CIVIL AVIATION AUTHORITY OF VIET NAM

MANUAL OF GUIDANCE FOR ESTABLISHING AND MAINTAINING QMS IN AIS/AIM

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GLOSSARY

ACRONYMS AND ABBREVIATIONS

AIM	Aeronautical information management
AIP	Aeronautical information publication
AISP	Aeronautical information service provider
AIS	Aeronautical information services
ANS	Air navigation services
ATM	Air traffic management
ATS	Air traffic service
CNS	Communications, navigation and surveillance
MET	Meteorological services
PDCA	Plan-Do-Check-Act
QMS	Quality management system
RNP	Required Navigation Performance
SAR	Search and rescue
SARPs	Standards and Recommended Practices
SMS	Safety management system
SWIM	System-wide information management

REFERENCES

Definitions for quality management are in Annex 15. The provisions related to QMS can be found in:

a) Annex 3 - *Meteorological Service for International Air Navigation*;

b) Annex 4 - *Aeronautical Charts*;

c) Annex 15 - *Aeronautical Information Services*, Chapter 3;

d) *Procedures for Air Navigation Services - Aeronautical Information Management* (PANS-AIM, Doc 10066), Chapter 3 - *Quality Management* and Appendix 1 - *Aeronautical Data Catalogue*;

e) *Aeronautical Information Services Manual* (Doc 8126, Part I - *Regulatory Framework for Aeronautical Information Services*, 3.2.4); and

f) Quality Assurance Manual for Flight Procedure Design (Doc 9906, Volume 1 -Flight Procedure Design Quality Assurance System).

Definitions for safety management are in Annex 19. The provisions related to SMS can be found in:

a) Annex 19 - *Safety Management*; and

b) Safety Management Manual, 4th edition (Doc 9859).

FOREWORD

The guidance material contained in this manual has been developed to assist the aeronautical information service (AIS) organization in the planning and implementation of quality management system (QMS) for aeronautical information services (including aeronautical charts) to fulfil the requirements in Annex 4, Annex 15. This manual contains key elements to provide AIS organization with an understanding of the requirements for QMS. Its purpose is to support AIS organization in implementing and maintaining a QMS encompassing all functions of an AIS organization. The objective is to provide the next intended users with the necessary assurance that the distributed aeronautical data and information satisfy the predefined data quality requirements, which are contained in the *Procedures for Air Navigation Services - Aeronautical Information Management* (PANS-AIM, Doc 10066).

Annex 15 and PANS-AIM (10066) recommend that the International Organization for Standardization (ISO) 9000 series of quality assurance standards be used when developing QMS for AIS. The methodology and concepts described in this manual are derived from ISO 9001:2015 - *Quality Management Systems - Requirements* and ISO 9000:2005 - *Quality Management Systems — Fundamentals and Vocabulary*. It should be noted, however, that ISO 9000 certification does not automatically mean that the QMS is encompassing all functions of an AIS organization.

Comments on this manual, particularly with respect to its application and usefulness, are appreciated. These comments will be taken into consideration in the preparation of subsequent editions. Comments concerning this manual should be addressed to:

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CHAPTER 1 - INTRODUCTION

1.1 Background

1.1.1 Manual of Standard - Aeronautical Information Services, Chapter 3 - Aeronautical information management, 3.6, contain requirements for a properly organized quality system in the AIS. The quality system shall comply with the ISO 9000 series of quality assurance standards, and certified by an approved organization. The Standard provides that the QMS encompassing all functions of an AIS organization shall be implemented and maintained to provide users with the necessary assurance that the distributed aeronautical data and aeronautical information satisfy the predefined data quality requirements.

1.1.2 As for national directives, the Ministry of Transport's Circular No. 19/2017/TT-BGTVT, dated June 6, 2017, sets regulations on the management and assurance of flight operations and Circular No. 32/2021/TT-BGTVT, dated December 14, 2021, amends and supplements certain articles of the aforementioned circular. Notably, Article 56 directs the Civil Aviation Authority of Viet Nam to guide the establishment of an AIS quality management system and oversee its implementation through audits and monitoring.

1.1.3 Pursuant to Article 56 of Circular No. 19/2017/TT-BGTVT, the Civil Aviation Authority of Viet Nam has issued a Manual detailing the implementation and maintenance of the quality management system for aeronautical services.

1.1.4 Therefore, this manual has been developed to assist aeronautical information service provider (AISP) about the implementation of a quality system for their aeronautical information service. It also ensures the safety oversight authorities that the implementation of the QMS encompasses all necessary functions and responsibilities of the AIS organization, thereby improving the trust between the regulator and the AISP.

1.1.5 The Guidance Material are not intended to replace ISO documentation and should be read in conjunction with the appropriate Standards.

1.2 Need for quality aeronautical data and aeronautical information

1.2.1 Quality aeronautical data and aeronautical information are critical for area navigation, required navigation performance (RNP), airborne computer-based navigation systems and data link systems.

1.2.2 The provision of quality assured aeronautical information products and services should be carried out in a standardized presentation, since there is an inherent need to fulfil the requirements of the next intended users. Customers in the AISdomain are the next intended users of aeronautical data and aeronautical information, such as pilots, air traffic controllers, flight planning organizations, etc..

1.2.3 Data quality specifications have evolved to include requirements for accuracy, resolution, integrity, traceability, timeliness, completeness and format of

aeronautical data and aeronautical information. These data quality specifications are found in MOS AIS, Chapter 3, 3.2.

1.2.4 Non-compliant and corrupted aeronautical data and aeronautical information can potentially affect the safety of air navigation.

1.3 Need for quality management system

1.3.1 Annex 15 requires States to introduce the QMS to provide users assurance and confidence in the quality of aeronautical data and aeronautical information throughout the aeronautical data chain, from origination to distribution. The roles, responsibilities, competencies and associated knowledge, skills and attitudes required for the performance of each function within the AIS are identified in the QMS.

1.3.2 The introduction of the QMS offers benefits such as risk-based thinking, effective communication, better understanding and improved control over processes.

1.3.3 The QMS is based on process approach (A process approach is a management strategy to control and improve interrelated processes.) principles to manage and control processes, the interactions between processes and the inputs and outputs that are required to meet customer and regulatory requirements. Processes (A process is a set of interrelated or interacting activities to transform inputs into consistent outputs.) and procedures (A procedure is a prescribed way of undertaking a process or part of a process, whereas a process is a set of interrelated or interacting activities to transform inputs into consistent outputs). provide structure in the work environment and promote quality and safety. Widely communicated, accepted and utilized processes ensure consistency in delivering of aeronautical information products and services.

1.3.4 Policies, processes and procedures, including the use of metadata, ensure that aeronautical data and aeronautical information is traceable to the source and allows anomalies to be detected and corrected.

1.3.5 Once the AISP establishes the quality policy and objectives, the following information is included as a minimum as part of the QMS:

a. scope of QMS;

b. overarching processes;

c. roles and responsibilities;

d. work instructions, operating procedures and guidance material;

e. training plans;

f. formal internal and external arrangements and agreements;

g. compliance observations; and

h. continuous monitoring and performance metrics.

1.3.6 An AISP must monitor compliance with the QMS and may elect to have the system certified under a quality management standard. An external certification organization will carry out conformity audits over the certificate validity period. For example, ISO 9001: 2015 - Quality Management Systems - Requirements certification

is a means to assure that the implemented QMS is compliant with the requirements of the quality standard. It should be emphasized, however, that ISO 9000 certification does not automatically mean that the QMS is encompassing all functions of an AIS organization. The AIS safety oversight authorities are therefore required to have inspectors trained in QMS perform an appropriate assessment of the QMS to ensure that the implementation meets the purpose of the standards.

1.4 Roles and responsibilities of relevant parties

1.4.1 Civil Aviation Authority of Viet Nam

- Civil Aviation Authority of Viet Nam guides the development and maintenance of QMS-AIS/AIM in all organizations and units responsible for aeronautical information services/ aeronautical information management.

- Proposing to adjust the regulations, guidance related to QMS-AIS/AIM.

- Inspect, supervise the construction and maintenance of QMS-AIS/AIM established by agencies and units.

- Inspect and supervise the signing of Letter of Agreement between the originator/organization and the AIS provider related to the provision of aeronautical data and aeronautical information.

1.4.2 AISP (Viet Nam Air Traffic Management Corporation)

- Coordinate with relevant agencies and units in the process of building and maintaining the QMS-AIS/AIM at the aeronautical information service providers.

- Implement QMS-AIS/AIM in accordance with the requirements of the QMS in accordance with ISO standards and recognized by a competent agency/organization.

- Implement the directions and instructions of the Civil Aviation Authority of Viet Nam to improve the quality of QMS-AIS/AIM.

- Signing Letter of Agreement and complying with the signed Letter of Agreements between the data originators, organizations and the Viet Nam Air Traffic Management Corporation regarding the provision of aeronautical data and aeronautical information.

1.4.3 Originators agencies

a) The Data Originator: responsible for the creation of the value associated with new data or information or the modification/withdrawal from effectivity of the value of existing data or information. Originator/agencies may include:

- AIS units of other countries, which have the interchange agreements to exchange AIS publications with Viet Nam.

- Airport Cooperation, Aerodrome Operators;

- Airlines;

- ATS, CNS, MET, SAR Units;

- Agencies and units of the Ministry of Defense;

- Other relevant agencies, enterprises and organizations (such as surveyor…).

b) Responsibilities:

- Creating and providing aeronautical data/ aeronautical information to AIS/AIM.

- Signing Letter of Agreement and complying with the signed Letter of Agreements between the data originator agency/organization and the AISP (Viet Nam Air Traffic Management Corporation) regarding the provision of aeronautical data and aeronautical information.

CHAPTER 2 - QUALITY AND SAFETY MANAGEMENT SYSTEMS

2.1 Relationship between quality and safety management systems

2.1.1 MOS AIS and PANS-AIM, describe responsibilities of AISP for the provision of aeronautical information products and services and require the AISP to implement a QMS. However, some of the aeronautical data and aeronautical information managed by the AISP are safety critical, such as Required Navigation Performance Authorization Required Approach (RNP AR APCH) waypoints that provide precise navigation to avoid terrain, or runway threshold coordinates that provide runway alignment for instrument approaches for low visibility or zero visibility operations. For this reason, implementing a safety management system (SMS) as well as a QMS would help with managing the identified safety risks regarding the processing of safety critical aeronautical data and aeronautical information.

2.1.2 A balanced SMS and QMS enable the AISP to realize safety obligations and provide quality control of aeronautical information products and services.

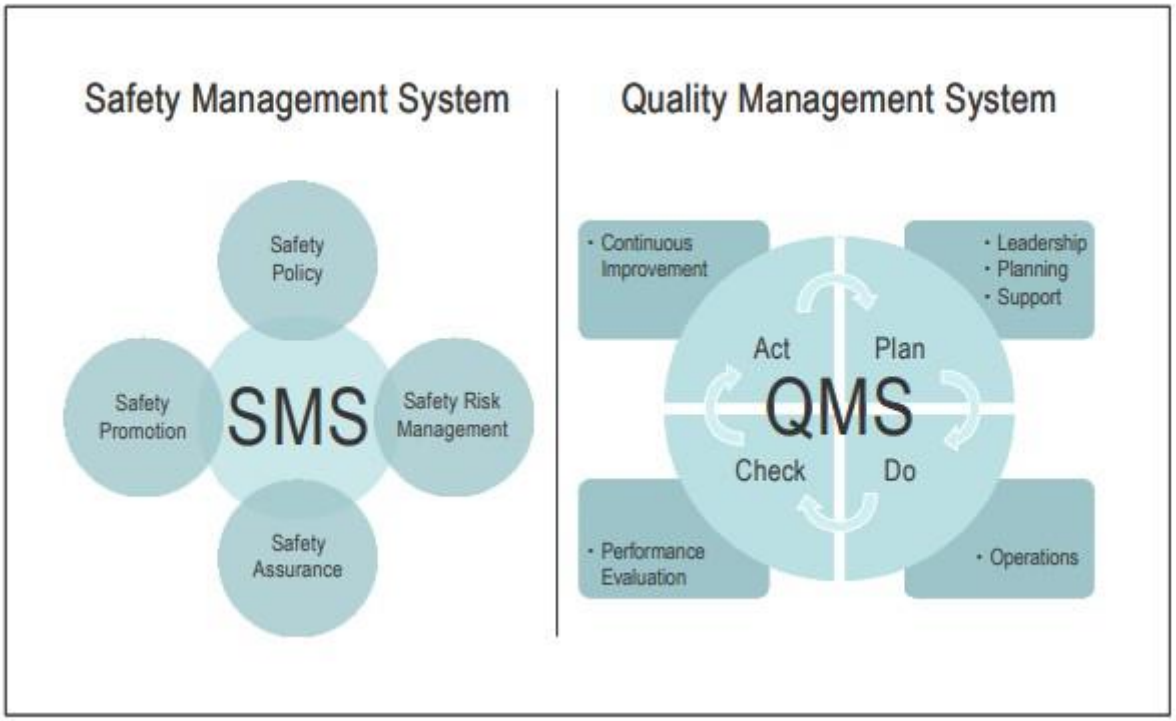

Figure 2.1 The SMS and QMS objectives

2.1.3 The management and delivery of aeronautical data and aeronautical information should provide quality assured aeronautical information products and services. An SMS is based on safety objectives and determination of risk, whereas quality is defined in terms of data requirements and customer requirements. Safety management and quality management are complementary and should work closely together to achieve assurances towards the overall goals of aviation safety.

2.1.4 The following paragraphs (2.2 and 2.3) describe the main components of SMS and QMS, and how these can be applied within an AIS organization, as either

integrated or standalone but complementary management systems. AISP should implement a standalone SMS within its organization. Air navigation services (ANS) consist of multiple and different kinds of services, namely air traffic service (ATS), AIS, communications, navigation and surveillance (CNS), meteorological information service (MET) and search and rescue (SAR), which are all related to safety of air navigation.

2.2 Safety management system

2.2.1 Recognizing and managing safety risks is critical to organizations that provide safety-critical products and services, such as an AIS organization. The AISP needs to identify hazards and establish processes for continually assessing and controlling the risk that may be associated with those hazards. Safety risk management processes establish formal methods for identifying hazards, controlling and continually assessing risks throughout the lifecycle of aeronautical data and aeronautical information. Safety risk management should be integrated into processes that control the AISP's activities. It ensures that organizational processes, procedures and behaviors related to aeronautical data and aeronautical information management do not negatively affect safety.

2.2.2 A safety management system is defined by four components, namely:

a. safety policy;

b. safety risk management;

c. safety assurance; and

d. safety promotion.

2.2.3 An AISP should consider the following with respect to safety management processes and procedures:

a. SMS awareness training: To ensure that AIS technical personnel are aware of the SMS implementation and requirements;

b. Safety communication: To ensure that AIS technical personnel are aware of the SMS to a degree commensurate with their roles and responsibilities; and

c. Hazard identification: To ensure that AIS technical personnel effectively identify and assess safety risks associated with identified hazards.

2.3 Quality management system

2.3.1 A QMS offers the ability to exercise control over processes and procedures for the provision of aeronautical information products and services. The AISP defines quality objectives that are focused on the standardized quality requirements of the next intended user of aeronautical products and services. A QMS should apply throughout the entire aeronautical data chain from origination of data to the distribution of products and services to the next intended user.

2.3.2 Data origination may be performed outside of Viet Nam; however the scope of the QMS applies to all AISP activities (including the collection, processing, and distribution) of the entire aeronautical data chain.

2.3.2 The Plan-Do-Check-Act (PDCA) cycle shown in Figure 2-2 is a useful tool

applicable to the QMS and its processes and can be defined as follows:

Plan: Determine what needs to be done and how it should be done (see Appendix 2 for an example of an implementation plan);

Do: Implement the planned activities;

Check: Monitor the effectiveness of processes implemented; and

Act: Take action to improve the performance of the QMS.

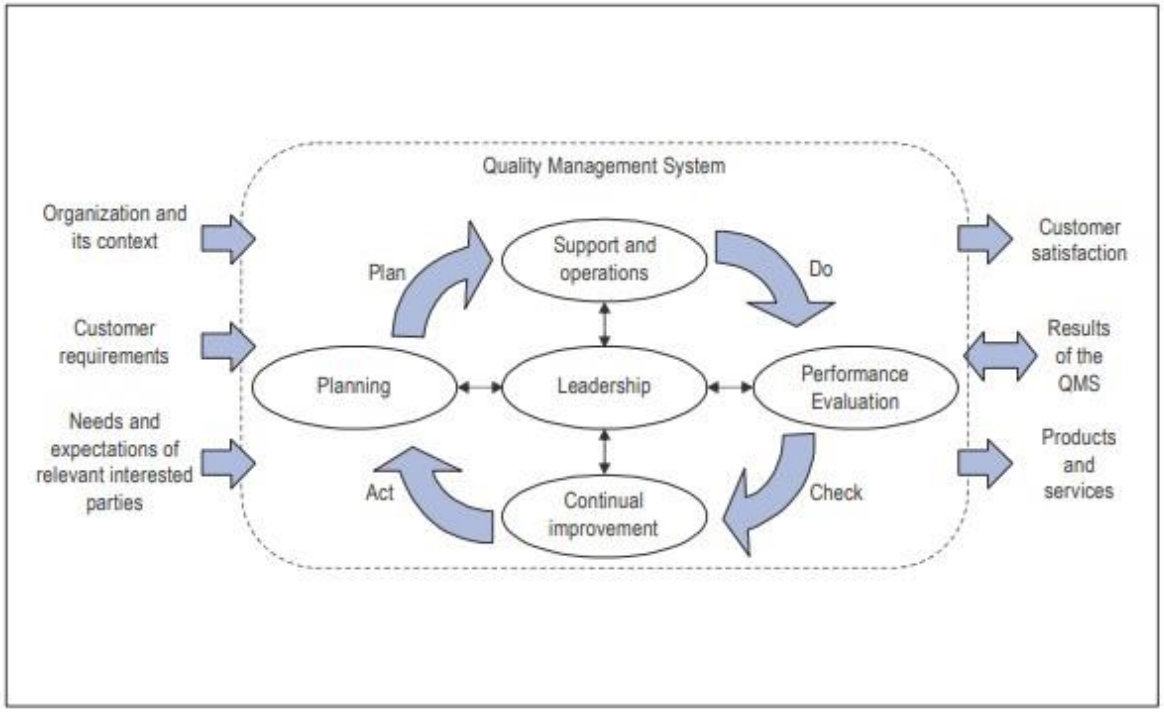

Figure 2-2. Structure of the requirements of a QMS

CHAPTER 3 - CONTEXT OF THE AERONAUTICAL INFORMATION SERVICES PROVIDER

3.1 Understanding the AISP and its context

3.1.1 The implementation of an effective QMS depends on planning and an in-depth understanding of what the AIS functions entail to assure the provision of consistent aeronautical information products and services that comply with regulatory requirements.

3.1.2 The QMS must incorporate the AIS functions of data collection, processing and distribution of data, as well as quality control of aeronautical information products and services covering the entire territory of Viet Nam. The AISP must consider external and internal issues that are relevant to the provision of aeronautical products and services, including legislative requirements, technology and organizational knowledge.

3.2 Understanding the needs and expectations of stakeholders

3.2.1 Stakeholders are entities or people that are affected by the AISP's operations, or where the stakeholders' actions may affect the outcomes of the AISP. It is essential to identify all stakeholders that the AISP deals with and understand their needs and expectations. Stakeholders include any regulatory oversight authorities, data originators, next intended users, industry associations, public interest and external contractors.

3.3 Determining the scope of the quality management system

3.3.1 A well-defined scope provides clear direction to the AISP to understand which functions of the AISP should adhere to the quality management requirements, and identifies the areas that will be monitored and audited

3.3.2 The criteria to be considered for the scope of the QMS includes the identified external and internal issues and the needs and requirements of the stakeholders. The scope should clearly define the aeronautical information products and services that are covered under the QMS, and the QMS standard applied. However, the operations of stakeholders are not included in the scope of the QMS.

3.3.3 When an international standard is applied, the QMS must adhere to all its provisions. International standard provisions that are excluded in the AISP's QMS should be clearly stated and the reason for exclusion explained in the scope.

3.4 Quality management system and its processes

As demonstrated in Figure 3-1, an AISP must determine what processes are needed to deliver standardized products and services, what in terms of quality is acceptable to the next intended users, such as pilots, airlines, navigation database suppliers, etc., and ensure the effectiveness and continuous improvement of the QMS. Activities that use resources to transform inputs to outputs are considered a process, and an output from

one process may be the input for another. A process approach is a strategy to manage and control processes, identify the systemic interaction of identified processes and to consider the required process inputs and outputs. The QMS also needs to demonstrate effective control over AIS processes performed external to the AISP.

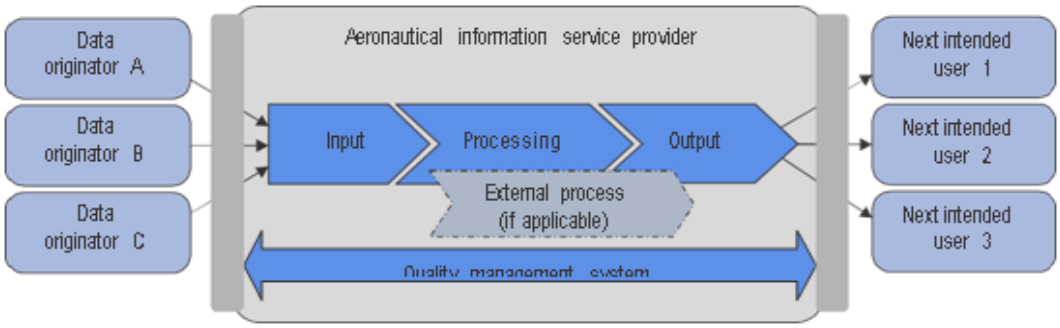

Figure 3-1. Processes included in the QMS

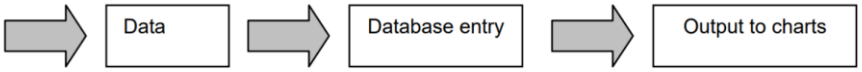

Figure 3-2. A simplistic process

3.4.1 To ensure externally-sourced information to applicable data quality requirements, the AISP must establish formal arrangements with data originators, such as aerodromes, air traffic service providers, instrument flight procedure and airspace designers, metalogical service providers and other AISP. The topic of formal arrangements is addressed in the Doc8126, Part I.

3.4.2 As shown in Figure 3-3, a process consists of several key components, which define a single process, namely inputs, methods, equipment, measures, resources and outputs. An example of an AISP process is to transform sourced data into an output (for example, dataset), to be used for chart production. This process maybe linked to a previous, concurrent or succeeding process, such as validation of the data against certain established parameters.

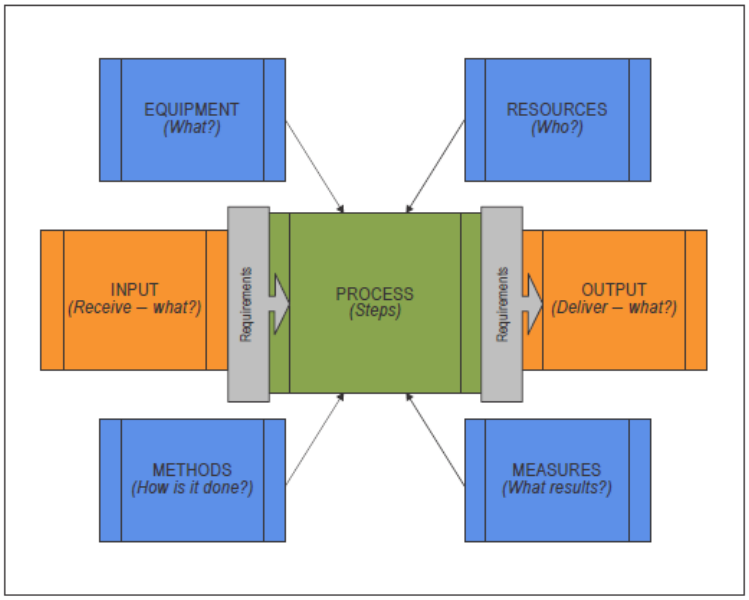

Figure 3-3: Components of a Process

3.4.3 The AISP is responsible for the establishment of processes which includes:

a. determination of the inputs required and the outputs expected from processes;

b. determination of processes required to ensure collected data is in accordance with formal arrangements and is traceable throughout the aeronautical data chain;

c. determination of additional processes that are required to ensure the data integrity is maintained throughout the process;

d. determination of the interaction and sequence of processes;

e. determination of the criteria and methods to control internal and external processes;

f. determination of resources needed and to ensure the availability of resources;

g. assignment of responsibilities to functions within the processes, for example:

- ✓ maintenance of aeronautical data and aeronautical information;
- ✓ creation of aeronautical information products;
- ✓ authorization to release aeronautical information products and services;
- ✓ communication with next intended users in relation to nonconforming outputs; and
- ✓ monitoring of compliance against all regulatory requirements.

h. identification and addressing of risks and opportunities for improvement, both internal and external;

i) evaluation and implementation of changes to the processes; and

j) continual improvement of the processes and the QMS

CHAPTER 4 - LEADERSHIP

4.1 Leadership and commitment

4.1.1 General leadership

4.1.1.1 The QMS is the responsibility of the entire organization, however,senior management is accountable to provide the leadership required to ensure the QMS achieves desired results. Management needs to be thoroughly familiar with the fundamentals of a QMS.

4.1.1.2 Commitment of the AISP management is paramount and can be demonstrated by:

a. aligning organizational goals to prioritize continuous improvement;

b. communicating goals to all personnel in order to promote quality and to ensure the effectiveness of the QMS;

c. developing means to track the performance of the QMS; and

d. ensuring that regular management reviews are conducted.

4.1.2 Customer focus

A primary goal of the AISP should be to deliver quality aeronautical information products and services in accordance with the intended use of the information. Management must collaborate with stakeholders to ensure national requirements are well defined and understood. Management must develop means to engage with the next intended users and must participate in customer feedback avenues such as forums, meetings, and customer enquiry tools.

4.2 Quality policy

4.2.1 The quality policy should provide the high-level direction and goals of the QMS and should enable specific quality objectives to shape the processes and procedures needed for the QMS.

4.2.2 Once a quality policy is established, it must be communicated to all personnel.

4.2.3 The quality policy forms an important element for the work of the AIS, and establishes:

a) a commitment to quality;

b) what the quality objectives or the organization are; and

c) how the objectives relate to customers' expectations

4.2.4 The Quality Policy must address these issues and ensure that it:

a) is appropriate for the needs of the organization;

b) includes commitment to meeting requirements and continual improvement;

c) provides a framework for establishing and reviewing quality objectives;

d) is communicated, understood and implemented throughout the organization; and

e) is reviewed for continuing suitability.

4.2.5 A Quality Policy includes AIS's definition of quality and how management and staff will demonstrate their commitment to the policy, and provides an identifiable focus for all staff in their daily activities.

4.2.6 One of the best techniques to develop a Quality Policy is a facilitated meeting of all staff at which individual definitions of "quality" can be consolidated to provide a definition and statement that encapsulates all staff's beliefs and understandings.

4.3 Organizational roles, responsibilities and authorities

4.3.1 AISP' director is responsible for strategic planning, establishment and communication of the quality policy and development of improvement processes and the provision of necessary resources for achieving quality goals and objectives. Additionally, AISP' director is responsible for conducting regular management reviews.

4.3.2 AISP' QMS Representative and operational management is responsible for the execution of the strategic plan, budgeting, and implementation of the QMS. This explicitly includes responsibility for ensuring adherence to the quality policy and organizational values.

4.3.3 All AISP personnel are responsible for adhering to processes established to provide quality aeronautical information products and services to customers. They are also key participants in the continuous improvement by identifying and reporting to management any issues relating to the products, processes, or the QMS through a corrective action.

CHAPTER 5 - PLANNING

5.1 Actions to address risks and opportunities for improvement

5.1.1 The AISP must monitor any identified issues and requirements that may turn into risks, as well as other opportunities for improvement potentially affecting the intended outcome of the QMS; this includes internal and external factors to the AISP. Issues that may affect the AISP could originate from legal, technological and economic environments. A good practice would be to also consider issues that may affect the data originator or next intended user.

5.1.2 During planning, the AISP determines the risks and opportunities for improvement associated with the production and dissemination of aeronautical information products and services, including how to enhance the desired outcomes.

5.1.3 The AISP must implement the required measures to prevent or reduce undesired side effects. This includes error management or security protocols to address risks associated with unauthorized access.

5.1.4 The AISP should document planned actions to address risks, incorporate the actions into the QMS and evaluate the effectiveness of these actions.

5.2 Quality objectives

5.2.1 Quality objectives are measurable goals designed to be achievable by the AISP. Quality objectives are designed to enhance customer satisfaction and be consistent with the quality policy. These objectives are initially established by management whenplanning a QMS and are continuously reviewed.

5.2.2 Quality objectives should have measurable outcomes on which basis improvements in the QMS are planned. Quality objectives should be reviewed quarterly for applicability.

Examples of quality objectives are reducing the number of data errors per aeronautical information regulation and control (AIRAC) cycle, timely delivery of products or services, or increase in customer satisfaction. Management should monitor the performance against these quality objectives and take appropriate action if objectives are not met.

5.3 Planning of change

5.3.1 Change management is an integral part of a QMS. Changes can be implemented because of an audit, a review, changes to requirements, continuous improvement action(s), innovation, change suggestions from personnel, and because of corrective or preventive action(s).

5.3.2 Any need or requirement for change that affects the QMS should be planned, implemented, and verified for effectiveness in line with predetermined change management processes to avoid undesired outcomes. An AISP should considerwhat the purpose of the change is and what consequence the change will have on the integrity of the QMS.

Advance notice of changes to aeronautical information systems, products and services should be given to allow stakeholders in the aeronautical data chain enough time to

review the effects of the planned change. A documented communication plan should identify communication criteria (what and when to communicate), and communication responsibilities (persons responsible to communicate with identified stakeholders). Aligning changes with the AIRAC cycle and providing sufficient notification allow for efficient coordination throughout the aeronautical data chain. Any identified hazards and risks associated with a change for internal and external stakeholders should be properly managed. The data originator and the next intended users must mutually agree upon the changes to data quality specifications to allow for coordinated implementation and continuing usability of the aeronautical information products and services.

5.3.3 An accountable authority must be assigned and adequate resources made available in order to successfully implement changes. The accountable authority can approve proposed changes to plans and procedures, including data product specifications, data processing procedures, configuration management and competency requirements. All plans, procedures, management instructions or operational changes must be reviewed and approved prior to change implementation.

5.3.4 Planned changes to the aeronautical information products and services may involve amendments to operational documentation requiring coordination with stakeholders. Documents must be controlled as part of a configuration management plan.

5.3.5 Data configuration management should be implemented and used to monitor and control changes to systems, processes and procedures. Changes to aeronautical data and system configuration should be traceable for audit purposes. In the event of a non-conformance, it can be traced back to the root cause of the nonconformity for corrective action.

5.3.6 A checklist can be used to document and guide the change management process. A change management checklist should contain a list of considerations for planned changes, for example:

a) reason for the change (what is the need or requirement to change, including expected benefits);

b) affected internal and external stakeholders;

c) potential consequences (risks and opportunities for improvement)

d) effects on the integrity of the QMS;

e) availability of resources to implement change;

f) allocation or reallocation of responsibilities and authorities;

g) effects the change will have on organizational knowledge, documentation and training; and

h) review of the change post implementation.

5.3.7 Appendix 5 contains an example of a change management form. AISP personnel suggesting changes to the QMS outside the formal QMS review process could use this form.

CHAPTER 6 - SUPPORT

6.1 Resources

The organization must ensure internal and external resources are made available for the establishment, implementation, maintenance and continuous improvement of the QMS. This includes control over processes for the provision of quality assured aeronautical information products and services. The following resources are to be considered:

a. Personnel: AIS technical and other personnel for the effective implementation and maintenance of the QMS, and the operation and control of related processes;

b. Infrastructure: Buildings, utilities, equipment, including hardware and software, and information and communication technology needed to provide aeronautical information products and services;

c. Environment for operation of processes: Social and psychological environment for AISP personnel, and physical environment, for example temperature, humidity, airflow, hygiene and noise;

d. Monitoring resources: Resources for monitoring of processes to ensure quality aeronautical information products and services are provided; and

e. Knowledge management: Manage knowledge "know-how" of each AIS function and considering internal or external knowledge when changing the operation of processes or continuous improvement of QMS.

6.2 Competence

6.2.1 Competent AIS technical personnel are a crucial part of the QMS and one of the most effective ways to ensure that quality and safety standards are maintained in daily operations. Training and competency of personnel need to serve the objectives of the QMS.

6.2.2 It is essential that each AISP undertakes their own training needs analysis to understand the tasks to be performed by AIS technical personnel, and the desired observable behaviors, knowledge, skills and attitudes needed to establish an adapted competency model that meets the objectives of the QMS. There are many commonalities between tasks, roles and functions across various AISPs, and detailed guidance on adapted competency models for an AISP can be found in the Aeronautical Information Services Training Manual (Doc 9991).

6.2.3 Personnel competence must be assessed against a training plan to ensure that the stated objectives of training have been accomplished. The QMS should support refresher training and assessment procedures for remediating detected shortfalls in knowledge or performance.

6.2.4 Processes and procedures related to the training and assessment of personnel that form part of the QMS must be routinely evaluated and monitored to ensure continued effectiveness. Inputs to this evaluation process could include

management reviews, AIS technical personnel performance data, and the feedback from AIS technical personnel and the next intended users of aeronautical information products and services.

6.2.5 Training records are to be retained as evidence that AIS technical personnel competence requirements have been met. Each AISP may have a different approach to capturing and documenting training and assessment evidence.

Examples of documented training records include:

a. training specifications for AIS technical personnel;

b. training and assessment plans;

c. training records for each phase of training;

d. evidence guides used to assess desired observable behaviors;

e. competency matrix based on training plan; and

f. assessment outcomes or results.

6.3 Awareness

6.3.1 Awareness training focuses on ensuring AISP personnel know how their activities fit into the QMS. Besides being part of the initial training, understanding the role AISP personnel have within the AISP should be reiterated when needed.

6.3.2 Awareness training typically includes:

a. the quality policy;

b. objectives and goals of the AISP;

c. significant quality aspects of the activities and related work instructions;

d. roles and responsibilities of personnel within the QMS;

e. accessing information;

f. reporting irregularities and non-conformances;

g. requesting or proposing changes; and

h. notifying AISP personnel of updates and changes.

6.4 Communication

Procedures must be developed to ensure effective communication within the AISP and with stakeholders. A communication plan should be used to identify the authority responsible for coordinating information, when such activity is required. For example, the communication plan spells out what to communicate; when and with whom to communicate; how to communicate and who communicates. The accountable authority will communicate significant procedural changes to AIS technical personnel

Internal communications provide a means to effectively disseminate information, build trust and identify opportunities for improvement. The quality policyand objectives, the quality manual and documented procedures, including planned changes within the AISP, should be communicated to all personnel.

External communications provide a means to relay product information, planned changes, encourage enquiries, address complaints and feedback and helpunderstand potential stakeholders' constraints..

6.5 Documented information

6.5.1 A QMS must include documentation as required by the adopted quality management standard and additional documents as required by the organization to ensure the effective operation and control of processes to enable consistent aeronautical information products and services. The extent of the documents required for the QMS is dependent upon the size and type of the organization, risk, complexity, interaction of the processes and competence of AIS technical personnel. A risk-based approach should be applied to determine the extent of additional documents required. Documented information is evidence that a QMS is in place and operating effectively; it is not the intent to create unnecessary paperwork.

6.5.2 The purpose of documentation in a QMS is to provide a ready reference for how, when, where, by whom and, if necessary, why an activity is performed. A list of documents to be maintained and retained is found in Appendix 3.

6.5.3 Procedures should be designed with the involvement of appropriate AIS technical personnel to ensure tasks are performed systematically and with dependable outcomes. It is important to keep written documentation simple, consistent and easy to amend.

6.5.4 Good documentation communicates roles and responsibilities, performance expectations and provides a basis to evaluate the effectiveness of the QMS. Documentation should be standardized for consistency and can be organized ina hierarchical form (Figure 6-1 refers).

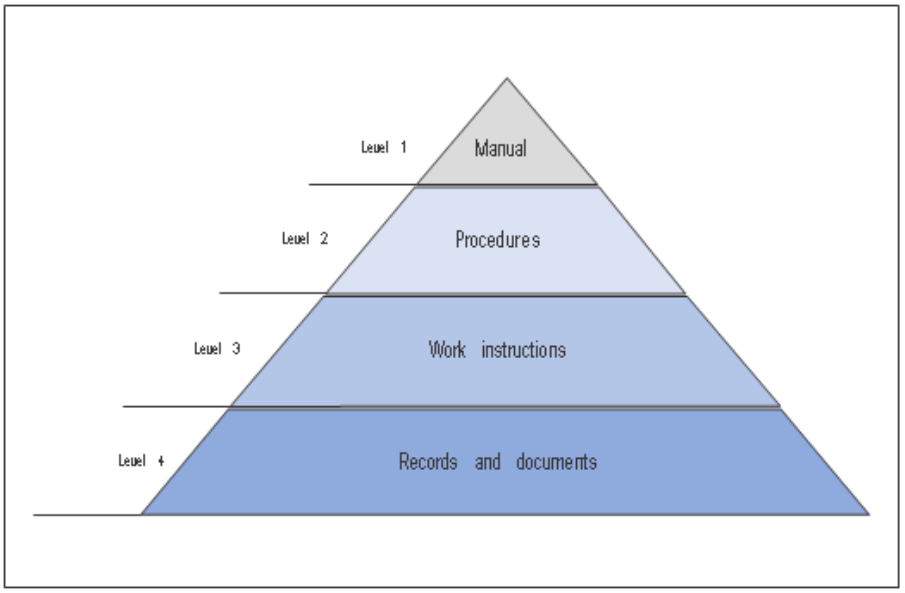

Figure 6-1. Hierarchy of QMS documents

6.5.5 Level 1. - Documentation that defines the principles of the QMS and consists of the quality manual, the quality policy and objectives of the organization.

6.5.6 A quality manual is a controlled document and a principal part of a QMS. The quality manual includes, but is not limited to, the following:

a. quality policy and objectives;

b. scope and exclusions;

c. organizational structure;

d. foundational, high-level processes and procedures;

e. description of the interactions between processes;

f. location of information and guidance;

g. definitions with a unique meaning to the organization;

h. roles, responsibilities and delegation of authority; and

i. other supportive information and data.

6.5.7 Level 2. - Documentation that consists of procedures by which the AISP manages the QMS; it describes:

a. control of documents and records;

b. internal audit;

c. management reviews;

d. control of non-conformance; and

e. corrective and preventative actions.

6.5.8 Level 3. - Documentation that provides detailed instructions, in the form of work instructions, which the AIS technical personnel need to follow when carrying out operational activities. The level of detail depends largely on the complexity of the tasks concerned. Effective work instructions will lead to consistent aeronautical information products and services. It is up to the organization to decide the level of detail that is included in the work instructions. Largely, this will depend on methods used, skills needed, training and extent of supervision required. Work instructions are generally included in an organizational repository.

6.5.9 Level 4. - Documentation that consists of all forms and records that serve as objective evidence of conformity to requirements and of the effective operation of the QMS.

6.5.10 Organizations may want to include additional QMS documentation, for example documents which include specifications, national requirements, ICAO guidance material, Viet Nam' AIP or regional air navigation plans.

6.6 Control of documents

6.6.1 All internal and external documents should be managed and controlled in an official document repository, for example on a shared network site that is accessible to all personnel. Procedures need to be in place for:

a. reviewing and updating documents to ensure accuracy;

b. approving documents;

c. ensuring changes and revision status are identified;

d. ensuring only current versions are available, for example obsolete documents should be archived and removed;

e. ensuring legibility and readability; and

f. ensuring internal and external documents are identified and the distribution controlled.

6.6.2 Controlled documents should be version controlled and only the latest and approved documents should be available and accessible by either establishing anofficial document repository site on a shared network or a document management system. To ensure the latest version of a document is used, a statement can be added that any uncontrolled copies must be verified against an official document repository.

6.7 Control of records

6.7.1 Records should be retained for traceability and audits. They provide objective evidence of actions by the AISP and can be used to verify that requirements were met, quality issues addressed and continuous improvement achieved. Management should prescribe the record management processes and indicate the quality records deemed necessary for control and retention.

6.7.2 Documented procedures must be established for the identification, storage, retrieval, protection, retention and disposal of quality records.

6.7.3 Documented retention periods for controlled records, including technical training records, may be determined by legal requirements, regulatory obligations or customer specification, and may vary by AISP. Generally, a minimum of three years is deemed sufficient for the retention of operational records.

6.7.4 Records can exist as hard copies, or electronic storage methods should be developed tominimize the risk of deterioration, damage or loss.

6.7.5 For each quality record, the following information should be considered:

Table 6-1. Record management considerations

Record Management Process	*Responsibility*	*Retention Period*	*Location*
1) Define a record 2) Produce a record 3) Index a record 4) Store a record 5) Dispose a record	Who is responsible for record indexing*, storage and disposal? * *may involve unique identifiers to file and retrieve.*	What is the minimum time to retain a record?	Where is a record stored?

6.7.6 Examples of Quality Records include: a) customer orders, specifications and requirements; b) meeting notes, e.g. Management review; c) audit reports; d) non-conformance records (service failure reports, customer complaints); e) corrective action

records; f) files on suppliers, e.g. evaluation of suppliers and their performance history; g) process control records; h) inspection and testing reports; i) training records; and j) records of goods received and delivered.

CHAPTER 7 - OPERATIONS

7.1 Operational planning and control

7.1.1 Operational planning and control are required for effective implementation of processes and include the following:

a. determination of required operational resources, such as personnel, equipment and budget;

b. establishment of verification requirements and acceptance criteria for aeronautical information products and services;

c. determination of criteria for processes to maintain data integrity and traceability;

d. determination of and implementation of process controls; and

e. determination of documentation to be maintained and controlled.

7.1.2 Figure 7-1 shows the aeronautical data chain from data origination to release of the aeronautical information products and services to the next intended user; however, the scope of the QMS only covers the internal processes from after the data has been submitted to the AISP, to releasing it to the next intended user.

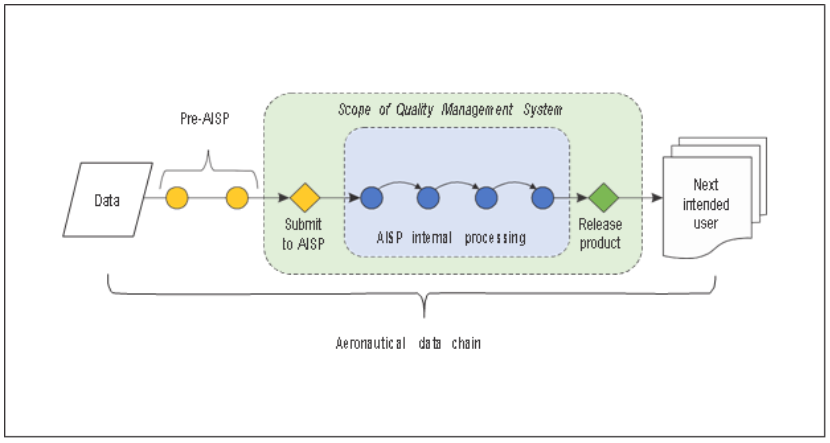

Figure 7-1. Aeronautical Data Chain

7.1.3 Procedures should be implemented by the AISP to provide assurance that the integrity of the data is maintained. Data should be traceable to its source and described by metadata that remains with the data element throughout its entire data lifecycle.

7.2 Requirements for aeronautical information products and services

Data quality requirements ensure that aeronautical information products and services meet the requirements of the intended users and must be included in the data exchange agreements between affected parties. The aeronautical data catalogue in the PANS-AIM, Doc 10066 contains the data quality requirements from data origination to dissemination and can be utilized to include identified data originators for traceability purposes.

7.3 Design and development of aeronautical information products and services

Management must determine if design and development of aeronautical information products and services are part of the AIS function. If design and development are not applicable to the AIS then the justification must be documented in the scope of the QMS. Standardized aeronautical information products and services are based on predefined standards or other guidance material. If products and services provided are not based on internationally recognized standards, then the AISP must define the design and development criteria for customized aeronautical information products and services.

7.4 Control of externally provided processes products and services

The QMS must include means to control processes, products and services provided on behalf of the AISP to ensure conformity with the organization's quality commitment. To ensure externally-sourced data conforms to all applicable quality requirements, the AISP must establish formal arrangements with data originators. The AISP needs to document and apply criteria for evaluation, performance monitoring and expected results of externally-provided processes, products and services.

7.5 Production and service provision

7.5.1 The AISP must establish the characteristics of aeronautical information products and services to ensure the required data quality requirements are met before a product can be released or a service provided. The AISP should consider availability of monitoring resources, stages when verification will occur and any corrective actions that may be required if errors are detected. Suitable means to identify and trace, for example, unique identifiers and metadata outputs both during production and after distribution, will assist the AISP to correct identified non-conformances. The AISP should apply adequate oversight when dealing with information belonging to external stakeholders provided for the purpose of inclusion in the aeronautical information products and services. Sensitive information should be identified, verified, and protected to avoid loss, unauthorized access or corruption of information.

7.5.2 Feedback should be actively sought from customers before and after distribution of aeronautical information products and services to determine any opportunities for improvements.

7.6 Release of aeronautical information products and services

7.6.1 Quality checks are performed at various stages of the aeronautical data chain to ensure that the integrity of the aeronautical information products and services have not been altered. Appropriate processes ensure that the aeronautical information products and services are ready for release and that the quality requirements of the next intended users are met; conformity with these data quality requirements should be recorded for traceability purposes. Only authorized personnel should release aeronautical information products and services.

7.6.2 The AISP should take the following steps to correct aeronautical information products and services that have already been delivered to affected users:

a. take immediate action to correct the aeronautical information products and services;

b. isolate, contain and suspend aeronautical information products and services;

c. inform affected users of the nonconformity; and

d. determine root cause for the nonconformity and take preventative action.

7.6.3 Records must be kept that describe the nonconformity and the corrective actions to be taken. Authorized personnel should then release the corrected aeronautical information products and services.

CHAPTER 8 - PERFORMANCE EVALUATION

8.1 Monitoring, analysis and evaluation

8.1.1 The AISP is required to develop a continuous monitoring plan to define what processes must be monitored to review and evaluate the performance of the QMS and to identify opportunities for improvement.

8.1.2 The purpose of a monitoring plan is to demonstrate compliance with the QMS, which provides continuity of the system. The AISP should create documented procedures for the monitoring of the QMS, which address how and when the QMS is to be monitored.

8.2 Internal audit

8.2.1 An internal audit is a documented, systematic and independent means to collect and review objective evidence to determine the organizations' conformity with internal and external requirements of the QMS. The QMS should be audited at planned intervals, for example, once a year, and the audit schedule documented. Any person authorized by the AISP to conduct the audit can perform internal audits; however, it is beneficial to use resources familiar with the QMS processes.

8.2.2 Audits are used to ensure QMS processes are in place and to retain evidence of conformance with these approved processes. Audits should also verify that the AISP maintains adequate levels of staff, maintains satisfactory competency levels and training programmes, and engages in continuous improvement.

8.2.3 The QMS should also include a documented process for mitigating any nonconformities that are identified during an internal audit.

8.3 Audit schedules

8.3.1 AISPs will benefit from requesting or implementing a well-defined audit schedule from their auditing bodies. Having a clear picture of the number and scope of audits helps the AISP to remain prepared and to allow time to implement necessary corrective actions or continuous improvement initiatives in between audits. It also assists in ensuring that work can be properly resourced during auditing periods when AIS technical personnel and management may be called upon to participate in audit activities.

8.3.2 An audit schedule can be planned for any period, and may vary in level of detail; however, possible items for inclusion are as follows:

a. audit type and auditing body;

b. date and planned duration of audit;

c. audit scope, that is which parts of the QMS will be audited; and

d. audit requirements like access to environments, personnel, facilities etc..

8.3.3 AISPs carrying out internal audits by their own quality teams may also benefit from providing inputs to the audit schedule. For example, if error reporting has detected an increase in incidents in a particular process, this process would be a good

candidate for inclusion in an internal audit schedule, either as part of a root cause analysis, or to check the effectiveness of current processes or of any implemented corrective actions. Note that the AISP could also be subject to ad hoc or unannounced audits.

8.4 Process auditing approach

8.4.1 Auditors usually spend time going through process flow diagrams and associated procedures when auditing a process. They may also wish to interview AIS technical personnel to assess the quality culture, as well as the understanding and effectiveness of QMS. Auditors will seek assurance that the AISP is following the published procedures in controlling the process. Therefore, the procedures should be straightforward while still ensuring consistency of the outputs. In general, the auditors will look at the following aspects of the process being audited:

a. quality objectives;

b. inputs and outputs;

c. process ownership;

d. process activities;

e. interrelation and interaction with other processes;

f. continuous improvement of the process; and

g. risks to the process.

8.5 Audit structure

8.5.1 Internal or external audits should follow a planned structure. This allows auditors and auditees to be prepared to provide the required information and evidence to maximize the time available for the audit.

8.5.2 A typical example of an audit structure, including follow-up activities, is provided below:

a. audit is scheduled and the audit scope provided to AISP;

b. pre-audit activities take place, for example, provision of documentation for review, if required;

c. audit opening meeting takes place;

d. audit activities carried out, such as interviews, process review and observations;

e. audit closing meeting takes place;

f. audit report provided to the AISP;

g. AISP reviews and responds to findings (acceptance); and

h. corrective actions implemented within an agreed period, as required.

8.6 Certification and third-party audit

A certification audit is a third-party audit and is conducted by an accredited certification body engaged by the AISP. Upon satisfactory completion of the certification audit, the QMS of the AISP will be certified to the specific quality standard. After certification, the certification body will conduct regular surveillance audits to confirm the continued conformance of the QMS to the specific qualitystandard.

8.7 Management review

8.7.1 Senior management should review the QMS at regular and planned intervals, for example, annually, to ensure continuing adequacy and effectiveness, as well as alignment with the strategic direction and quality policy of the organization. The intent of a management review is to ensure the continuing suitability of the QMS in accordance with the quality needs of the organization. During management review meetings, senior management should discuss, at a minimum, how to:

a. resolve process and procedure issues which have been raised, or where changes have occurred;

b. plan activities to promote compliance, communication and coordination with the QMS requirements;

c. analyze collected data, metrics, trends, customer feedback and address results;

d. determine possible corrective actions; and

e. identify hazards, risks, opportunities for improvement, or any requiredmitigation actions.

8.7.2 The meeting minutes of the management reviews with actions must be retained in a record repository for audit purposes.

CHAPTER 9 - IMPROVEMENT

9.1 Continuous improvement

Once a QMS has been implemented, the AISP should continuously monitor the system and its processes. The intent is to continuously improve the QMS processes and procedures to provide high quality aeronautical information products and services and improve customer satisfaction.

9.2 Nonconformity and correction action

As part of the activities that are necessary to assure the quality of aeronautical information products and services, the AISP should address any nonconformities based on their identified level of risk. The AISP should implement a corrective action plan to determine the root cause(s) of the nonconformity, corrective actions to fix the nonconformity, and modifications to existing processes and procedures designed to mitigate recurrence. See Appendix 4 for an example of an error management checklist.

Appendix 1 - QUALITY POLICY

EXAMPLE OF A QUALITY POLICY:

"Aeronautical Information Services is committed to delivering quality assured aeronautical information products and services that satisfy regulatory requirements and meet the requirements of the next intended users. This commitment includes continuously improving the efficiency of business processes and providing improved customer service."

Appendix 2 - IMPLEMENTATION PLAN

1.1 Example of an implementation plan

Planning the QMS

1. Identify the AISP functions

2. Identify the AISP products and services

3. Identify the stakeholders - needs and expectations

4. Identify internal and external issues; examples of internal issues are values, culture, knowledge etc., and examples of external issues are legal, economic, technological, etc.

5. Identify and address risks and opportunities for improvement, both internal and external

6. Identify the quality standard(s) to comply with

7. Identify any exclusions from the quality standard (ensure this does not affect the ability or responsibility to ensure the conformity of products and services and enhancement of customer satisfaction)

8. Define the requirements for the products and services to be designed and developed, or offered to customers; include all national requirements (including complementary ICAO provisions), or those deemed necessary by the organization

9. Identify a compliance plan that can be used to demonstrate compliance with national requirements; document what needs to be done, how it is done, and, if not compliant, how compliance can be achieved, or file a difference with ICAO, if needed

10. Specify the essential characteristics of all products and services to be provided; corresponding data quality requirements are defined in the data catalogue

11. Draft the scope of the QMS with the types of products and services to be delivered; provide justification for any requirement of the adopted quality standard that is not applicable to the scope

12. Assign accountable management, including their roles, responsibilities and authorities

13. Ensure the QMS conforms to all requirements of the relevant quality standard

14. Determine processes to ensure that the QMS delivers intended outputs

15. Establish quality policy and objectives

16. Communicate quality policy

17. Determine availability of resources (people, infrastructure, equipment, budget, etc.), including (re-)allocation of responsibilities and authorities, monitoring of resources, and ensure availability of required operational resources

18. Determine effect on current knowledge, determine what additional knowledge and updates will be required

19. Determine documentation to be maintained and controlled

20. Determine all required processes, including their inputs, outputs, methods, equipment, resources and measures

21. Determine work instructions, operating procedures and guidance material

22. Determine monitoring and measurement activities at appropriate stages; verify that all criteria for control of processes or outputs, and acceptance criteria for products and services have been met, including

- Required verification and validation activities (data quality requirements);
- Control of external processes, products and services to ensure conformity to QMS objectives;
- Identification and traceability of information and products; and
- Verification that data quality requirements correspond to those defined in the data catalogue

23. Establish an appropriate design and development process to ensure the reliable provision of all products and services (if applicable)

24. Perform training needs analysis and develop an adapted competency model, including training plans, assessment plans, and evidence of competency

25. Determine and manage knowledge necessary for the operation of processes, and make this available to the extent necessary

26. Develop processes for change management, error management, continuous review and improvement, document management protocols; consider all required processes, responsibilities, configuration plans (automated systems, workflows, products, services and data elements, etc.), communication plan, identified benefits, regulatory obligations, internal and external issues, and customer feedback

27. Determine record management protocols, including retention period, media to be used, version control, and management of external information for inclusion in products and services

28. Determine internal audit, including draft audit schedule, and internal audit checklist

29. Generate a communication plan, including who will communicate and with whom, what, when, and how

30. Determine management review schedule

1.2 Note that this list may not be complete

1.3 For each item of the implementation plan, it is advisable to capture the expected outcomes, as well as additional documentation that is deemed necessary by the AISP.

Appendix 3 - LIST OF DOCUMENTS TO BE MAINTAINED AND RETAINED

The following list contains all the documented information of the QMS that should be made available to stakeholders, and maintained and retained for audit purposes. The AISP may determine that additional documentation isnecessary.

Documented information			
	Available	*Maintain*	*Retain*
Stakeholders and their relevant requirements		X	
Scope of the QMS	X	X	
Documented processes		X	
Evidence of processes being carried out as planned			X
Quality policy	X	X	
Quality objectives		X	
Evidence of fitness for purpose of monitoring and measuring resources			X
Basis used for calibration or verification (if applicable)			X
Evidence of competence			X
Review of requirements of products and services			X
Data quality requirements (as per data catalogue)		X	
New requirements for products and services			X
Formal arrangements (for the exchange of information including the required data quality requirements and identification of data originators for traceability and establishment of agreements)		X	
Configuration plans (to demonstrate compliance with regulatory requirements, data quality requirements, and any other requirements deemed necessary to control)		X	
Changes to requirements for products and services (if amended)		X	

Evidence to demonstrate that design and development requirements have been met			X
Design and development inputs (if applicable)			X
Design and development controls (if applicable)			X
Design and development outputs (if applicable)			X
Design and development changes (if applicable)			X
Review of design and development changes (if applicable)			X
Authorization of design and development changes (if applicable)			X
Actions taken to prevent adverse impacts due to design and development changes (if applicable)			X
Activities and necessary actions arising from the evaluations of externally-provided processes, products and services			X
Information to enable traceability			X
Report circumstances about lost, damaged or unsuitable for intended use externally-provided property			X
Review of changes, persons authorizing the change and necessary actions arising from the review			X
Release of products or services, including evidence of conformity with acceptance criteria and traceability to person(s) authorizing the release. Data product specifications, etc.			X
Describing nonconformities, actions taken and the authority deciding the actions to be			X

taken			
Evidence of monitoring and measuring results			X
Implementation of audit programme and audit results			X
Results of management reviews			X
Nature of nonconformities, corrective actions and the results of the actions taken			X

Appendix 4 - ERROR/NON-CONFORMANCE INVESTIGATION TEMPLATE

Example of an error investigation template; each AISP to consider what needs to be included:

Step	*Action*	*Responsibility*
1.	Record nonconformities	<insert>
2.	Determine root cause of nonconformity	<insert>
3.	Implement corrective action	<insert>
4.	Advise originator	<insert>
5.	Determine actions required to prevent reoccurrence of nonconformities	<insert>
6.	Filing records created after corrective action taken	<insert>
7.	Determine if future review is required	<insert>

Appendix 5 - CHANGE MANAGEMENT TEMPLATE

1. Personnel are encouraged to make change suggestions at regular review meetings. However, it is also beneficial to provide a mechanism for personnel to suggest changes to improve the QMS outside of formal meetings. To facilitate this process, suggestions could be made in the form of a change proposal form. Each suggestion is recorded with an individual number and with details entered of the action taken and advice to the originator.

2. Example of a change management template:

AIS Quality Management System — Change suggestion/improvement opportunity		
No:	*To: <Insert to whom the suggestions are directed, e.g. Manager AIS>*	*From:*
Details:		
Change management checklist to be completed by accountable authority/person		
Step	*Action*	*Responsibility*
1	Register the suggestion	<insert>
2	Understand current requirements and analyse the proposed change; identify benefits of the proposed change	<insert>
3	Determine any impacts on hazards, risks, regulatory requirements,customer requirements and impact on internal or external issues	<insert>
4	Determine course of action to be taken	<insert>
5	Plan change - determine steps to be followed to reach desired outcome	<insert>
6	Review documentation, training material, human factors, system and/oraeronautical information product(s) for any consequential changes	<insert>
7	Implement and monitor change	<insert>
8	Advise change proponent of the outcome or actions taken	<insert>
9	Record filed	<insert>
10	Review change implemented (after a set period, if deemed necessary)	<insert>

Actions taken	Originator advised	Date:
1	<insert>	<insert>
2	<insert>	<insert>