

**Doc 9841**  
**AN/456**



# Manual on the Approval of Training Organizations

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Approved by the Secretary General  
and published under his authority

Second Edition — 2012

International Civil Aviation Organization



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## FOREWORD

The purpose of this document is to provide information and guidance to the Licensing Authority on the implementation of the Standards of Annex 1 — *Personnel Licensing* related to the approval of training organizations. The first edition of Doc 9841 was developed by the Flight Crew Licensing and Training Panel in 2004 and was focused exclusively on flight training entities. This latest edition is significantly expanded in scope and now deals with the approval of training organizations which provide training services for the issue of an aviation personnel licence or rating. This manual should be used in conjunction with Annex 1.

*Note.— Although not falling under the criteria of training specifically for the issue of a licence or a rating, flight crew undergoing approved training for the maintenance of competency or for gaining an operational qualification that does not fall under the training criteria outlined in Annex 6 — Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes, Chapter 9, 9.3, or Part III — International Operations — Helicopters, Section II, Chapter 7, 7.3, should receive such training from an approved training organization.*

Comments on this manual would be appreciated. They will be taken into account in the preparation of subsequent editions. Comments concerning the manual should be addressed to:

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# TABLE OF CONTENTS

	<i>Page</i>
Glossary .....	(xi)
Publications .....	(xv)
<b>Chapter 1. Approved training organization (ATO) — General .....</b>	<b>1-1</b>
1.1 Characteristics of an ATO .....	1-1
1.2 Organizational structure .....	1-1
1.3 Designated management .....	1-1
1.4 Training services .....	1-2
1.5 Competency-based training.....	1-2
1.6 Systems-based governance models .....	1-2
<b>Chapter 2. ATO approval process.....</b>	<b>2-1</b>
2.1 Obtaining approval .....	2-1
2.2 Licensing Authority’s review and approval process .....	2-1
2.3 Nature of the approval given to a training organization .....	2-1
2.4 Renewal of the approval.....	2-2
2.5 Changes in the scope of the approval .....	2-2
2.6 Continued surveillance after the approval .....	2-2
<b>Chapter 3. Training and procedures manual.....</b>	<b>3-1</b>
3.1 Introduction.....	3-1
3.2 Documentation management .....	3-1
3.3 Content.....	3-1
3.4 Organization .....	3-2
3.5 Structure.....	3-2
3.6 Validation.....	3-2
3.7 Deployment and feedback.....	3-2
3.8 Amendment .....	3-3
<b>Chapter 4. Quality assurance (QA) .....</b>	<b>4-1</b>
4.1 Objective .....	4-1
4.2 Elements .....	4-1
4.3 QA and the quality system of the ATO .....	4-1

	<i>Page</i>
<b>Chapter 5. Safety management system (SMS).....</b>	<b>5-1</b>
5.1 Objective .....	5-1
5.2 Framework and required elements .....	5-1
5.3 SMS within an ATO .....	5-1
<b>Chapter 6. Facilities and equipment .....</b>	<b>6-1</b>
6.1 Facilities .....	6-1
6.2 Training courseware and equipment .....	6-1
6.3 Approval of training devices .....	6-1
<b>Chapter 7. ATO staffing .....</b>	<b>7-1</b>
<b>Chapter 8. Third-party providers (outsourcing).....</b>	<b>8-1</b>
8.1 Courseware .....	8-1
8.2 Facilities and equipment.....	8-1
8.3 Personnel .....	8-1
<b>Chapter 9. Record-keeping.....</b>	<b>9-1</b>
<b>Chapter 10. Oversight exercised by the Licensing Authority.....</b>	<b>10-1</b>
<b>Chapter 11. Authorized evaluations and checks carried out by the ATO.....</b>	<b>11-1</b>
<b>Chapter 12. Approval of a foreign ATO .....</b>	<b>12-1</b>
12.1 Need for approval.....	12-1
12.2 Approval process.....	12-1
12.3 Bilateral approval agreements.....	12-1
<b>Appendix A. Content of the training and procedures manual .....</b>	<b>App A-1</b>
Part I — Content requirements for all ATOs .....	App A-1
Part II — Additional content for flight training organizations (utilizing aircraft) .....	App A-6
<b>Appendix B. Quality assurance and the quality system of the ATO .....</b>	<b>App B-1</b>
<b>Appendix C. Organizational structure of the ATO .....</b>	<b>App C-1</b>
<b>Appendix D. The safety management system (SMS) of the ATO .....</b>	<b>App D-1</b>
<b>Appendix E. Competency-based training programmes .....</b>	<b>App E-1</b>

---

	<i>Page</i>
<b>Appendix F. Alternative means of compliance .....</b>	<b>App F-1</b>
<b>Appendix G. Approving authority training requirements.....</b>	<b>App G-1</b>

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# GLOSSARY

## ABBREVIATIONS/ACRONYMS

AMO	Approved maintenance organization
AQP	Advanced qualification programme
ATO	Approved training organization
ATQP	Alternative training and qualification programme
CAA	Civil aviation authority
FCLTP	Flight Crew Licensing and Training Panel (ICAO)
ISD	Instructional systems design
IWG	International working group
KSA	Knowledge, skill(s) and attitude(s)
LMS	Learning management system
MPL	Multi-crew pilot licence
PANS-TRG	Procedures for Air Navigation Services — Training
PDCA	Plan – do – check – act
QA	Quality assurance
QS	Quality system
RA	Risk assessment
RSOO	Regional safety oversight organization
SMM	Safety management manual
SMS	Safety management system

## DEFINITIONS

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

**Accountable executive.** The individual who has corporate authority for ensuring that all training commitments can be financed and carried out to the standard required by the civil aviation authority (CAA), and any additional requirements defined by the approved training organization (ATO).

*Note.— The accountable executive is normally the head of training and may delegate to another person within the organization the day-to-day management functions but not the overall approval management responsibility. In complex corporate structures, the accountable executive may be responsible for several different ATOs, each with its own head of training (see example 2 in Appendix C).*

**Alternate means of compliance.** A pre-approved manner of achieving regulatory compliance that has been determined to be an acceptable substitute to the regulatory requirements.

*Note 1.— An example of alternate means of compliance would be the CAA's acceptance of reduced training time for personnel undergoing a specific air operator's approved aircraft type-rating training programme rather than the training time requirements traditionally prescribed for approved programmes of a more generic nature leading to the same aircraft type-rating.*

*Note 2.— This definition is introduced to ensure that the reader understands the difference between an “alternate means of compliance” (a term used by some States) and an “alternative means of compliance” (a term used by ICAO). The concept of “alternate means of compliance” is not relevant to the guidance provisions of this manual.*

**Alternative means of compliance.** An approved alternative to prescribed approaches, which has been demonstrated to consistently achieve or exceed the desired outcomes as intended through regulation.

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

**Approved training organization (ATO).** An organization approved by and operating under the supervision of a Contracting State in accordance with the requirements of Annex 1 to perform approved training.

*Note.— The Contracting State is required to ensure that the ATO is included in the State’s ongoing safety oversight programme.*

**Checking.** See definition of **testing**.

**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.

*Note.— This training process is derived from a job and task analysis and is focused on the achievement of well-defined benchmarked standards of performance as opposed to training programmes simply focused upon the acquisition of prescribed levels of experience.*

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

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

**Compliance.** The state of meeting those requirements mandated through regulation.

**Conformity.** The state of meeting established criteria, standards, specifications and desired outcomes.

**Evaluator.** A generic term used in the context of an ATO to describe a person who is qualified, authorized and assigned to carry out specific assessment, checking, testing and/or auditing duties to determine that all required standards of performance have been satisfactorily achieved.

*Note 1.— These standards of performance may be obligated as an end-state objective or be required to be met on a continuous basis. In either case, the evaluator is responsible for making a determination of the actual standards attained and any recommendations for immediate remediation.*

*Note 2.— Evaluator functions may be assigned to suitable ATO instructors for the continuous evaluation of students in a competency-based training programme and for progress checks at the end of a phase of training. Evaluator functions, associated with the role of an examiner for the Licensing Authority, may also be assigned to ATO instructors for the final examination at the completion of the training programme, either through a CAA designation or under an ATO process approved by the CAA.*

**Finding.** A finding is a conclusion by the operator’s or by the CAA’s audit personnel that demonstrates either non-compliance with a regulation or non-conformity with a specific standard.

**Hazard.** A condition or an object with the potential to cause injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

**Head of training.** The individual responsible for the organization's activities, policies, practices and procedures while ensuring the continued maintenance of the training organization's approval status.

*Note.— The head of training is normally the accountable executive; however, in complex corporate structures it may be possible that the accountable executive is located at company headquarters and oversees the operation of several different ATOs (see example 2 in Appendix C).*

**Host State.** The State in whose territory an approved training organization is located.

**Instructional services manager.** The manager responsible for the day-to-day delivery of training services that consistently meet regulatory requirements and organizational objectives.

**Instructional systems design (ISD).** A formal process for designing training which includes analysis, design and production, and evaluation.

**Knowledge, skill and attitude (KSA).** The three performance domains that are under constant evaluation and form the basis for the performance criteria statements.

**Maintenance manager.** The manager responsible for the day-to-day provision of aircraft maintenance activities and the continuing airworthiness of all aircraft released for flight operations.

**Performance criteria.** Simple, evaluative statements on the required outcome of the competency element and a description of the criteria used to judge whether the required level of performance has been achieved.

**Policy.** A document containing the organization's position or stance regarding a specific issue.

**Process.** A set of interrelated or interactive activities which transform inputs into outputs.

**Quality.** The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.

**Quality assurance (QA).** All the planned and systematic actions necessary to provide adequate confidence that all training activities satisfy given standards and requirements, including the ones specified by the approved training organization in relevant manuals.

**Quality audit.** A systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.

**Quality inspection.** That part of quality management involving quality control. In other words, inspections accomplished to review a document or observe events/actions, etc., in order to verify whether established operational procedures and requirements are being fulfilled during the accomplishment of the event or action, and whether the required standard is being achieved.

*Note.— Student stage checks and skill tests are quality inspections, and they are also quality control functions.*

**Quality manager.** The manager responsible for the quality monitoring function and for requesting remedial action.

*Note.— The quality manager is responsible directly to the head of training. In the event the ATO's head of training is not the accountable executive, reporting mechanisms should be instituted to ensure that the accountable executive is aware of all issues impacting the quality of the training services being provided by the affected ATO (see example 2 in Appendix C for one such example).*

**Quality management.** A management approach focused on the means to achieve product or service quality objectives through the use of its four key components: quality planning; quality control; quality assurance; and quality improvement.

*Note.— This definition is specific to this manual.*

**Quality manual.** The document containing the relevant information pertaining to the approved training organization's quality system.

**Quality of training.** The outcome of the training that meets stated or implied needs within the framework of defined standards.

**Quality system (QS).** The aggregate of all the organization's activities, plans, policies, processes, procedures, resources, incentives and infrastructure working in unison towards a total quality management approach. It requires an organizational construct complete with documented policies, processes, procedures and resources that underpins a commitment by all employees to achieve excellence in product and service delivery through the implementation of best practices in quality management.

*Note.— This definition is specific to this manual.*

**Safety management system (SMS).** A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

*Note 1.— A safety management system, consisting of documented policies, processes and procedures designed to manage risks, integrates operations and technical systems with the management of financial and human resources to ensure aviation safety and the safety of the public.*

*Note 2.— The requirement to adopt SMS practices is restricted to only those entities whose activities directly impact upon the safe operation of aircraft.*

**Safety manager.** The manager responsible for providing guidance and direction for the planning, implementation and operation of the organization's safety management system.

*Note.— The safety manager is directly responsible to the head of training. In the event that the ATO's head of training is not the accountable executive, reporting mechanisms should be instituted to ensure that the accountable executive is aware of all issues impacting the safety programme of the affected ATO (see example 2 in Appendix C for one such instance).*

**Testing.** The comparison of the knowledge about a task, or the skill or the ability to perform a task against an established set of criteria to determine that the knowledge, skill or ability observed meets or exceeds, or does not meet, those criteria.

*Note.— The use of the words testing or checking depends on the CAA's preference because they are very similar in meaning, and their use may be dependent on the outcome of the event, e.g. a step towards a licence issuance, a recurrent evaluation of competency.*

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## **PUBLICATIONS**

(referred to in this manual)

*Convention on International Civil Aviation* (Doc 7300)

### **Annexes**

Annex 1 — *Personnel Licensing*

Annex 6 — *Operation of Aircraft*

Part I — *International Commercial Air Transport — Aeroplanes*

Part II — *International General Aviation — Aeroplanes*

Part III — *International Operations — Helicopters*

### **Procedures for Air Navigation Services (PANS)**

*Training* (PANS-TRG, Doc 9868)

### **Manuals**

*Human Factors Training Manual* (Doc 9683)

*Manual of Criteria for the Qualification of Flight Simulation Training Devices* (Doc 9625)

*Manual of Procedures for Establishment and Management of a State's Personnel Licensing System* (Doc 9379)

*Safety Management Manual (SMM)* (Doc 9859)

*The Safety Oversight Manual* (Doc 9734)

Part B — *The Establishment and Management of a Regional Safety Oversight Organization*



# Chapter 1

## APPROVED TRAINING ORGANIZATION (ATO) — GENERAL

### 1.1 CHARACTERISTICS OF AN ATO

1.1.1 An ATO is an organization that is approved by the Licensing Authority to deliver specific approved training programmes to aviation personnel for licensing purposes. As a prerequisite to the approval process this organization will have demonstrated that it is staffed, equipped, financially resourced, and operated in a manner conducive to achieving the required standards. Its approved programmes may from time to time take advantage of the reduced experience requirements provided for in both Annex 1 and the applicable national regulations for certain licences and ratings.

1.1.2 ATOs are distinguished from non-approved training organizations by the approval process and the ongoing oversight provided by the Licensing Authority.

### 1.2 ORGANIZATIONAL STRUCTURE

1.2.1 The organizational structure of an ATO will vary depending upon the scope and complexity of its business model. The design and make-up of its structure should ensure that the delivery of training meets the client's needs and expectations while maintaining compliance with the applicable regulatory requirements. Therefore, ATOs need to have a management structure that is designed around best quality management practices. Chapter 4, 4.1, defines the objective of those practices.

1.2.2 In all cases, ATOs require an accountable executive who is the final corporate authority on decisions that may impact upon the continued suitability of the organization to deliver training to aviation personnel for licensing purposes. Since the accountable executive may not have a day-to-day awareness of the training activity, that person must rely heavily upon the performance and advice of key personnel within the organization. As a result, the qualifications and competencies of ATO personnel must be maintained to a very high standard. See Chapter 7, 7.1, for additional information on ATO staffing requirements.

*Note.— Appendix C provides several recommended organizational structures for consideration.*

### 1.3 DESIGNATED MANAGEMENT

1.3.1 The composition of the management team will be dependent upon the organizational needs and the applicable national regulations. The fact that some ATOs may be approved to provide training to aviation personnel from multiple occupations within the industry could necessitate a complex management structure.

1.3.2 In all cases, the Licensing Authority should expect the head of training to receive, from the ATO management team, candid and complete information on operational and quality issues. To that end, ATOs should establish separate and distinct managerial positions, each of which reports directly to the head of training, which have overall authority for the following areas of responsibility:

- a) training or instructional services; and
- b) quality management processes.

#### **1.4 TRAINING SERVICES**

1.4.1 Annex 1 obligates ATOs to have all their services authorized under the terms of their organization's approval. The content of each approved training programme including the courseware and equipment used needs to be documented. Paragraph 2 of Appendix 2 to Annex 1 details this requirement while describing the content of the training and procedures manual.

1.4.2 An increasing number of ATOs offer training services to holders of foreign-issued licences. As a consequence, national civil aviation authorities may be called upon to collaborate with their counterparts in other Contracting States with respect to instituting mutually beneficial oversight practices. Chapter 2, 2.3, and Chapter 12 address this issue in greater detail.

#### **1.5 COMPETENCY-BASED TRAINING**

1.5.1 Although not currently in extensive use, there is a growing recognition of the performance benefits associated with competency-based training methodologies. For instance, early results from multi-crew pilot licence (MPL) training programmes are providing powerful evidence that well-designed competency-based training can yield significant improvements in performance levels over more traditional training approaches.

1.5.2 Traditional aviation training programmes are designed predominately for acquiring the performance standards established to meet the qualifications of a licence, a rating or a privilege. These standards are embedded in Annex 1 and are further amplified in the applicable national regulations. The standards are frequently expressed in quantitative terms that prescribe training programme "inputs" (e.g. required hours of study, hours of practice), and the programme design and content are further influenced by the Licensing Authority's testing criteria and methods.

1.5.3 The cornerstone to a competency-based training programme is a detailed and accurate job/task analysis. It is from that analysis that the critical competency elements and units are derived, which are then subjected to instructional systems design (ISD) methodologies. The end result of this clinical process is a fully integrated and "outcomes-focused" training programme whose "raison d'être" is to provide the graduates with the knowledge, skill and attitude competencies to be safe, efficient and highly effective in the performance of their duties. Appendix E provides overall guidance to ATOs and Licensing Authorities on this subject.

1.5.4 PANS-TRG (Doc 9868) was originally prepared by the Flight Crew Licensing and Training Panel (FCLTP) to introduce competency-based training methodologies and the multi-crew pilot licence. It describes the general provisions for competency-based training and assessment practices. Amendment 1 introduced a new Chapter 4 on competency-based training and assessment specific to aircraft maintenance personnel. PANS-TRG is meant to complement the existing standards in Annex 1 and should be referred to in that context.

#### **1.6 SYSTEMS-BASED GOVERNANCE MODELS**

1.6.1 With the increasing complexities of the world's economy, exposure to risk has changed exponentially. To meet that challenge, ICAO and its Member States have rallied to develop standards that implement best practices in risk mitigation. These practices are generally focused on quality and safety levels, which are under constant threat and are intrinsically linked to each other. Consequently, governance models to proactively manage threats to both these areas are now viewed as being critical to the well-being of the aviation industry.

1.6.2 ICAO Standards require States to establish requirements for effective system-based governance models in various components of the aviation industry through national regulations. Expectations for ATOs regarding both the quality system and the safety management system are discussed in Appendices B and D.

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## Chapter 2

### ATO APPROVAL PROCESS

#### 2.1 OBTAINING APPROVAL

2.1.1 The Licensing Authority should publish procedures for obtaining approval, describing the application process and how the Authority will verify that an applicant meets the approval requirements.

2.1.2 With the application for the approval, a draft copy of the proposed ATO's training and procedures manual must be submitted to the Authority. The requirements for the contents of this manual are stipulated in Chapter 3, 3.3, and detailed guidance on this subject is provided in Appendix A.

#### 2.2 LICENSING AUTHORITY'S REVIEW AND APPROVAL PROCESS

2.2.1 The Licensing Authority should review the application for approval. Once it is assessed as satisfactory, the Authority normally conducts a site inspection prior to final approval. Upon successful completion of the process, the Licensing Authority issues the approval. This consists of an approval certificate and additional documentation specifying the terms of the approval.

2.2.2 A State may decide to delegate the approval process to a regional safety oversight organization (RSOO) set up by a group of States to achieve greater commonality and regional integration of regulations and operating standards in a cost-effective manner. In this case, the delegated functions should be clearly defined in the agreement document establishing the RSOO.

*Note.— Guidance on how a joint licensing approval and certification system could work within a regional safety oversight organization (RSOO) is contained in Doc 9734, Part B, and in Doc 9379.*

#### 2.3 NATURE OF THE APPROVAL GIVEN TO A TRAINING ORGANIZATION

2.3.1 The granting of approval by the Licensing Authority authorizes the ATO to conduct the training courses specified in the terms of the approval document.

2.3.2 Under the Convention on International Civil Aviation, States have an obligation to ensure the validity of the documents that they issue and the competency of the document holders. Consequently, Licensing Authorities may impose restrictions on where holders of their State-issued licences can train and what programmes are considered acceptable for the purposes of gaining or maintaining the privileges attached to a licence.

2.3.3 To ensure the integrity of their aviation documents, Licensing Authorities may require foreign-based training organizations to meet their national licensing standards prior to crediting any training provided to their licence holders. This inward-looking, albeit understandable, regulatory approach can sometimes pose an unnecessary burden on industry and represents a wasteful utilization of badly needed resources. All Authorities need to be mindful of the potential impact of duplicating approval processes for these training organizations and their programmes. Therefore,

whenever possible, Authorities are encouraged to establish joint procedures for oversight and approval processes to validate that their national standards continue to be met by ATOs located in each other's territories. The approval of foreign-based ATOs is discussed further in Chapter 12.

## **2.4 RENEWAL OF THE APPROVAL**

Some States issue a training organization approval that contains an explicit period of validity while others issue an open-ended approval that remains valid as long as the conditions under which the approval has been granted are fulfilled. The requirements contained in Annex 1 provide for the two approaches, and each State can choose the option that best fits its legal system and its administrative procedures.

## **2.5 CHANGES IN THE SCOPE OF THE APPROVAL**

2.5.1 Aviation training is a dynamic activity, and it is likely that ATOs will ask regularly for a change in the scope of their approval; for instance, they may want to provide new training or change a training programme to take advantage of new training equipment or facilities. In such a case, the applicant should provide supporting information to the Licensing Authority that will assess it using the applicable Standards of Appendix 2 to Annex 1, its national requirements and the relevant parts of this guidance material. An amendment to the approval document should be issued after a satisfactory assessment.

2.5.2 Changes or modifications in equipment, software, facilities, or key managerial personnel should be reported to the applicable Licensing Authority to ensure that any required approvals are obtained without delay.

## **2.6 CONTINUED SURVEILLANCE AFTER THE APPROVAL**

2.6.1 After receiving an approval, the ATO will be subjected to continued surveillance by the Licensing Authority to ensure that the ATO is operating within the terms of its approval.

2.6.2 Guidance on the continued surveillance to be conducted by the Licensing Authority is provided in Chapter 10.

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## **Chapter 3**

# **TRAINING AND PROCEDURES MANUAL**

### **3.1 INTRODUCTION**

3.1.1 The training and procedures manual describes the training programmes being offered and the way in which the training organization conducts its activities. As such, it is an essential document for the organization because it provides the management and line personnel with clear guidance on the policy of the organization as well as the procedures and processes which are used to provide training. It is also an essential document for the Licensing Authority. During the approval process, it allows the Authority to assess whether the way in which an organization is planning to operate is in line with existing requirements and accepted practices. Once the training organization is functioning, a large part of the surveillance activities of the Licensing Authority is to ensure that the organization is following the training and procedures manual.

3.1.2 It is important that the contents of all operational documents, including the training and procedures manual, be consistent with each other and consistent with regulations, manufacturer's requirements and Human Factors principles. It is also necessary to ensure that the manual is used consistently across all departments within the organization. An integrated approach, recognizing operational documents as a complete system, is the key to success.

3.1.3 This chapter explains how the training and procedures manual should be developed, implemented and managed.

### **3.2 DOCUMENTATION MANAGEMENT**

3.2.1 Appendix 2 to Annex 1 provides for the training and procedures manual to be issued in separate parts should the ATO find it too cumbersome to have all the required content appear in one single document. It also mandates that these documents be maintained to ensure their continued relevancy and compliance with applicable national regulations. Practices that will assist ATOs in conforming to these standards are discussed at some length in 3.8.

3.2.2 Appendix B to this manual details the elements of an effective quality system, a system that requires robust policies, processes and procedures for documentation management and record-keeping. Since shortcomings in documentation management eventually lead to poor standardization and a diminished quality of training, Authorities should be vigilant of weaknesses in this area by including it in their safety oversight programme.

### **3.3 CONTENT**

The content of the training and procedures manual is spelled out in general terms in Appendix 2 to Annex 1. Appendix A to this manual provides a more detailed breakdown of the content of the manual and includes additional requirements for ATOs that are engaged in flight training utilizing aircraft. Depending on the size, complexity and scope of the training provided by the organization, some of the elements contained in the list can be reduced, combined or expanded further.

### **3.4 ORGANIZATION**

3.4.1 The training and procedures manual should be organized according to criteria relating to the information, its importance and use. The information should be structured and sequenced so that operational personnel can access it easily. These principles will help determine whether to issue the manual as a single document or in separate parts. When the training and procedures manual is organized in separate parts, it should include a master index to help readers locate information included in more than one part. The master index should be placed in the front of each document.

3.4.2 The manual should be consistent with the training organization's philosophies, policies, processes and procedures.

### **3.5 STRUCTURE**

3.5.1 The structure of the manual should be easy to understand, appropriate for the information documented and clearly identified through headings and other formatting devices. An explanation of the document structure should be provided at the beginning of the document, explaining organizational elements such as the headings, numbering scheme, main parts of the document and other sources of coding or groupings.

3.5.2 Precise language should be used wherever possible. Terms for common items and actions should be consistent throughout the manual and must be clear and easily understood.

3.5.3 Writing style, terminology, formatting and use of graphics and symbols should be consistent throughout the document, including the location of specific types of information and use of units of measurement and codes.

3.5.4 The manual should contain a glossary of definitions and significant terms including a list of acronyms and/or abbreviations. The glossary should be updated on a regular basis to ensure access to the most recent terminology.

3.5.5 For ease of amendment and distribution, an appropriate revision process should be defined and set up when designing the manual.

3.5.6 The training and procedures manual should comply with the requirements of the training organization's quality assurance practices.

### **3.6 VALIDATION**

3.6.1 The training and procedures manual should be reviewed and tested under realistic conditions before its operational release. The validation process should include using the critical aspects of the information contained in the manual to verify its effectiveness. Routine interaction among groups within the organization should be included in the validation process.

3.6.2 A final review of the manual should ensure that all required topics have been addressed with an appropriate level of detail for users. The final review should also confirm compliance with safety regulations, manufacturers' recommendations and the organization's philosophy, policies, procedures and processes.

### **3.7 DEPLOYMENT AND FEEDBACK**

3.7.1 The training organization should monitor the use of the training and procedures manual after its release. This will ensure appropriate and realistic use of the manual, based on the operational environment, in a way that is operationally relevant and beneficial to the personnel for whom it is intended.

3.7.2 Monitoring should include a formal feedback system to obtain input from principal users of the manual and other persons who would be affected by a new or revised policy, procedure or process. This is discussed at some length in Appendix B.

### 3.8 AMENDMENT

3.8.1 The training organization should develop an effective information gathering and review system to process information obtained from all sources relevant to the organization, such as the Licensing Authority, safety regulators, training customers, manufacturers and equipment vendors, as well as a distribution and revision control system.

*Note.— Manufacturers provide information on the operation, handling and maintenance of specific equipment, aircraft and components thereof, which emphasizes the equipment or aircraft systems and procedures under conditions that may not fully match the requirements of the training organization. Training organizations should ensure that such information meets their specific needs and those of the Licensing Authority.*

3.8.2 The training organization should also develop an information review, distribution and revision control system to process information resulting from changes that originate within the organization. This includes changes to:

- a) the organization's policies, processes, procedures and practices;
- b) respond to operating experience;
- c) the scope of training provided;
- d) the content of training programmes;
- e) results stemming from the installation of new equipment;
- f) an approval document or certificate; and
- g) maintain standardization.

3.8.3 The training and procedures manual should be reviewed in association with other operational documents that form the organization's document control system:

- a) on a regular basis (at least once a year);
- b) after major events such as mergers, acquisitions, rapid growth or downsizing;
- c) after technology changes, e.g. the introduction of new equipment; and
- d) after changes to safety regulations.

3.8.4 Permanent changes to the training and procedures manual should be communicated through a formal amendment process. The manual should be amended or revised as necessary to ensure that the information contained is kept up to date.

3.8.5 Distribution of amendments and revisions should have a tracking system. The tracking system should include some form of log combined with a procedure to ensure that all amendments are furnished promptly to all organizations or persons to whom the manual has been issued.

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## Chapter 4

### QUALITY ASSURANCE (QA)

#### 4.1 OBJECTIVE

4.1.1 The objective of QA, as defined in Appendix 2 to Annex 1, is to ensure the achievement of results that conform to the standards set out in the ATO's manuals and in those requirements and documents issued by the Licensing Authority. The effective application of QA principles will aid the ATO in meeting all regulatory requirements.

4.1.2 Quality is an outcome of a number of processes: establishing standards; planning activities and documenting procedures to support such activities and standards; training the personnel involved before implementing the documented procedures; and measuring the outcomes of the activities to ensure that they meet the standards and expected results. If any non-conformities are found, corrective actions are taken to improve processes and procedures. It is to be emphasized that, to be truly effective in delivering the very best possible products and services, ATOs need to implement proactive as well as reactive processes. Appendix B describes proactive processes and provides guidance on how to institutionalize a quality system that incorporates QA and assists ATOs in reaching their full potential.

4.1.3 The instructions and information contained in the following paragraphs provide guidance on the QA that each ATO shall establish in accordance with Appendix 2 to Annex 1.

#### 4.2 ELEMENTS

The following QA elements should be clearly identifiable in the training and procedures manual:

- a) the organization's training policy (for clients as well as for its own personnel);
- b) training standards;
- c) allocation of responsibility;
- d) resources, organization and operational processes;
- e) procedures to ensure conformity of training with the policy;
- f) procedures for identifying deviations from policy and standards and taking corrective action; and
- g) the evaluation and analysis of experiences and trends concerning policy and training standards, in order to provide feedback into the system for the continual improvement of the quality of training.

#### 4.3 QA AND THE QUALITY SYSTEM OF THE ATO

Details on the requirements for QA and the development of an overarching quality system for an approved training organization can be found in Appendix B.



## Chapter 5

# SAFETY MANAGEMENT SYSTEM (SMS)

### 5.1 OBJECTIVE

5.1.1 Appendix 2 to Annex 1 states that an ATO “that is exposed to safety risks during the provision of its services [shall be required to] implement a safety management system acceptable to the [Contracting] State.” It is important for the Licensing Authority and ATOs to realize and understand the applicability of SMS for ATOs: the requirement to adopt SMS practices is intended to be restricted to only those training entities whose activities directly impact upon the safe operation of aircraft.

*Note 1.— For example, ATOs either using aircraft for flight training or involved in air traffic controller student training whereby aircraft are actually being controlled at the ATO’s privately operated airfield would be required to institute an SMS programme. In the case of air traffic controller student training, the SMS requirement may be satisfied if an air navigation service provider’s SMS specifically covers the training activity.*

*Note 2.— An example of an ATO not directly posing a risk to the safe operation of aircraft would be an ATO that provides approved flight crew training using only flight simulation training devices. Another example would be an ATO that sends its aircraft maintenance students to an approved maintenance organization (AMO) for some on-the-job training as part of the syllabus. In this instance, the onus would be on the AMO to ensure that the student’s participation in aircraft maintenance activities is captured by the AMO’s SMS.*

5.1.2 SMS is a management system consisting of documented policies, processes and procedures designed to manage safety risks, which integrates operations and technical systems with the management of financial and human resources to ensure aviation safety and the safety of the public.

*Note.— In view of the fact that there is close correlation between an SMS and a QS (if a QS is implemented beyond the Annex 1 requirement for QA), it may be suitable for the two systems to be integrated under a single “safety and quality” function if deemed appropriate by the organization.*

### 5.2 FRAMEWORK AND REQUIRED ELEMENTS

The framework and required elements for the implementation and maintenance of a safety management system are contained in Appendix 4 to Annex 1. Guidance on safety management systems is contained in Doc 9859.

### 5.3 SMS WITHIN AN ATO

Appendix D provides guidance for ATOs that are required to implement SMS.





## Chapter 6

# FACILITIES AND EQUIPMENT

### 6.1 FACILITIES

An ATO should have access to facilities appropriate to the size and scope of the intended operations provided in an environment conducive to learning. These facilities should include:

- a) general areas which consist of sufficient:
  - office space for ATO managerial, administrative and training staff;
  - study and examination rooms and reference/library facilities; and
  - storage areas, including secure areas for training and personnel records;
- b) classroom areas which are suitably equipped to effectively deliver the theoretical elements of the training programme in accordance with the training and procedures manual; and
- c) practical training areas which are designed and equipped to ensure the attainment of end-state competencies. These facilities should include, whenever applicable:
  - operations, planning and briefing rooms;
  - simulation and procedure trainer areas;
  - suitable parking areas for aircraft used in training;
  - workshop and aircraft hangar facilities; and
  - parts, tools and material storage areas.

*Note.— The facilities above do not consider any arrangement required by the State's security programme, such as screening areas for persons accessing security restricted areas.*

### 6.2 TRAINING COURSEWARE AND EQUIPMENT

As provided for in Annex 1, an ATO needs to ensure that all courseware and equipment required by the training programme, as specified in the training and procedures manual, are available and in good working order. Changes to these working conditions and any temporary “work-around” solutions should be discussed with the appropriate Authority prior to continuing with the scheduled training.

### 6.3 APPROVAL OF TRAINING DEVICES

6.3.1 With the rapid improvements in technology, an increasing number of simulation training devices for training licensed personnel within the aviation industry are entering the marketplace. Some training programmes even use web-based simulation to such an extent that full accreditation for successful programme completion is achieved without the trainees ever having to leave their normal place of work or, in some cases, even their residence.

6.3.2 Each training device that is intended for training, testing or checking in an approved training programme and for which credit is being sought needs to be made available to the applicable Licensing Authority, prior to initial use, for determination of its suitability.

6.3.3 In addition to meeting the obligations of national regulations, the ATO should implement at least the following for all training devices:

- a) a routine maintenance programme to ensure that the training devices continue to function properly and, when applicable, continue to accurately replicate any component, system or equipment for which training, checking or testing credits are being sought; and
- b) a record-keeping process for each training device to be established and maintained, which accurately records the device's use and lists any discrepancies with respect to its functionality or intended performance characteristics that may impact training.

6.3.4 Criteria for the qualification and training suitability of flight simulation training devices that replicate aeroplanes (and helicopters after the publication of Doc 9625, Volume II, in 2012) are detailed in Doc 9625.

6.3.5 ICAO has not published qualification criteria for simulation training devices other than flight simulation training devices. In consequence, a Licensing Authority has the responsibility to establish criteria for the determination of the suitability of a simulation training device, which is not covered by the guidance of Doc 9625, for any approved training programme. For that, the Licensing Authority would consider the training tasks proposed to be conducted utilizing the device, the related credit sought and the capability of the device to achieve the desired training outcome.

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## Chapter 7

### ATO STAFFING

7.1 Each ATO should have an accountable executive and key managerial personnel. Typical key positions include:

- a) accountable executive (who may also be head of training);
- b) head of training;
- c) instructional services manager;
- d) quality manager;
- e) maintenance manager, if applicable; and
- f) safety manager, if applicable.

7.2 Depending on the size and scope of the organization and the requirements of the Licensing Authority, some of the key positions may be supplemented by subordinates as illustrated in the organizational charts in Appendix C. Small and less complex ATOs may wish to combine some key positions when it becomes clear that the resulting position's roles and responsibilities would not be adversely affected by such a decision.

7.3 The ATO is expected to provide the number of qualified and competent instructors and evaluators appropriate to the size and scope of the intended operations, who hold appropriate licences, certificates, qualifications and ratings or authorizations as deemed necessary by the Licensing Authority.

7.4 Instructors and evaluators will be expected to undergo initial training and recurrent training at intervals that the Licensing Authority deems necessary, as well as update training relevant to the most recent technology and training methodologies appropriate to the competencies for which the students are being trained and examined.

7.5 The ATO is expected to ensure that sufficient trained and competent personnel are available for the continued effectiveness of its quality system.



## **Chapter 8**

### **THIRD-PARTY PROVIDERS (OUTSOURCING)**

#### **8.1 COURSEWARE**

8.1.1 As training programme design becomes ever more sophisticated an increasing number of ATOs are finding it advantageous to outsource the development of courseware. This is particularly true with competency-based programmes which are founded upon accurate job/task analyses that are further subjected to instructional systems design methodologies. The effort required to effectively design such a programme along with the relatively short-term need for an increase in manpower during the development phase will often drive ATOs to contact companies which specialize in designing training courseware.

8.1.2 Whether or not an ATO engages outside assistance in designing and providing courseware, the Licensing Authority needs to hold the ATO accountable for the quality and suitability of its courseware. The work being performed by the third-party provider should therefore be subjected to the same QA practices that the ATO is expected to apply to its own work.

#### **8.2 FACILITIES AND EQUIPMENT**

8.2.1 Frequently the aviation training industry runs in cycles, with ATOs operating below capacity for long periods of time only to suddenly find themselves inundated by demands that exceed their ability to deliver. To mitigate the impact of not being able to effectively respond and thus potentially lose valued customers, ATOs frequently have standing agreements with other institutions to lease their facilities and equipment.

8.2.2 The temporary utilization of another organization's facilities and equipment can pose some challenges in terms of the QA processes of the ATOs. It is precisely under these circumstances that a breakdown in vigilance can cause serious damage to the integrity and quality of the training. To protect against such lapses, ATOs should develop and document contingency plans in their quality manual for instances when training levels are such that the use of another institution's facilities and equipment is required.

#### **8.3 PERSONNEL**

8.3.1 The most frequent outsourcing practice of ATOs is the hiring of temporary instructional personnel, often from companies that specialize in providing licensed training personnel. It is during these times in particular that a robust quality system will protect the integrity and quality of an ATO's training programmes and the ATO's reputation for delivering quality products and services.

8.3.2 Despite their best intentions and qualifications, temporary employees elevate the risk of non-standardized delivery of training and of a decrease in the level of service provided to the ATO's clients. Detailed, documented policies, processes and procedures that are easy to understand and uniformly applied, combined with initial indoctrination training, will go a long way to mitigating this risk.

8.3.3 Besides training its regular staff, ATOs should ensure that refresher training is implemented on a scheduled basis for part-time or temporary instructional personnel prior to commencing their duties after a specified hiatus. Re-familiarization with the organization's quality system and expected levels of service should be included in this training scheme. As with the contingency plans discussed in 8.2, the policies, processes and procedures to be used for the employment of temporary instructional staff should be well documented in the ATO's quality manual.

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## Chapter 9

### RECORD-KEEPING

9.1 Keeping accurate and complete training records is an important aspect of complying with the approval requirements. It is also an essential tool for the ATO to ensure the continuity and consistency of its training. The qualifications required for training personnel and trainees should be recorded in the record-keeping system to ensure that those qualifications are monitored and current.

9.2 The record-keeping system of an ATO should have the following characteristics:

- a) **Completeness.** The records kept by the training organization should be sufficient to provide documentary evidence of each training action and allow the reconstruction of the training history of each student or instructor in the organization.
- b) **Integrity.** It is important to maintain the integrity of records, ensuring that they are not removed or altered. A backup of the records is also necessary to ensure continuity in case of a major disaster.

9.3 Each training organization should also establish rules for archiving personal employment and training records that are non-active. The rules for archiving records should also be consistent with the national requirement and the requirements contained in Appendix 2 to Annex 1, paragraph 8.3.





## Chapter 10

### OVERSIGHT EXERCISED BY THE LICENSING AUTHORITY

10.1 Oversight is the responsibility of the Licensing Authority. It consists of the approval process of an ATO and the continued surveillance of the ATO's training delivery after approval. The purpose of the surveillance activities is to ensure that the ATO is operating within the terms of its approval. It includes a review of the ATO's QA system, its administrative, technical and training records, as well as its operational activities. Surveillance is an ongoing function that may also include consideration of records held by the Licensing Authority, for example, flight test and examination results, in addition to on-site inspections, audits and other surveillance activities.

10.2 The main elements of the ATO activities that are subject to the Licensing Authority's oversight include, as applicable, the following:

- a) staff adequacy in terms of number and qualifications;
- b) validity of instructors' licences, certificates, ratings and authorizations;
- c) logbooks;
- d) appropriate and adequate facilities for the training and for the number of students;
- e) documentation process (e.g. the review and update of the training and procedures manual), with particular emphasis on course documentation, including records of system updates, training/operations manuals, etc.;
- f) training delivery in the classroom and in simulation devices and, if applicable, flight instruction or on-the-job training, including briefing and de-briefing;
- g) instructor training;
- h) QA practices;
- i) safety management system functionality;
- j) evaluation and checking;
- k) training, examination and assessment records;
- l) aircraft registration, associated documents and maintenance records; and
- m) training device qualification and approval.

10.3 A State may decide to delegate the approval and/or continued surveillance processes to a regional safety oversight organization (RSOO) set up by a group of States to achieve greater commonality and regional integration of regulations and operating standards in a cost-effective manner. In that case, the delegated functions should be clearly defined in the agreement document establishing the RSOO.

*Note.— Guidance on how a joint licensing approval and surveillance system could work within a regional safety oversight organization (RSOO) is contained in Doc 9734, Part B, and in Doc 9379.*

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## Chapter 11

### **AUTHORIZED EVALUATIONS AND CHECKS CARRIED OUT BY THE ATO**

11.1 Licensing Authorities will normally issue separate guidance on evaluation and checking of trainees. The Licensing Authority is responsible for ensuring that appropriate procedures are in place for the conduct of licensing and rating tests or checks. It is always desirable to avoid situations where the person giving the instruction is also responsible for evaluating the student on completion of the instruction. Ideally, the evaluation function for the purpose of the issue of a licence or rating should be carried out by evaluators who are independent from the ATO that conducts the training.

11.2 At the discretion of the Licensing Authority, it may be appropriate for the ATO to designate evaluators in accordance with criteria approved by the Licensing Authority. Such an arrangement should be considered only when the ATO can demonstrate that it is capable of consistent compliance with the standards prescribed by the Licensing Authority.

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## Chapter 12

### APPROVAL OF A FOREIGN ATO

#### 12.1 NEED FOR APPROVAL

There is often a need for a Licensing Authority to approve an ATO that is located outside the national territory. This is sometimes driven by cost considerations or simply because the national market is not sufficient to support certain types of specialized aviation training locally.

#### 12.2 APPROVAL PROCESS

12.2.1 In principle, there is no difference between the approval of training organizations based abroad and those based in-country. The principles and procedures that are described in this document fully apply to foreign-based ATOs.

12.2.2 In practice, there are difficulties that are essentially linked to the fact that Licensing Authorities may not have the necessary means to ensure proper oversight of ATOs located abroad. To overcome such difficulties, these Authorities have often found it convenient to rely on the approval and surveillance system of the host State to supplement their efforts. This approach is efficient but requires States that accept the oversight provided by the host State to fully understand the conditions and the regulatory basis of the original approval and the ongoing surveillance programme. This may lead to the establishment of supplementary oversight conditions.

#### 12.3 BILATERAL APPROVAL AGREEMENTS

Whenever possible, States are encouraged to set up jointly agreed-to procedures to minimize the likelihood of imposing an unnecessary burden on the Licensing Authorities and industry due to the duplication of approval activities by each concerned Authority. Following the initial issuance of an ATO's approval, States may gain some efficiency by comparing their approval processes with the host State and entering into shared best practices for a mutually beneficial ongoing oversight programme of ATOs within each other's territory.



## Appendix A

### CONTENT OF THE TRAINING AND PROCEDURES MANUAL

This appendix supplements the information in Appendix 2 to Annex 1. Part I of this appendix covers the content requirements for the training and procedures manual of all ATOs. Part II deals with the additional content requirements for ATOs that provide flight training utilizing aircraft.

#### Part I — Content requirements for all ATOs

The training and procedures manual should include the elements in paragraphs 1 to 8 of this appendix as far as they are appropriate to the type of training to be provided.

#### 1. GENERAL

- 1.1 Preamble relating to the use and applicability of the manual.
- 1.2 Table of contents.
- 1.3 Amendment, revision and distribution of the manual:
  - a) procedures for amendment;
  - b) record of amendments page;
  - c) distribution list; and
  - d) list of effective pages.
- 1.4 Glossary of definitions and significant terms, including a list of acronyms and/or abbreviations.
- 1.5 Description of the structure and layout of the manual, including:
  - a) the various parts and sections, as well as their contents and use; and
  - b) the paragraph numbering system.
- 1.6 Description of the scope of training authorized under the organization's terms of approval.
- 1.7 Organization (chart of the ATO's management organization — see examples in Appendix C) and the names of the post holders.
- 1.8 Qualifications, responsibilities and succession of command of management and key operational personnel, including but not limited to:

- a) accountable executive;
  - b) head of training;
  - c) instructional services manager;
  - d) quality manager;
  - e) maintenance manager, if applicable;
  - f) safety manager, if applicable;
  - g) instructors; and
  - h) examiners, evaluators and auditors.
- 1.9 Policies dealing with:
- a) the training organization's objectives, including ethics and values;
  - b) the selection of ATO personnel and the maintenance of their qualifications;
  - c) the training programme design and development, including the need for programme validation and review in accordance with Chapter 3, 3.6 and 3.8 of this manual, as well as the outsourcing of training programme development to third-party providers in accordance with Chapter 8 of this manual;
  - d) the evaluation, selection and maintenance of training material and devices;
  - e) the maintenance of the training facilities and equipment;
  - f) the development and maintenance of a quality system governance model (see Appendix B); and
  - g) the development and maintenance of a culture focused on safety in the workplace, including, when applicable, implementation of a safety management system governance model (see Appendix D).
- 1.10 Description of the facilities and equipment available, including:
- a) general-use facilities, including offices, stores and archives, and library or reference areas);
  - b) the number and size of classrooms, including installed equipment; and
  - c) the type and number of training devices, including their location if other than at the main training site.

## 2. STAFF TRAINING

2.1 Identification of persons or positions responsible for the maintenance of performance standards and for ensuring the competency of personnel.

2.2 Details of the procedures to validate the qualifications and determine the competency of instructional personnel as required by paragraph 7.3 of Appendix 2 to Annex 1.



2.3 Details of the initial and recurrent training programmes for all personnel as required by paragraph 7.4 of Appendix 2 to Annex 1, including awareness training with respect to their responsibilities within the ATO's system governance processes (see Appendices B and D for details on QS and SMS respectively).

2.4 Procedures for proficiency checks and upgrade training.

### 3. CLIENT TRAINING PROGRAMMES

Client training programmes cover each individual training programme conducted by the training organization for its customers and consist of a training plan, a practical training syllabus and a theoretical knowledge syllabus, if applicable, as described in 3.1, 3.2 and 3.3.

#### 3.1 Training plan

3.1.1 The aim of the course in the form of a statement of what the student is expected to be able to do as a result of the training, the level of performance and the training constraints to be observed.

3.1.2 Pre-entry requirements, including:

- a) minimum age;
- b) education or qualification requirements;
- c) medical requirements; and
- d) linguistic requirements.

3.1.3 Credits for previous knowledge, experience or other qualifications, which should be obtained from the Licensing Authority before the training commences.

3.1.4 Training curricula, including:

- a) theoretical training (knowledge);
- b) practical training (skills);
- c) training in the domain of Human Factors (attitudes);

*Note.— Guidance material to design training programmes on human performance can be found in Doc 9683.*

- d) assessment and examinations; and
- e) monitoring of the training process, including assessment and examination activities.

3.1.5 Training policies in terms of:

- a) restrictions regarding the duration of training periods for students and instructors; and
- b) if applicable, minimum rest periods.

- 3.1.6 Policy for the conduct of student evaluation, including the:
- a) procedures for authorization of tests;
  - b) procedures for remediation training before retest and procedures for re-writing knowledge tests;
  - c) test reports and records;
  - d) procedures for skill progress checks and skill tests;
  - e) procedures for knowledge progress tests and knowledge tests, including procedures for knowledge test preparation, types of questions and assessments, and standards required for a pass; and
  - f) procedures for question analysis and review and for issuing replacement exams (applicable to knowledge tests).
- 3.1.7 Policy regarding training effectiveness, including:
- a) liaison procedures between training departments;
  - b) requirements for reporting and documentation;
  - c) internal feedback system for detecting training deficiencies;
  - d) completion standards at various stages of training to ensure standardization;
  - e) individual student responsibilities;
  - f) procedures to correct unsatisfactory progress;
  - g) procedures for changing instructors;
  - h) maximum number of instructor changes per student; and
  - i) procedures for suspending a student from training.

## **3.2 Syllabi for non-competency-based training programmes**

### **3.2.1 Practical training syllabus**

3.2.1.1 A statement of how the course will be divided into phases, indicating how the phases will be arranged to ensure completion in the most suitable learning sequence and that exercises will be repeated at the proper frequency.

3.2.1.2 The syllabus hours for each phase and for groups of lessons within each phase and when progress tests are to be conducted.

3.2.1.3 A statement of the standard of proficiency required before progressing from one phase of training to the next. It includes minimum experience requirements and satisfactory exercise completion before undertaking the next phase.

3.2.1.4 Requirements for instructional methods, particularly with respect to adherence to syllabi and training specifications.

3.2.1.5 Instruction for the conduct and documentation of all progress checks.

3.2.1.6 Instruction, where applicable, given to all examining staff regarding the conduct of examinations and tests.

### 3.2.2 *Theoretical knowledge syllabus*

The syllabus for theoretical knowledge instruction should be structured generally as in 3.2 of this appendix but with a training specification and objective for each subject.

## 3.3 Syllabus for competency-based training programmes

3.3.1 Modern training programmes should be competency-based.

3.3.2 Competency-based training programmes are based upon a job and task analysis to define the knowledge, skills and attitudes required to perform a job or a task. Such programmes use an integrated approach in which the training in the underlying knowledge to perform a task is followed by practice of the task so that the trainee acquires the underlying knowledge, skills and attitudes related to the task in a more effective way.

3.3.3 As a result, the syllabus is structured as a single document that is subdivided into modules containing a training objective and the same information as in 3.2.1, but applied to both the theoretical knowledge and practical training delivered by the module.

## 4. TESTS AND CHECKS CONDUCTED BY THE ATO FOR THE ISSUANCE OF A LICENCE OR A RATING

When a State has authorized an ATO to conduct the testing required for the issuance of a licence or rating in accordance with the training and procedures manual, the manual should include:

- a) the name(s) of the personnel with testing authority and the scope of the authority;
- b) the role and duties of the authorized personnel;
- c) if the school has been given authority to appoint personnel to conduct the testing required for the issuance of a licence or rating, the minimum requirements for appointment as well as the selection and appointment procedure; and
- d) the applicable requirements established by the Licensing Authority, such as:
  - the procedures to be followed in the conduct of checks and tests; and
  - the methods for completion and retention of testing records as required by the Licensing Authority.

## 5. RECORDS

Policy and procedures regarding:

- a) attendance records;
- b) student training records;

- c) staff training and qualification records;
- d) persons responsible for checking records and student personal logs;
- e) nature and frequency of record checks;
- f) standardization of record entries;
- g) personal log entries; and
- h) security of records and documents.

## **6. SAFETY MANAGEMENT SYSTEM (IF APPLICABLE)**

The requirement to adopt SMS practices is intended to be restricted to only those training entities whose activities directly impact on the safe operation of aircraft. Should that requirement apply to the ATO, the training and procedures manual, as stated in paragraph 1.9 of this appendix, must address the ATO's SMS by reference to a separate manual or including the SMS practices in the training and procedures manual.

## **7. QUALITY ASSURANCE (QA)**

Provide a brief description of the QA practices, as required by paragraph 5 of Appendix 2 to Annex 1, by reference to a separate quality manual or including the QA practices in the training and procedures manual (refer to Appendix B, paragraph 9).

## **8. APPENDICES**

As required:

- a) sample progress test forms;
- b) sample logs, test reports and records; and
- c) a copy of the approved training organization's approval document.

### **Part II — Additional content for flight training organizations (utilizing aircraft)**

The training and procedures manual for ATOs that provide flight training utilizing aircraft should include additional elements to those indicated in Part I, as contained in paragraphs 9 to 12 of this appendix.

## **9. FLIGHT TRAINING — GENERAL**

9.1 Qualifications, responsibilities and succession of command of management and key operational personnel (in addition to paragraph 1.8 of this appendix), including but not limited to:

- a) chief flight instructor; and
  - b) chief ground instructor.
- 9.2 Policies and procedures (in addition to paragraph 1.9 of this appendix) dealing with:
- a) approval of flights;
  - b) responsibilities of the pilot-in-command;
  - c) flight planning procedures — general;
  - d) carriage of passengers;
  - e) operational control system;
  - f) reporting of safety hazards, incidents and accidents (see Appendix D for more details);
  - g) duty periods and flight time limitations for flying staff members and students; and
  - h) minimum rest periods for flying staff members and students.
- 9.3 Description of the facilities and equipment available (in addition to paragraph 1.10 of this appendix), including:
- a) flight simulation training devices and training aircraft;
  - b) maintenance facilities and apron parking areas for training aircraft;
  - c) computer-based classrooms; and
  - d) dispatch control and briefing areas.

## **10. AIRCRAFT OPERATING INFORMATION**

- 10.1 Certification and operating limitations.
- 10.2 Aircraft handling, including:
- a) performance limitations;
  - b) use of checklists;
  - c) standard operating procedures; and
  - d) aircraft maintenance procedures.
- 10.3 Instructions for aircraft loading and securing of load.
- 10.4 Fuelling procedures.
- 10.5 Emergency procedures.

## 11. ROUTES

- 11.1 Performance criteria, e.g. take-off, en route and landing.
- 11.2 Flight planning procedures including:
  - a) fuel and oil requirements;
  - b) minimum safe altitudes;
  - c) planning for contingencies (e.g. emergency or diversion scenarios); and
  - d) navigation equipment.
- 11.3 Weather minima for all instructional training flights during day, night, VFR and IFR operations.
- 11.4 Weather minima for all student training flights at various stages of training.
- 11.5 Training routes and practice areas.

## 12. FLIGHT TRAINING PLAN

- 12.1 Training curricula (in addition to paragraph 3.1.4 of this appendix), including, as applicable, the:
    - a) flying curriculum (single-engine);
    - b) flying curriculum (multi-engine);
    - c) theoretical knowledge curriculum; and
    - d) flight simulation training curriculum.
  - 12.2 The general arrangements of daily and weekly programmes for flying training, ground training and flight simulation training.
  - 12.3 Training policies (in addition to paragraph 3.1.5 of this appendix) in terms of:
    - a) weather constraints;
    - b) maximum student training times for flight, theoretical knowledge and flight simulation training, per day/week/month;
    - c) restrictions in respect of training periods for students;
    - d) duration of training flights at various stages;
    - e) maximum individual student flying hours in any day or night period;
    - f) maximum number of individual student training flights in any day or night period; and
    - g) minimum rest periods between training periods.
-

## Appendix B

### QUALITY ASSURANCE AND THE QUALITY SYSTEM OF THE ATO

#### 1. QUALITY POLICY AND STRATEGY

1.1 The ATO shall describe how the organization formulates, deploys and reviews its policy and strategy and turns them into plans and actions applicable to all levels of the organization. A formal, written quality policy should be prepared, establishing a commitment by the accountable executive of the training organization to achieving and maintaining the highest possible standards of quality. The quality policy should reflect the achievement of, and continued compliance with, relevant parts of Appendix 2 to Annex 1, together with all applicable national regulations and any additional standards specified by the ATO.

1.2 The accountable executive of the training organization will have the overall responsibility for the standard of quality including the frequency, format and structure of the internal management review and analysis activities and may delegate responsibility for the tasks defined under paragraph 2 of this appendix to a quality manager. Depending on the size and scope of the organization and the requirements of the Licensing Authority, the accountable executive and quality manager may interact in different ways as illustrated in the organizational charts in Appendix C.

#### 2. QUALITY MANAGER

2.1 The primary role of the quality manager is to verify, by monitoring activities in the field of training, that the standards as established by the ATO and any additional requirements of the Licensing Authority are being carried out properly.

2.2 The quality manager should be responsible for ensuring that the quality system is properly documented, implemented, maintained and continuously reviewed and improved (see paragraph 17 of this appendix).

2.3 The quality manager should:

- a) report directly to the head of training (see Note); and
- b) have unencumbered access to all parts of the ATO.

*Note.— When the head of training is not the accountable executive, reporting mechanisms should be instituted to ensure that the accountable executive is aware of all issues impacting the quality of the training services being provided by the affected ATO (see example 2 in Appendix C).*

2.4 The quality manager should be responsible for ensuring that personnel training related to the quality system is conducted.

#### 3. QUALITY ASSURANCE (QA)

3.1 The term QA is frequently misunderstood to mean the testing and checking of products and services. Organizations that only do checking and testing activities are merely applying “quality control” measures, which are

designed to catch product and service defects but not necessarily prevent them. For example, an ATO that administers exams at the end of the training syllabus, only to discover that a large proportion of the students have failed to meet the required standard, has only identified a deficiency in expected results. The implication could be that there is a problem with the training programme or the instructor or even the student selection criteria. In this instance the ATO has no idea what the real problem is or what to do about it. Quality control, by itself, provides limited value without the suite of complementary activities that comprise QA.

3.2 QA, on the other hand, attempts to improve and stabilize the training process and to identify and avoid, or at least minimize, issues that lead to problems in the first place. It continuously verifies that standards are adhered to throughout the training process by introducing various checkpoints and controls. It further introduces a system of audits to ensure that documented policies, processes and procedures are consistently followed. It is the “assurance” part of quality management.

3.3 A QA plan for an ATO should encompass well-designed and documented policies, processes and procedures for at least the following activities:

- a) monitor training services and process controls;
- b) monitor assessment and testing methods;
- c) monitor personnel qualifications and training;
- d) monitor training devices and equipment qualification, calibration and functionality, as applicable;
- e) conduct internal and external audits;
- f) develop, implement and monitor corrective and preventive actions and associated reporting systems (see paragraph 8 of this appendix); and
- g) utilize appropriate statistical analysis to identify and respond appropriately to trends.

3.4 An effective QA plan will aid significantly in the ATO’s compliance with requirements, its conformity with the standards and the adequacy of its training activities. To take the ATO’s performance to a higher level requires a structure that ensures that the combined QA effort of the employees reaches its full potential.

*Note.— Annex 1 requires ATOs only to establish and implement QA policies, processes and procedures acceptable to the Licensing Authority granting the approval, which ensures that training and instructional practices comply with all relevant requirements.*

3.5 QA plans by themselves are subject to breakdowns in human performance and therefore are in need of robust organizational structures that underpin the QA efforts of individuals. It is for this reason that ATOs and States should embrace the quality system governance model described in this appendix.

#### 4. QUALITY SYSTEM FOR THE ATO

4.1 A quality system is the aggregate of all the organization’s activities, plans, policies, processes, procedures, resources, incentives and infrastructure working in unison towards a total quality management approach. It requires an organizational construct complete with policies, processes, procedures and resources that underpins a commitment to achieve excellence in product and service delivery through the implementation of best practices in quality management.



4.2 An ATO that supports its QA plan with a well-designed, implemented and maintained quality system structure should be able to easily and repeatedly achieve results that exceed both the requirements of the applicable national regulations and the expectations of the ATO's clients.

4.3 The basic attributes of an effective quality system should include, but are not necessarily limited to:

- a) a managerial structure that facilitates and encourages clear and unencumbered access to the decision makers (Appendix C provides some examples);
- b) an overarching company commitment to achieving excellence in the delivery of training services, rather than meeting minimum requirements;
- c) quality policies, processes and procedures that are well-designed, consistently applied and subject to formalized review and refinement processes;
- d) an employee training plan that instils and promotes best practices in quality management efforts;
- e) an organizational risk profile and corresponding risk management plan, which together provide a comprehensive list of hazards that are tied to the ATO's activities and establish mitigating measures to effectively manage those risks which threaten the achievement of desired standards of performance; and
- f) a strategic review of policies and procedures which measures the organization's current assumptions, objectives and plans by applying a relevance test matched to evolving trends in the industry or changes occurring within the ATO.

## 5. ORGANIZATIONAL RISK PROFILE

5.1 An organizational risk profile is an inventory of identified hazards and threats that present risks which are likely to prevent conformity with the required standards of performance. This "threat to quality" list is normally arrived at by first establishing a directory of those activities that routinely take place in order to deliver and administer a training programme. Once complete, the activity directory is then expanded to identify the hazards and threats associated with each individual activity. Some examples of routine activities that should be examined during this process are:

- a) selection and training of staff;
- b) training programme development, validation and review;
- c) development and maintenance of training courseware;
- d) administrative staff duties in support of the training programme, the instructors and evaluators, and the students;
- e) delivery of training;
- f) record-keeping;
- g) assessment and examination processes; and
- h) client and Licensing Authority feedback.

5.2 The risks identified through this exercise should not be limited to just those which currently exist but should also include those potential risks that could arise from a change to existing circumstances or conditions.

## **6. RISK MANAGEMENT PLAN**

6.1 A risk management plan is designed to mitigate the identified risks, real or potential, which were derived from the organizational risk profile exercise. The plan's objective is not to eliminate risk so much as it is to effectively manage risk by putting in place risk controlling measures.

6.2 A well-developed and implemented risk management plan will substantially aid in accurately scoping out the depth and frequency of planned QA-related activities.

6.3 The plan should be subject to the management review process outlined in paragraph 4.3 f) of this appendix.

6.4 The current risk management plan should be readily accessible to all employees so that it can be accurately followed and open to comment for improvement.

## **7. COHERENCE MATRIX**

7.1 A coherence matrix, sometimes known as a correspondence matrix, is a very powerful addition to the ATO's compliance efforts. It is a detailed, tabulated document that lists all the applicable regulatory requirements imposed on the ATO. Beside each listed provision there should be at least two descriptive elements that identify:

- a) the existing processes that are designed to ensure continuous compliance with that specific regulatory rule or standard; and
- b) the individual managerial position responsible for the effective implementation of each process.

7.2 The coherence matrix should indicate the most recently completed and next intended audits designed to validate the functionality of each of the identified processes. Any recent audit findings should be listed in the matrix or referred to as being documented in a separate "register of findings".

7.3 The coherence matrix is developed and managed by the quality manager and is subject to the management review process outlined in paragraph 4.3 f) of this appendix.

7.4 The current coherence matrix should be readily accessible to all employees so that it can be accurately followed and open to comment for improvement.

## **8. CORRECTIVE AND PREVENTIVE ACTION REPORTS**

8.1 QA plans should include a well-structured reporting system to ensure that suggestions by ATO personnel for both corrective and preventive actions are recorded and promptly addressed. Paragraph 3.3 f) of this appendix identifies this as a necessary component of QA.

8.2 After an analysis of the reports submitted, the reporting system should specify who is required to rectify a discrepancy and/or non-conformity in each particular case and the procedure to be followed if corrective action is not completed within an appropriate timescale. Just as important, the reporting system should identify who is required to investigate and act upon any report identifying measures that could prevent a non-conformity from occurring.

8.3 Corrective and preventive action reports should be able to be submitted anonymously, if individuals so choose, to maximize the opportunity for open and effective reporting.

*Note.— Since corrective and preventive action reports, in this instance, represent suggestions for improvement in conformity levels and deal with quality issues, this reporting system and its processes should be managed by the quality manager.*

## 9. QUALITY-RELATED DOCUMENTATION

9.1 Relevant documentation includes parts of the training and procedures manual which may be included in a separate quality manual.

9.2 In addition, the relevant documentation should include the following:

- a) quality policy and strategy;
- b) glossary;
- c) organizational risk profile;
- d) risk management plan;
- e) coherence matrix;
- f) procedures and reporting system for corrective and preventive actions;
- g) specified training standards;
- h) description of the organization;
- i) assignment of duties and responsibilities; and
- j) training procedures related to the quality system to ensure regulatory compliance.

9.3 The QA audit programme documentation should reflect:

- a) the schedule of the monitoring process;
- b) audit procedures;
- c) reporting procedures;
- d) procedures for follow-up and corrective actions;
- e) the recording system; and
- f) document control.

## 10. QA AUDIT PROGRAMME

The QA audit programme should include all planned and systematic actions necessary to provide confidence that every training activity is being conducted in accordance with all applicable requirements, standards and procedures.

## 11. QUALITY INSPECTION

11.1 The primary purpose of a quality inspection is to review a document or observe a particular event, action, etc., in order to verify whether established training procedures and requirements were followed during the conduct of the inspection and whether the required standard was achieved.

11.2 Examples of typical subject areas for quality inspections are:

- a) actual training sessions;
- b) maintenance, if applicable;
- c) technical standards; and
- d) training standards.

## 12. QUALITY AUDITS

12.1 An audit is a systematic and independent comparison between the way in which training is being conducted and the way in which it should be conducted according to the published training procedures.

12.2 Audits should include at least the following quality procedures and processes:

- a) a description of the scope of the audit, which should be explained to the personnel to be audited;
- b) planning and preparation;
- c) gathering and recording evidence; and
- d) analysis of the evidence.

12.3 The various techniques that make up an effective audit are:

- a) a review of published documents;
- b) interviews or discussions with personnel;
- c) the examination of an adequate sample of records;
- d) the witnessing of the activities which make up the training; and
- e) the preservation of documents and the recording of observations.

## 13. AUDITORS

13.1 The ATO should decide, depending on the complexity of the organization and the training being conducted, whether to make use of a dedicated audit team or a single auditor. In any event, the auditor or audit team should have relevant training and/or operational experience.

13.2 The responsibilities of the auditors should be clearly defined in the relevant documentation.

## 14. AUDITOR'S INDEPENDENCE

14.1 Auditors should not have any day-to-day involvement in the area of the operation or maintenance activity that is to be audited.

14.2 An ATO may, in addition to using the services of full-time dedicated personnel belonging to a separate quality department, undertake the monitoring of specific areas or activities through the use of part-time auditors. An ATO whose structure and size does not justify the establishment of full-time auditors may undertake the audit function using part-time personnel from within its own organization or from an external source under the terms of an agreement acceptable to the Licensing Authority.

14.3 In all cases the ATO should develop suitable procedures to ensure that persons directly responsible for the activities to be audited are not selected as part of the auditing team. Where external auditors are used, it is essential that any external specialist has some familiarity with the type of activity conducted by the ATO.

14.4 The QA audit programme of the ATO should identify the persons within the organization who have the experience, responsibility and authority to:

- a) perform quality inspections and audits as part of ongoing QA;
- b) identify and record concerns or findings and the evidence necessary to substantiate such concerns or findings;
- c) initiate or recommend solutions to concerns or findings through designated reporting channels;
- d) verify the implementation of solutions within specific and reasonable timescales; and
- e) report directly to the quality manager.

## 15. AUDIT SCHEDULING

15.1 A QA audit programme should include a defined audit schedule and a periodic review cycle. The schedule should be flexible and allow unscheduled audits when negative trends are identified. The quality manager should schedule follow-up audits when necessary to verify that a corrective action resulting from a finding was carried out and that it is effective.

15.2 An ATO should establish a schedule of audits to be completed during a specific calendar period. This schedule should be influenced by the organizational risk profile and be reflected in both the risk management plan and the coherence matrix documents. As a minimum, all aspects of the training should be reviewed within a period of twelve months in accordance with the audit programme.

15.3 When an ATO defines the audit schedule, it should take into account significant changes to the management, organization, training or technologies, as well as changes to the standards and requirements as discussed in paragraph 4.3 f) of this appendix.

## 16. MONITORING AND CORRECTIVE ACTION

16.1 The aim of monitoring within the quality system is primarily to investigate and judge its effectiveness and thereby ensure that defined policy and training standards are continuously complied with. Monitoring and corrective action functions fall under the responsibilities of the quality manager. Monitoring activity is based upon:

- a) quality inspections;
- b) quality audits; and
- c) corrective and preventive action reports and subsequent follow-up.

16.2 Any non-conformity identified as a result of monitoring should be communicated by the quality manager to the manager responsible for taking corrective action or, if appropriate, to the head of training or, when circumstances warrant, to the accountable executive. Such non-conformity should be recorded for the purpose of further investigation in order to determine the cause and to enable the recommendation of an appropriate corrective action.

16.3 The QA audit programme should include procedures to ensure that corrective and preventive actions are developed in response to findings. Personnel implementing these procedures should monitor such actions to ensure that they have been completed and verify their effectiveness. Organizational responsibility and accountability for the implementation of corrective action resides with the department where the finding was identified. The accountable executive will have the ultimate responsibility for ensuring, through the quality manager, that the corrective action has re-established conformity with the standard required by the ATO and any additional requirements established by the Licensing Authority or the ATO.

16.4 As part of its quality system, the ATO should identify internal and external customers and monitor their satisfaction by measurement and analysis of feedback.

## 17. CONTINUOUS IMPROVEMENT PROCESS

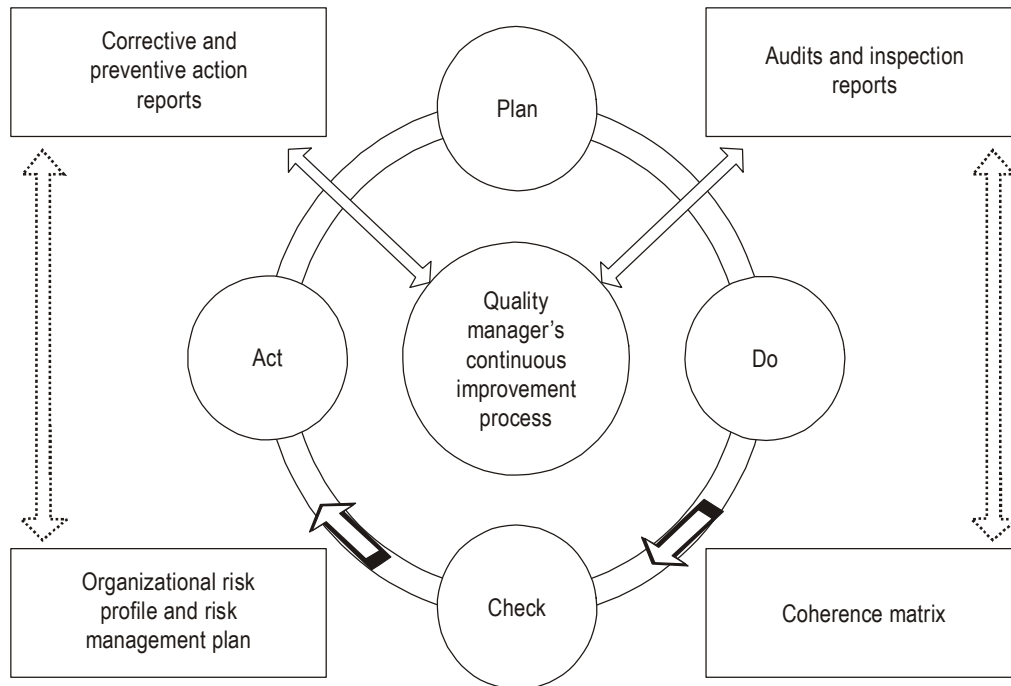
17.1 As stated in 2.2 of this appendix, the quality manager should be responsible for the review and continuous improvement of the established quality system's policies, processes and procedures. The following tools, on which the quality manager relies, are essential to the continuous improvement process:

- a) organizational risk profile;
- b) risk management plan;
- c) coherence matrix;
- d) corrective and preventive action reports; and
- e) inspection and audit reports.

17.2 These tools and processes are interrelated and help define the continuous improvement efforts of the organization. For example, any corrective or preventive action report could identify a deficiency or an opportunity for improvement. As outlined in 8.2 of this appendix, the quality manager would then be required to ensure the identified issue was addressed and corrective action effectively implemented. The same would be true if the issue was identified during an inspection or audit.

17.3 The effective implementation of change and the subsequent validation that the change did indeed result in the desired outcome are critical to the continuous improvement process. Simply introducing a well-meaning suggestion for improvement into the organization without carefully managing that change could have undesirable consequences. It is therefore incumbent upon the quality manager to responsibly introduce, monitor and validate improvement efforts.

17.4 A simplistic but effective process to use in managing continuous improvement is known as the plan-do-check-act, or PDCA, approach, which is illustrated in Figure App B-1 and described below:



**Figure App B-1. The plan – do – check – act approach**

- a) **Plan.** Map out the implementation of the recommended change, identifying at least:
  - 1) the people who will be affected by the change;
  - 2) the required quality control measures necessary to mitigate risk; and
  - 3) the desired outcome and its intended consequences.
- b) **Do.** Execute the implementation plan once all affected groups have accepted the proposal and understand their role in ensuring its success.
- c) **Check.** Apply sufficient quality control “stage” checks throughout the implementation phase to ensure any unintended deviations in the execution are identified and addressed without delay.
- d) **Act.** Analyse the results and take appropriate action as necessary.

## 18. MANAGEMENT REVIEW AND ANALYSIS

18.1 Management should accomplish a comprehensive, systematic and documented review and analysis of the quality system, training policies and procedures and should consider:

- a) the results of quality inspections, audits and any other indicators;

- b) the overall effectiveness of the management organization in achieving stated objectives; and
- c) the correction of trends and, where applicable, the prevention of future non-conformities.

*Note.— Paragraph 4.3 of this appendix identifies the basic attributes which require review and analysis.*

18.2 Conclusions and recommendations made as a result of the review and analysis should be submitted to the responsible manager, in writing, for action. The responsible manager should be an individual who has the authority to resolve relevant issues and take action. The head of training should decide on the frequency, format and structure of meetings for internal review and analysis, in coordination with the accountable executive, if different, because the accountable executive has the overall responsibility for the quality system including the frequency, format and structure of the internal management review and analysis activities (see 1.2 of this appendix).

## 19. RECORDS

19.1 Accurate, complete and readily accessible records documenting the result of the QA audit programme should be maintained by the ATO. Records are essential data to enable an ATO to analyse and determine the root causes of non-conformity so that areas of non-compliance can be identified and subsequently addressed.

19.2 Records should be retained at least for the period that may be mandated by national requirements. In the absence of such requirements, a period of three years is recommended. The relevant records include:

- a) audit schedules;
- b) quality inspection and audit reports;
- c) responses to findings;
- d) corrective and preventive action reports;
- e) follow-up and closure reports; and
- f) management review and analysis reports.

## 20. QA RESPONSIBILITY FOR SATELLITE ATOs

20.1 An ATO may decide to subcontract certain training activities to external organizations subject to the approval of the Licensing Authority.

20.2 The ultimate responsibility for the training provided by the satellite ATO always remains with the ATO. A written agreement should exist between the ATO and the satellite ATO clearly defining the training services to be provided and the level of quality to be assured. The satellite ATO's activities relevant to the agreement should be included in the ATO's QA audit programme.

20.3 The ATO should ensure that the satellite ATO has the necessary authorization/approval when required and commands the resources and competence to undertake the task.



## 21. QA TRAINING

21.1 As outlined in 4.3 d) of this appendix, appropriate and thorough training is essential to optimize quality in every organization. To achieve this, the ATO should ensure that all staff members understand the objectives as laid out in the quality manual, to a level relevant to their duties, including:

- a) the concept of QA and associated systems;
- b) quality management;
- c) the quality manual;
- d) inspections and audit techniques; and
- e) reporting and recording.

21.2 Time and resources should be allocated to provide appropriate levels of QA training to every employee.

21.3 QA courses are available from the various national or international standards institutions, and an ATO should consider whether to offer such courses to those likely to be involved in the management or supervision of QA processes. Organizations with sufficient appropriately qualified staff should consider the possibility of providing in-house training.

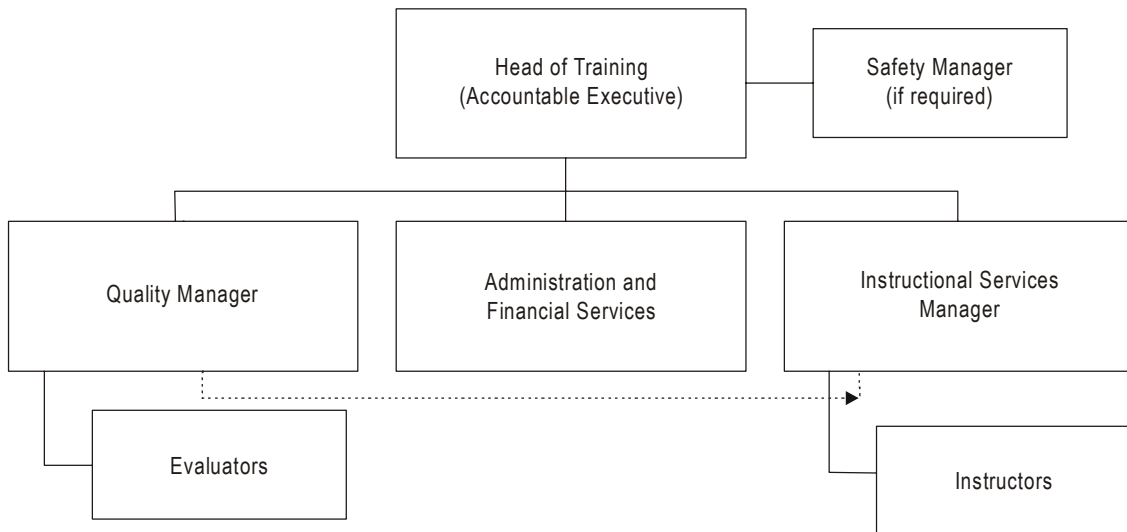
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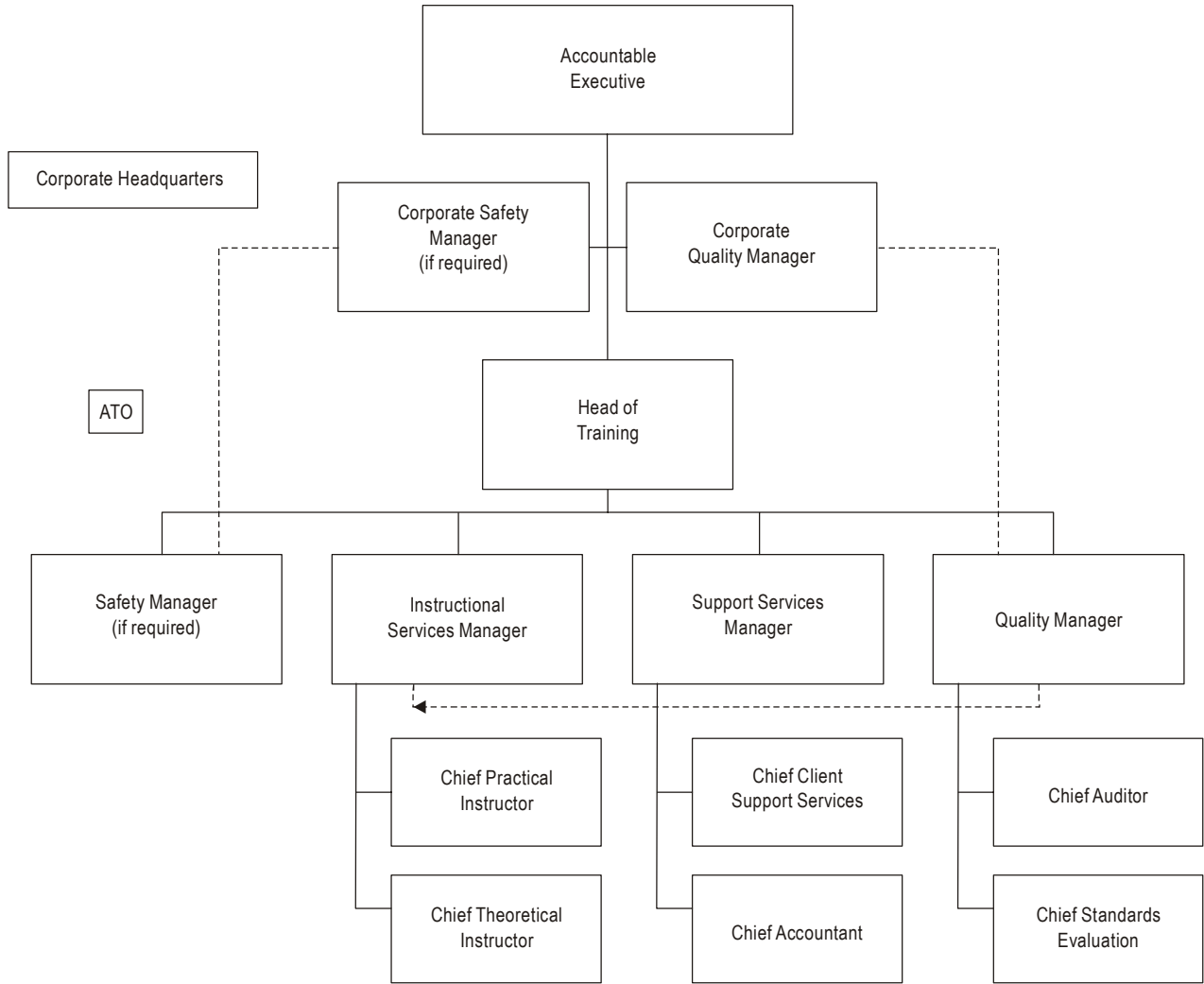
## Appendix C

### ORGANIZATIONAL STRUCTURE OF THE ATO

The following organizational charts are by no means exhaustive and do not pretend to meet all operational requirements. They are provided only to assist training organizations in developing and maintaining an organizational structure that is consistent with the needs of an effective quality system governance model.

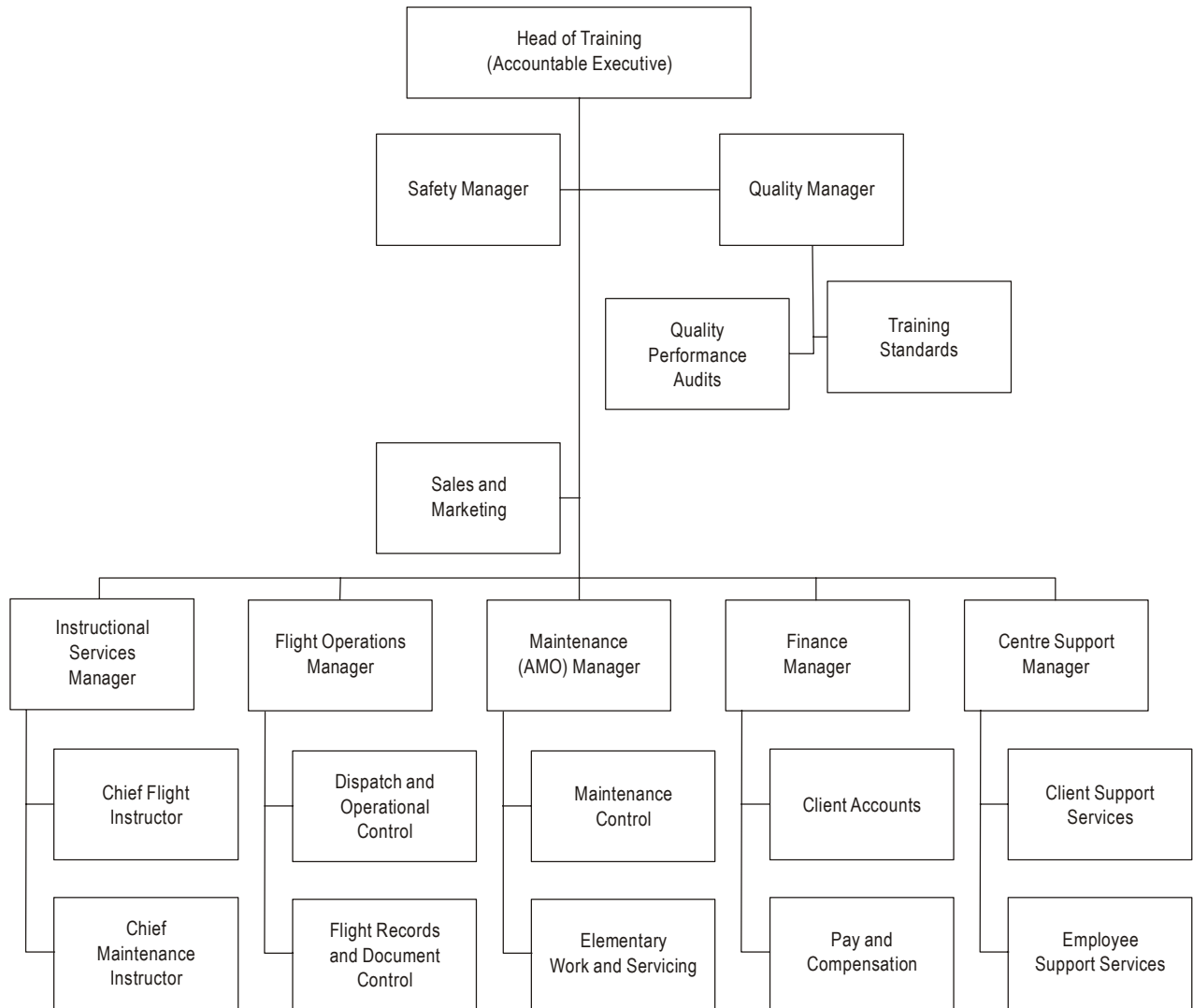


**Figure App C-1. Example of a very small generic training organization**



**Figure App C-2. Example of a small/medium (complex) generic training organization**

This example depicts a training organization that is part of a much larger company, which oversees it as a business unit.



**Figure App C-3. Example of a large (complex) multi-faceted training organization**

This ATO has an AMO certificate for maintenance of aircraft. The AMO may also be involved in on-the-job training for the aircraft maintenance students. In this instance, the ATO has an SMS programme covering both aircraft flight operations and maintenance activities.



## **Appendix D**

### **THE SAFETY MANAGEMENT SYSTEM (SMS) OF THE ATO**

#### **1. SAFETY POLICY**

1.1 Appendix 2 to Annex 1 requires all ATOs that engage in activity which directly impacts the safe operation of aircraft to operate within a safety management system. Doc 9859 provides very detailed guidance on the history of aviation safety, why SMS is so important in industry's collective effort to reduce safety occurrences, and how to design and maintain an effective SMS.

1.2 Safety is defined as the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management. The purpose of an SMS is to provide the ATO with effective policies, processes and procedures that permit it to achieve and maintain safe operations.

1.3 The way an ATO operates is affected primarily by the decisions and actions of its management. The style of management and the approach that is taken in dealing with operational issues will profoundly influence the employees' beliefs, behaviours, and even their values. Therefore, it is essential that the ATO's senior management take an active and genuine interest in the development and maintenance of the organization's SMS. That enthusiasm and commitment must be repeatedly conveyed to all employees through the words and action of every single member of the management team.

1.4 The ATO's safety policy needs to be developed, documented and signed off by the accountable executive. It should be communicated and made clear to all employees. The policy is required to state the management's commitment to safety, all employee responsibilities and safety accountabilities with respect to the SMS, and to identify the key safety personnel. The policy should also reflect management's resolve to foster a robust safety reporting culture and should identify those conditions under which employees will not be subjected to punishment or retribution. The development of an SMS policy is detailed in Chapter 8 of Doc 9859.

#### **2. SAFETY MANAGER**

2.1 Appendix 4 to Annex 1 requires all ATOs that operate within an SMS to appoint an individual to fulfil the duties of safety manager. The scope of the safety manager's duties should include safety planning, safety programme implementation and the operation of the SMS.

2.2 The safety manager, like the quality manager, should report directly to the head of training. If the organizational structure is similar to the one depicted in Figure App C-2 of Appendix C, then the safety manager should have a reporting capability to the accountable executive.

#### **3. SAFETY MANAGEMENT SYSTEM**

3.1 SMS is a systems-based approach for organizations to effectively manage risk. The scope of an ATO's SMS should be directly proportional to the organization's size and the complexity of its operations.

3.2 Appendix 4 to Annex 1 outlines the framework of an SMS and describes the necessary components and elements of such a system.

3.3 Doc 9859 details the design and strategies for a phased-in implementation of SMS.

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# Appendix E

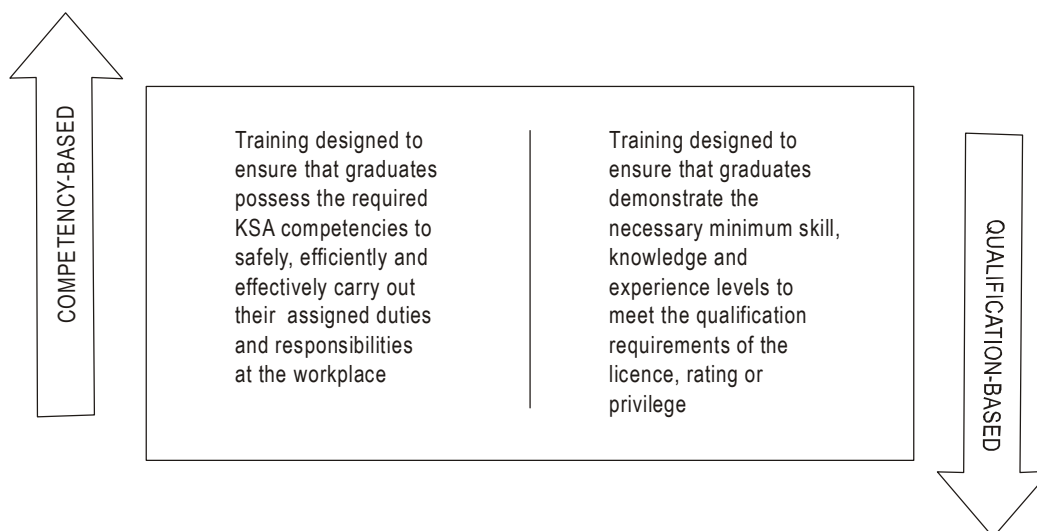
## COMPETENCY-BASED TRAINING PROGRAMMES

### 1. DEFINITION AND OBJECTIVES

1.1 One powerful and relatively new addition to civil aviation training is the application of competency-based training methodologies. This approach represents a paradigm shift away from “traditional” training and is all too frequently misunderstood by much of the industry and Licensing Authorities alike because of its complex course-development methodology and the requirement for continuous assessment and for qualification of evaluators (see Doc 9868, 2.2). In competency-based training, the training programme focus is on trainees acquiring all the knowledge (K), skill (S) and attitude (A), often referred to as KSA, necessary to achieve the competencies, to perform their duties in a safe, efficient and effective manner at the workplace. This goal of competency-based training is very different from other training programmes, which are designed so that the trainee meets the minimum skill, knowledge and experience requirements of the licence, permit, certificate, rating or operational authorization being sought, as illustrated in Figure App E-1.

1.2 Competency-based training and assessment is defined in Doc 9868 as “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.” It is important to realize that this training process is derived from a thorough job and task analysis and is focused on the achievement of well-defined benchmarked standards of performance as opposed to other training programmes that simply focus on the acquisition of minimum prescribed levels of skill, knowledge and experience.

1.3 Once the philosophical differences between the two methodologies are understood, the challenge then becomes to properly apply the required components in the design and implementation of a competency-based training programme.



**Figure App E-1. Difference between competency-based training and qualification-based training methodologies**

## 2. UNDERPINNING ATTRIBUTES

2.1 ATOs that wish to offer competency-based training should be mindful of the complexities in both the design and the delivery of such programmes. From initial conceptualization until the completion of the evaluation stage, the programme will often require a significant investment in highly skilled resources. The expense of temporarily acquiring these resources may be prohibitive for some ATOs, and as a result they may contract out some or all of the programme's development to firms specialized in courseware and learning systems for initial assistance with the desired programme's implementation.

2.2 Similarly, Licensing Authorities need to be mindful that they will likely require specialized training for their personnel in order to approve and oversee the competency-based training with a good measure of confidence. Appendix G outlines some supplemental training considerations.

2.3 In order to effectively introduce competency-based training, ATOs and Licensing Authorities need to understand the following underpinning attributes of such a highly-structured training programme:

- a) instructional systems design (ISD) processes;
- b) learning management systems (LMSs);
- c) programme and learning dynamics;
- d) screening and selection criteria; and
- e) continuous assessment principles.

## 3. INSTRUCTIONAL SYSTEMS DESIGN

3.1 ISD is a highly structured, systematic approach to the development and delivery of training. ISD methodologies are focused on effectively addressing specifically targeted objectives derived from a detailed task or job description. Attached to these task/job descriptions are measurable performance standards identified as being essential to safely, effectively and efficiently carrying out the assigned duties.

3.2 The ISD methodology adopted by ICAO has three distinct stages, sometimes referred to as categories (see Figure App E-2). The first is the analysis stage during which the needs of the programme are determined. The second is known as the design and production stage, and the third is known as the evaluation stage.

3.3 ATOs should refer to the Attachment to Chapter 2 of Doc 9868 for details on the specific activity and desired objectives of each of these ISD stages.



**Figure App E-2. The three ISD stages (categories) of implementing competency-based training**

#### 4. LEARNING MANAGEMENT SYSTEMS

4.1 Competency-based training demands continuous assessment of trainees against benchmarked performance standards. Additionally, ATOs need to ensure that the development and delivery of their training programmes are captured by their quality assurance programmes. These two fundamentals can sometimes be difficult to achieve when the ATO's resources are limited. Regardless, competency-based training requires significantly well-structured learning management processes to be in place.

4.2 Although it is possible to manage the delivery of such a programme with tools as simple as chalkboards, tracking sheets and training booklets, the necessities of this type of specialized training make it highly desirable to have more effective LMSs in place.

4.3 An LMS is a system designed to fulfil the following competency-based training processes:

- a) courseware control;
- b) documentation and record-keeping;
- c) student and instructor performance monitoring;
- d) course progression tracking;
- e) standardization of delivery; and
- f) data analysis.

4.4 LMS is most frequently known today as a software application for computers which can effectively accomplish all the processes in 4.3 above and much more. Some of the more elaborate systems are web-based to permit learning from remote sites, thereby permitting students to complete lesson plans within their own personal schedules. Other systems can manage scheduling, messaging and even billing. Because the characteristics and capabilities of modern-day LMSs are virtually unlimited, ATOs may wish to consider these issues during the design and production stage of implementing a competency-based programme.

#### 5. PROGRAMME AND LEARNING DYNAMICS

5.1 A properly designed training programme should take a systematic approach to developing the trainee's ability to achieve end-state objectives. Applying an ISD methodology to the design of such a programme will result in a fully integrated training solution that clearly maps out the training syllabus, terminal objectives and expected timelines of each training event, training module and phase of training. This charted sequencing of the programme is often referred to as the "training footprint".

5.2 The training footprint in a qualification-based (non-competency-based) programme (see 1.1 of this appendix) is normally static in nature. Adjustments to the footprint are usually made only to permit last-minute remediation training to ensure the trainee succeeds with qualification exams or tests.

5.3 Paragraph 7 of this appendix explains why competency-based training programmes require continuous assessment of the trainee's progress measured against benchmarked expected performance standards for each phase or stage of the training. With this in mind, it is understandable that a remediation training effort in competency-based training requires a much more proactive approach to managing the learning experience. To press ahead with the syllabus and leave a detected performance deficiency unresolved does not lead to competency. Proceeding in this manner is more likely to have the opposite outcome.

5.4 Even if all the cultural, language and educational backgrounds of a group of trainees were similar, it is well understood that everyone in that group would learn and develop their KSA competencies at a different pace. It is those learning dynamics that must be accounted for in the design of a competency-based training programme footprint. The programme must be able to respond to the learning needs of each individual and permit remediation efforts to take place at the appropriate time.

## **6. SCREENING AND SELECTION CRITERIA**

6.1 Effective screening and selection processes for any training programme will go a long way to ensuring a high degree of trainee success. Yet, ATOs usually restrict themselves to the screening of trainee's enrolment applications and their supporting documentation to ensure that the individual meets all the regulatory requirements. And since the trainees often come to the programme after they have already gone through their own employer's screening and selection process, ATOs may not see any reason to involve themselves in these processes. But in some instances there might be some very compelling reasons to do so.

6.2 The objective of screening and selection is to determine the candidate's suitability, capability and motivation. There are many methods to make that determination, but the method chosen must be capable of making the distinction between identified deficiencies that can be corrected through training and those deficiencies that cannot. Major employers all over the world rely heavily upon the accuracy of their company's screening and selection efforts to ensure that only those people having the desired KSA for the job are considered suitable for employment. Interestingly enough, competency-based training programmes are derived from a detailed job or task analysis from which an ATO can extrapolate the entry-level KSA necessary to ensure a high probability of success. Although these identified KSA competencies may not be mandated by local regulations, ATOs may wish to suggest to their clients the added benefit of ensuring the existence of entry-level KSA prior to training.

6.3 MPL training puts some new demands on ATOs. In MPL training, the organization is providing "ab initio" (no previous experience) flight training to an air operator's future flight crew members, often under contract. That contract frequently requires the delivery of a specific number of qualified co-pilots over a given time period. This can place an enormous amount of stress on the organization to repeatedly deliver extremely well-trained pilots within very restrictive time constraints. It should also be understood that, with the exception of some major air operator cadet programmes, air operators traditionally have little or no experience in the screening and selection of ab initio pilot candidates. Therefore, ATOs should make every effort to become actively involved in these processes. Joint participation in such an effort by the future employer and the ATO will often yield the best results.

## **7. CONTINUOUS ASSESSMENT REQUIREMENTS**

7.1 Competency-based training requires continuous evaluation of the trainee's progress. This assessment is to ensure that the individual is meeting the expected performance standards as derived from the programme's identified competency elements and units.

7.2 Competency-based training programmes themselves need to be subjected to evaluation processes as well. This is particularly true during all phases of the evaluation stage. The Attachment to Chapter 2 of Doc 9868 describes this in greater detail.

7.3 ATOs are to include all their training programmes in their continuous improvement efforts, as detailed in Section 17 of Appendix B in order to meet the QA requirements stated in Annex 1. This implies a continuous assessment of the training programmes.

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## Appendix F

### ALTERNATIVE MEANS OF COMPLIANCE

#### 1. APPLICABILITY

1.1 Each Licensing Authority attempts to develop rules and standards of conduct in close harmonization with ICAO's Standards and Recommended Practices (SARPs) in so far as they are consistent with national interests. Article 1 of the Convention recognizes the sovereignty of the State while Article 38 makes provisions for the filing of differences when circumstances so warrant.

1.2 Another obligation of Contracting States is the need to establish and maintain a national safety oversight programme designed to ensure civil aviation standards are upheld. This obligation requires the Authority to effectively manage risk in those parts of the civil aviation industry that fall within its jurisdiction. It is with the risk management process that applicants wishing to seek approval for new training methodologies need to become most familiar.

1.3 Besides employing best practices in risk management, civil aviation authorities need to be assured that changes to the regulatory status quo are supported by data which provide irrefutable evidence that the proposed change represents an improvement to existing practices and demonstrated outcomes. In other words, applicants requesting approval for new approaches to training should be prepared to put their proposal through a rigorous testing process, such as a proof-of-concept trial.

*Note.— Provisions for new approaches regarding evidence-based training programmes will be provided in Doc 9868 and in the new Manual of Evidence-Based Training in 2012.*

#### 2. PROOF-OF-CONCEPT TRIALS

2.1 Many Licensing Authorities are adopting approval processes which incorporate varyingly complex proof-of-concept trials as a means of validating potential modifications to their regulatory framework. They commence this exercise by subjecting each new idea or issue to a formal risk assessment process. This is particularly true when evaluating concepts that are relatively new, such as employing competency-based training methodologies.

2.2 In addition to demonstrating an improvement to existing practices and outcomes, as described in 1.3 of this appendix, another important feature of any particular proposal for change is being able to demonstrate that the end-state or outcome is in the public's interest.

*Note.— Provision has been made in Annex 1 for some reduction in the experience requirements for the issue of certain licences and ratings, provided that the Licensing Authority has determined the existence of at least equivalent levels of competencies to those originally prescribed. In these instances, Licensing Authorities will likely require an evaluative process similar to that described in this appendix.*

2.3 It stands to reason, therefore, that the ability to successfully obtain approval for a new training approach is dependent upon the applicant's proposal undergoing a thorough "proof-of-concept" trial which is able to consistently demonstrate that the proposal meets all of the following objectives:

- a) it maintains an equivalent or reduced exposure to risk;

- b) it results in improvements in efficiencies or existing outcomes; and
- c) it continues to meet the public's interest as intended in the applicable regulations and their associated standards.

### 3. REGULATORY CONSIDERATIONS

States have implemented differing organizational structures in the design of their civil aviation authorities, which will greatly influence the approach necessary for gaining approval. As an example, a proposal to adopt new training methodologies into existing airline training programmes will require a carefully orchestrated process designed to meet both licensing and operational suitability requirements. Often these two oversight domains, licensing and operations, are managed independently by Authorities due to their distinct specialization requirements. Both the applicant and the Authority, therefore, need to be respectful of these considerations in charting out a plan to adequately assess the impact of the proposal on both domains.

*Note.— Guidance on meeting licensing and operational requirements will be provided in Doc 9868 and in the new Manual of Evidence-Based Training in 2012.*

### 4. APPLICANT CONSIDERATIONS

4.1 Since CAAs are frequently approached by stakeholders to provide “relief” or “exemptions” from specific regulatory provisions, it becomes incumbent upon the applicant seeking approval to make it easy for the Licensing Authority to discriminate its proposal from those less substantiated requests that are frequently submitted for consideration.

4.2 To that end, if the applicant wishes to ensure that its proposal will meet the objectives outlined in 2.3 of this appendix, the following steps should be undertaken prior to making a formal application for approval:

- a) identify the end-state objectives of the proposal;
- b) quantify the improvement in efficiencies/outcomes being sought;
- c) determine the current regulatory impediments to achieving the desired improvements;
- d) identify the overriding hazards of the intended proposal and develop a thorough risk profile;
- e) define the risk controlling measures in the form of a risk management plan that must be implemented and validated during the proof-of-concept trial;
- f) establish data collection and analysis procedures for the trial; and
- g) determine if the proposed change will continue to serve the public's interest.

4.3 With all these factors addressed, the applicant needs to devise a detailed draft proof-of-concept plan for consideration by the Authority.

### 5. IDENTIFYING RISK

5.1 A risk profile is an objective evaluation of potential risk, developed by making reasonable assumptions tied to both known conditions and uncertainties. It represents a critical step in the development of an effective risk management programme.

5.2 There are several ways to determine a risk profile. But in all instances the objective is the same: to develop a dynamic tool that enables the effective management of those risks which threaten desired outcomes.

5.3 The risk profile usually is initiated by evaluating all the processes that define a work effort. In other words, it is an exercise that begins with identifying all the major activities that an entity is required to carry out in order to produce or deliver a product or a service. For example, it might be all the activities that a commercial air operator or an ATO would undertake in order to successfully design, deliver and administer a new training programme. In this instance, each activity must be identified along with all the associated potential hazards. The next step is to determine what risk each of the hazards poses.

*Note 1.— Traditional risk assessment (RA) methodologies are somewhat different in that they require risk scenarios to be developed for each identified hazard. The risks attached to the hazard are then subjected to an evaluation process which includes determining the cost/benefit factors of the activity posing the risk. Ultimately, this leads to the realization of the overall impact of the risks on the affected organization and the identification of means to control those risks. This methodology is detailed in Chapters 4 and 5 of Doc 9859.*

*Note 2.— A traditional RA is a valued tool in determining whether or not to proceed with the proof-of-concept trial, and, if so, under what conditions. Unless a real risk to safety is identified during the risk profile exercise, conducting a formal safety RA is unnecessary.*

## 6. MANAGING RISKS

6.1 Risk management is the process of identifying hazards and their associated risks, assessing their implications, deciding on a course of mitigating action and evaluating the results. The simplified approach to managing risk begins with the completion of a risk profile as described in paragraph 5 of this appendix.

6.2 Once the identified risks have been assessed, a weighted factor is applied to each risk activity in terms of the potential impact of the risk, the likelihood of its occurrence and the long-term consequences to the organization. This exercise results in the creation of a prioritization list which will help in the development of a risk management plan.

6.3 The identification of effective controlling measures to mitigate each risk and how to best employ them becomes the basis by which a risk management plan is developed and documented.

6.4 Implementation of a risk management plan is a dynamic process, supported by documented procedures which are coordinated by a responsible member of the risk management team. Throughout its implementation those procedures and their results are subjected to constant review and refinement, as are the original assumptions that were made in determining the risk profile.

6.5 The overall objective is to be able to create a risk management process that permits the proof-of-concept trial to proceed under safe conditions.

## 7. PARTNERING FOR RESULTS

7.1 There is measurable added-value by partnering the efforts of the Authority and of industry in reaching sustainable improvements to current regulatory frameworks. The mutual challenge is to arrive at a common understanding of how the proposed trial's objective represents a valued return on investment since both parties will be committing resources to the endeavour.

7.2 In order to promote an efficient and effective national transportation system, a CAA is constantly trying to balance the trial's objective with the need to create a safe operating environment. Implementing best practices in risk management becomes its ultimate target. Hence, an organization that methodically scopes out the proposed trial in the manner suggested in this appendix has a much higher probability of realizing a common understanding with the CAA of the importance and advantage of proceeding.

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## Appendix G

### APPROVING AUTHORITY TRAINING REQUIREMENTS

#### 1. NEW AND EMERGING DIFFERENCES IN TRAINING

1.1 More than at any other time in recent history, civil aviation training has been undergoing some innovative and exciting changes. These are changes brought about and, to some extent, made necessary by rapid advancements in technology, by improved methodologies in training programme and courseware design, and by the need to realize significant increases in safety levels through training that is more job-focused. These dynamic realities gave rise to the establishment of ICAO's Flight Crew Licensing and Training Panel (FCLTP) in 2003. The FCLTP is just one example of the aviation community's appreciation of the evolution of its industry and of the need to modernize and make relevant internationally accepted training standards.

1.2 Rapidly introduced improvements in simulation fidelity have, in many instances, outpaced our ability to embrace the full potential of simulation within the training environment. Only a few years ago, many respected training professionals were arguing that a seamless transfer of learned skills from a highly simulated training environment to the actual work environment was not likely to happen. The need for significant remediation once the graduates of a training programme entered the workplace was expected to be a common occurrence. This particular concern was a driving force in the FCLTP's final recommendations for the multi-crew pilot licence (MPL) to include the need to complete twelve take-offs and landings on the actual type-rated aeroplane prior to the holder exercising the privileges of that licence. In this instance, although global MPL training is still in its infancy, the fear of systemic skill transfer issues for MPL holders has not materialized.

1.3 Along with the increased use of simulation, there have been significant improvements in course design and programme delivery. Instructional systems design (ISD) methodologies involving the analysis, development (design and production) and evaluation stages of new training programmes are now in frequent use. This clinical approach to perfecting course design is focused on achieving specifically targeted learning objectives derived from detailed job/task analysis. ISD is covered in greater detail in Appendix E to this manual and in Doc 9868.

1.4 Recent changes to ICAO Standards and Recommended Practices have recognized competency-based training programmes as an alternative way to gain civil aviation occupational qualifications. The advanced qualification programme (AQP) used extensively in North America has components that are focused on the achievement of specifically targeted competencies. The same could be claimed by alternative training and qualification programmes (ATQP) used by some air operators in other continents. But in so far as being singularly focused on the achievement of benchmarked competency elements, a properly ISD-developed MPL training programme is by far the most notable example in civil aviation training at this time (see Appendix E and Doc 9868 for details).

1.5 To complete the suite of large changes, systems-based governance models have now been universally accepted as an essential requirement for the effective management of risk. Risks that can undermine the quality and safety of training are mitigated through the implementation of effective system-based governance models. Both quality systems and safety management systems are detailed in Appendices B and D respectively.

#### 2. NATIONAL REGULATORY REVIEW

2.1 Recent changes to internationally accepted standards and supporting documentation should trigger a review by Licensing Authorities of existing national regulatory frameworks in the following domains:

- a) qualifying standards for simulation devices and their expanded use for training credits;
- b) system-based governance requirements for approved training organizations; and
- c) competency-based training programmes.

2.2 An International Working Group (IWG) was established in March 2006 by the Royal Aeronautical Society's Flight Simulation Group to review and expand upon existing technical criteria detailed in Doc 9625. The IWG decided to also establish simulation fidelity levels required to support specific training tasks for each pilot licence, qualification or rating. This activity led to the promulgation of new criteria for aeroplane training devices in Volume I of the third edition of the manual in 2009. The criteria for helicopter flight simulation training devices (FSTDs) will be published in a second volume of Doc 9625 in 2012. These volumes should be reviewed by Licensing Authorities to ensure their national rules are consistent with the much expanded ICAO criteria.

2.3 Although many Authorities already require that safety management programmes be instituted by their major air operators, some may not have implemented that requirement for ATOs. The requirement for ATOs to adopt a safety management system (SMS) governance model applies to only those ATOs engaged in specific activities that directly pose a risk to the safe operation of aircraft.

*Note 1.— An example of an activity “directly” posing a risk to the safe operation of aircraft would be an ATO that conducts flight training utilizing an aircraft during a portion of the training syllabus.*

*Note 2.— An example of an ATO not directly posing a risk to the safe operation of aircraft would be an ATO that sends its aircraft maintenance students to an approved maintenance organization (AMO) for some on-the-job training as part of the training syllabus. In this instance, the onus would be on the AMO to ensure that the student's participation in aircraft maintenance activities is captured by the AMO's SMS.*

2.4 Appendix 2 to Annex 1 requires ATOs to adopt QA processes acceptable to the Licensing Authority. Appendix B to this document provides expanded guidance on how to maximize the effectiveness of an ATO's QA efforts through the implementation of a quality system governance model. However, it should be expected that all ATOs may not have the resources or the expertise to implement the quality system model as suggested in Appendix B. What is important to understand is that each ATO is required by Annex 1 to implement QA policies, procedures and practices “which ensure that training and instructional practices comply with all relevant requirements.” Appendix B is intended only to provide a very effective way of achieving such an objective.

2.5 Internationally accepted practices with respect to competency-based training programmes conducted by ATOs are described in Appendix E. Doc 9868 covers the technical aspects of both programme design and delivery for the MPL and aircraft maintenance personnel training and will expand this coverage to additional categories of aviation personnel in the future. Authorities need to intuitively understand the significant differences between competency-based training methodologies and the traditional training programmes with which they have been most familiar up to now.

2.6 The three domains of change mentioned in 2.1 of this appendix suggest that a review of national regulatory structures for aviation training is in order, but they also point to a need to review internal qualification training for inspectorate and enforcement CAA personnel to ensure that they are ready to provide an effective safety oversight programme.

### 3. LICENSING AUTHORITY TRAINING

While it is recognized that several Authorities already have made some adjustments to their internal training scheme for their personnel, additional guidance is needed. In light of recent changes to international standards and accepted practices, the following subject areas should be covered in qualification training for inspectors and enforcement personnel:

- a) Use of simulation in training, to include:
  - Doc 9625, Volumes I and II;
  - applicable national regulations and standards for simulation; and
  - device technical qualification versus device suitability for a training programme.
- b) Quality assurance programmes:
  - process approach to achieving objectives; and
  - attributes of effective quality assurance practices.
- c) Safety management programmes:
  - process approach to achieving objectives;
  - non-punitive reporting cultures; and
  - attributes of effective safety management.
- d) System-based governance models, to include:
  - “governance”, the term’s definition and objectives;
  - design and effective application of organizational structures; and
  - Appendices B and D to this manual.
- e) Competency-based training, to include:
  - Appendix E to this manual; and
  - Doc 9868.
- f) Alternative means of compliance, to include:
  - definition of the term “alternative” means of compliance (as opposed to “alternate” means of compliance) — see glossary;
  - paragraph 3.1 of Appendix 2 to Annex 1; and
  - Appendix F to this manual.

#### 4. DEVELOPMENT AND MAINTENANCE OF APPROVAL STANDARDS

4.1 Licensing Authorities will need to recognize the changes outlined in 2.1 of this appendix and determine if current national approval standards for ATOs still serve their needs. This is particularly important when evaluating the:

- a) application of instructional systems design methodologies in programme design;

- b) use of differing levels of simulation in training programmes;
- c) use of learning management systems for tracking student progress; and
- d) performance measurement criteria and continuous assessment practices in competency-based training programmes.

4.2 Authorities also must recognize the need to establish rigorous proof-of-concept methodologies that provide irrefutable evidence to support any approval of an “alternative means of compliance”, as provided for in Appendix 2 to Annex 1. The basis for such an approval should be focused upon the proposal’s outcomes being sustainable and repeatable. Appendix F details one effective approach for introducing new training methodologies in a risk-managed environment.

— END —



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