plans

Chapter 3

GENERIC COMPETENCY FRAMEWORK FOR DANGEROUS GOODS PERSONNEL

This chapter contains a generic ICAO competency framework for dangerous goods personnel as described in Chapter 2. Employers implementing competency-based training and assessment should adapt the framework into an adapted competency model based on their specific requirements. The adapted competency model should include the elements listed in 2.2.2.2.

Generic ICAO competency framework for dangerous goods personnel

<i>Generic competency</i>	<i>Description</i>	<i>Observable behaviour</i>
Application of procedures and compliance with regulations	Identifies and applies appropriate procedures in accordance with published operating instructions and in compliance with applicable regulations	Identifies where to find procedures and regulations
		Follows relevant procedures in a timely manner
		Complies with applicable regulations
		Applies relevant procedural knowledge
Communication	Communicates through appropriate means in the work environment, in both normal and non-normal situations	Ensures the recipient is ready and able to receive information
		Selects appropriately what, when, how and with whom to communicate
		Conveys messages clearly, accurately and concisely
		Confirms that the recipient correctly understands important information
		Listens actively and demonstrates understanding when receiving information
		Asks relevant and effective questions
		Completes accurate reports as required by operating procedures
		Announces deviations from normal or intended conditions
		Correctly uses and interprets non-verbal communication

<i>Generic competency</i>	<i>Description</i>	<i>Observable behaviour</i>
Leadership, teamwork and self-management	Demonstrates effective leadership, teamwork and self-management	Encourages team participation and open communication
		Demonstrates initiative and provides direction when required
		Engages others in planning
		Considers inputs from others
		Gives and receives feedback constructively
		Addresses and resolves conflicts and disagreements in a constructive manner
		Exercises decisive leadership
		Admits mistakes and takes responsibility for own performance, detecting and resolving own errors
		Carries out instructions when directed and applies effective intervention strategies when necessary
		Confidently intervenes when important for safety
		Self-evaluates the effectiveness of actions
Problem-solving and decision-making	Identifies problem precursors and resolves actual problems using decision-making techniques, in a timely manner	Seeks accurate and adequate information from appropriate sources
		Identifies and verifies what and why things have gone wrong
		Employs proper problem-solving strategies
		Perseveres in working through problems while prioritizing safety
		Uses appropriate and timely decision-making techniques
		Sets priorities appropriately
		Identifies and considers options as appropriate
		Monitors, reviews, and adapts decisions as required
		Identifies, assesses and manages risks and threats to safety effectively
		Adapts when faced with situations where no guidance or procedure exists
		When an event conducive to startle is encountered, recognizes and manages the situation
Workload management	Maintains available workload capacity by prioritizing and distributing tasks using appropriate resources	Exercises self-control in all situations
		Plans, prioritizes and schedules tasks effectively
		Manages time efficiently when carrying out tasks
		Offers and gives assistance, delegates when necessary
		Seeks and accepts assistance, when appropriate
		Monitors, reviews and cross-checks actions conscientiously

<i>Generic competency</i>	<i>Description</i>	<i>Observable behaviour</i>
		Verifies that tasks are completed to the expected outcome
		Manages and recovers from interruptions, distractions, variations and failures effectively while performing tasks

Chapter 4

DANGEROUS GOODS TASK LIST

This chapter contains a generic list of tasks typically performed by dangerous goods personnel as described in Chapter 1, 1.7. It is an indicative list provided as guidance. More tasks may need to be added or removed depending on the scope of the employer's operations. The employer should therefore adapt this task list to reflect the specific tasks performed by its personnel.

Generic dangerous goods task list

- 1 Classifying dangerous goods
 - 1.1 Evaluate substance or article against classification criteria
 - 1.1.1 Determine if it is dangerous goods
 - 1.1.2 Determine if it is forbidden under any circumstances
 - 1.2 Determine dangerous goods description
 - 1.2.1 Determine class or division
 - 1.2.2 Determine packing group
 - 1.2.3 Determine proper shipping name and UN number
 - 1.2.4 Determine if it is forbidden unless approval or exemption is granted
 - 1.3 Review special provisions
 - 1.3.1 Assess if special provision(s) is applicable
 - 1.3.2 Apply special provision(s)
- 2 Preparing dangerous goods shipment
 - 2.1 Assess packing options including quantity limitations
 - 2.1.1 Consider limitations (de minimis quantities, excepted quantities, limited quantities, passenger aircraft, cargo aircraft only, special provisions, dangerous goods in the mail)
 - 2.1.2 Consider State and operator variations
 - 2.1.3 Determine if all-packed-in-one can be used
 - 2.1.4 Select how dangerous goods will be shipped based on limitations and variations
 - 2.2 Apply packing requirements
 - 2.2.1 Consider constraints of packing instructions
 - 2.2.2 Select appropriate packaging materials (absorbent, cushioning, etc.)
 - 2.2.3 Assemble package
 - 2.2.4 Comply with the packaging test report when UN specification packaging is required

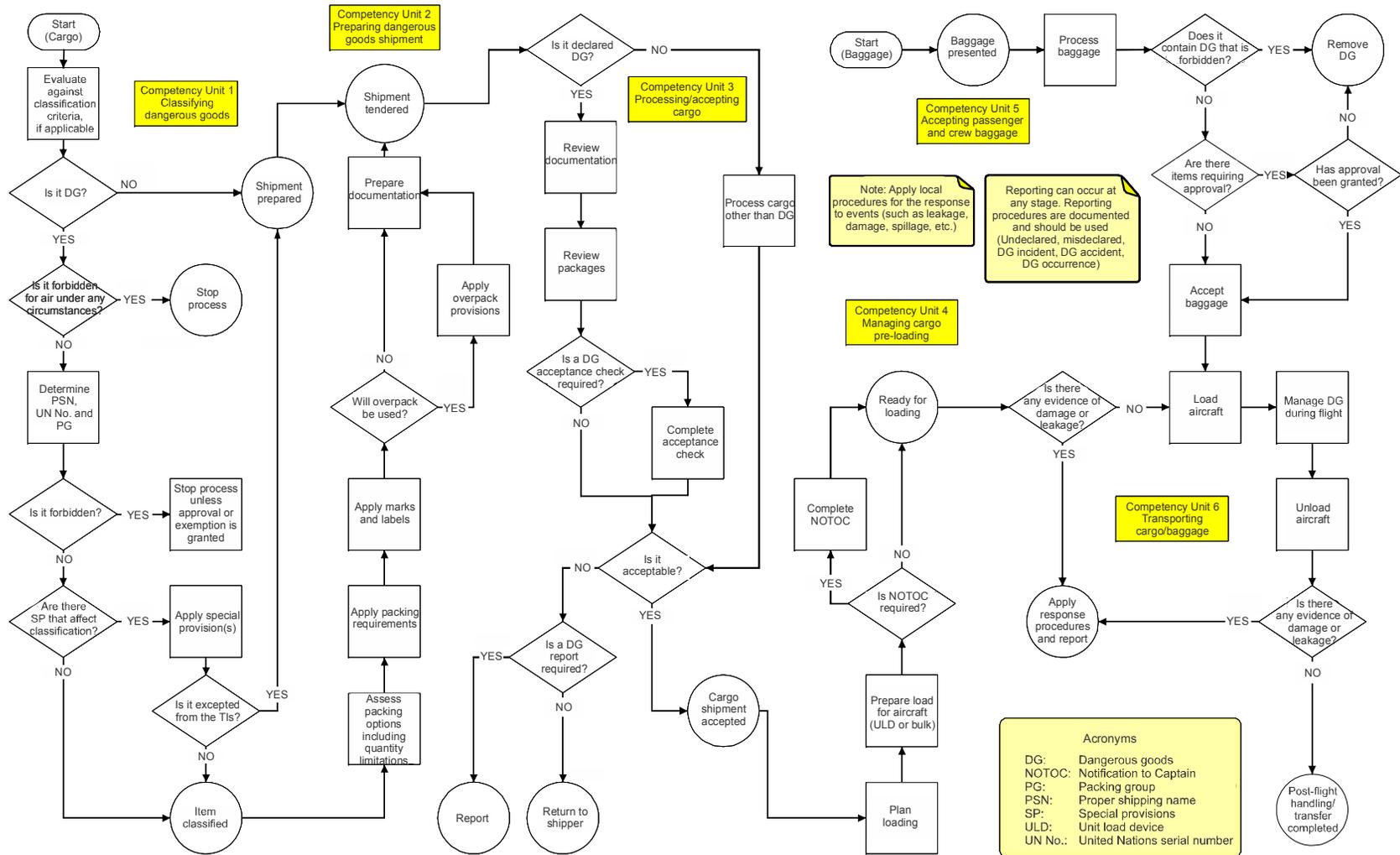
- 2.3 Apply marks and labels
 - 2.3.1 Determine applicable marks
 - 2.3.2 Apply marks
 - 2.3.3 Determine applicable labels
 - 2.3.4 Apply labels
- 2.4 Assess use of overpack
 - 2.4.1 Determine if overpack can be used
 - 2.4.2 Apply marks if necessary
 - 2.4.3 Apply labels if necessary
- 2.5 Prepare documentation
 - 2.5.1 Complete the dangerous goods transport document
 - 2.5.2 Complete other transport documents (e.g. air waybill)
 - 2.5.3 Include other required documentation (approvals/exemptions, etc.)
 - 2.5.4 Retain copies of documents as required
- 3 Processing/accepting cargo
 - 3.1 Review documentation
 - 3.1.1 Verify dangerous goods transport document
 - 3.1.2 Verify other transport documents (e.g. air waybill)
 - 3.1.3 Verify other documents (exemptions, approvals, etc.)
 - 3.1.4 Verify State/operator variations
 - 3.2 Review package(s)
 - 3.2.1 Verify marks
 - 3.2.2 Verify labels
 - 3.2.3 Verify package type
 - 3.2.4 Verify package conditions
 - 3.2.5 Verify State/operator variations
 - 3.3 Complete acceptance procedures
 - 3.3.1 Complete acceptance checklist
 - 3.3.2 Provide shipment information for load planning
 - 3.3.3 Retain documents as required
 - 3.4 Process/accept cargo other than dangerous goods
 - 3.4.1 Check documentation for indications of undeclared dangerous goods
 - 3.4.2 Check packages for indications of undeclared dangerous goods

-
- 4 Managing cargo pre-loading
 - 4.1 Plan loading
 - 4.1.1 Determine stowage requirements
 - 4.1.2 Determine segregation, separation, aircraft/compartment limitations
 - 4.2 Prepare load for aircraft
 - 4.2.1 Check packages for indications of undeclared dangerous goods
 - 4.2.2 Check for damage and/or leakage
 - 4.2.3 Apply stowage requirements (e.g. segregation, separation, orientation)
 - 4.2.4 Apply ULD tags when applicable
 - 4.2.5 Transport cargo to aircraft
 - 4.3 Issue NOTOC
 - 4.3.1 Enter required information
 - 4.3.2 Verify conformance with load plan
 - 4.3.3 Transmit to loading personnel
 - 5 Accepting passenger and crew baggage
 - 5.1 Process baggage
 - 5.1.1 Identify forbidden dangerous goods
 - 5.1.2 Apply approval requirements
 - 5.2 Accept baggage
 - 5.2.1 Apply operator requirements
 - 5.2.2 Verify passenger baggage requirements
 - 5.2.3 Advise pilot-in-command

- 6 Transporting cargo/baggage
 - 6.1 Load aircraft
 - 6.1.1 Transport cargo/baggage to aircraft
 - 6.1.2 Check packages for indications of undeclared dangerous goods
 - 6.1.3 Check for damage and/or leakage
 - 6.1.4 Apply stowage requirements (e.g. segregation, separation, orientation, securing and protecting from damage)
 - 6.1.5 Verify that NOTOC reflects against aircraft load
 - 6.1.6 Verify passenger baggage requirements
 - 6.1.7 Inform pilot-in-command and flight operations officer/flight dispatcher
 - 6.2 Manage dangerous goods pre- and during flight
 - 6.2.1 Detect presence of dangerous goods not permitted in baggage
 - 6.2.2 Interpret NOTOC
 - 6.2.3 Apply procedures in the event of an emergency
 - 6.2.4 Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
 - 6.2.5 Inform emergency services of the dangerous goods on board in the event of an emergency
 - 6.3 Unload aircraft
 - 6.3.1 Apply specific unloading considerations
 - 6.3.2 Check packages for indications of undeclared dangerous goods
 - 6.3.3 Check for damage and/or leakage
 - 6.3.4 Transport cargo/baggage to facility/terminal
 - 7 Collecting safety data
 - 7.1 Report dangerous goods accidents
 - 7.2 Report dangerous goods incidents
 - 7.3 Report undeclared/misdeclared dangerous goods
 - 7.4 Report dangerous goods occurrences
-

Appendix A to Chapter 4

DANGEROUS GOODS FUNCTIONS — PROCESS FLOWCHART



Chapter 5

TASK/KNOWLEDGE MATRIX TOOL

This chapter contains a generic task/knowledge matrix table that can be used as a tool to map out the knowledge that is necessary to perform specific tasks. Tasks corresponding to the task list provided in Table 3-1 are listed across the columns of the table and knowledge elements are listed down the rows. The employer should indicate what knowledge is needed for a particular task within the organization with a checkmark at the point at which the task element and the knowledge element intersect. To facilitate this process, some cells in the table have been shaded. These shaded cells identify knowledge elements that would normally be irrelevant to the corresponding task and for which a checkmark would not normally be necessary.

Template for determining the knowledge that should be possessed by personnel performing specific tasks

Note.— The numbers under “Dangerous goods tasks” refer to tasks and sub-tasks from Table 3-1. The titles of the tasks are replicated in a legend below the following table.

Dangerous goods knowledge	Dangerous goods tasks																							
	1. Classifying dangerous goods			2. Preparing dangerous goods shipment					3. Processing/ accepting cargo				4. Managing cargo pre-loading			5. Accepting passenger and crew baggage		6. Transporting cargo/baggage			7. Collecting safety data			
	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	4.1	4.2	4.3	5.1	5.2	6.1	6.2	6.3	7.1	7.2	7.3	7.4
Scope and applicability																								
Limitation of dangerous goods on aircraft																								
Definitions																								
Training																								
Dangerous goods security																								
General provisions concerning radioactive material																								
Reporting of dangerous goods accidents, incidents and other occurrences																								
Classification — General																								
Classification — Class 1																								

Dangerous goods knowledge	Dangerous goods tasks																								
	1. Classifying dangerous goods			2. Preparing dangerous goods shipment					3. Processing/ accepting cargo				4. Managing cargo pre-loading			5. Accepting passenger and crew baggage		6. Transporting cargo/baggage			7. Collecting safety data				
	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	4.1	4.2	4.3	5.1	5.2	6.1	6.2	6.3	7.1	7.2	7.3	7.4	
Packagings for infectious substances of Category A	■	■	■			■	■						■	■	■	■	■	■	■	■					
Requirements for the construction, testing and approval of packages for radioactive material and for the approval of such material							■						■	■	■	■	■	■	■	■					
Acceptance procedures	■	■	■	■	■	■	■	■					■	■		■	■	■	■	■			■		
Storage and loading	■	■	■	■	■	■	■	■	■				■				■								
Inspection and decontamination	■	■	■	■	■	■	■	■	■				■	■			■								
Provision of information	■	■	■	■	■	■	■	■	■				■		■		■	■			■				
Provisions concerning passengers and crew																									
Provisions to aid recognition of undeclared dangerous goods	■																								
Helicopter operations	■	■	■	■	■	■	■	■	■								■	■							

Tasks

1. **Classifying dangerous goods**
 - 1.1 — Evaluate substance or article against classification criteria
 - 1.2 — Determine dangerous goods description
 - 1.3 — Review special provisions

 2. **Preparing dangerous goods shipment**
 - 2.1 — Assess packing options including quantity limitations
 - 2.2 — Apply packing requirements
 - 2.3 — Apply marks and labels
 - 2.4 — Assess use of overpack
 - 2.5 — Prepare documentation

 3. **Processing/accepting cargo**
 - 3.1 — Review documentation
 - 3.2 — Review package(s)
 - 3.3 — Complete acceptance procedures
 - 3.4 — Process/accept cargo other than dangerous goods

 4. **Managing cargo pre-loading**
 - 4.1 — Plan loading
 - 4.2 — Prepare load for aircraft
 - 4.3 — Issue NOTOC

 5. **Accepting passenger and crew baggage**
 - 5.1 — Process baggage
 - 5.2 — Accept baggage

 6. **Transporting cargo/baggage**
 - 6.1 — Load aircraft
 - 6.2 — Manage dangerous goods pre- and during flight
 - 6.3 — Unload aircraft

 7. **Collecting safety data**
 - 7.1 — Report dangerous goods accidents
 - 7.2 — Report dangerous goods incidents
 - 7.3 — Report undeclared/misdeclared dangerous goods
 - 7.4 — Report dangerous goods occurrences
-

Appendix A to Chapter 5

EXAMPLE ADAPTED TASK LISTS FOR CERTAIN WELL-DEFINED ROLES

A. INTRODUCTION

The examples below indicate the tasks from the task list provided in Chapter 3 that personnel responsible for certain well-defined functions would typically perform and for which training and assessment would therefore be required. Personnel would need to have relevant knowledge to competently perform these tasks. The task/knowledge matrix tool provided in Chapter 5 may be used as a guide for determining what knowledge is needed for a given task. The examples in this chapter and the task/knowledge tool provided in Chapter 5 may be used for designing training programmes. However, they should not be considered as mandatory. Additional training and assessment may be required for personnel assigned additional responsibilities, and less training and assessment may be required for personnel assigned fewer responsibilities than those presented in these lists. The employer is responsible for ensuring employees are competent to perform the functions for which they are responsible and must therefore ensure that training programmes are designed to accomplish this. Dangerous goods training programmes are subject to State approval in accordance with national regulations, policies and procedures.

B. PERSONNEL RESPONSIBLE FOR PREPARATION OF DANGEROUS GOODS CONSIGNMENTS

Training and assessment for personnel preparing dangerous goods consignments for transport may be tailored to address only those classes, divisions or even UN numbers that they prepare for transport. Training and assessment may also be limited to address only the specific tasks personnel perform. For example, where personnel are only responsible for the packing, marking and labelling of packages and overpacks, training and assessment may be tailored to address just those tasks. Personnel would need to have relevant knowledge to competently perform these functions. The task/knowledge matrix tool provided in Chapter 5 may be used as a guide for determining what knowledge is needed. The following are tasks personnel responsible for preparation of dangerous goods consignments typically perform and for which training and assessment would therefore be required:

1 Classifying dangerous goods

1.1 Evaluate substance or article against classification criteria

- 1.1.1 Determine if it is dangerous goods
- 1.1.2 Determine if it is forbidden under any circumstances

1.2 Determine dangerous goods description

- 1.2.1 Determine class or division
- 1.2.2 Determine packing group
- 1.2.3 Determine proper shipping name and UN number
- 1.2.4 Determine if it is forbidden unless approval or exemption is granted

1.3 Review special provisions

- 1.3.1 Assess if special provision(s) is applicable
- 1.3.2 Apply special provision(s)

2 Preparing dangerous goods shipment

- 2.1 Assess packing options including quantity limitations
 - 2.1.1 Consider limitations (de minimis quantities, excepted quantities, limited quantities, passenger aircraft, cargo aircraft only, special provisions, dangerous goods in the mail)
 - 2.1.2 Consider State and operator variations
 - 2.1.3 Determine if all-packed-in-one can be used
 - 2.1.4 Select how dangerous goods will be shipped based on limitations and variations
- 2.2 Apply packing requirements
 - 2.2.1 Consider constraints of packing instructions
 - 2.2.2 Select appropriate packaging materials (absorbent, cushioning, etc.)
 - 2.2.3 Assemble package
 - 2.2.4 Comply with the packaging test report when UN specification packaging is required
- 2.3 Apply marks and labels
 - 2.3.1 Determine applicable marks
 - 2.3.2 Apply marks
 - 2.3.3 Determine applicable labels
 - 2.3.4 Apply labels
- 2.4 Assess use of overpack
 - 2.4.1 Determine if overpack can be used
 - 2.4.2 Apply marks if necessary
 - 2.4.3 Apply labels if necessary
- 2.5 Prepare documentation
 - 2.5.1 Complete the dangerous goods transport document
 - 2.5.2 Complete other transport documents (e.g. air waybill)
 - 2.5.3 Include other required documentation (approvals/exemptions, etc.)
 - 2.5.4 Retain copies of documents as required

7 Collecting safety data

- 7.1 Report dangerous goods accidents
- 7.2 Report dangerous goods incidents
- 7.3 Report undeclared/misdeclared dangerous goods
- 7.4 Report dangerous goods occurrences

C. PERSONS RESPONSIBLE FOR PROCESSING OR ACCEPTING GOODS PRESENTED AS GENERAL CARGO

Personnel responsible for processing goods presented as general cargo [should/must] be competent to perform tasks aimed at preventing undeclared dangerous goods from being loaded on an aircraft. They may work for freight forwarders, ground handling agents or operators. Personnel would need to have relevant knowledge to competently perform these tasks. The task/knowledge matrix tool provided in Chapter 5 may be used as a guide for determining what knowledge is needed. They may need additional knowledge and be capable of performing at a more advanced skill level depending on the actual responsibilities assigned. The following are tasks aimed at preventing undeclared dangerous goods from being loaded on aircraft that such personnel would typically perform and for which training and assessment may be required.

3 Processing/accepting cargo

- 3.4 Process/accept cargo other than dangerous goods

- 3.4.1 Check documentation for indications of undeclared dangerous goods
- 3.4.2 Check packages for indications of undeclared dangerous goods

7 Collecting safety data

- 7.1 Report dangerous goods accidents
- 7.2 Report dangerous goods incidents
- 7.3 Report undeclared/misdeclared dangerous goods
- 7.4 Report dangerous goods occurrences

D. PERSONNEL RESPONSIBLE FOR PROCESSING OR ACCEPTING DANGEROUS GOODS CONSIGNMENTS

The following are tasks personnel responsible for processing or accepting dangerous goods consignments typically perform and for which training and assessment would therefore be required:

3 Processing/accepting cargo

- 3.1 Review documentation
 - 3.1.1 Verify air waybill
 - 3.1.2 Verify dangerous goods transport document
 - 3.1.3 Verify other documents (exemptions, approvals, etc.)
 - 3.1.4 Verify State/operator variations
- 3.2 Review package(s)
 - 3.2.1 Verify marks
 - 3.2.2 Verify labels
 - 3.2.3 Verify package type
 - 3.2.4 Verify package conditions
 - 3.2.5 Verify State/operator variations
- 3.3 Complete acceptance procedures
 - 3.3.1 Complete acceptance checklist
 - 3.3.2 Provide shipment information for load planning
 - 3.3.3 Retain documents as required

7 Collecting safety data

- 7.1 Report dangerous goods accidents
- 7.2 Report dangerous goods incidents
- 7.3 Report undeclared/misdeclared dangerous goods
- 7.4 Report dangerous goods occurrences

E. PERSONS RESPONSIBLE FOR HANDLING CARGO IN A WAREHOUSE, LOADING AND UNLOADING UNIT LOAD DEVICES AND LOADING AND UNLOADING AIRCRAFT CARGO COMPARTMENTS

The following are tasks personnel responsible for handling cargo in a warehouse, loading and unloading unit load devices, and loading and unloading passenger baggage and aircraft cargo compartments typically perform and for which training and assessment would therefore be required:

4 Managing cargo pre-loading

- 4.2 Prepare load for aircraft
 - 4.2.1 Check packages for indications of undeclared dangerous goods
 - 4.2.2 Check for damage and/or leakage
 - 4.2.3 Apply stowage requirements (e.g. segregation, separation, orientation)
 - 4.2.4 Apply ULD tags when applicable
 - 4.2.5 Transport cargo to aircraft

6 Transporting cargo/baggage

- 6.1 Load aircraft
 - 6.1.1 Transport cargo/baggage to aircraft
 - 6.1.2 Check packages for indications of undeclared dangerous goods
 - 6.1.3 Check for damage and/or leakage
 - 6.1.4 Apply stowage requirements (e.g. segregation, separation, orientation, securing and protecting from damage)
 - 6.1.5 Verify that NOTOC reflects against aircraft load
 - 6.1.6 Verify passenger baggage requirements
 - 6.1.7 Inform pilot-in-command and flight operations officer/flight dispatcher
- 6.3 Unload aircraft
 - 6.3.1 Apply specific unloading considerations
 - 6.3.2 Check packages for indications of undeclared dangerous goods
 - 6.3.3 Check for damage and/or leakage
 - 6.3.4 Transport cargo/baggage to facility/terminal

7 Collecting safety data

- 7.1 Report dangerous goods accidents
- 7.2 Report dangerous goods incidents
- 7.3 Report undeclared/misdeclared dangerous goods
- 7.4 Report dangerous goods occurrences

**F. PERSONS RESPONSIBLE FOR ACCEPTING PASSENGER AND CREW BAGGAGE,
MANAGING AIRCRAFT BOARDING AREAS AND OTHER TASKS INVOLVING
DIRECT PASSENGER CONTACT AT AN AIRPORT**

The following are tasks personnel responsible for accepting passenger and crew baggage, managing aircraft boarding areas, and other functions involving direct passenger contact at an airport typically perform and for which training and assessment would therefore be required.

5 Accepting passenger and crew baggage

- 5.1 Process baggage
 - 5.1.1 Identify forbidden dangerous goods
 - 5.1.2 Apply approval requirements
- 5.2 Accept baggage
 - 5.2.1 Apply operator requirements
 - 5.2.2 Verify passenger baggage requirements
 - 5.2.3 Advise pilot-in-command

7 Collecting safety data

- 7.1 Report dangerous goods accidents
- 7.2 Report dangerous goods incidents
- 7.3 Report undeclared/misdeclared dangerous goods
- 7.4 Report dangerous goods occurrences

G. PERSONNEL RESPONSIBLE FOR THE PLANNING OF AIRCRAFT LOADING

The following are tasks personnel responsible for planning of aircraft loading (passengers, baggage, mail and cargo) would typically perform and for which training and assessment would therefore be required:

4 Managing cargo pre-loading

- 4.1 Plan loading
 - 4.1.1 Determine stowage requirements
 - 4.1.2 Determine segregation, separation, aircraft/compartment limitations
- 4.3 Issue NOTOC
 - 4.3.1 Enter required information
 - 4.3.2 Verify conformance with load plan
 - 4.3.3 Transmit to loading personnel

H. FLIGHT CREW

The following are tasks the flight crew would typically perform and for which training and assessment would therefore be required:

6 Transporting cargo/baggage

- 6.2 Manage dangerous goods pre- and during flight
 - 6.2.1 Detect presence of dangerous goods not permitted in baggage
 - 6.2.2 Interpret NOTOC
 - 6.2.3 Apply procedures in the event of an emergency
 - 6.2.4 Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
 - 6.2.5 Inform emergency services of the dangerous goods on board in the event of an emergency

7 Collecting safety data

- 7.1 Report dangerous goods accidents
- 7.2 Report dangerous goods incidents
- 7.3 Report undeclared/misdeclared dangerous goods
- 7.4 Report dangerous goods occurrences

I. FLIGHT OPERATIONS OFFICERS AND FLIGHT DISPATCHERS

The following are tasks flight operations officers and flight dispatchers would typically perform and for which training and assessment would therefore be required:

6 Transporting cargo/baggage

- 6.2 Manage dangerous goods pre- and during flight
 - 6.2.2 Interpret NOTOC
 - 6.2.3 Apply procedures in the event of an emergency
 - 6.2.5 Inform emergency services of the dangerous goods on board in the event of an emergency

J. CABIN CREW

The following are tasks the cabin crew would typically perform and for which training and assessment would therefore be required:

5 Accepting passenger and crew baggage

- 5.2 Accept baggage
 - 5.2.1 Apply operator requirements
 - 5.2.2 Verify passenger baggage requirements
 - 5.2.3 Advise pilot-in-command

6 Transporting cargo/baggage

- 6.2 Manage dangerous goods pre- and during flight
 - 6.2.1 Detect presence of dangerous goods not permitted in baggage
 - 6.2.2 Interpret NOTOC
 - 6.2.3 Apply procedures in the event of an emergency

- 6.2.4 Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
- 6.2.5 Inform emergency services of the dangerous goods on board in the event of an emergency

7 Collecting safety data

- 7.1 Report dangerous goods accidents
- 7.2 Report dangerous goods incidents
- 7.3 Report undeclared/misdeclared dangerous goods
- 7.4 Report dangerous goods occurrences

K. PERSONNEL RESPONSIBLE FOR THE SCREENING OF PASSENGERS AND CREW AND THEIR BAGGAGE, CARGO AND MAIL

The following are tasks that personnel responsible for the screening of passengers and crew and their baggage, cargo and mail would typically perform and for which training and assessment would therefore be required:

3 Processing/accepting cargo

- 3.4 Process/accept cargo other than dangerous goods
 - 3.4.2 Check packages for indications of undeclared dangerous goods

5 Accepting passenger and crew baggage

- 5.1 Process baggage
 - 5.1.1 Identify forbidden dangerous goods
-

REFERENCES

Annex 6 — Operation of Aircraft

Annex 18 — The Safe Transport of Dangerous Goods by Air

Annex 19 — Safety Management

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

Safety Management Manual (SMM), Doc 9859, 23rd Edition, 2013.

Technical Instructions for the Safe Transport of Dangerous Goods by Air (Technical Instructions) (Doc 9284)

APPENDIX B

GUIDANCE ON TRAINING FOR STATE EMPLOYEES

Replace Part S-1;5 of the Supplement with the following new text:

Chapter 5

GUIDANCE TO STATES ON TRAINING FOR STATE EMPLOYEES INVOLVED IN THE TRANSPORT OF DANGEROUS GOODS BY AIR

5.1 INTRODUCTION

Note.— Dangerous goods State employees include employees performing safety management functions related to dangerous goods transport. In this document, “State” refers to the authority that is signatory to the Chicago Convention and which normally establishes a civil aviation authority (CAA) and other aviation-related authorities.

The objective of this chapter is to provide guidance to States on ensuring qualified State employees engaged in safety management of the transport of dangerous goods by air are recruited and that their qualifications are maintained through the implementation of competency-based training and assessment. The principles contained in it are elaborated in the *Manual on the Competencies of Civil Aviation Safety Inspectors* (Doc 10070), which provides guidance on the development and maintenance of a competent civil aviation safety inspectors workforce, and the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868), which provides greater detail on competency-based training and assessment. Guidance on competency-based training for dangerous goods personnel is provided in *Guidance on Competency-based Dangerous Goods Training and Assessment* (Doc xxxx).

5.2 Background

5.2.1 To effectively fulfil its responsibilities, a State civil aviation system needs to be properly organized and staffed with qualified personnel capable of accomplishing a wide range of technical duties involved in safety management. ICAO's *Global Aviation Safety Plan (GASP)* (Doc 10004), together with its *Global Air Navigation Plan (GANP)* (Doc 9750), define the means and targets by which ICAO, States and aviation stakeholders can anticipate and efficiently manage air traffic growth while proactively maintaining or increasing safety. The documents and their amendments are approved by the Council prior to endorsement by the Assembly. Their overarching priority is to continually reduce the global accident rate. The GASP identifies the recruitment and retention of qualified personnel and continued investment in initiatives that develop and enhance the skills of the aviation workforce as a key component towards success in achieving its objectives. An “investing in people” approach enables advances in both educational and training programmes to ensure that employees have the skills necessary to operate the international aviation system safely as it undergoes significant growth and change. The introduction of ICAO provisions that enable more systematic training methodologies include competency-based training and assessment.

5.2.2 Annex 19 — *Safety Management* identifies eight elements critical to an effective safety oversight system. The fourth critical element (CE-4) requires States to establish minimum qualification requirements for technical personnel performing safety-related functions and to provide for appropriate initial and recurrent training to maintain and enhance their competence at the desired level. CE-4 also requires States to implement a system for the maintenance of training records for technical personnel. Data collected through the ICAO Universal Safety Oversight Audit Programme (USOAP) related to this critical element has revealed it to be the critical element with the lowest effective implementation rate at the global level. Data collected has also identified specific deficiencies and inconsistencies in relation to dangerous goods safety oversight programmes globally. For example, some States have clearly established formal dangerous goods training programmes for State employees while others do not. A competency-based approach to training and assessment applying the principles provided in this chapter ensures the recruitment of appropriate/suitable personnel and the development of competent employees. It also encourages harmonized performance standards of dangerous goods State employees globally.

5.3 DANGEROUS GOODS STATE EMPLOYEES

5.3.1 The transport of dangerous goods is recognized as an integral part of a State's safety programme. A training programme should be developed for each staff position commensurate with its responsibilities. This training programme should include all the training required for the new and current employees to acquire and maintain the necessary competencies. The training programme may include initial training, on the job training, recurrent training and all the specialized training necessary for that technical position, with the minimum content for each type of training, as applicable.

5.3.2 Dangerous goods State employees perform a variety of functions including supporting the development and implementation of a State's dangerous goods programme, approving and monitoring an operator's dangerous goods system, conducting oversight of dangerous goods operations, conducting State safety risk management and resolving identified safety issues. The State needs to train dangerous goods State employees to perform these functions competently. In addition to the vital importance of technical competency in performing these functions, it is critical that State employees possess a high degree of integrity, be impartial in carrying out their tasks, be tactful, have a good understanding of human nature and possess good communication skills. These are reflected in the generic task list and competency framework for State employees provided in Attachments I and III to this chapter, both of which are described in more detail below.

5.4 COMPETENCY-BASED TRAINING AND ASSESSMENT

5.4.1 Overview

A competency based training approach is a method of developing competent State employees. The goal of competency-based training and assessment is to produce a competent workforce by providing focused training. It does so by identifying key competencies that need to be achieved, determining the most effective way of achieving them and establishing valid and reliable assessment tools to evaluate their achievement. Competency-based training and assessment can yield the following benefits:

- a) It ensures that State employees achieve a level of performance that enables them to work independently and effectively.
- b) It supports decision-makers/managers in monitoring the ongoing competence of State employees through the identification and collection of assessment evidence.
- c) It supports the early identification of performance gaps and the design of more effective training to close the performance gap.
- d) It supports the development of effective recruitment and selection tools.
- e) It supports a more accurate analysis of how State employees' tasks, techniques and methods will be affected by changes which, in turn, will support the development of more effective continuation training.

All of these benefits contribute to an effective safety management system.

5.4.2 ICAO competency framework, adapted competency model and task list

5.4.2.1 Traditional approaches to training development involve the decomposition of jobs into tasks. For each task there is a related objective, an assessment and associated elements in a training plan. A limitation of this approach is that each task must be taught and assessed. In complex systems, or when jobs evolve rapidly, it may not be possible to teach and assess each task. Moreover, learners may demonstrate the ability to perform tasks in isolation without being competent in their job. Competency-based training and assessment is based on the concept that competencies are transferable. In the design of a competency-based training and assessment programme, the purpose of the training and tasks associated with this purpose are identified and a limited number of competencies are defined. In the design of training and assessments, tasks and activities are incorporated because they are useful for facilitating, developing or assessing a competency or competencies. Typically, a task will involve several competencies, and competencies may apply across a variety of tasks and settings. Specific tasks may be used to develop specific competencies. The lack of specific competencies may be identified as a root cause of failure in the performance of a task.

5.4.2.2 The A competency model provides a means of defining competencies by identifying those needed for a given role, describing them, and providing criteria for each. Generic, high-level competency frameworks for aviation personnel have been developed by ICAO and included in PANS-TRG and various ICAO documents. They are intended as a framework on which customized competency models can be developed.

5.4.2.3 An ICAO competency framework for dangerous goods State employees is provided in Attachment I to this chapter. It is based on the competencies described in the *Manual on the Competencies of Civil Aviation Safety Inspectors* (Doc 10070). States may adapt this framework into competency models that meet their needs. This customized model is identified as an *adapted competency model*, which is then used to develop competency-based training and assessment for a given role. A template for an adapted competency model is provided in Figure S-1. Guidance on developing an adapted competency model is provided in the PANS-TRG. A generic task list covering tasks typically performed by dangerous goods State employees as part of an integrated State safety programme is provided in Attachment I to this chapter. States may use this list as a tool for developing specific training specifications for its personnel.

Table S-1-2. Template for an adapted competency model

Adapted competency	Description	Performance criteria		
		Observable behaviour	Competency assessment	
Adapted competency 1	Description 1	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		
Adapted competency 2	Description 2	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		
Adapted competency 3	Description 3	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		

5.5 TERMINOLOGY

For the purpose of this chapter, the following terminology applies:

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

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

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

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

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

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

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

Operations manual. A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

ATTACHMENT I TO CHAPTER 5

GENERIC COMPETENCY FRAMEWORK FOR STATE EMPLOYEES

1. SCOPE OF THE GENERIC COMPETENCY FRAMEWORK

1.1 The scope of the generic competency framework concerns State employees involved in the regulation and oversight of the transport of dangerous goods by air based on obligations of States according to the Convention on International Civil Aviation.

1.2 The State is responsible for implementing a system for determining compliance with Annex 18 and the relevant parts of Annex 6 and 19.

1.3 The application of the basic principles of a competency-based approach determines the performance level for State employees in carrying out their function to meet the State's obligations as defined by the Annex 18.

1.4 The dangerous goods-related activities referred to in the Universal Safety Oversight Audit Programme Continuous Monitoring Approach (USOAP CMA) are reflected in the competency framework. The details of the competency framework are based on common practices as applied by a number of States on training, operational procedures for inspection, surveillance and enforcement.

Generic ICAO competency framework for dangerous goods State employees

Generic competency	Description	Observable behaviour
Ethics and values	Demonstrates integrity, transparency, openness, respect and fairness and considers the consequences when making a decision or taking action. Acts consistently in accordance with fundamental values of the civil aviation authority.	Treats others respectfully, fairly and objectively regardless of differences.
		Answers questions truthfully without embellishment or attempt to cover up a lack of knowledge.
		Maintains privacy and confidentiality when appropriate.
		Manages professional relationships with appropriate role boundaries.
		Adheres to professional codes of conduct when taking action and making decisions.
		Takes responsibility for own actions.
		Identifies and mitigates conflict of interest situations.
		Acts with integrity.
		Uses resources of the CAA and aviation entities in a cost-conscious manner.
		Demonstrates the values of the CAA.
Communication	Effectively conveys, receives and understands information in oral, written and non-verbal modes.	Verifies that the recipient is prepared to receive information.
		Confirms that information conveyed was received and accurately understood.
		Listens actively and objectively without interrupting.
		Checks own understanding of other's communication (e.g. repeats or paraphrases, asks additional questions).
		Presents appropriate and accurate information in a clear, concise and compelling manner in all media.
		Adapts content, style, tone and media of communication to suit the target audience including cultural considerations and to promote dialogue.

Generic competency	Description	Observable behaviour
		<p>Understands other people’s concerns.</p> <p>Maintains open lines of communication with management, stakeholders and colleagues.</p> <p>Communicates complex issues clearly and credibly with diverse audiences.</p> <p>Delivers difficult or unpopular messages with clarity, tact and diplomacy.</p>
Problem solving and decision making	Solves issues of varied levels of complexity, ambiguity and risk. Makes timely decisions that take into account relevant facts, tasks, goals, constraints, risks and conflicting points of view.	<p>Collects related and sufficient information from a variety of sources in a timely manner.</p> <p>Breaks down complex tasks into manageable parts.</p> <p>Considers multiple possible causes of problems.</p> <p>Identifies risks involved for different solutions to a problem.</p> <p>Identifies interdependencies between various components of a problematic situation.</p> <p>Develops solutions that address the situation in its entirety.</p> <p>Takes steps to mitigate medium- to long-term impact of solutions when developing solutions to fix immediate issues.</p> <p>Provides a rationale behind each decision.</p> <p>Makes timely decisions based on applicable rules and procedures.</p> <p>Responds decisively when inappropriate conduct is identified to affect positive change without delay.*</p> <p>Recognizes scope of own authority for decision making and escalates to the appropriate level if necessary.</p> <p>Demonstrates decisiveness when under pressure or faced with complex or sensitive situations.</p> <p>Incorporates lessons learnt in future decisions.</p>
Initiative	Identifies and addresses issues independently, proactively and persistently to achieve objectives.	<p>Seizes opportunities that arise.</p> <p>Acts promptly in a crisis situation.</p> <p>Deals with obstacles effectively.</p> <p>Looks for ways to enhance efficiency and effectiveness.</p> <p>Looks for resources to support objectives.</p> <p>Anticipates and acts on potential issues.</p> <p>Organizes personal workload to ensure excellence in productivity and quality of service.</p>
Technical expertise	Applies and improves technical knowledge and skills to perform safety oversight duties in a specific aviation discipline.	<p>Applies technical knowledge and skills to correctly address a situation.</p> <p>Accurately answers complex technical questions.</p> <p>Keeps up to date on specialized technical knowledge and skills.</p> <p>Recognizes trends in practice of one’s own technical area and anticipates changes.</p> <p>Interprets correctly and explains the intent of the applicable statute, regulation, or standard for a given context.</p> <p>Evaluates efforts by stakeholders to demonstrate initial compliance with the regulations.</p>

Generic competency	Description	Observable behaviour
		<p>Develops and implements an effective programme to monitor continuing compliance of the regulations by stakeholders.</p> <p>Contributes as a subject-matter expert to the development of regulations and guidance.</p> <p>Consistently provides appropriate guidance to stakeholders and colleagues on how to implement performance-based regulations.</p> <p>Applies appropriate procedures in accordance with the CAA standards.</p> <p>Applies enforcement measures when necessary and in accordance with applicable regulations.*</p>
Systems thinking	Understands and determines how the various components of management systems interact and affect the overall system safety performance.	<p>Accurately evaluates the inter-relationship between policies, processes and procedures of the stakeholder's systems.</p> <p>Accurately evaluates the inter-relationship between various systems including quality planning, quality control, and quality assurance of the stakeholder.</p> <p>Determines the effectiveness of the implementation of continuous improvement, reactive and proactive processes.</p> <p>Recognizes the essential components of a functional safety management system and their interoperability.</p> <p>Determines whether the stakeholder's management systems are appropriate for the size and scope of the operation.</p> <p>Accurately evaluates the inter-relationships between the management systems across various stakeholders.</p> <p>Uses the appropriate set of metrics to measure and monitor regulatory and stakeholder safety performance.</p> <p>Interprets findings from analysis of performance data.</p> <p>Assesses if the stakeholder safety performance objectives achieve the desired safety performance.</p> <p>Provides feedback on potential deficiencies of the regulatory framework.</p> <p>Accurately determines whether the root cause(s) of deficiencies results from a single-point or systemic failure(s).*</p> <p>Accurately evaluates the inter-relationship between policies, processes and procedures of the</p>
Risk management	Demonstrates an effective approach to the oversight of a stakeholder considering its business model, risk profile and its availability of resources.	<p>Carries out comprehensive risk assessments of service providers using appropriate methodologies.</p> <p>Makes strategic decisions based on risk assessment, principles, values and business cases.</p> <p>Accurately determines on a timely basis trends, problem areas or hazards that may negatively impact safety.</p> <p>Recognizes business practices or organizational cultures that are potential indicators of increased levels of risk.</p>

Generic competency	Description	Observable behaviour
		<p>Applies appropriate certification requirements and surveillance techniques according to changing levels of risk.</p> <p>Evaluates appropriateness of safety cases submitted by service providers.</p> <p>Evaluates appropriateness of risk assessments performed by stakeholders and actions taken to manage hazards to an acceptable level.</p> <p>Identifies if appropriate remedial or enforcement action is required to address an issue at its root cause.*</p> <p>Ensures that stakeholders implement remediation measures.*</p>
Leadership and teamwork	Collaborates up, down and across the organization to foster and promote a clear vision and common goals. Energizes others to achieve the goals and positive results.	<p>Gains the trust and confidence of others.</p> <p>Promotes positive working relationships.</p> <p>Encourages open discussion.</p> <p>Facilitates resolution of conflicts.</p> <p>Inspires others to collaborate and strive towards excellence.</p> <p>Actively solicits constructive feedback.</p> <p>Willingly adopts suggestion for improvement from others.</p> <p>Directs the work of the team to adapt to circumstances.</p> <p>Empowers team members to make decisions.</p> <p>Identifies the required resources to support the team.</p>
Critical thinking	Analyses information in order to consistently achieve desired outcomes.	<p>Accurately analyses stakeholder performance data for trends.</p> <p>Evaluates information with accuracy and objectivity.</p> <p>Seeks additional detail or clarification from colleagues or stakeholders.</p> <p>Synthesises data from a variety of sources appropriately.</p> <p>Applies procedures appropriately.</p> <p>Recognizes that different processes and procedures can lead to similar outcomes.</p> <p>Analyses the thoroughness and effectiveness of all documented processes.</p> <p>Determines if CAA employees understand and adhere to processes.</p> <p>Determines if stakeholders understand and adhere to processes.</p> <p>Assesses the efficiency and effectiveness of the implementation and maintenance of mandatory system-based programmes against operational requirements.</p> <p>Distinguishes between lapses, negligence and reckless action.*</p>

ATTACHMENT II TO CHAPTER 5

GENERIC TASK LIST FOR DANGEROUS GOODS STATE EMPLOYEES

Table S-1-3. Generic Task List for Dangerous Goods State Employees

This task list aligns with State safety management responsibilities required by Annex 19 and is based on an integrated State safety programme illustrated in Figure 8-1 of the *Safety Management Manual (SMM)* (Doc 9859).

1	Establish and Maintain Safety Policies [State Safety Policy]	
	1.1	Establish safety policies, objectives and resources [CE-1, CE-2, & CE-4]
	1.1.1	Apply procedures to develop national regulations on the transport of dangerous goods by air
	1.1.2	Monitor relevant changes to ICAO provisions and other relevant international provisions that may impact national dangerous goods air transport regulations
	1.1.3	Develop guidance on how to comply with national regulations
	1.1.4	Maintain a safety training program that ensures that personnel are trained and competent to perform their dangerous goods oversight duties.
	1.2	Develop technical guidance, tools and provisions of safety-critical information [CE-5]
	1.1.1	[Develop policies and procedures to approve an operator's manuals specific to dangerous goods] see 2.1.1 it's already covered.
	1.2.2	[Develop policies and procedures to approve an operator's training program specific to dangerous goods] see 2.2.1
	1.2.3	[Develop policies and procedures to approve the designated postal operator's training program specific to dangerous goods]
	1.2.4	Develop policies and procedures to conduct oversight of entities performing any functions prescribed in national regulations for the transport of dangerous goods by air
	1.2.7	[Develop policies and procedures to grant approvals and exemptions] 2.3.1
	2	Manage Safety Risks [Safety Risk Management]
2.1		Approve the dangerous goods component of the operations manual [CE-6]
2.1.1		Verify the operations manual against the national regulations, policies and procedures for the transport of dangerous goods by air
2.1.2		Recommend amendments to the operations manual, as necessary
2.1.3		Verify that the amendments to the operations manual are completed
2.1.4		Issue the approval
2.2		Approve dangerous goods training programme [CE-6]
2.2.1		Verify the training programme against the national regulations, policies and procedures for the transport of dangerous goods by air
2.2.2		Verify that the training programme addresses all dangerous goods functions identified in the operations manual
2.2.3		Recommend amendments to the training programme, as necessary
2.2.4		Verify that the amendments to the training programme are completed
2.3		Grant Exemptions and Approvals [CE-6]
2.3.1		Develop and maintain a process to assess applications
2.3.2		Verify that applicant can adhere to established safety standards
2.4		Accident and incident investigation [CE-6]
2.4.1		Gather evidence
2.4.2		Verify non-compliance against national regulations for the transport of dangerous goods by air
2.5		Take corrective/appropriate actions [CE-6]
2.5.1		Document specific areas of non-compliance
2.5.2		Apply national enforcement policy
2.5.3		Confirm effectiveness of corrective action
2.6	Identify Hazards and Mitigate Safety Risks [CE-6]	
2.6.1	Establish and maintain a process to identify dangerous goods hazards from collected safety data	
2.6.2	Develop and maintain a process that ensures the assessment of dangerous goods safety risks associated with the identified hazards	
2.6.3	Identify required mitigations and safety performance indicators	
2.6.4	Review effectiveness of mitigations	

3	Assure Safety [Safety Assurance]		
	3.1	Define and Plan Surveillance Activities [CE-7]	
		3.1.1	Analyse collected safety data, identify hazards, and identify surveillance priorities
		3.1.2	Define and plan surveillance activities on a continuous basis
	3.2	Conduct Surveillance Activities [CE-7]	
		3.2.1	Proactively assure that entities performing any function for the transport of dangerous goods by air continue to meet the established requirements.
		3.2.2	Define and plan surveillance activities on a continuous basis
	3.3	Resolve safety issues [CE-8]	
		3.3.1	Take appropriate actions, up to and including enforcement measures, to resolve identified safety risks.
		3.3.2	Approve an entity's plan to address identified safety risks and findings of non-compliance.
	3.4	Continuous Monitoring [CE-8]	
		3.4.1	Monitor and record progress, including actions taken by entities to resolve identified safety risks.
	3.4.2	Document and assess system performance.	
4	Promote Safety [Safety Promotion] [Annex 19, 3.5]		
	4.1	Develop Internal communication and dissemination of safety information	
		4.1.1	Develop a strategy of promoting safety through communication.
		4.1.2	Develop awareness materials related to dangerous goods safety.
		4.1.3	Promote safety awareness and the sharing and exchange of safety data and information.
	4.2	Develop external communication and dissemination of safety information [Annex 19, 3.5]	
		4.2.1	Develop a strategy of promoting state safety through communication.
4.2.2		Develop public awareness materials related to dangerous goods safety.	
	4.2.3	Promote safety awareness and the sharing and exchange of safety data and information with the aviation [dangerous goods] community.	

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