Agenda Item 3: Communications, navigation and surveillance / Air traffic management (CNS/ATM) systems

SOUTH AMERICAN REGION PERFORMANCE-BASED IMPLEMENTATION PLAN

Presented by the Secretariat)

Summary

The first draft of the SAM performance-based implementation plan for the SAM Region is presented in this paper, as per GREPECAS Conclusion 15/1 and Decision CNS/ATM/SG/1-1. The meeting is encouraged to issue comments on the mentioned document.

References:

- Air Navigation Global Plan (Doc. 9570);
- ATM Global Operational Concept (Doc. 9854);
- GREPECAS/14 and GREPECAS/15 Reports;
- CNS/ATM/SG/1 Report;
- Transition plan towards ATM Operational concept for the CAR/SAM Regions; and
- Regional Project RLA/06/901.

ICAO Strategic objectives:	*A – Safety* *C – Environmental Protection and sustainable development of air transport*

1 Background

1.1 After the progress in the CNS/ATM System implementation, achieved by States and Regional Planning and Implementation Groups, under the framework of the air navigation global plan (previously called CNS/ATM Systems Air Navigation Global Plan), it was recognised that technology was not a goal *per-se* and that a full concept of an integrated ATM global system was required, based on operational requirements clearly established. This concept, at the same time, would be the basis for the coordinated implementation of CNS/ATM technologies, also based in clearly established requisites. In order to prepare this concept, the ICAO Air Navigation Commission established the Air Traffic Management Concept Panel (ATMCP).

1.2 The Global ATM Operational Concept, prepared by the aforementioned panel, was approved by the Eleventh Air Navigation Conference (September – October 2003), and published as Doc 9854 AN/458, through Recommendation 1/1.

1.3 After the AN-Conf/11, the *Sixth Meeting of ANC Consultation with Industry on Fostering the Implementation of the Recommendations of the Eleventh Air Navigation Conference* was held in Montreal, with the issue of "fostering the application of recommendations of the Eleventh Air Navigation Conference". Among other matters, the "Global ATM – From Concept to Reality"; was dealt with, agreeing that all stakeholders that are in a position to do so, work together to prepare a common roadmap or global action plan, with the aim to provide operational benefits at short and mid terms, and that such document be available for use of ICAO by mid October 2004, for further consideration of the Air Navigation Commission, and its inclusion in the global plan.

1.4 In order to adequate global planning to the conclusions of the Eleventh Air Navigation Conference, as well as the industry roadmap, ICAO initiated the development of a new air navigation global plan. In addition to including the Global ATM Operational Concept, the Air Navigation Global Plan is focused in a series of "Global Plan Initiatives" (GPI), providing the necessary conditions for implementations, aimed at achieving benefits for the ATM community in the short and mid-term.

1.5 Within this context, the South American Region prepared a transition plan towards the ATM operational concept implementation, establishing the vision of the Region with regard to the GPIs, which would be the core of the implementation of improvements and optimisation of air navigation services in the region. This document was initially approved by GREPECAS/14.

1.6 During GREPECAS/15 Meeting, (October 2008), it was informed on the ICAO significant progress in the preparation of the pertinent guidance material in the transition towards the implementation of the ATM operational concept, and in view of the need to count with a document to guide the implementation of the global plan initiatives, the meeting approved Conclusion 15/1, in order that this Group develop a performance-based regional plan, as per the global air navigation plan and the global ATM operational concept. This plan should include the identification of the performance regional objectives and performance framework forms to be completed by all air navigation areas, such as ATN, CNS, SAR, AIM, MET and AGA/AOP, leading to the fact that, in a similar way, States develop their performance-based national plans.

1.7 The GREPECAS CNS/ATM/SG/1 Meeting analysed the documentation existing in the CAR and SAM Regions, requesting SAM States, through Decision CNS/ATM/SG/1-1, that with the assistance of ICAO, prepare a performance-based implementation plan for the South American Region, and to finalise it by June 2011.

2 Analysis

2.1 In view of the above, SAM Region States, with the assistance of Regional Project RLA/06/901, committed to the reformulation of the plan that had been presented at GREPECAS/14.

2.2 To this end, the support of five experts from four States of the South American Region, Argentina, Colombia, Paraguay and Perú, was achieved. These experts, in coordination with the Regional Officers, prepared the first draft of the South American Region Performance-based Implementation Plan, shown in **Appendix A** to this paper.

2.3 The Document has been developed keeping in mind the Air Navigation Global Plan (Doc 9750), and has the aim to apply the Global Plan Initiatives (GPI) as stipulated in the mentioned Document, in order to initiate transition towards the ATM operational concept as envisaged by ICAO.

2.4 In addition, this plan is addressed to establishing an implementation strategy aimed at achieving benefits for the ATM community in the sort and mid-term (2012 – 2018), based on the ATM-related infrastructure and the available and foreseen aircraft capabilities.

2.5 The document contemplates the different air navigation areas (CNS, AIS, MET, SAR and AGA/AOP), and also considers other relevant aspects involved, necessary to go along with such evolution.

2.6 The document is developed in 11 Chapters. Chapter 1 explains the objectives, scope, history, and some deficiencies of the current Region's system are identified and how is the evolution and transition towards the ATM operational concept envisaged.

2.7 Chapter 2 makes a brief description of air traffic in the SAM Region, as well as in adjacent Regions. This information is the result of the Seventh Meeting of GREPECAS Forecast Group, where an assessment of air traffic growth up to 2007 and forecasts from that date to 2027 were made.

2.8 Chapter 3 refers to the planning considerations that were taken into account listing homogeneous areas and main air traffic flows that have been identified in the Region, the methodology and planning tools used, a brief description of the evolution foreseen, the analysis of the global plan initiatives and its integration with the SAM Region performance objectives.

2.9 Chapters 4 to 9 briefly describe the situation in each one of the air navigation areas, ATM, CNS, MET, SAR, AIS and AGA/AOP, the implementation strategies in each one of the areas and a description of the performance framework forms (PFF), including all the information related with performance objectives, main tasks required to reach such performance objective, and at the same time, maintain a direct relationship with the ATM system components.

2.10 Chapter 10 refers to the development of human resources and competence management, keeping in mind the new requirements derived from the ATM operational concept implementation and at the same time, SAM Region States are encouraged to consider planning of human resources and management of abilities, keeping in mind the air navigation global plan initiatives, as well as new regulations and requirements for implementation at short and mid-term.

2.11 Chapter 11 relates to safety, cross transversal element to all air navigation areas and emphasizes in the State Safety Programme (SSP), and the Safety Management System (SMS).

2.12 Finally, the five attachments to the document make reference to significant material to be taken into account in planning and executing regional performance objectives and particularly Attachment D of the Document collects in PFFs the 25 performance objectives formulated for the different air navigation areas.

2.13 In order to understand the inter-relationship between of PFF in the different fields, which have tasks which inter-relate inter-relation master among PFF was prepared so that planners keep in mind that in order to attend PFF tasks in particular, coordination with other areas must exist, in order to coincide in the implementation of performance objectives.

2.14 As it may be noticed, the reference document is associated to all programmes and projects which the Region has assumed. This document has the philosophy to work jointly with the regional ATM community, applying to a certain extent the collaboration in decision-making (CDM), since nowadays it is inconceivable to work in an isolated manner to airspace users requirements, either if they are commercial, private, military or general aviation operators.

2.15 In order to impart to the ATM community the awareness about the vision of SAM States regarding the implementation of the ATM operational concept in the medium term (2012 to 2018), as well as on the implementation of the performance based Air Navigation Plan for the SAM Region, a Seminar/Workshop on the Implementation of the Performance Based Air Navigation Plan for the South American Region will be held in Lima, Peru, from 9 to 13 May 2011.

2.16 The document, once analyzed by all States and international organizations involved in the South American Region, will be presented at the Twelfth Meeting of Civil Aviation Authorities of the SAM Region (RAAC/12) (Lima, Peru, 3 to 6 October 2011) for its adoption at a regional level.

3 Suggested action

3.1 The meeting is invited to take note of the information provided in this paper and also to encourage comments on the SAM Region performance-based implementation plan.

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APPENDIX A

INTERNATIONAL CIVIL AVIATION ORGANIZATION

SOUTH AMERICAN REGIONAL OFFICE

PERFORMANCE-BASED IMPLEMENTATION PLAN FOR THE SAM REGION

Version 1.0

October 2010

TABLE OF CONTENTS

Page No.

1. Chapter 1: Foreword 4

1.1 Objective 4
1.2 Scope 4
1.3 Background 4
1.4 Evolution and Transition 6

2. Chapter 2: Air Traffic in the SAM Region 7

2.1 Traffic Forecast in the SAM Region 7

3. Chapter 3: Planning Considerations 8

3.1 Introduction 8
3.2 ATM Homogeneous Areas and Main International Traffic Flows 9
3.3 Planning Methodology 10
3.4 Planning Tools 11
3.5 Evolution 12
3.6 Global Plan Initiatives 12
3.7 Integration of Initiatives 13

4. Chapter 4: Air Traffic Management (ATM) 14

4.1 Introduction 14
4.2 General Principles 14
4.3 Analysis of the current situation 15
4.4 Strategy for the Implementation of Performance Objectives 16
4.5 En-Route Operations 16
4.6 TMA Operations 18
4.7 References 23

5. Chapter 5: Communications, Navigation and Surveillance (CNS) 24

5.1 Introduction 24
5.2 Analysis of the current situation (2010) 25
5.3 Strategy for the implementation of performance objectives 26
5.4 References 29

6. Chapter 6: Meteorology 30

6.1 Introduction 30
6.2 Analysis of the current situation 31
6.3 Strategy for the implementation of performance objectives 31
6.4 References 33

7. Chapter 7: Search and Rescue (SAR) Services 34

7.1 Introduction 34
7.2 Analysis of the current situation 34
7.3 Implementation strategy of performance objectives 35
7.4 References 37

8. Chapter 8: Aeronautical Information Services 38

8.1 Introduction 38
8.2 Analysis of the current situation 38
8.3 Strategy for the implementation of performance objectives 39
8.4 References 41

9. Chapter 9: Aerodromes and Ground Aids / Aerodrome Operational Planning (AGA/AOP) ... 42

9.1 Introduction 42
9.2 Analysis of the current situation 42
9.3 Strategy for the implementation of performance objectives 42
9.4 References 45

10. Chapter 10: Development of Human Resources and Competence Management 46

10.1 Introduction 46
10.2 Analysis of the current situation 47
10.3 Strategies for the implementation of performance objectives 48
10.4 References 49

11. Chapter 11: Safety 50

11.1 Introduction 50
11.2 Current situation 51
11.4 References 52

ATTACHMENTS

ATTACHMENT A - Traffic forecasts in the SAM Region
ATTACHMENT B - Homogeneous Areas and Main Traffic Flows identified
ATTACHMENT C - Global Plan Initiatives and their relationship with the main groups
ATTACHMENT D - Performance framework form (PFF)
ATTACHMENT E - Glossary of acronyms

1. Chapter 1: Foreword

1.1 Objective

1.1.1 This 'Performance-Based Plan for the SAM Region' (SAM-PBIP) has been drafted taking into account the Global Air Navigation Plan (Doc 9750), and its objective is to implement the Global Plan Initiatives (GPIs) as specified in that document, in order to begin the transition to the ATM operational concept as foreseen by ICAO.

1.1.2 Likewise, this Plan seeks to establish an implementation strategy so that benefits can be obtained for the ATM community in the short and medium term, based on the ATM-related infrastructure and available and foreseen aircraft capabilities. The document contains the air navigation infrastructure (CNS, AIS, MET, SAR and AGA/AOP) and contemplates the institutional aspects required to support such evolution.

1.2 **Scope**

1.2.1 This transition plan covers the SAM Region up to its boundaries, and includes the short-and medium-term implementations between 2012 and 2018, in keeping with the guidelines contained in the Global Air Navigation Plan. The long-term initiatives required for the evolution to a global ATM system, as shown in the Global ATM Operational Concept, will be added to this Plan as they are developed and approved.

1.3 **Background**

1.3.1 Following the progress made by States and Regional Planning and Implementation Groups in the implementation of CNS/ATM systems within the framework of the Global Air Navigation Plan (formerly Global Navigation Plan for CNS/ATM Systems), it was recognised that technology was not an end in itself and that an integrated global ATM system concept was required, based on clearly established operational requirements. This concept, in turn, would serve as the basis for the coordinated implementation of CNS/ATM technologies also based on clearly established requirements. In order to develop the concept, the ICAO Air Navigation Commission created the Air Traffic Management Operational Concept Panel (ATMCP).

1.3.2 The Global ATM Operational Concept developed by the aforementioned panel was approved by the Eleventh Air Navigation Conference (September-October 2003) and published as Doc. 9854 AN/458, through recommendation 1/1, which reads as follows:

a) ICAO, the States and the regional planning and implementation groups (PIRG) should consider the concept as the global common framework for guiding ATM system implementation planning and channelling ATM development work;

b) The global ATM operational concept should be used as high-level guidance for the development of ICAO provisions concerning CNS/ATM systems;

c) The States, with the support of other members of the ATM community, must undertake the task of validating the seven components of the global ATM operational concept (see Figure 1);

d) ICAO, the States and the PIRGs should develop transition strategies for the implementation of ATM systems based on the global ATM operational concept; and

e) ICAO should align its technical programme to facilitate the future work related to the ATM operational concept.

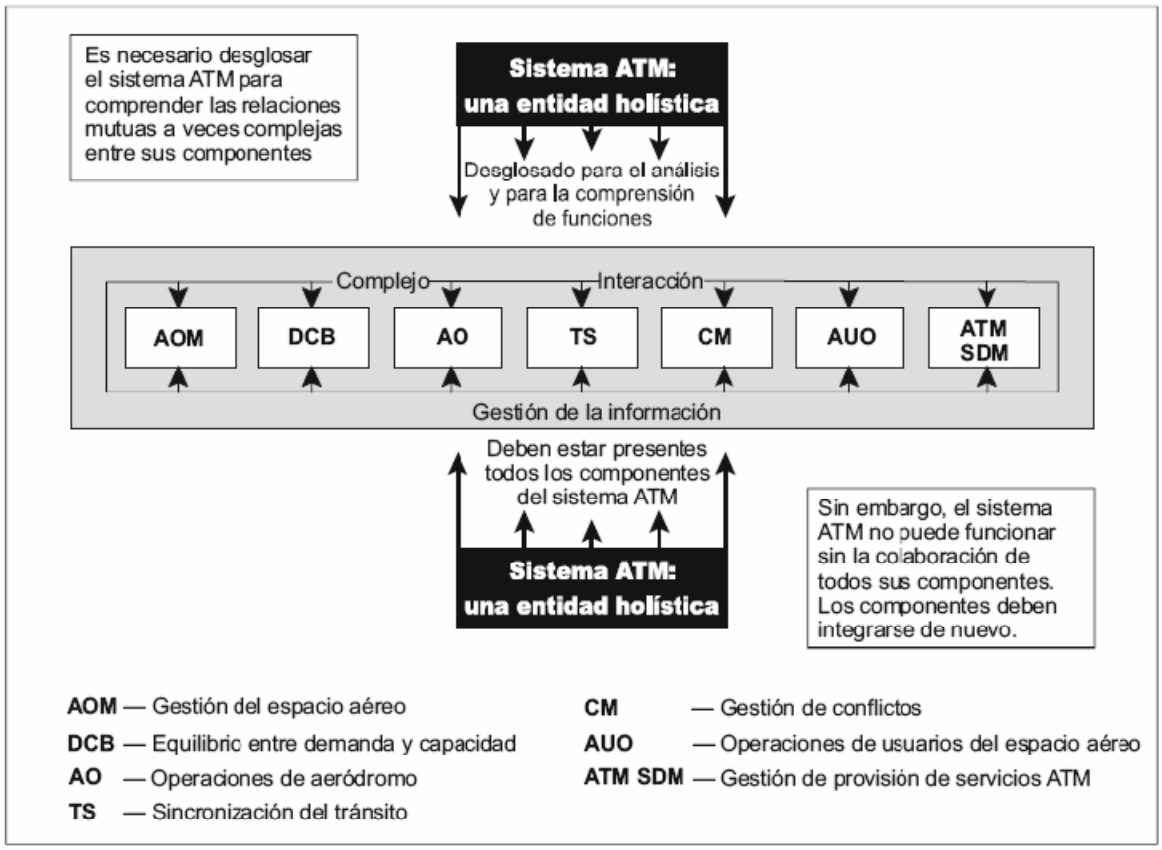

Figure 1: ATM system components

1.3.3 Following the AN-Conf/11, the Sixth Meeting of ANC Consultation with Industry was held in Montreal, on the topic "Promoting the implementation of the recommendations of the 11th Air Navigation Conference". Amongst the topics discussed, "Global ATM - From Concept to Reality" generated the following conclusion:

> "That all partners capable of doing so, work together in the preparation of a common roadmap or global action plan, with the purpose of deriving operational benefits in the short and medium term, and that said document be available for use by ICAO by mid October 2004 for submission to the Air Navigation Commission and be considered for inclusion in the Global Plan."

1.3.4 The industry roadmap included the short- and medium-term implementation activities related to CNS/ATM systems, while long-term objectives are contemplated in the operational concept. Accordingly, the Commission felt that the roadmap was fully consistent with the operational concept and that if positive results continued to be obtained, convergence would be achieved with the ATM system foreseen in the operational concept. The Global Plan and the aforementioned concept would form a complete planning structure.

1.3.5 In order to align global planning with the conclusions of the Eleventh Air Navigation Conference, mainly in relation to the Global ATM Operational Concept, as well as with the Industry Roadmap, ICAO began the development of the new Global Air Navigation Plan. In addition to including the Global ATM Operational Concept, the Global Air Navigation Plan focuses on a set of "Global Plan Initiatives" (GPIs), providing the necessary conditions for the implementations that seek to attain benefits for the ATM community in the short and medium term.

1.3.6 Within this context, the GREPECAS/15 (October 2008) took note of the significant progress made by ICAO in the drafting of the relevant guidance material. These documents include: a) the Global Air Traffic Management Operational Concept (Doc 9854); b) the Air Traffic Management System Requirements (Doc 9882); the Manual on the Global Performance of the Air Navigation System (Doc 9883); and d) the Global Air Navigation Plan (Doc 9750).

1.3.7 Likewise, GREPECAS/15 approved Conclusion 15/1 for the development by the Group of a regional performance-based plan, in keeping with the Global Air Navigation Plan and the Global ATM Operational Concept. This plan should include the identification of the regional performance objectives and the performance framework forms to be completed by all air navigation areas, such as ATM, CNS, SAR, AIM, MET and AGA/AOP. In a similar way, the States would develop their national performance-based plans.

1.3.8 Furthermore, ICAO published the Manual on Performance-Based Navigation – PBN (Doc. 9613), which identifies the relationship between RNAV and RNP applications, defining the advantages and limitations of each of them as navigation requirements. The manual provides practical guidance on implementation to make sure that performance requirements are suited to the proposed application.

1.4 Evolution and Transition

1.4.1 When considering the general system concept, evolution and transition issues are of great importance. It will be necessary to ensure the harmonisation of CNS/ATM implementation in the region, based on the PBN concept, in order to optimise the investments made in on-board systems, making sure that aircraft are not necessarily forced to carry a multiplicity of equipment and operators are not forced to request multiple operational approvals.

1.4.2 Likewise, it is necessary to make sure that the different levels of development worldwide will not create incompatibility amongst the various components of the ATM Operational Concept in the ICAO Regions. Given the broad scope of these components, the aforementioned considerations require judicious coordination of planning at regional and global level in order to achieve an optimum implementation of these systems.

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2. Chapter 2: Air Traffic in the SAM Region

2.1 Traffic Forecast in the SAM Region

2.1.1 Aircraft movement forecasts are important for anticipating when and where may airspace or airport congestion occur, and thus, are essential for planning capacity increases. These forecasts also play an important role in the implementation of ATM/CNS systems.

2.1.2 For purposes of this Plan, use has been made of the 2007-2027 forecasts prepared at the seventh meeting of the CAR/SAM Forecasting Group (Doc. 9917) that are relevant for the SAM Region within the framework of homogeneous areas (AR) and main flows (see section 3.2 of this Plan). Accordingly, it is interesting to analyse the percentage of growth expected for that period, as shown in the tables contained in Attachment A to this document.

2.1.3 In summary, passenger traffic in the South American Region during the 2007-2027 period is expected to increase at an annual rate of 8.8%, reaching 73 million passengers in 2027. The aircraft movement forecast for the same period shows an annual increase of 7.9%, reaching 497.000 movements for 2027.

2.1.4 Always within the 2007-2027 period, it is expected that passengers between South American and Central America and the Caribbean will increase 8.9%, reaching 27 million passengers in 2027. Aircraft movement for that period may reach a figure of 8.2%, with 282.000 movements in 2027.

2.1.5 Between South America and North America for the period 2007 – 2027, an increase of 5.7% is expected per year, reaching a figure of about 173 million passengers for 2027. Aircraft movements may reach 5%, or 1.625.700 movements in 2027.

2.1.6 Finally, with respect to the South Atlantic, the Europe-South America corridor specifically, a growth of 5.4% a year is expected, reaching an approximate figure of 21.5 million passengers for 2027 and a growth in aircraft movements of 5.5%, reaching more than 90.000 movements in 2027.

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3. Chapter 3: Planning Considerations

3.1 Introduction

3.1.1 As traffic volume increases throughout the world, the demands on air navigation service providers in a given airspace increase, and air traffic management becomes more complex. Increased traffic density brings about an increase in the number of flights that cannot fly their optimum path.

3.1.2 It is foreseen that the implementation of the components of the ATM operational concept will provide sufficient capacity to meet the growing demand, generating additional benefits in terms of more efficient flights and higher levels of safety. Nevertheless, the potential of new technologies to significantly reduce the cost of services will require the establishment of clear operational requirements.

3.1.3 Taking into account the benefits of the ATM operational concept, it is necessary to make many timely decisions for its implementation. An unprecedented cooperation will be required at both global and regional level.

3.1.4 The regional planning process is the main factor in ICAO planning and implementation work. It is here where the top-down approach, which includes global guidance and regional harmonisation, converges with the bottom-up approach of States and aircraft operators and their proposals concerning implementation alternatives.

3.1.5 In its most elementary form, the result of the regional planning process is a list of air navigation facilities and the dates in which they could be available, information that is required for the implementation of the Global Plan Initiatives, leaading to a gradual transition towards the ATM Operational Concept. These lists will be incorporated into the CAR/SAM Regional Air Navigation Plan (ANP), and will be kept up to date by the CAR/SAM Regional Planning and Implementation Group (GREPECAS), with the assistance of the ICAO Regional Offices.

3.1.6 This plan is a guide for the gradual, coordinated, timely, cost-effective and global implementation of the components of the ATM operational concept, taking into account the Global Plan Initiatives (GPIs) that may be implemented in the short and medium term. Accordingly, the plan fulfils two main functions:

a) It provides guidelines to regional planning organisations, States/Territories, service providers and users for the transition to the ATM operational concept.

b) It measures implementation progress.

3.1.7 The planning of the implementation of the components of the ATM operational concept, as well as the development of guidelines to ensure a harmonious and integrated implementation, should be basically a regional responsibility, while the implementation is the responsibility of the States/Territories or groups of States/Territories and International Organisations, working together within the concept framework and the implementation strategy developed by GREPECAS for the two Regions. However, each CAR and SAM State must develop and publish its own plan for the transition to the ATM operational concept.

3.1.8 Regional planning should take into account the intrinsic characteristics of the components of the ATM operational concept, whose application on facilities may go beyond national boundaries, thus requiring the implementation of multinational facilities to avoid duplication of resources and services. The relevant institutional aspects shold be taken into account for the implementation of multinational facilities. These aspects, in general, cover all matters related to technical, operational, financial and legal issues, which should be taken into account when considering the establishment of multinational facilities.

3.1.9 In view of the above and the need to develop an appropriate structure for the implementation of multinational facilities, regional coordination is underway to establish a SAM Regional Multinational Organisation, aimed at ensuring the optimisation of the investments required for the implementation and maintenance of air navigation services. In this sense, during the first semester of 2010, six SAM States signed an Agreement of Incorporation.

3.1.10 The planning period under consideration is 2012-2018.

3.2 ATM Homogeneous Areas and Main International Traffic Flows

ATM Homogeneous Area

3.2.1 A homogeneous ATM area is airspace with a common ATM interest, based on similar air navigation system characteristics in terms of traffic density, complexity, infrastructure requirements or other specified considerations, in which a detailed common plan will foster the implementation of interoperable ATM systems. ATM homogeneous areas may cover States, specific parts of States or groups of States. It may also cover extensive oceanic and continental areas. Areas of interest and common requirements are taken into account.

3.2.2 As stated in the ATM Operational Concept, ATM homogeneous areas and/or routing areas should be minimised and consideration be given to the merging of adjacent areas.

Main Traffic Flows

3.2.3 A main traffic flow is a concentration of significant air traffic volumes on the same path or on flight paths that are near each other. Main traffic flows may cross several ATM homogenous areas with different characteristics.

3.2.4 ATM homogeneous areas and main traffic flows are especially related to the en-route airspace. However, the enhancement of the capacity and efficiency of terminal control areas (TMA) and aerodromes, and working based on a set of common initiatives, will serve as an important basis for achieving a homogeneous ATM system. Therefore, several Global Plan Initiatives were specifically drafted to improve aerodrome and TMA operations.

3.2.5 The most significant air traffic flows in the SAM Region reach the boundaries between the SAM Region with the AFI, CAR, EUR, NAM, NAT and PAC Regions. **Attachment B to this Plan** shows the Main Traffic Flows identified in the Homogeneous Areas of the SAM Region, in keeping with the Global Air Navigation Plan (Doc 9750).

3.3 Planning Methodology

3.3.1 After identifying ATM homogeneous areas and the main traffic flows, GREPECAS conducted a study of the current and foreseen fleet of aircraft and their capabilities, the forecast traffic figures and ATM infrastructure, including human resource availability and requirements, amongst other elements. The analysis of the collected data revealed performance "gaps". Global Plan Initiatives were assessed with respect to these gaps in order to identify those that would provide the operational improvements required to meet the performance objectives in the SAM Region, and will be discussed in detail in the following chapters.

3.3.2 This planning process will continue with the development of different options for the implementation of the initiatives, a profitability analysis of these different options, and the preliminary development of auxiliary requirements concerning infrastructure. Additional steps will include the drafting of implementation plans and funding profiles, a more in-depth analysis of human resource requirements to support the initiatives identified, followed by additional profitability analyses. Finally, national and regional implementation plans would be drafted or amended based on the selected initiatives. It is a process that may require the repetition of several steps until the initiatives are finally selected. Once available, planning tools will help GREPECAS to carry out the aforementioned steps. Figure 2 shows a planning flow diagram.

3.3.3 The work for the SAM Region is organised based on project management techniques and clearly defined performance objectives to support the Global Plan strategic objectives aligned with the ICAO strategic plan.

3.3.4 All of the activities listed in the performance objectives will be designed based on strategies, concepts, action plan models and roadmaps that may be shared in order to align the inter-regional work with the main objective of maximising interoperability and transparency.

3.3.5 Planning of all the activities should ensure an efficient use of resources, avoiding duplicated or unnecessary activities or tasks, so as to make sure that such activities/tasks can be easily adjusted to the SAM Region. Planning should also encourage the optimisation of human resources, financial savings, and the use of electronic media, such as the Internet, videoconferences, teleconferences, e-mail, telephone and fax.

3.3.6 The new processes and work methods must make sure that performance objectives can be measured, based on timetables and regional progress reports to the ICAO Council and the Air Navigation Commission.

3.3.7 Based on this Implementation Plan, the States should develop their own national transition plan, containing the work programme, timetable, responsible parties and status of implementation, in order to monitor and report on the progress made in such activities. Additionally, it should also consider detailed information about the activities required for implementation, the means to provide feedback on the progress made through an annual reporting process, which will help administrations to prioritise the required actions and support, and will also help to identify annual assistance requirements of each ICAO Region.

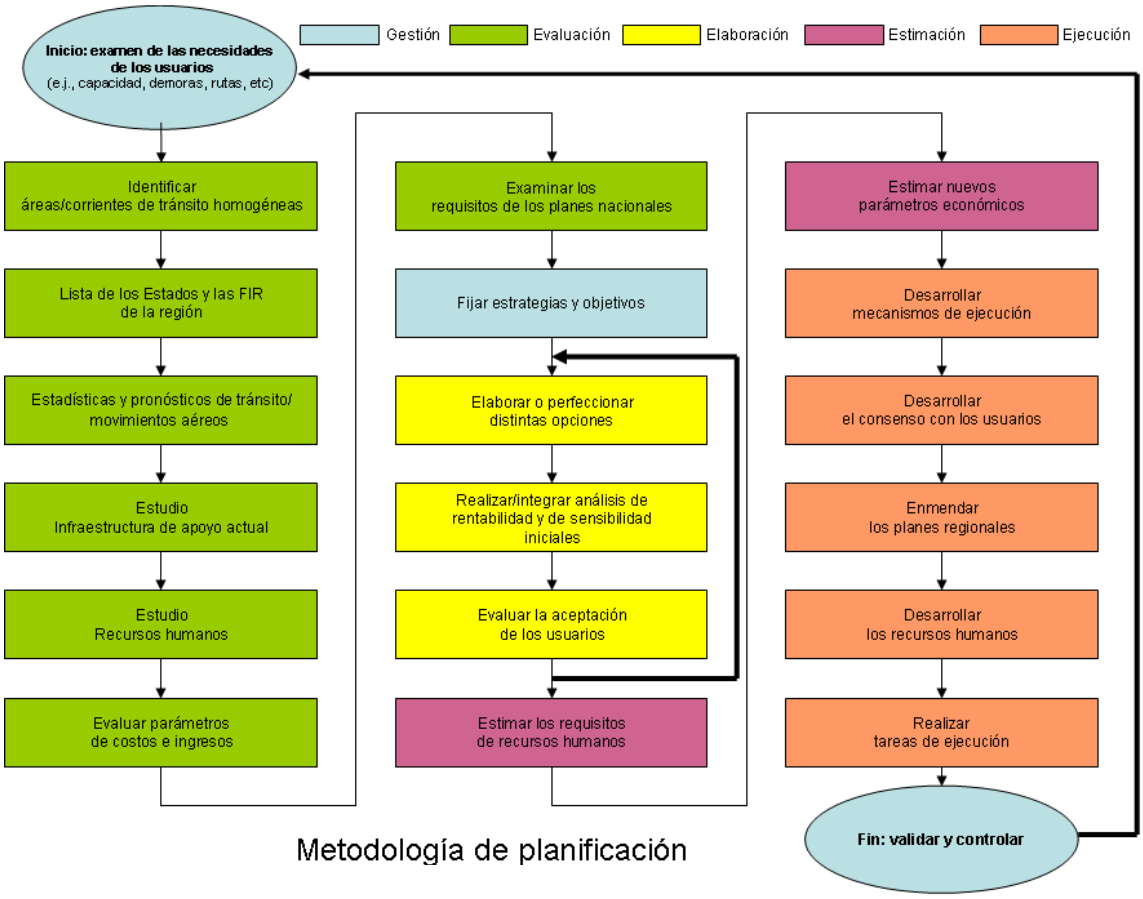

Figure 2. Planning flow diagram

3.3.8 The development of work programmes is based on the experience gained and lessons learned during the previous cycle of the CNS/ATM implementation process. Consequently, this Implementation Plan is aimed at maintaining a uniform regional harmonisation and improving implementation efficiency, taking advantage of infrastructure capacity and existing regional applications.

3.4 Planning Tools

3.4.1 This Implementation Plan will be supported by the planning tools of the Global Plan, which will provide the various electronic formats (*e.g.*, software applications, planning documentation, web-based reporting forms, project management tools, etc.), with a view to following up and ensuring coordination of projects, in which GPIs, performance objectives and target implementation dates, as well as timetables and the resulting action plans are defined. As States contemplate the implementation of the initiatives, they may use common programme templates as a basis for establishing performance objectives and implementation target dates, and develop comprehensive timetables and planning activities to meet the work programme associated to global initiatives (GPIs).

3.5 Evolution

3.5.1 The SAM ATM system is based on the provision of integrated services. In order to describe how these services will be provided, Doc. 9854 defines seven components of the ATM operational concept (see Figure 1 of this Plan), together with key conceptual changes. Performance objectives were Relationshiped to the components of the ATM operational concept in a logical manner to ensure that work is aimed at achieving the ATM system described in the operational concept. Thus, the term Components of the ATM Operational Concept used in this Plan refers to the seven components described in the ATM operational concept, namely: airspace organisation and management, aerodrome operations, demand/capacity balancing, traffic synchronisation, conflict management, airspace user operations, and ATM service delivery management.

3.5.2 In all cases, the initiatives must meet the global objectives based on the operational concept. Accordingly, planning and implementation activities start with the implementation of available procedures, processes and capacities. Evolution would then lead to the implementation of emerging procedures, processes, and capacities and, finally, the migration to the ATM system based on the operational concept. Figure 3 shows the evolution of the Global Plan.

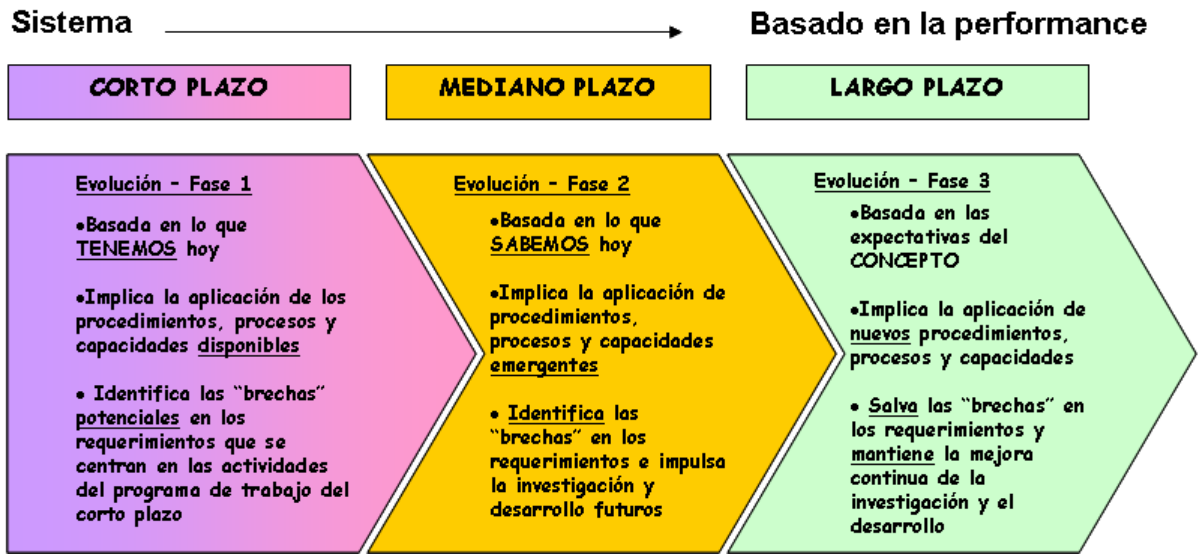

Figure 3. Evolution of the Global Plan

3.6 Global Plan Initiatives

3.6.1 In order to achieve the desired ATM system, numerous initiatives will be gradually implemented in the course of several years. These initiatives were established in order to support the planning and implementation of performance objectives in the SAM Region. The set of initiatives contained in this Transition Plan is aimed at facilitating and harmonising the work already underway in the SAM Region, and providing aircraft operators the benefits they need in the short and medium term. ICAO will continue developing new initiatives, based on the operational concept that will be included in the Global Plan and, consequently, on this Transition Plan.

3.6.2 **Attachment C** to this Plan lists the Global Plan Initiatives (GPIs) that may be taken into account by GREPECAS and the States. In this Transition Plan, the initiatives will be inserted in each of the following chapters, divided by operational area: ATM, CNS, AGA, MET, AIS, SAR, etc. The planning and implementation of each of the performance objectives should shart in the short term and proceed in an evolutionary manner. Long-term initiatives, which are necessary to guide the evolution to a global ATM system as foreseen in the operational concept, will be added to the Global Plan and, consequently, to this Implementation Plan, as they are developed and approved.

Note: The Global Plan lists the objective and the relevant implementation strategy for each initiative.

3.7 **Integration of Initiatives**

3.7.1 GPIs are provided to expedite the planning process, and should not be considered as independent but rather, in many cases, as interrelated tasks. Therefore, initiatives may be integrated and support each other. In fact, integration is one of the objectives of a global ATM system.

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4. Chapter 4: Air Traffic Management (ATM)

4.1 Introduction

4.1.1 According to the Global ATM Operational Concept, the general objective of ATM is to achieve a global, interoperational air traffic management system for all users during all flight phases, that meets the agreed levels of safety, provides optimum operations, is environmental sustainable, and meets national security requirements.

4.1.2 The future system must evolve from the current system in a way that, inasmuch as possible, meets the needs of the users, according to clearly established operational requirements. The reality is that transition and integration are the most difficult institutional issues facing ATM system designers. It is simply impracticable to evolve from one system to the other in phases that last less than several years.

4.1.3 Airspace boundaries and divisions should not restrict the development of the airspace structure. Planning should be coordinated between adjacent areas in order to achieve a seamless airspace, in which the user does not perceive any division. The airspace should be free of operational discontinuities and inconsistencies, and should be organised in such as way as to accommodate the requirements of the different types of users. The transition between areas should be seamless to users at all times.

4.1.4 The planning and implementation of the components of the ATM Operational Concept should include a study of their impact and requirements in terms of human factors.

4.1.5 Some of the benefits that are expected from the implementation of these components are improved safety, reduced operating fuel costs for users, reduced delays and gas emissions, and increased system capacity.

4.1.6 The evolution of air traffic management in the SAM Region has been carefully planned to avoid the degradation of the performance of the existing system. The safety level attained to date must be preserved during the transition, as a minimum, gradually improving air navigation efficiency. Consideration has also been given to avoiding an unnecessary overloading of aircraft with multiple CNS equipment, both existing and new, during the extended transition period.

4.2 General Principles

4.2.1 Unrestricted access to air navigation services listed in this document must be guaranteed to all SAM States.

4.2.2 The need for SAM States to fully comply with national plans, as well as with the standards governing the use of the new systems, is acknowledged.

4.2.3 SAM States must accept the global nature of the ATM Operational Concept and the objective of providing integration mechanisms for its timely implementation.

4.2.4 CNS infrastructure must be carefully planned based on the requirements identified for the appropriate level of air traffic management in the SAM Region.

4.2.5 The new CNS elements shall be gradually introduced, taking into account the benefits to be derived by the ATM community.

4.3 **Analysis of the current situation**

Gaps of the Current ATM System in the SAM Region

4.3.1 The ATM system currently available in the SAM Region presents some gaps, including the following:

a) Incipient implementation of Performance-Based Navigation (PBN) and, in general, absence of airspace management (ASM).
b) The lack of a systematic use of cost-benefit analyses for the implementation of new airspace structures causes difficulties in the definition of air navigation infrastructure implementation priorities, and prevents measuring the benefits obtained by the ATM community.
c) The lack of a policy and procedures for the flexible use of airspace hinders airspace design and management, preventing the implementation of an optimum airspace structure and the use of optimum flight paths.
d) The lack of air traffic flow management (ATFM) in most airspaces of the SAM Region causes congestion in some airspaces and airports, and prevents optimum use of ATC and airport capacity, thus affecting users.
e) The lack of coordination in the provision of the existing CNS/ATM services sometimes generates a duplication of resources and services;
f) The inadequate quality of communication media and language difficulties create problems in the provision of air traffic services. Operations still rely on increasingly congested voice radiocommunications for air-ground exchanges;
g) The lack of an ATS surveillance service in some portions of the airspace of the Regions prevents a harmonised reduction of aircraft spacing, due to the application of different separation criteria in FIR boundaries (with and without ATS surveillance), thus restricting the use of optimum flight profiles;
h) The lack of harmonisation of automated ATM systems in the SAM Region, as well as the scarce sharing of ATS surveillance data, generates discontinuity in ATS services.
i) Limited facilities for real-time exchange of information between ATM, aerodromes and aircraft operators, leading to a poor response to changes made in the operational requirements of users.

4.3.2 The limitations of the current ATM system result in inefficient aircraft operations. These limitations include:

a) The requirement to fly circling patterns in departure and arrival procedures;
b) The exclusion of civil air traffic from the airspace reserved for defence purposes;
c) Routes based on ground radio aids that prevent direct flights between the origin-destination airports and/or city pairs, and also operations at incorrect flight levels and/or speeds that make it difficult for aircraft to maintain optimum flight profiles;
d) Excessive ground and en-route delays related to the system;
e) Insufficient flexibility to properly address disturbances in airline operations caused by meteorological conditions.

4.4 Strategy for the Implementation of Performance Objectives

4.4.1 ATM evolution in the SAM Region has been planned taking into account the GPIs that could be applied in the short and medium term. These will be applied to main international traffic flows identified in homogeneous areas, as well as in the main terminal areas, providing operational benefits to the ATM community. ATM performance objectives, in addition to the requirements for the implementation of ATM improvements, determine the implementation dates of planned improvements, as well as the performance objectives and the main tasks related to GPI implementation.

4.4.2 The planning period considered is 2012 to 2018.

4.4.3 ATS evolution is based on Global Plan Inititiatives applicable to:

a) En-route operations;
b) TMA operations; and
c) Air operations in general

4.4.4 Planning has been based on seven global aspects, as shown in **Attachment D**, and as listed below:

a) En-route airspace optimisation. (SAM PFF 01)
b) TMA airspace structure optimisation. (SAM PFF 02)
c) Implementation of RNP approaches. (SAM PFF 03)
d) Improvements in civil-military coordination and cooperation (SAM PFF 04)
e) Implementation of the new flight plan. (SAM PFF 05)
f) ATFM implementation (SAM PFF 06)
g) Improvement of ATM situational awareness (SAM PFF 07)

4.4.5 It should be noted that the different specialties (CNS, AIS; MET; AGA/AOP; SAR) developed in this Implementation Plan support ATM development and, in turn, constitute an integrated, indivisible system. In particular, this Implementation Plan contains some cross-cutting issues that the States must especially address, namely:

a) Management of ANS personnel competencies (see Chapter 10).
b) Safety management – SMS (see Chapter 11)

4.5 En-Route Operations

4.5.1 The evolution of ATM for en-route operations took into account the main GPIs applicable to the SAM Region and was planned in order to permit optimum airspace management and organisation.

4.5.2 Homogeneous areas and the main continental and oceanic flows were taken into account, and the corresponding ATM evolution table was developed.

PBN Implementation for En-Route Operations

4.5.3 PBN implementation will foster the use of advanced aircraft navigation capabilities, which, combined with the air navigation system infrastructure, will permit airspace optimisation, including the route network. Thus, it will promote an ATS routing environment that meets the needs of airpsace users, reducing the workload of controllers and pilots and aircraft concentration in certain parts of the airspace.

4.5.4 The implementation of PBN for en-route operations will require the establishment of exclusionary airspaces, considering that these would provide the conditions for making the necessary changes to the airspace structure. So as not to exclude a significant number of users, the vertical limits of the airspace where PBN will be implemented shall be examined in depth.

Short Term

4.5.5 Taking into account the low density of air traffic in oceanic airspaces, no significant changes are expected in the existing airspace structure. The only exception will be the implementation of RNP-10 in the region called WATRS, which will provide significant benefits in the CAR Region. In those airspaces where RNP-10 is applied (EUR/SAM Corridor, the Lima-Santiago route and the South Atlantic Random Route System), no short-term changes are expected.

4.5.6 It is expected that RNAV-5 will be implemented in continental airspace where it can be supported by the available CNS infrastructure.

Medium Term

4.5.7 It is expected that RNP-4 will be implemented in the EUR/SAM Corridor and in the Santiago-Lima route segment, using ADS/CPDLC, in order to permit the use of a 30-NM lateral and longitudinal separation. This implementation will depend on the evolution of the aircraft fleet operating in these airspaces.

4.5.8 During this phase, it is expected that RNP-2 will be implemented in selected continental airspaces, using only GNSS, taking into account that the ground infrastructure will not support RNAV applications. It will be necessary to establish a back-up system for GNSS and to develop contingency procedures in case of GNSS failure. The implementation of RNP-2 will facilitate the implementation of PBN in airspaces with no ATS surveillance service. With the exclusive use of GNSS, more information about the GNSS signal will be required.

Situational Awareness and En-Route Data Relationship Applications

4.5.9 The use of ADS-C and CPDLC in oceanic airspaces will foster the necessary conditions for using 30-NM horizontal separation minima in the EUR/SAM Corridor and in the Santiago-Lima route segment. Furthermore, in other oceanic airspaces with less traffic density, ADS-C and CPDLC will provide reliable surveillance and communication media, reducing the workload of controllers and pilots.

4.5.10 In the continental airspace, the use of enhanced surveillance techniques (ADS-B and/or multilateration) will help reduce horizontal separation minima, enhance safety, increase capacity, and improve the cost-effectiveness of flights. The use of other data Relationship applications instead of voice communications will bring significant benefits in terms of safety and pilot and controller workload.

4.5.11 These benefits may be achieved by providing surveillance in areas that lack primary or secondary radar when so warranted by cost-benefit analyses. In airspaces where radar is used, improved surveillande may help enhance the quality and reliability of surveillance information both on the ground and in the air. The States shall conduct a consistent cost-benefit analysis to determine if, when the time comes, PSR and/or SSR systems should be replaced by ADS-B systems or multilateration.

4.5.12 The use of CPDLC in high traffic density continental airspace must be assessed, taking into account that it might not be feasible due to the characteristics of ATC interventions.

4.5.13 The gradual implementation of ATS interfacility data communication (AIDC) will enhance airspace safety and reduce coordination errors between ATS units.

4.5.14 The implementation of ATS surveillance systems and data Relationship applications should take into account the corresponding automation aspects, mainly with respect to the need for harmonisation between the systems applied, with a view to ensuring system interoperability.

4.5.15 Furthermore, the implementation of ATS surveillance systems and data Relationship applications should consider ATM automation tools (minimum safe altitude warning; conflict prediction; conflict alert; conflict resolution advisory; path conformance control; functional integration of ground and airborne systems, etc.). Amongst others, the following applications are identified:

a) TFMS - SYNCHROMAX or similar
b) Surveillance tools to identify the boundaries of the airspace sector
c) Use of A-SMGC at specific aerodromes, as required
d) Availability of SIGMET in graphical format
e) Dissemination of AIS/NOTAMs.

4.6 **TMA Operations**

4.6.1 The evolution of air traffic management in terminal areas shall be harmonised with the evolution of ATM for en-route operations, providing for a harmonious and integrated ATM system.

4.6.2 The evolution of ATM for TMA operations took into account the combination of different GPIs applicable to the SAM Region, and was planned so as to permit an optimum airspace management and organisation.

4.6.3 The table on TMA structure optimisation combined GPIs 5, 10, 11 and 12, taking into account that they are all related to the optimisation of the TMA airspace structure through the use of approach procedures, SIDs, STARs, based on RNAV and RNP, the application of TMA design and management techniques, and the functional integration of ground and airborne systems.

4.6.4 The table on situational awareness and implementation of data Relationship applications combined GPIs 9 and 17, taking into account the close relationship between the implementation of enhanced surveillance techniques (ADS-B and/or MLAT) and the use of data Relationship applications.

4.6.5 There are many factors that should be taken into account when planning the requirements for a TMA air navigation service infrastructure. In addition to traffic volume, consideration should be given to other factors, such as: number and location of aerodromes, traffic characteristics, terrain, meteorological conditions, etc. Therefore, the States should analyse each particular TMA and determine, in coordination with the users, the requirements for the implementation of the corresponding air navigation services.

TMA Structure Optimisation

4.6.6 TMA airspace structure optimisation will be achieved through the following measures:

a) PBN implementation, which includes the implementation of SIDs and STARs with RNP and RNAV, and RNP approach procedures.
b) The functional integration of ground and airborne systems.
c) The use of improved design and management techniques.

Implementation of PBN for TMA Operations

4.6.7 TMA operations have specific characteristics, taking into account the separation minima applicable between aircraft, and between aircraft and obstacles. This also involves the diversity of aircraft, including low-performance aircraft that carry out arrival and departure procedures on the same path as, or close to the paths of, high-performance aircraft.

4.6.8 In this sense, the States shall develop their own national TMA PBN implementation plans, based on the CAR/SAM PBN Roadmap. They shall seek harmonisation of aircraft separation criteria and the applicable RNAV and/or RNP criteria, in order to avoid the need for multiple approvals for intra- and inter-regional operations.

4.6.9 The efficiency of TMA operations in a PBN environment depends on aerodrome design and management (GPI 13) and runway operations (GPI 14), taking into account that any air traffic flow increase in TMA operations shall be absorbed by airport infrastructure.

Short Term

4.6.10 It is expected that States will apply RNAV-1 in selected TMAs, in environments with ATS surveillance service and adequate ground-based navigation infrastructure, permitting DME/DME and DME/DME/INS operations. During this phase, operations with equipped and non-equipped aircraft will be permitted, and RNAV-1 operations shall start when an adequate percentage of approved operations is reached.

4.6.11 In environments with no ATS surveillance service and/or where there is no adequate navigation infrastructure on the ground, it is expected that the States will apply RNP-1 in selected TMAs, applying only GNSS, provided there is an adequate percentage of approved aircraft. Nevertheless, operations with approved and non-approved aircraft will be permitted in these TMAs once the corresponding operational benefits are verified. The implementation of overlay procedures and exclusive RNP procedures will depend on air traffic complexity and density.

4.6.12 It is expected that RNP 0.3 (Basic GNSS) approach procedures will be applied in as many airports as possible, mainly in those that have international operations, maintaining conventional approach procedures for non-equipped aircraft.

4.6.13 It is expected that RNP with approval required approach procedures (RNP AR) will be applied at airports in which obvious operational benefits can be obtained, based on the existence of significant obstacles.

Medium Term

4.6.14 During this phase, it is expected that the States will extend the implementation of RNAV or RNP-1 applications to selected TMAs, depending on ground infrastructure and aircraft navigation capacity. At more complex TMAs, RNAV or RNP-1 equipment will be mandatory (exclusionary airspace). At less complex TMAs, equipped and non-equipped aircraft will still be admitted.

4.6.15 During this phase, it is expected that the implementation of RNP 0.3 and RNP AR procedures will be extended to selected airports. It is also expected that the GLS procedure will start to be used to improve the transition between the TMA and approach phases, basically using GNSS for the two phases.

Functional Integration of Ground and Airborne Systems

4.6.16 States are expected to analyse the feasibility of functionally integrating ground and airborne systems, with a view to applying flight procedures that provide the most efficient path during the approach of an aircraft to the destination aerodrome. These procedures shall permit a seamless flight path from the top of descent until the aircraft is stabilised for landing.

4.6.17 The optimisation of TMA efficiency will depend on a maximum use of automation. Likewise, in addition to the continuous descent capacity, aircraft will be increasingly equipped with time of arrival calculation. This capability should be integrated with the ground-based automated systems in order to identify the times of arrival at specific fixes. These schedules should help in the landing sequencing process, allowing aircraft to remain close to their preferred 4D path.

Use of Improved Design and Management Techniques

4.6.18 Airspace planners should apply design techniques for TMA restructuring, with a view to:

a) Validating the proposed airspace structure.

b) Assessing the impact of PBN implementation, including RNAV and/or RNP SID and STAR procedures, and FMS-based arrival procedures, using ATC simulations as needed.

c) Ensuring a favourable cost-benefit ratio.

d) Optimising sectoring so as to make it seamless for users and balanced in terms of workload.

4.6.19 The improvement of TMA management should contemplate the implementation of WGS-84 and of measures for optimising traffic and capacity management, including a collaborative decision-making process involving the tower, the TMA and en-route sectors, while also strategically involving airspace users.

Situational Awareness and Data Relationship Applications for TMA

4.6.20 In addition to the considerations contained in the section on en-route operations, which also apply to TMA operations, the States should consider the following aspects for the implementation of ATS surveillance services and data Relationship applications in the TMA.

1.1.1 The implementation of improved surveillance techniques (ADS-B and/or multilateration) at the TMAs will provide the conditions required for the integration of en-route and TMA operations.

4.6.21 The use of ATS surveillance systems (SSR, ADS-B and/or multilateration) will permit the use of RNAV-based navigation techniques, without RNP, taking into account that surveillance will permit flight monitoring for the detection of any path deviation. Thus, it will be possible to include in TMA operations those users that would not be approved for RNP operations.

4.6.22 The implementation of improved surveillance techniques will facilitate the operation of aircraft not approved for RNAV/RNP, taking into account that the controller will be able to vector them to the final approach.

4.6.23 The implementation of CPDLC in the TMA is not expected, taking into account the characteristics of ATC intervention in these airspaces. However, other data Relationship applications will reduce the workload of controllers and pilots, such as: D-ATIS and digital flight plan clearance (DCL).

4.6.24 It should be noted that TMA users might not be equipped with data Relationship systems, since there is a significant number of low performance aircraft that fly in this airspace and might not be capable of being properly equipped. In that case, procedures must be developed to allow non-equipped aircraft to fly, unless air traffic density warrants the use of exclusionary airspaces.

4.6.25 **Air operations in general**

4.6.26 This part of the Plan contains the Global Plan Initiatives applicable to general air operations that cannot be considered as en-route and/or TMA operations.

Flexible Use of Airspace (FUA)

4.6.27 The optimum, balanced and equitable use of airspace by civil and military users, facilitated by strategic coordination and dynamic interaction, will permit the establishment of optimum flight paths, while reducing the operating cost of airspace users.

4.6.28 SAM States should establish policies for temporary or permanent use of restricted airspaces, in order to avoid the adoption of airspace restrictions inasmuch as possible, especially of a permanent nature.

4.6.29 The implementation of the flexible use of airspace should start with an assessment of hazardous, restricted and prohibited airspaces that affect or could affect traffic flow.

4.6.30 The establishment of letters of agreement between ATS and military units or other users for the dynamic and flexible use of airspace should avoid restrictions to the use of airspace, thus accommodating the needs of all airspace users.

4.6.31 In those cases in which airspace restriction is inevitable, the letters of agreement should stipulate that the activation of restricted airspace should not exceed the time required. To that end, it will be necessary to develop paths for dynamic re-routing of aircraft to avoid such airspaces.

4.6.32 The cited paths should be published in the AIP to let users know of the need to take into account such possible deviations in flight planning.

4.6.33 FUA implementation requires convincing the military authorities of the States involved, assuring them that their needs will be met whether or not airspace restrictions are applied. Consequently, seminars/meetings with such authorities will be required to demonstrate the importance of an optimised use of airpsace.

Air Traffic Flow Management - ATFM

4.6.34 The implementation of timely measures for demand/capacity balancing will avoid an overload of the ATM system and will create the conditions for maximising airport and ATC capacity. This should increase significantly airspace capacity and operational efficiency.

4.6.35 Considering that air traffic congestion and saturation problems in the SAM Region are still scarce, the implementation of air traffic flow management measures should be gradual, allowing the States to gain experience, mainly in the calculation and maximisation of ATC and airport capacity.

4.6.36 ATFM implementation in the SAM Region should take into account the objective and principles established in Appendix AL to Item 3 of the GREPECAS/13 meeting, noting that ATFM measures must foster a maximum use of existing capacity without compromising safety. Likewise, it is important to note that ATFM measures must not be used to resolve intrinsic deficiencies of the ATM system.

4.6.37 The CAR/SAM ATFM Operational Concept establishes a simple strategy that should be developed in stages, maximising available capacity and allowing the parties involved to gain sufficient experience.

4.6.38 The experience gained in other Regions and by some SAM States permits the application of basic ATFM procedures at airports, without the immediate need for a centralised ATFM. A centralised ATFM will require extensive studies in order to define operational concepts, system requirements and institutional aspects for ATFM implementation in the SAM Region.

4.6.39 Thus, ATFM in the SAM Region will be implemented by stages, based on the established operational requirements, in keeping with the SAM ATFM Operational Concept.

Centralised ATFM

4.6.40 In order to maximise its efficiency, a centralised ATFM should be responsible for delivering the service in as much airspace as possible, provided it is homogeneous. According to ATFM planning in the CAR and SAM Regions, at least two centralised ATFM will be in place, one for each Region.

4.6.41 During the implementation process, procedures must be developed in a harmonious manner between ATFM units so as not to jeopardise safety. This means establishing a regional and inter-regional strategy to facilitate and harmonise the whole implementation process. Each phase should be implemented based on operational configuarions, descriptive system documents and operational models, in keeping with the established strategy.

4.6.42 In order to conciliate national plans with the CAR/SAM ATFM Regional Plan, civil aviation administrations must take the required measures and closely monitor the regional development of ATFM. They must also prepare an ATFM Implementation Programme that defines implementation requirements and analyses the impact it will have on the national ATC system, both on the airspace and on air traffic services, as well as on airport operations and services. Likewise, they must coordinate as necessary to enable an integral, harmonious and timely regional implementation.

New Flight Plan Format

4.6.43 The new flight plan format is scheduled for implementation by late 2012, in keeping with Amendment N° 1 to Doc. 4444 PANS-ATM. In this sense, the States must coordinate as necessary to interconnect their automated ATC systems of the control centres of the Region, without neglecting the transition stage in which they must make sure that the flight plans in the new format are not rejected due to incompatibility with the aforementioned ATC systems.

4.7 References

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM Requirements
- ICAO Document 9828: Eleventh Air Navigation Conference
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Annex 11, Air Traffic Services
- CAR/SAM PBN Roadmap, version 1.4 / July 2009;
- GNSS Manual, Doc 9849 AN/457;
- GREPECAS /14 Final Report (April 2007)
- GREPECAS /15 Final Report (October 2008)

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5. Chapter 5: Communications, Navigation and Surveillance (CNS)

5.1 Introduction

5.1.1 SAM States must consider the operational requirements contained in Chapter 4 of this Plan when implementing CNS systems.

5.1.2 In view of the new requirements derived from the implementation of the ATM Operational Concept, SAM States shall consider planning improvements to, and the strengthening of, aeronautical communication, navigation and surveillance services, taking into account the global air navigation plan initiatives, as well as new provisions and requirements that need to be implemented in the short and medium term, and the related components of the aforementioned concept (Attachment C).

Communications

5.1.3 Communication systems contemplated in this plan respond to short- and medium-term expectations of the operational requirements in the Region. Accordingly, this plan has taken into account the following communication systems:

a) Aeronautical message handling system (AMHS).
b) ATS interfacility data communication (AIDC).
c) Controller/pilot data Relationship communications (CPDLC).
d) D-ATIS.
d) SAM ATN network.

Navigation

5.1.4 The function of navigation systems is to support en-route, terminal, approach and landing operations and surface movements.

5.1.5 The navigation systems contemplated in this plan respond to short- and medium-term operational requirements of the Region. In this respect, this plan for navigation systems has taken into account the ground navigation infrastructure and the GNSS requirements concerning the operations foreseen in the CAR/SAM PBN Roadmap approved through Conclusion 46 of GREPECAS/14.

Surveillance

5.1.6 The function of surveillance systems is to provide aircraft position information to air traffic service units (ATS)

5.1.7 The surveillance systems contemplated in this plan respond to short- and medium-term operational requirements in the Region. Accordingly, this plan considers the following systems:

a) ADS-B
b) ADS-C
c) MLAT
d) SSR
e) The combination of the aforementioned tools.

5.2 Analysis of the current situation (2010)

5.2.1 The current situation of communication, navigation and surveillance services in support of air navigation is described below.

Communications - Aeronautical Fixed Service

5.2.2 AFTN service: The circuits foreseen have been fully implemented. However, and given their average life cycle, maintenance of the existing centres is a significant problem.

5.2.3 ATS speech service: The circuits foreseen have been fully implemented. Circuits are analog and operate without any major problem.

5.2.4 AMHS service: This service has been implemented in most SAM States.

5.2.5 Memoranda of Understanding (MoU) have been drafted for the interconnection of AMHS systems.

Flight plan transfer

5.2.6 *OLDI*: It is available in several SAM States, although only one State uses it within the framework of its own administration.

5.2.7 *AIDC*: It is being implemenated in many States.

Information delivery network

5.2.8 Currently, a satellite digital network (REDDIG) is available in the region to support the required aeronautical fixed services. In order to support the new services foreseen for the short and medium term, the implementation of a new network, that will represent the regional ATN, is required.

Aeronautical Mobile Service

5.2.9 *VHF*: Services have been implemented as indicated in FASID Table CNS 2A, ensuring coverage in most of the selected areas, with problems at low levels in selected airspaces. In the case of terminal areas and aerodromes, many facilities do not follow the recommendation of having different frequencies for APP and TWR services. The *PDC* service has not been implemented at the level required.

5.2.10 *HF*: Although required in FASID Tables CNS 2 A and 2B, the HF service is not being operationally used in many States of the Region. It is mainly provided at some States that have oceanic areas in their FIRs.

5.2.11 ATIS: Implemented according to Table CNS 2A, but in an insufficient number. Use is made of conventional audio recorders and analog VHF transmitters.

5.2.12 *VDL / CPDLC*: Not yet implemented en-route/continental area or terminal area/aerodromes.

5.2.13 *VDL/PDC*: Implemented in very few airports for terminal area/aerodrome.

5.2.14 HFDL / CPDLC: Application for en-route/oceanic area that has not yet been implemented.

5.2.15 Satellite/CPDLC: Service implemented in some oceanic FIRs for FANS-equipped aircraft.

5.2.16 D-ATIS: Implemented in very few airports.

Navigation

5.2.17 Radio aids: All conventional radio navigation aid systems (NDB, VOR, DME and ILS) have been implemented and fully installed pursuant to Table CNS 3 (radio navigation aids). Regarding NDBs, a deactivation process is underway, starting with those stations where the NDB is installed next to a VOR/DME.

5.2.18 ABAS is being implemented in selected airspaces of the Region for en-route, terminal area and NPA operations.

Surveillance

5.2.19 Radar systems: Conventional surveillance systems (PSR and SSR) have been implemented and installed almost entirely in the SAM Region according to Table CNS 4 A (surveillance system). The surveillance systems specified in this table cover most of the terminal areas of the States in the Region. However, not all the routes in the Region are covered.

5.2.20 Radar data exchange: It only exists in very few States of the Region.

5.2.21 ADS-B and MLAT: No services have been enabled to date.

5.2.22 ADS-C: Service provided by some oceanic FIRs, with FANS-equipped aircraft.

5.3 **Strategy for the implementation of performance objectives**

5.3.1 CNS implementation shall be based on a harmonised strategy for the SAM Region, with action plans and consistent timetables, taking into account operational requirements and the corresponding cost-benefit analyses, comparing the current structure with the improvements to be achieved when the new systems are implemented. Consideration should also be given to analysing the existence of two or more technologies to meet the same operational requirement.

5.3.2 The period considered for this planning is from 2012 to 2018.

5.3.3 Planning has been based on four global aspects, as shown in **Attachment D**, and as listed below:

a) Improvements to the aeronautical fixed service in the SAM Region (SAM PFF 08)
b) Improvements to the aeronautical mobile service in the SAM Region (SAM PFF 09)
c) Improvements to the navigation systems in the SAM Region (SAM PFF 10)
d) Improvements to the air surveillance service in the SAM Region (SAM PFF11)

5.3.4 A cross-cutting issue is the management of ANS personnel competencies (SAM PFF 24). In this sense, States must pay special attention to meet ICAO requirements (see Chapter 10) and, of special interest in this chapter, the management of CNS personnel competencies.

Communications

Improvements to the Aeronautical Fixed Service

5.3.5 AMHS: During this period, it is expected that AMHS systems will be implemented in those States that still have an AFTN system in place. Likewise, during that period, it is expected that each one of the AMHS systems installed will be interconnected to its respective AMHS systems, as specified in FASID Table CNS 1Bb.

5.3.6 Communication services for the centralised ATFM: States must make the necessary efforts to implement communication services that effectively support ATFM.

5.3.7 AIDC: The States must make efforts to install automated systems in all their ACCs, with AIDC capability, and use them for the automatic transfer of flight plans between adjacent ACCs.

5.3.8 Improvement of the regional ATN network: In order to implement all the new services in a harmonised manner, the current Aeronautical Telecommunication Network (REDDIG) requires improvements regarding its technological platform, communication protocols, and an increase in capacity for the delivery of information. To this end, it is expected that, during the cited period, a new ATN network will be available to support all the existing services as well as those foreseen. During this period, a study on the optimum network configuration for the region will be conducted and, once approved, it will start being implemented.

Improvements to the Aeronautical Mobile Service

5.3.9 VHF: States must ensure coverage of continental VHF communications for lower flight levels when so required by the operations. Likewise, separate VHF channels must be implemented for TWR and APP services in the terminal area.

5.3.10 HF: The HF service must be maintained in keeping with the requirements listed in Table CNS 2B, “HF network designators for CAR/SAM aeronautical stations”.

5.3.11 CPDLC: States that have oceanic areas in their FIRs must make efforts for the provision of CPDLC services in the corresponding ACCs (HFDL or satellite). Likewise, for continental areas, the States must consider replacing their existing VHF equipment with VDL Mode 2 equipment.

5.3.12 DATIS: The States must start providing DATIS services to replace similar conventional services or where they do not exist.

5.3.13 Protection of the radio frequency spectrum: The States must make the necessary efforts to ensure the protection and proper use of the radio frequency spectrum assigned to aviation for radiocommunication services.

Navigation

Improvements to Navigation Systems

5.3.14 NDB: States must continue with the NDB phase-out plan, as defined by GREPECAS/14 (April 2007). It is estimated that, during the period defined in the plan, most NDB will be deactivated.

5.3.15 VOR/DME: During the period defined in the plan, it is felt that, as part of the transition to the GNSS, VOR/DME systems must be maintained in selected TMAs, gradually starting the deactivation of en-route VOR systems.

5.3.16 ILS: Likewise, it is foreseen that, within the planning period, ILS systems will remain operative.

5.3.17 GLS: Approaches based on CATI GLS will begin at airports that have an operational demand that warrants them.

5.3.18 Flight trial support systems: The States must consider modernising their in-flight and ground trial elements so as to be prepared for a GNSS environment.

5.3.19 Protection of the radio frequency spectrum: The States must make the necessary efforts to ensure protection and proper use of the radio frequency spectrum assigned to aviation for radionavigation services.

Surveillance

Improvements to the Air Surveillance Service

5.3.20 ADS-B and MLAT: The main means of surveillance will continue to be collaborative surveillance in the form of SSR radars, extensively used in TMA and en-route services, and Mode S in high-density TMAs. The use of ADS-B (ES Mode S receivers) and MLAT will start providing en-route and terminal area surveillance as required, strengthening surveillance in areas covered by SSR Modes A/C and S. ADS-B (ES Mode S) will be gradually implemented on the ground to cover en-route and terminal areas.

5.3.21 A-SMGCS: It is foreseen that surface movevement guidance and control systems A-SMGCS will be implemented at airports with a high level of complexity and traffic. A prior study will need to be conducted to identify what system level is required at the aerodrome.

5.3.22 ADS-C: All States responsible of an oceanic FIR shall make operational use of ADS-C surveillance.

5.3.23 Protection of the radio frequency spectrum: The States must make the necessary efforts to ensure protection and proper use of the radio frequency spectrum assigned to aviation for air surveillance services.

5.4 **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM Requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Annex 10, Volumes I to V
- CAR/SAM PBN Roadmap, version 1.4 / July 2009;
- GNSS Manual, Doc 9849 AN/457;
- GREPECAS /14 final report (April 2007)
- Guidelines for the transition to satellite navigation systems in the CAR/SAM Regions (Appendix H to Document 8733);
- Strategies for the introduction and application of non-visual aids in approach, landing and departure in the CAR/SAM Regions (Appendix I to Document 8733);
- Strategy for the evolution of air navigation systems in the CAR/SAM Regions - First Edition Rev. 2.0 – CNS/ATM/SG/1
- CAR/SAM regional unified surveillance strategy - CNS/ATM/SG/1
- Guidance for improving communication, navigation and surveillance systems to meet short- and medium-term operational requirements for en-route and terminal area operations - Project RLA/06/901- October 2008
- 37th Session of the Assembly, Working Paper A37-WP/ 64: Report on outcomes of initiatives regarding Next Generation Of Aviation Professionals.

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6. Chapter 6: Meteorology

6.1 Introduction

6.1.1 The global ATM operational concept represents the vision of ICAO for a globally integrated, harmonised and interoperational ATM system. The purpose of the ATM operational concept is to achieve a globally interoperational ATM system for all users during all flight phases that meets the agreed levels of safety, provides cost-effective operations, is environmentally sustainable, and meets national security requirements. The development of new tecnologies for both ATS and airborne systems will significantly expedite the improvement and expansion of the ATS currently provided to aircraft operators. This process will undoubtedly require additional meteorological support for ATS and will affect coordination between ATS and meteorological authorities and their respective operational units.

6.1.2 The provision of meteorological information will be an integral function of the ATM system. Information will be adjusted to accommodate ATM requirements in terms of content, format and timing. The main benefits of meteorological information for the ATM system are related to the following:

a) A more precise and timely meteorological information will optimise flight path planning and prediction, thus enhancing the safety and efficiency of the ATM system;
b) The greater availability of meteorological information shared on board the aircraft will help to perfect the preferred path in real time;
c) A better identification, prediction and display of meteorological conditions will permit to address their effects more efficiently, thus enhancing safety and flexibility; for example, precise and timely information on the need for a deviation or re-routing will be available;
d) Improved aerodrome reports and forecasts will facilitate the optimum use of available aerodrome capacity;
e) The greater availability of meteorological information (special air-reports) from airborne meteorological sensors will contribute to improve meteorological forecasts and the display of such information in real time; and
f) Meteorological information will contribute to minimise the environmental impact on air traffic.

6.1.3 In view of the new requirements derived from the implementation of the ATM Operational Concept, SAM States shall consider the planning of improvements and strengthening of aeronautical meteorological services, taking into account the global air navigation plan initiatives, as well as new short- and medium-term implementation provisions and requirements, and the related components of the aforementioned concept (Attachment C).

6.1.4 Improvements to meteorological services imply compliance with ICAO standards in terms of facilities and competent meteorological personnel, and are essential to effectively support ATM for decision-making, flight path optimisation and avoiding unnecessary airspace closures.

6.1.5 Performance management will be an important part of meteorological information quality assurance.

6.2 Analysis of the current situation

6.2.1 SAM States provide an aeronautical meteorological service that has been improving in recent years. Meteorological data automation processes are in a very advanced phase at the aerodromes of the Region. Unfortunately, in most States, the installation of automatic meteorological stations has not resulted in a better service because of insufficient use of the data generated (for example, the non-inclusion of RVRs in METARs or SPECIs). An improvement in the infrastructure of aeronautical meteorological offices and in the meteorological watch offices has also been noted, but improvements are still needed in these units to support the surveillance of meteorological conditions in their area of responsibility so that they can improve the quality of aeronautical meteorological forecasts.

6.2.2 The lack of compliance with ICAO and WMO (World Meteorological Organization) standards and recommendations referred to personnel involved in aerodrome MET units is a concern in most States of the Region.

6.2.3 The establishment of an appropriate quality management system in aeronautical meteorological services (MET/QMS) is fundamental for the improvement of the meteorological service in support of aeronautical activities in general and ATM in particular. In order to implement MET/QMS in the SAM Region, the commitment of the administrations and/or meteorological authorities and of the necessary resources is absolutely necessary; otherwise, any effort by ICAO will be useless.

6.3 Strategy for the implementation of performance objectives

6.3.1 Planning of meteorological systems in support of ATM has been done taking into account current MET deficiencies identified in the Region by the ICAO South American Regional Office, the work programmes of the different ICAO panels and operational groups (IVATF, IAWVOPSG, AWOS, METWSG, SADISOPSG, WAFSOPSG), changes introduced to SARPS, and the provisions contained in Doc. 9750 - *Global Air Navigation Plan*.

6.3.2 Planning has been based on four main axes, as shown in Attachment D, and as listed below:

a) Implementation of the MET service quality management system. (SAM PFF 12)
b) Improvements in MET facilities. (SAM PFF 13)
c) Improvements in the implementation of the international airways volcano watch (IAVW), in the surveillance of the accidental release of radioactive material, and in the issuance of SIGMETs. (SAM PFF 14)
d) Improvements in OPMET data exchange; and implementation and follow-up of the evolution of the WAFS (SAM PFF 15).

6.3.3 The management of personnel competencies (SAM PFF 24) and, in some States, the designation of meteorologists and aeronautical meteorology technicians to meet ICAO requirements (see Chapter 10) are cross-cutting issues.

Implementation of the MET Service Quality Management System

6.3.4 The implementation of QMS in MET services will ensure the quality of data and services provided by the aerodrome meteorological units. As a first step towards the achievement of this goal, the development and validation of a QMS Implementation Guide will be of vital importance. With this guide at the disposal of the States, an effective QMS implementation planning should begin. This implementation would require concrete actions by the States.

Improvements in MET Facilities

6.3.5 One of the first consequences of QMS implementation is the improvement of MET facilities. The provision of the appropriate infrastructure to ensure the quality of the meteorological data generated at the aerodrome is of vital importance. Immediate access to real-time global meteorological information would be achieved through the installation of automatic weather stations (AWOS) equipped with RVR sensors and cloud distance meter, in particular, at the aerodromes listed in the AOP Table of the CAR/SAM FASID. A MET equipment inspection and preventive maintenance programme would help to ensure a continuous operation. With respect to Aeronautical Meteorological Offices (AMOs) and Meteorological Watch Offices (MWOs), consideration should be given to a plan to strengthen them and thus improve FIR surveillance. This plan, in addition to personnel competence management, must include, as applicable, the provision of the equipment necessary for the personnel to fully meet their responsibilities.

Improvements in the Implementation of the International Airways Volcano Watch (IAVW), the Surveillance of the Accidental Release of Radioactive Material, and the Issuance of SIGMETs

6.3.6 The implementation of the MET-QMS in conjunction with the improvements to MET facilities should pave the way to a substantial improvement in weather watch, the timely development of OPMET meteorological messages, and their proper coding. An improvement in this field would be the appropriate implementation of the International Airways Volcano Watch and the adoption of steps for the surveillance of the release of radioactive material, in addition to continued monitoring of severe phenomena. The States should ensure the existence, knowledge, and proper use of all the documents related to the responsibility of each institution involved and the units affected in case of volcanic activity, deposition of volcanic ash, or accidental release of radioactive material. Regarding this last point (radioactive material), even in the absence of adequate information and documentation on this matter, it is included in this document in keeping with the provisions of Annex 3 and the future work of the IAVW.

Improvements in OPMET Data Exchange; and Implementation and Follow-up to WAFS Evolution

6.3.7 The timely preparation of OPMET messages and their proper coding, as well as the implementation of the new WAFS products and the evolution of the WAFS will help in the decision-making by operators and airspace users, as well as in aerodrome operations. States should adopt contingency measures for the dissemination of OPMET messages for those cases in which conventional communication systems are disrupted. In conjunction with COM units, the MET authority should plan the coding of OPMET messages in XML format, the implementation of upRelationships from the AWOS MWO(s) to the aircraft, the dissemination of SIGMET(s) in graphical format, and the updating of systems that receive WAFS products so that they may be compatible with future operational environments.

6.3.8 Regional planning will consist of two phases. The first one is related to MET-QMS implementation and the second is related to the evolution of ATM requirements. These phases will include roadmaps listing the activities that the States must carry out. The first phase is to be completed by **12 November 2012**, when the ICAO contracting States will make sure that the meteorological authority has established and implemented a duly-organised quality system that includes procedures, processes and resources for ensuring the quality of meteorological information for aeronautical users in support of international civil aviation.

6.4 **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Annex 3 - Meteorological service for international air navigation.
- ICAO Document 8896: Manual of aeronautical meteorological practice
- ICAO Document 9377: Manual on coordination between air traffic services, aeronautical information services and aeronautical meteorological services
- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 9854: Global air traffic management operational concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- WMO Bulletin No. 258, Supplement No. 1 – Training and qualification requirements for aeronautical meteorological personnel
- *http://www2.icao.int/en/anb/met-aim/met/sadisopsg/Pages/default.aspx*
- *http://www.metoffice.gov.uk/sadis/index.html*
- *http://www2.icao.int/en/anb/met-aim/met/wafsopsg/Pages/default.aspx*
- *http://www2.icao.int/en/anb/met-aim/met/metwsg/Pages/HomePage.aspx*
- *http://www2.icao.int/en/anb/met-aim/met/iavwopsg/Pages/HomePage.aspx*
- *http://www2.icao.int/en/anb/met-aim/met/ivatf*

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7. Chapter 7: Search and Rescue (SAR) Services

7.1 Introduction

7.1.1 The mission of SAR services is to find people in danger, help them and transport them to a safe place to receive proper care. The key for organising and having successful SAR services lies in top management, whose mission is to perform managerial tasks that will result in improved SAR operations, that is, the availability of an organised, trained and available SAR system capable of effectively helping people in danger.

7.1.2 The availability of SAR resources is often a critical initial capacity for responding and providing assistance to safe lives during the first stages of a disaster caused by natural causes or by the aviation activity *per se*. Accordingly, SAR services are sometimes part of an emergency management system.

7.1.3 SAR activities are an excellent means to encourage cooperation among States and organisations at the local, national and international level, since they involve missions that rarely create conflicting situations. Cooperation in this field may also lead to cooperation in other spheres. Such activities protect goods that may have a high value, which contributes to justify the existence of SAR services.

7.1.4 Close coordination between civil and military organisations is essential. National SAR coordination committees are a means for the establishment of such cooperation. The legislation should provide for the use of military and other public resources in support of search and rescue.

7.2 Analysis of the current situation

SAR requirements

7.2.1 The basic requirements for the establishment of an effective SAR system are:

a) The establishment of a regional framework concerning the need for availability of the SAR services that have jurisdiction over the different Search and Rescue Regions of the SAM Region;
b) Measures for using the available resources and procuring others as necessary;
c) The designation of the geographical areas of responsibility of the associated RCCs and RSCs;
d) Staffing, training and other personnel resources to manage and maintain the system in operation;
e) The appropriate and available means of communication; and
f) Agreements, plans, and related documents aimed at meeting the objectives and defining work relationships.

7.2.2 The periodic assessment of SAR requirements at regional level is very important for planning SAR resources and personnel in a coordinated manner, taking into account the respective SAR regions of the SAM States.

7.2.3 These updated and regionally harmonised requirements include, *inter alia*, the timely establishment of agreements between the different SAR services of SAM States for the provision of a regional search and rescue service, in keeping with the characteristics and needs of the aircraft fleet operating in the Region**.**

7.3 Implementation strategy of performance objectives

Risk management in practice

7.3.1 The use of risk management techniques gives some order to the uncertainty surrounding SAR organisations. It is an extremely useful tool for determining future work priorities and improving the capacity to meet the objective of the organisation, which is to find people in distress and take them to a safe location.

7.3.2 Risk analysis is a useful tool for those responsible for SAR organisations, since it can help in the assignment of resources that have priority for the organisation, and its results may be used to raise awareness amongst independent parties about the importance of search and rescue. SAR organisations should conduct a risk analysis and use the information thus obtained to increase their possibilities of saving lives.

Quality management

7.3.3 Initiatives aimed at improving the quality of SAR services will substantially improve the results and reduce costs, mainly by eliminating the causes of unnecessary expenditures. These are important objectives for any administration, regardless of the volume of resources available.

7.3.4 The top management of a SAR system that assigns importance to quality tends to conduct more activities, make fewer mistakes, enjoy good reputation, and attract the resources necessary for the growth and better performance of the system.

7.3.5 In contrast, SAR organisations that do not pay attention to quality are subject to mistakes that may result in a reduced number of lives saved, the adoption of wrong or late operational decisions that create confusion, accidents and equipment failures, a deficient or inadequate use of resources, and unnecessary expenditure of economic resources.

7.3.6 Given the increasing air traffic activity and the use of large aircraft with a large passenger capacity, and its relationship with the responsibility of SAM States to protect human lives, it is important for SAR top management to develop a quality assurance programme for search and rescue (SAR) services, to be used as a quality management tool to ensure compliance with the objective of the national SAR plan of each SAM State.

7.3.7 This will also contribute to the provision of effective SAR services within the respective areas of SAR responsibility of each of these States, so as to foresee and particularly meet the many needs that would result from an accident with a large aircraft.

Competence of the search and rescue personnel

Training

7.3.8 Training is essential for operations and safety. The purpose of the SAR system is to save those who are in danger, and also to use training to reduce risks for the personnel and their means, which are very valuable. The training of personnel to conduct sound risk assessments will help ensure that the professionals who have received such training and the valuable means continue to be available for future operations.

Qualification

7.3.9 The purpose of the qualification is to validate the capacity of individuals to carry out certain tasks. They must demonstrate that they have a minimum level of knowledge and skills. This validation may be conducted in a specific position, through maintenance activities by a given team, or as a member of a group within a unit.

7.3.10 Qualification methods demonstrate the capacity of an individual to carry out concrete tasks. A qualification programme will cover the essential knowledge required to perform the functions in a given position and will test individuals in the use of the systems that they will have to manage or maintain.

Certification

7.3.11 The term certification is used in ICAO and other organisations within the context of authorising the personnel or the means to carry out certain functions. The term is also used to officially leave on record that an individual is duly trained and qualified to perform the tasks entrusted.

7.3.12 Thus, the objective of the certification is to authorise an individual to serve in a given capacity. Certificates should be issued to applicants that meet the conditions required for the service, as well as age, physical fitness, training, qualification, exam and maturity requirements. The certification must be issued in writing before the individual assumes his/her responsibilities in the surveillance service.

7.1.1 Training can only provide knowledge and skills at a basic level. Qualification and certification procedures help to demonstrate that sufficient experience, maturity and good judgment have been achieved. During the qualification process, the individual, upon showing his/her skill, should demonstrate that he/she is physically and mentally fit to be part of a group. Thus, the certification is the official acknowledgment by the organisation that it trusts the individual in the use of such skill.

7.3.13 The specific certification requirements vary according to the type of work location (ship, aircraft or RCC). The applicant to the title or certification may be assigned to a SAR specialist, who will observe how he/she carries out each of the tasks, and who will attest to his/her competence. A detailed knowledge of the geographical area of operation shall also be demonstrated. Certain tasks may require a periodic certification renewal.

7.3.14 Those responsible for managing the SAR service in general perform administrative functions; consequently, it is advisable that they participate in training courses on the following topics:

a) Planning;
b) Organisation;
c) Personnel;
d) Budget; and
e) Performance assessment

7.3.15 The use of means and personnel in search and rescue operations under severe weather or in rough terrain will require a special ability that is not generally learned through normal courses. Consequently, consideration should be given to the conduction of specialised courses for personnel training.

7.4 References

- ICAO Annex 12, Search and Rescue Services
- IMO/ICAO Doc 9731 – International Manual of Search and Rescue Aeronautical and Maritime Services

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8. Chapter 8: Aeronautical Information Services

8.1 Introduction

8.1.1 SAM States must consider the operational requirements of Chapter 4 of this Plan when implementing aeronautical information services.

8.1.2 In view of the new requirements derived from the implementation of the ATM Operational Concept, SAM States shall consider planning improvements to, and the strengthening of, aeronautical information services, taking into account the initiatives of the Global Air Navigation Plan, as well as new provisions and requirements for short and medium-term implementation, and the related components of the aforementioned concept (Attachment C).

8.2 Analysis of the current situation

8.2.1 Both ground and in-flight operational requirements introduced the need for new AIS requirements for the provision of information in electronic format, while assuring its quality, integrity, and timely distribution. In order to meet these new requirements, the aeronautical information service, with its product-oriented activities, will evolve towards a broader concept, known as Aeronautical Information Management, whose activities will be data-oriented.

8.2.2 In order to facilitate coordination, improve efficiency and safety, and ensure that the different members of the ATM community have the same information for collaborative decision-making, it is essential to have both statistical and dynamic information in one same display. Electronic information containing sets of geographical data will improve situational awareness of pilots during all flight phases, through its use on airborne equipment. The same information must be provided, for example: in different ATC positions, pre-flight planning units, flight planning departments of airlines or general aviation users. Electronic information must be adaptable, customising its presentation in a way that meets the requirements of all users of the ATM community and is best suited to their respective applications.

8.2.3 Standard models will be used for the establishment of integrated terrain and obstacle aeronautical information databases. Likewise, common specifications will be adopted for the digital display of such data, such as the electronic Aeronautical Information Publication (eAIP), and electronic aeronautical and aerodrome charts available on board.

8.2.4 Data exchange will be carried out using a standard model that displays static information (for example, that contained in the AIP) and also includes dynamic information (NOTAM). To this end, it is necessary to create a restructured NOTAM that permits its full digital processing. This new format is known as digital NOTAM.

8.2.5 Collaborative decision-making processes will require the combination of AIM and MET data products. To this end, meteorological data must be available in a format similar to other aeronautical data. Therefore, standardisation and implementation activities that help to find solutions for the interoperability of MET and AIS data products must be included.

8.3 **Strategy for the implementation of performance objectives**

8.3.1 Planning has been based on two main axes, which are shown in Attachment D, and listed below:

a) Quality, integrity and availability of electronic aeronautical information (SAM PFF 17)
b) Transition to the provision of electronic aeronautical information (SAM PFF 18)

Quality, Integrity and Availability of Electronic Aeronautical Information

8.3.2 A prerequisite for the transition to AIM is the establishment of SARPs on quality assurance, integrity and timely availability of aeronautical information.

Aeronautical information regulation and control (AIRAC)

8.3.3 The efficacy of aeronautical information management (AIM) will largely depend on an adequate distribution and synchronisation of data. This will require better response times, which will only be possible if at least current requirements are met.

Quality management system (QMS)

8.3.4 The use of data sets on airborne equipment (FMS), automated systems for ATC, ground proximity warning systems (GPWS) and other systems related to an improved situational awareness make it absolutely necessary to implement processes to ensure the quality and integrity of the aforementioned data. These processes should be organised in a quality management system (QMS) applicable to all activities performed by the AIS.

8.3.5 The quality management system should be consistent with the ISO 9000 series and be certified by an accredited certification body. This certification is sufficient measure of compliance.

Monitoring of integrity in the data supply chain

8.3.6 Quality management systems should evolve until they are applied to all the data supply chain, starting at their origin.

8.3.7 In order to guarantee raw data integrity, service level agremeents (SLA) must be established with the originators.

8.3.8 These SLAs will serve as a regulatory framework for the provision of data by the originators, and will contain details, *inter alia*, on: services to be provided, related indicators, acceptable and unacceptable levels of service, commitments and responsibilities of the parties, action to be taken in face of given events or circumstances, agreed data transmission formats, etc.

8.3.9 The SLAs are also a tool for measuring service performance, through the use of key performance indicators (KPIs).

Use of WGS-84

8.3.10 GNSS implementation requires the use of a common geodetic reference system. The SARPs determine that this common reference system must be WGS-84.

8.3.11 Consequently, the objective should be to express all coordinates in the WGS-84 reference system in an effective and verifiable manner. This requirement will also apply to future data products.

Transition to the Provision of Electronic Aeronautical Information

8.3.12 The transition to aeronautical information management (AIM) implies--as already stated--a data-oriented product. This transition to a digital format must be based on standard models and products that permit the exchange at a global level.

8.3.13 Based on this standardisation, the implementation of products and models will be done in a coordinated manner, at a global level, and in keeping with SARP updates resulting from new specifications.

Aeronautical Information Conceptual Model

8.3.14 A conceptual model defines the semantics of aeronautical information in terms of common data structures, and takes into account the new requirements derived from the ATM Operational Concept.

8.3.15 The implementation of a conceptual model fosters interoperability and should serve as a reference in the design of the database specified in 8.3.16, 8.3.17, 8.3.18 and 8.3.19

Integrated Aeronautical Information Database

8.3.16 Use will be made of an integrated aeronautical information database that integrates the digital aeronautical data of a State or Region and will serve to generate AIM products or services.

8.3.17 Use of database engines with spatial characteristics (geo-database) is highly advisable, since it enables data processing in geographical information systems (GIS).

8.3.18 Although it is not necessary for the design of these databases to be identical in all States or Regions, their modelling according to a common conceptual model (see 8.3.14 and 8.3.15) would facilitate the subsequent exchange of data.

8.3.19 Database management may be carried out by a State or through regional initiatives.

Aeronautial Information Exchange Model (AIXM)

8.3.20 An exchange model is essential for interoperability, since it establishes an aeronautical data syntax for names and characteristics.

8.3.21 It will be established based on open standards (XML, GML), facilitating their incorporation into pre-existing or future systems.

8.3.22 It shall contemplate the exchange of dynamic information (NOTAM), enabling the extension of the traditional NOTAM format to give way to the digital NOTAM digital.

Terrain and obstacle database (e-TOD)

8.3.23 Ground proximity warning systems (GPWS), like the GIS-based procedure design and optimisation tools, require the electronic availability of high-quality terrain and obstacle data products.

8.3.24 To respond to this need, terrain and obstacle databases will be established according to common definitions that will be incorporated into the SARPs.

Electronic Aeronautical Information Publication (eAIP)

8.3.25 The eAIP must be considered as the evolution from the traditional paper-based AIP to the digital medium. The electronic version will have two formats: one will be suited for printing and the other will be accessible only through web browsers.

8.3.26 The eAIP must maintain a standard format, just like its predecessor, facilitating the exchange and preventing the proliferation of different presentations.

Electronic mapping and aerodrome mapping

8.3.27 Taking into account the technology available on board and in order to improve situational awareness, new digital mapping products suited to these devices will be established.

8.3.28 The use of the exchange model will allow these products to incorporate dynamic information in real time.

AIS-MET interoperability

8.3.29 Once an exchange model has been established for AIM and a similar one for MET, it will be necessary to implement processes that promote AIS-MET interoperability and thus permit information integration.

8.4 **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Annex 15 - Aeronautical Information Service”
- ICAO Annex 4 “Aeronautical Charts”
- ICAO Document 8126 “Aeronautical Information Services Manual”
- ICAO Document 8697 “Aeronautical Chart Manual”
- ICAO Document 9674 “World Geodetic System (WGS-84) Manual”.
- “AIS-AIM Transition Roadmap” – ICAO

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9. Chapter 9: Aerodromes and Ground Aids / Aerodrome Operational Planning (AGA/AOP)

9.1 Introduction

9.1.1 SAM States must take into account the operational requirements listed in Chapter 4 of the Aerodrome Operational Plan, including ground aids.

9.1.2 In view of the new requirements derived from the implementation of the ATM Operational Concept, SAM States shall consider the planning of improvements and strengthening of aerodrome services, taking into account the Global Air Navigation Plan initiatives as well as new provisions and requirements that require implementation in the short and medium term, and the related components of the cited concept (Attachment C).

9.2 Analysis of the current situation

9.2.1 The aerodrome shall manage the increase of TMA operations within an environment of safety. This requires the identification and optimisation of the critical elements inside and outside of the aerodrome that have an impact on this objective.

9.2.2 There is a need to identify aerodromes that are close to operational saturation with respect to these critical elements, as well as the actions required to improve this capacity, based on the identification of these limitations through the use of best practices in the existing infrastructure and, if necessary, in the modified infrastructure.

9.2.3 Other aerodrome operational capacity issues that must be assessed are the penalties applied by the environmental authority to aerodromes, expressed in the limitation of operations, and the use of time slots for noise control and use of the ground. On the other hand, the closure of airports due to adverse weather conditions, conditions external to the operation, and capacity of the installed infrastructure affect or restrict the required optimisation.

9.3 Strategy for the implementation of performance objectives

9.3.1 Planning has been based on main axes, which are shown in Attachment D, as listed below:

a) Quality of aerodrome data (SAM PFF 19)
b) Aerodrome certification (SAM PFF 20)
c) Safe aerodrome operations that to not meet ICAO SARPs (certification with limitations). (SAM PFF 21)
d) Optimisation of aerodrome capacity (SAM PFF 22)
e) Prevention of runway excursion (SAM PFF 23)

9.3.2 As a result of the assessment of aerodrome capacity factors directly affected by the increase in the flow of operations within the framework of safety management, strategies for achieving AGA/AOP objectives are identified, as summarised in five Performance Framework Formats (PFFs): Aerodrome information quality requirements, aerodrome certification, safe operations at aerodromes that do not meet ICAO SARPs (certificates with limitations), aerodrome capacity optimisation, and runway incursions and excursions.

Quality of Aerodrome Data

9.3.3 In order to achieve more efficient aerodrome operations and reduce the risk of aviation accidents, the quality of aerodrome information must be assured through updates.

9.3.4 The tasks required to attain this perfomance objective includes the development of a regional action plan that identifies the need to update the information contained in Document 8733, CAR/SAM Navigaion Plan, Vol. II FASID, Table AOP1. The updating of information will contribute to a reduction of air navigation deficiencies in the States, taking into account that many of them result from non-compliance with the information contained in Table AOP1 originally provided by the States. Likewise, it will be necessary to establish letters of agreement with AIM, not only to ensure the quality of aerodrome information, but also to update aerodrome obstacle data in the WGS-84 system through e-TOD.

Aerodrome Certification

9.3.5 The aerodrome certification process in the SAM Region is a prerequisite for improving operational capacity of aerodromes within a safety environment, and requires a provisional certification based on compliance with ICAO SARPs and the subsequent validation of this certification in accordance with the LARs.

9.3.6 Compliance with this PFF requires the development of a strategic plan for aerodrome certification, a regional plan for the certification of aerodromes capable of meeting ICAO SARPs, and based on this certification, an SMS assurance process based on internal audits to the aerodromes (Document 9859). The second phase requires the development of LAR regulations, procedures and documentation, as tools that States can use for the validation of aerodrome certification and its implementation in the SAM Region.

Safe Operations at Aerodromes non-compliant with ICAO SARPs (certification with limitations)

9.3.7 The conditions of part of the aerodrome infrastructure in the SAM Region reveal that some are susceptible of receiving a certification with limitations in the compliance with ICAO SARPs. However, this does not exempt these and other aerodromes in the Region from having guides for their certification under these conditions, and thus aerodrome operations in a safety environment that promotes risk management, self-auditing by the aerodrome, State audits (Document 9859) and ICAO audits.

9.3.8 The foregoing requires a regional plan for the initial identification of these aerodromes in the SAM Region, the development of guides by ICAO for the certification of aerodromes with limitations in the compliance with ICAO SARPs. These guides should include guidance on the conduction of cost-effectiveness/SMS aeronautical studies that encourage States to certify their aerodromes. The implementation of the certification of these aerodromes is also a safety objective of the SAM Region.

Optimisation of Aerodrome Capacity

9.3.9 The capacity obtained through the aforementioned strategies relates to the installed infrastructure and its utilisation, understood as capacity with respect to the required demand. Accordingly, aerodrome capacity must be assessed based on saturation or near saturation under current and expected traffic conditions. Therefore, it is very important for the Region to identify airports that are close to this saturation condition in order to propose the development of manuals that contemplate, as a first objective, capacity improvements in runways, turning apron, taxiways and apron, based on the existing infrastructure and, as a second objective, the implementation of new infrastructure.

9.3.10 Accordingly, it is necessary to assess the aerodromes of the Region that are close to the point of saturation, develop a guide containing runway capacity optimisation procedures that use operational tools such as runway segregation, segmented runways, optimisation of surface movement, and then plan the new infrastructure in harmony with the environment. It is necessary to include letters of operational agreement in this new operational condition, as well as the monitoring of the optimisation of runways and their supplementary systems.

Prevention of Runway Excursions

9.3.11 The safety of aircraft operations with respect to conditions that cause runway excursions, may largely depend on pavement surface conditions, their behaviour under different weather conditions, and their use. Consequently, the identification and management of such conditions to keep them within acceptable levels favour this operational requirement. These characteristics are: friction on paved surfaces covered by snow or ice or water, surface drainage capacity, and rubber contamination.

9.3.12 The foregoing requires the development of a regional action plan for the identification of these runway surface safety requirements and the assurance of an acceptable SMS risk.

9.3.13 Likewise, aerodrome operators must report these operating conditions to users, authorities and providers, as a requirement for ensuring proper dissemination.

9.3.14 The States must monitor the progress of the programme, and this information shall be provided to ICAO in order to contribute to safety measurements.

9.4 **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Annex 14, Standards and Recommended Practices - SARPs.
- ICAO Document 9774: Aerodrome Certification Manual.
- ICAO Document 9157. Aerodrome Design Manual.
- ICAO Document 9859. Safety Management Manual.
- ICAO Document 9184. Airport Planning Manual.
- ICAO Document 9137. Airport Services Manual.
- ICAO Document 9830. Surface Movement Guidance and Control Systems (SMGCS) Manual
- Report of the seventh meeting of the AGA/AOP/SG7 Subgroup, Buenos Aíres, Argentina, 9 to 13 September 2009.

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10. Chapter 10: Development of Human Resources and Competence Management

10.1 Introduction

10.1.1 In view of the new requirements derived form the implementation of the ATM Operational Concept, SAM States shall consider planning the Development of Human Resources and Competence Management, taking into account the Global Air Navigation Plan Initiatives, new provisions and requirements in the short and medium term, as well as the related components of the cited concept (Attachment C).

10.1.2 A main objective of ATM systems is the creation of a seamless global air navigation system. A continuous navigation environment will require an international team duly prepared to work within this scope. To achieve this, the members of this team must receive a uniform and high-quality level of training.

10.1.3 The proper provison of air navigation services will depend on the management of the competencies of technical and operational personnel, as well as on their availability in sufficient numbers to cover the different services.

10.1.4 In the past, the evolution of aeronautical technologies has been gradual and, to a large extent, Civil Aviation Training Centres (CATCs) and instructors have been able to face the challenges of change, even though they did not always have refined training methodologies and instruments available. However, the new ATM systems are based on many new concepts, and their implementation represents an even bigger challenge.

10.1.5 The introduction of these new conepts within the ATM system will have a big impact on aeronautical personnel, not only on ground personnel but also on the flight crew. That is why competence management is one of the key issues for a successful transition.

10.1.6 As a result of the introduction of the components of the ATM Operational Concept, new aeronautical disciplines will emerge. From the point of view of human resource planning, it will be necessary to redistribute and train personnel.

10.1.7 The planning of personnel competence management for the implementation of the components of the ATM Operational Concept shall take into account the specific requirements of each implementation activity in each of the areas that make up this Document.

10.1.8 The planning of training in the SAM Region shall be done in coordination with CATCs where the required courses would be given.

10.1.9 ICAO has adopted a new training policy that includes a process to support training organisations and courses. This new training policy covers all safety and security aspects and supplements the work of the special team on the new generation of aviation professionals (NGAP). The civil aviation training policy of ICAO permits the implementation of an integral framework that ensures that all training provided by ICAO or third parties is subject to assessment to make sure it complies with the stringest standards concerning the design and development of training courses (EB2010/40).

10.2 **Analysis of the current situation**

10.2.1 The CAR/SAM ANP, within its planning aspects, contemplates human factors and training plans. It recognises that the high level of automation and interdependence of the current system gives rise to several problems related to human factors. The experience gained with human factors indicates that they should be considered as an integral part of any plan for the implementation of new technologies. It also recognises that an important objective of regional planning is the creation of a uniform air navigation system that will require an international team duly prepared to work in that environment.

10.2.2 Similarly, frequent mention is made of the deficiencies in human resource planning and training as a main reason for the lack of implementation of regional air navigation plans. Human resource development challenges will multiply during the period of transition from the current system to the system envisaged in the ATM operational concept. Since the existing and emerging air navigation technologies will work in parallel for some time, civil aviation personnel will have to develop new skills and maintain those necessary for the operation and maintenance of the existing systems. To solve this problem, a collaborative approach should be applied for civil aviation training.

10.2.3 The analysis of the current situation reveals two types of problems: *existing and emerging problems.*

10.2.4 **Existing problems include, *inter alia*:**

a) Lack of personnel to operate the systems
b) Legal and budgetary limitations of the States
c) High cost of training (initial, specialised, recurrent, and maintenance of personnel qualifications)
d) Personnel with inadequate knowledge of English
e) Insufficient amount of simulators for initial training of personnel
f) Insufficient level of qualification of instructors in the new concepts
g) Trianing organisations inadequately prepared to face the new challenges
h) Inadequate selection of candidates

10.2.5 **Emerging problems could be attributed, *inter alia*, to:**

a) The need to implement new training methods
b) New competencies as a result of the increased dependence of aviation on real-time digital technologies
c) Increased traffic volume

10.2.6 Currently, the South American Region has a regional mechanism made up by the Directors of Civil Aviation Training Centres, which meets on an annual basis. These events are aimed at analysing human resource planning and training, cooperation amongst training centres, the creation of introductory courses to the new CNS/ATM systems, the need to professionalise training centres in order to face the new demands of the new systems, promote the TRAINAIR programme through the incorporation of new centres into the programme, and the development of courses under this methodology. This mechanism should reflect the new requirements, and establish a programme in keeping with current requirements.

10.3 **Strategies for the implementation of performance objectives**

10.3.1 All the areas involved in ATM have participated in the planning of the development of human resources and training requirements, including operations and airworthiness personnel of the aeronautical authority of each State. The starting point was the absence of a full integration and the need to become aware of the role of each individual within the ATM Operational Concept, taking into account the guidelines of Document 9750 – Global Air Navigation Plan, the Global ATM Operational Concept and other related ICAO documents.

10.3.2 In a first phase, the ICAO SAM Regional office, in cooperation with the States, should develop a roadmap that includes concrete activities to face the challenges of the new concepts, with duly trained and updated personnel.

10.3.3 ICAO programmes concerning the formation of the new generation of aviation professionals (NGAP) must be taken into account, using the results of this panel for planning the courses.

10.3.4 In order to plan competence management for the implementation of the ATM Operational Concept, the Region may use the following strategy to expedite international cooperation for the development of programmes and materials to be used in the courses, and in regional and national seminars and workshops:

a) Prompt identification of training needs and priorities for ANS personnel: Given the considerable amount of training that will be needed to prepare for the new systems, as well as the need to standardise training, it is essential to establish a collaborative plan for the development of the required materials. However, an effective and profitable plan may only be formulated after training needs and priorities have been clearly identified.

b) Coordination and planning of training for ANS personnel at regional level: Effective planning and coordination of the appropriate materials should be done at a regional level. The SAM Region has structures that could be used to fulfil this task.

10.3.5 Through Regional projects, consideration shall be given, in a first phase, to the development of a Guide on the ATM Operational Concept and its supporting systems, in order to train instructors in the new concepts to be implemented.

10.3.6 When planning the courses, it should be assured that programmes on each ATM specialty include basic training in the other areas, so that the personnel will be aware of the work done in other units and of the impact their tasks have on the overall ATM. As a strategy, the planning of personnel competence management shall consider three stages:

a) Basic training: This stage shall include the new concepts of the ATM system, communication systems and all the aspects that will be involved in the operation of air navigation systems.

b) Training for implementation planners: Training is required at the top management level in order to provide decision makers the necessary basic information for planning the implementation of ATM systems. This type of training is required for executive staff responsible for planning ATM systems, as well as for those responsible for planning contributory systems.

c) Task-specific training: The third category of training is the one required for ongoing management, operation and maintenance of systems. This category accounts for most of the training needs and is the most difficult to plan, develop and implement.

10.3.7 Planning has been based on a main axis, which is shown in Attachment D, and listed below:

a) Management of air navigation service personnel competence (SAM PFF 24).

10.3.8 CATCs shall actively accompany the planning and development of update and training courses on the ATM Operational Concept to comply with the roadmap developed by ICAO and the States.

10.4 **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Document 9868: Training (PANS)
- ICAO Document 7192 -AN/857: Training Manual
- Assembly 37Th Session A37-WP/64 “Report on outcomes of initiatives regarding Next Generation of Aviation Professionals”
- WMO Bulletin No. 258, Supplement No. 1 – *Training and qualification requirements for aeronautical meteorological personnel*
- ICAO Electronic Bulletin EB2010/40 of 28 September 2010 “ ICAO Civil Aviation Training Policy”

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11. Chapter 11: Safety

11.1 Introduction

The Global Aviation Safety Plan

11.1.1 The objective of the Global Aviation Safety Plan (GASP) is to reduce the risk of accidents for civil aviation by providing a common frame of reference for all stakeholders to as to have a more dynamic approach to aviation safety and contribute to the coordination and guidance of global safety policies and initiatives. The first version of the ICAO GASP was prepared in 1997 and was regularly updated until 2005. The 36th Assembly Session, held in October 2007, was presented with an amended GASP, which was subsequently acknowledged in Resolution A36-7.

11.1.2 The cited Resolution A 36-7 urges contracting States and the industry to adopt the principles and objectives contained in the Global Aviation Safety Plan and the Global Aviation Safety Roadmap, and to apply their methodologies in partnership with all stakeholders with a view to reducing the number and rate of aircraft accidents.

Regional Aviation Safety Groups

11.1.3 The Regions are currently resolving safety issues through different mechanisms established by the States themselves and the industry. The Pan-American States created the Regional Aviation Safety Group— Pan-America (RASG-PA) in 2008 in response to Resolution A 36-7. This Group was established as a focal point to ensure harmonisation and coordination of safety efforts aimed at reducing aviation risks in the North American, Central American and Caribbean (NACC) and South American (SAM) Regions, and the promotion, by all the stakeholders, of the implementation of the resulting safety initiatives.

State Safety Programme (SSP)

11.1.4 The introduction in the SARPs of requirements related to the State safety programme (SSP) resulted from the growing recognition that safety management principles impact most of the civil aviation management activities, including regulation, policy-making and safety oversight.

Safety Management System (SMS)

11.1.5 The States will require, as part of the State safety programme, that the air traffic service provider and aerodrome operators implement a safety management system acceptable to the State and that, at least:

a) Identifies safety hazards;
b) Ensures the implementation of the necessary corrective measures to maintain the agreed level of safety efficacy;
c) Provides for ongoing monitoring and periodic assessment of safety efficacy; and
d) Seeks to improve the general status of the safety management system on a continuous basis.

11.1.6 The SMS will clearly define the lines of responsibility for safety within the organisation of the air traffic service provider or aerodrome operator, including the direct safety responsibility of high managerial staff.

11.1.7 When AIS, CNS, MET and/or SAR services are provided under the authority of an ATS provider, the provision of these services will be subject to the requirements established in 11.1.5 and 11.1.6 above.

11.1.8 When AIS, CNS, MET and/or SAR services are fully or partially provided by an entity other than an ATS provider, the requirements established in 11.1.5 and 11.1.6 will apply to those aspects of these services that a have direct operational impact.

11.1.9 Likewise, the State administration must establish mechanisms to ensure the effective supervision of the critical elements of the safety oversight function. Furthermore, it must create mechanisms to ensure that hazard identification and safety risk management by service providers is consistent with the established regulatory controls (requirements, specific operating regulations and implementation policies). These mechanisms include inspections, audits and surveys to ensure that safety risk regulatory controls are properly integrated in the SMS of service providers, that they are implemented as designed, and that they have the expected effect on safety risks.

11.1.10 According to ICAO Annex 11, any significant change in the ATS system related to safety, including the implementation of reduced separation minima or a new procedure, will only become effective after a safety assessment has shown that they will meet an acceptable level of safety and that users have been consulted. When applicable, the responsible authority will make sure that the appropriate measures are taken for post-implementation monitoring to verify that the established level of safety is being met. When the acceptable level of safety cannot be expressed in quantitative terms due to the nature of the change, the safety assessment may rely on operational judgment.

11.2 Current situation

11.2.1 Since 2007, courses on safety management systems (SMS) have been dictated at a regional level and in all South American States. Also, since 2009, regional courses were dictated and in some States of the Region on State Safety Programmes (SSP) and in different forums SAM States have been encouraged to implement their SSP demanding implementation of the corresponding SMS to service providers.

11.2.2 During the process of safety assessment, it could be noted that a few States have implemented in an effective manner both their SSP as well as their SMS at a level of service providers; therefore a high commitment is required by States and service providers in order to reach this performance objective.

11.3 Strategy for the Implementation of Performance Objectives

11.3.1 Planning has been based on a main axis, as shown in Attachment D, called ‘Safety” (SAM PFF 25), as follows:

a) Safety (PFF SAM 25)

11.4 **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- Safety Management Manual *(Doc. 9859)*

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ATTACHMENT A

TRAFFIC FORECASTS IN THE SAM REGION

Homogeneous Area of Routing AR-1

- Buenos Aires – Santiago de Chile
- Buenos Aires – Sao Paulo/Rio de Janeiro
- Santiago de Chile – Sao Paulo/Rio de Janeiro
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Rank	City Pair	Total Aircraft Movements/ 2007/	Total Aircraft Movements 2027	Average Annual Growth (Per cent) 2007-2027
1	Santiago(Intl) - Buenos Aires(Pistarini)	12185	39079	6.0
2	Sao Paulo(Intl) - Buenos Aires(Pistarini)	11843	37982	6.0
3	Rio De Janeiro(Intl) - Buenos Aires(Pistarini)	5484	33681	9.5
4	Santiago(Intl) - Rio de Janeiro	4979	25453	8.5
5	Santiago(Intl) - Sao Paulo	846	4741	9.0
	TOTAL	35337	140936	7.2

- Sao Paulo/Rio de Janeiro – Europe

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Sao Paulo-Paris	2921	8523	5.5
2	Sao Paulo-London	1665	5867	6.5
3	Rio De Janeiro-Paris	1559	6033	7.0
4	Sao Paulo-Madrid	1543	3721	4.5
5	Sao Paulo-Frankfurt	1521	3668	4.5
6	Sao Paulo-Milan	1284	4969	7.0
7	Rio De Janeiro-Madrid	1112	2213	3.5
8	Sao Paulo-Lisbon	992	2894	5.5
9	Rio De Janeiro-Lisbon	943	3323	6.5
10	Sao Paulo-Johannesburg	878	3094	6.5
11	Santiago-Rio De Janeiro	846	4741	9.0
12	Sao Paulo-Amsterdam	730	1761	4.5
13	Sao Paulo-Munich	726	2118	5.5
14	Zurich-Sao Paulo	676	1221	3.0
15	Rio De Janeiro-Porto	304	593	3.4
16	Sao Paulo-Porto	302	589	3.4
17	Rio De Janeiro-Frankfurt	190	371	3.4
18	Rio De Janeiro-Milan	16	31	3.4
19	Sao Paulo-Rome	2	4	3.4
	Total	18210	55734	5.8

Homogeneous Area of Routing AR-2

- Sao Paulo/Rio de Janeiro – Miami
- Sao Paulo/Rio de Janeiro – New York

Rank	City Pair	Total Aircraft Movement 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Rio de Janeiro-Miami	1082	1954	3.0
2	Sao Paulo- new York (Newark)	362	979	5.1
3	Sao Paulo-Miami	3482	6289	3.0
3	Sao Paulo-New York(JFK)	3233	5839	3.0
5	Sao Paulo-new York(Newark)	362	979	5.1
	Total	8521	16040	3.2

Homogeneous Area of Routing AR-3

- Sao Paulo/Rio de Janeiro — Lima
- Sao Paulo/Rio de Janeiro — Los Angeles

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Sao Paulo-Lima	2596	15944	9.5
2	Sao Paulo-Los Angeles	182	492	5.1
	Total	2778	16436	9.3

Homogeneous Area of Routing AR-4

- Santiago — Lima — Miami
- Buenos Aires — New York
- Buenos Aires — Miami

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Buenos Aires - New York	835	2258	5.1
2	Buenos Aires - Miami	2652	7172	5.1
3	Santiago - Lima	4208	21511	8.5
4	Lima - Miami	2220	6004	5.1
5	Santiago - Miami	1781	4816	5.1
	Total	11696	41761	6.6

Homogeneous Area of Routing AR-5

- North of South America — Europe

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Madrid - Bogota	1830	7774	7.5
2	Madrid - Caracas	1639	6342	7.0
3	Madrid - Lima	1323	3934	5.6
4	Madrid - Guayaquil	1099	3268	5.6
5	Paramaribo - Amsterdam	754	2242	5.6
6	Paris - Bogota	730	1318	3.0
7	Paris - Caracas	724	2322	6.0
8	Paris(Orly) - Cayenne	719	2782	7.0
9	Frankfurt - Caracas	676	2872	7.5
10	Milan - Caracas	520	1230	4.4
11	Quito - Madrid	519	1228	4.4
12	Lima - Amsterdam	493	1166	4.4
13	Lisbon - Caracas	434	1027	4.4
14	Santa Cruz - Madrid	433	1024	4.4
15	Funchal - Caracas	242	573	4.4
16	Madrid - Cali	227	537	4.4
17	Rome - Caracas	210	497	4.4
18	Porlamar - Frankfurt	209	494	4.4
19	Bogota - Barcelona	157	371	4.4
20	Tenerife - Caracas	110	260	4.4
21	Porto - Caracas	104	246	4.4
22	Porlamar - London	94	222	4.4
23	Bogota - Alicante	52	123	4.4
24	Porlamar - Manchester	48	114	4.4
25	Porlamar - Amsterdam	47	111	4.4
	Total above routes	13393	42079	5.9
	All other routes	58	137	4.4
	TOTAL	13451	42216	5.9

Homogeneous Area of Routing AR-7

Santiago — Lima — Los Angeles

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Santiago - Lima	4208	21511	8.5
2	Los Angeles - Lima	1155	3123	5.1
3	Santiago - Los Angeles	304	822	5.1
	Total	5667	25457	7.8

Homogeneous Area of Routing AR-8

- South America — South Africa

Rank	City Pair	Total Aircraft Movements 2007[2/]	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Sao Paulo - Johannesburg	878	3094	6.5
2	Buenos Aires - Cape Town	208	406	3.4
	Total	1086	3500	6.0

- Santiago de Chile — Easter Island — Papeete (PAC)

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Santiago - Easter Island	499	1456	5.5
2	Easter Island - Papeete	209	504	4.5
	Total	708	1960	5.2

ATTACHMENT B

HOMOGENOUS AREAS AND MAIN TRAFFIC FLOWS IDENTIFIED

Note: The Table does not include Routing Area AR 6, since it is exclusive to the NAM and CAR Region.

-1- Routing Area (AR)	-2- Traffic flows	-3- FIRs involved	-4- Type of area covered	-5- Remarks
South American (SAM) Region				
AR 1	Buenos Aires-Santiago de Chile	Ezeiza, Mendoza, Santiago	Low-density continental	SAM intra-regional traffic flow
	Buenos Aires-Sao Paulo/Rio de Janeiro	Ezeiza, Montevideo, Curitiba, Brasilia	High-density continental	SAM intra-regional traffic flow
	Santiago de Chile-Sao Paulo/Rio de Janeiro	Santiago, Mendoza, Córdoba, Resistencia, Asunción, Curitiba, Brasilia	Low-density continental	SAM intra-regional traffic flow
	Sao Paulo/Rio de Janeiro-Europe	Brasilia, Recife, Atlantic	Low-density continental/oceanic	SAM/AFI/EUR inter-regional traffic flow
AR 2	Sao Paulo/Rio de Janeiro-Miami	Brasilia, Amazónica, Maiquetía, Curaçao, Kingston, Santo Domingo, Port- au-Prince, Havana, Miami	Low-density continental/oceanic	CAR/SAM/NAM inter- and tra-regional traffic flow
	Sao Paulo/Rio de Janeiro-New York	Brasilia, Amazónica, Paramaribo, Georgetown, Piarco, Rochambeau, San Juan (New York)	Low-density continental/oceanic	CAR/SAM/NAM/NAT inter- and intra-regional traffic flow

-1- Routing Area (AR)	-2- Traffic flows	-3- FIRs involved	-4- Type of area covered	-5- Remarks
AR 3	Sao Paulo/Rio de Janeiro-Lima	Brasilia, Curitiba, La Paz, Lima	Low-density continental	SAM intra-regional traffic
	Sao Paulo/Rio de Janeiro-Los Angeles	Brasilia, Amazónica, Bogota, Barranquilla, Panama, Central America, Mérida, Mexico, Mazatlán (Los Angeles)	Low-density continental	CAR/SAM/NAM inter- and intra-regional traffic flow
AR 4	Santiago - Lima - Miami	Santiago, Antofagasta, Lima, Guayaquil, Bogota, Barranquilla, Panama, Kingston, Havana, Miami.	Low-density continental/oceanic	CAR/SAM/NAM intra- and inter-regional traffic flow
	Buenos Aires - New York	Ezeiza, Resistencia, Asunción, La Paz, Amazónica, Maiquetía, Curaçao, Santo Domingo, Miami (New York)	Low-density continental/oceanic	CAR/SAM/ NAM/NAT intra- and inter-regional traffic flow
	Buenos Aires - Miami	Ezeiza, Resistencia, Córdoba, La Paz, Amazónica, Bogota, Barranquilla, Kingston, Havana, Miami	Low-density continental/oceanic	CAR/SAM/ NAM intra- and inter-regional traffic flow
AR 5	Northern South America - Europe	Guayaquil, Bogota, Maiquetía, Piarco (NAT-EUR)	High-density continental/oceanic	SAM/CAR/ NAT/EUR inter-regional traffic flow
AR 7	Santiago - Lima - Los Angeles	Santiago, Antofagasta Lima, Guayaquil, Central America, Mexico, Mazatlán	Low-density oceanic	CAR/SAM/ NAM intra- and inter-regional traffic flow

-1- Routing Area (AR)	-2- Traffic flows	-3- FIRs involved	-4- Type of area covered	-5- Remarks
AR 8	South America - South Africa	Ezeiza, Montevideo, Brasilia, Atlantic Johannesburg (AFI)	Low-density oceanic	SAM/AFI inter-regional traffic flow
	Santiago de Chile - Easter Island - Papeete (PAC)	Santiago, Easter Island, Tahiti	Low-density oceanic	SAM/PAC inter-regional traffic flow

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ATTACHMENT C

GLOBAL PLAN INITIATIVES AND THEIR RELATIONSHIP WITH THE MAIN GROUPS

GPI		En-route	Terminal Area	Aerodrome	Ancillary Infrastructure	Associated component of the Operational Concept
GPI-1	Flexible use of airspace	X	X			AOM, AUO
GPI-2	Reduced vertical separation minima	X				AOM, CM
GPI-3	Harmonisation of level systems	X				AOM, CM, AUO
GPI-4	Alignment of upper airspace classifications	X				AOM, CM, AUO
GPI-5	RNAV and RNP (Performance-based navigation)	X	X	X		AOM, AO, TS, CM, AUO
GPI-6	Air traffic flow management	X	X	X		AOM, AO, DCB, TS, CM, AUO
GPI-7	Dynamic and flexible ATS route management	X	X			AOM, AUO
GPI-8	Collaborative airspace design and management	X	X			AOM, AUO
GPI-9	Situational awareness	X	X	X	X	AO, TS, CM, AUO
GPI-10	Terminal area design and management		X			AOM, AO, TS, CM, AUO
GPI-11	RNP and RNAV SIDs and STARs		X			AOM, AO, TS, CM, AUO
GPI-12	Functional integration of ground and airborne systems		X		X	AOM, AO, TS, CM, AUO
GPI-13	Aerodrome design and management			X		AO, CM, AUO
GPI-14	Runway operations			X		AO, TS, CM, AUO
GPI-15	Match IMC and VMC operating capacity		X	X	X	AO, CM, AUO

GPI		En-route	Terminal Area	Aerodrome	Ancillary Infrastructure	Associated component of the Operational Concept
GPI-16	Decision support and alerting systems	X	X	X	X	DCB, TS, CM, AUO
GPI-17	Implementation of data Relationship applications	X	X	X		DCB, AO, TS, CM, AUO, ATMSDM
GPI-18	Aeronautical information	X	X	X	X	AOM, DCB, AO, TS, CM, AUO, ATMSDM
GPI-19	Meteorological systems	X	X	X	X	AOM, DCB, AO, AUO
GPI-20	WGS-84	X	X	X	X	AO, CM, AUO
GPI-21	Navigation systems	X	X	X	X	AO, TS, CM, AUO
GPI-22	Communication infrastructure	X	X	X	X	AO, TS, CM, AUO
GPI-23	Aeronautical radio spectrum	X	X	X	X	AO, TS, CM, AUO, ATMSDM

ATTACHMENT D

PERFORMANCE FRAMEWORK FORM (PFF)

1. This outcome and management form is applicable to both regional and national planning, and includes references to the Global Plan. Other formats may be appropriate, but they must contain, at least, the elements described below.

1.1 Performance objective: Regional/national performance objectives should be defined, using the performance-based approach that best reflects the activities required to support ATM systems at regional/national level. Along their life cycle, performance objectives may change, depending on the evolution of the ATM system; therefore, during the implementation process, they should be coordinated with all the stakeholders in the ATM community and be at their disposal. The establishment of joint decision-making processes ensures that all stakeholders are involved and agree on the rquirements, tasks and timetables.

1.2 Regional performance objectives: Regional performance objectives are the improvements required by the air navigation system to support global performance objectives, and are related to the operational environments and the priorities applicable at regional level.

1.3 National performance objectives: National performance objectives are the improvements required by the air navigation system in support of regional performance objectives, and are related to the operational environments and priorities applicable at State level.

1.4 Benefits: Regional/national performance objectives should meet the expectations of the ATM community, as described in the operational concept; they should generate benefits for the parties involved; and should be attained through operational activities and techniques aligned with each performance objective.

1.5 Metrics: Metrics permit to measure the objectives achieved. The monitoring and measurement of the performance of ATM systems may require metrics in areas such as access, capacity, cost-effectiveness, efficiency, environment, flexibility, prediction capacity, and safety.

1.6 **Strategy:** ATM evolution requires a clearly-defined gradual strategy that includes the tasks and activities that best represent the national and regional planning processes, in keeping with the global planning framework. The goal is to achieve a harmonised implementation process that evolves towards a global and seamless ATM system. Accordingly, it is necessary to develop short- (1-5 years) and medium-term (6-10 years) work programmes focused on system improvements that reflect a clear work commitment of the parties involved.

1.7 **Components of the ATM operational concept:** Each strategy or set of tasks should be associated to components of the ATM operational concept. The designators of the ATM components are as follows:

- AOM – Airspace organisation and management
- DCB – Demand/capacity balancing
- AO – Aerodrome operations
- TS – Traffic synchronisation
- CM – Conflict management

- AUO – Airspace user operations
- ATM SDM – ATM service delivery management

1.8 **Tasks:** The regional/national work programmes, based on these PFF templates, should define the tasks required to attain said performance objective while maintaining a direct relationship with the components of the ATM system. The following principles should be taken into account when developing a work programme:

- Work should be organised using project management techniques and performance-based objectives, in line with ICAO strategic objectives.
- All tasks related to the compliance with the performance objectives should be carried out based on strategies, concepts, action plans and roadmaps that may be shared amongst the parties, with the main objective of attaining transparency through interoperability and harmonisation.
- Task planning should include the optimisation of human resources, as well as the promotion of the dynamic use of electronic communication amongst the parties (for example, Internet, video-conferences, tele-conferences, e-mail, telephone and fax). Likewise, resources should be used efficiently, avoiding duplication of work or unnecessary tasks.
- The process and work methods should ensure the possibility of measuring the performance objectives, comparing them with timetables, and easy reporting of the progress made at national and regional level to the PIRGs and ICAO Headquarters, respectively.

1.9 **Period:** Indicates the start and end of that task in particular.

1.10 **Responsibility:** Indicates the organisation/entity/individual responsible for the fulfilment or management of the associated tasks.

1.11 **Status:** The status basically monitors progress in the fulfilment of said task as it proceeds to the date of completion.

1.12 **Relationship with the global plan initiatives (GPIs)*:*** The 23 GPIs, as described in the Global Plan, provide a global strategic framework for the planning of air navigation systems, and are designed to contribute to the achievement of regional/national performance objectives. Each performance objective should be Relationshiped with the corresponding GPIs. The goal is to make sure that the evolutionary work process at State and regional level is integrated within the global planning framework.

2. The PFFs prepared for the performance objectives concerning ATM, CNS, MET, SAR, AIS, AGA/AOP, personnel competence management and SMS are presented below. Likewise, a matrix with the relationships amongs the aforementioned areas is included, in addition to a matrix with the inter-relationship amongst the PFFs.

REGIONAL PERFORMANCE OBJECTIVE: SAM 01 OPTIMISATION OF THE EN-ROUTE AIRSPACE STRUCTURE	
Benefits	
Safety	• Improves airspace safety
Environmental protection and sustaintable development of air transport	• Reduces miles flown, fuel consumption and, thus, CO2 emissions into the atmosphere; • Increases airspace capacity. • Takes advantage of aircraft capacity to fly optimum paths;
Metrics	• Number of implemented PBN (RNAV/RNP) routes • Reduction of CO2 emissions

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AUO**	a) Formulate airspace concept and establish requirements	2012 - 2013	Regional Project States	Valid
	b) Assess progress of Version 2 of the SAM ATS route network, and the implementation of RNAV 5 exclusionary space.	2012	States	Valid
	c) Optimise oceanic routes and implement RNAV10 (RNP10) corridors.	(*) - 2012	States	In progress
	d) Review and update the SAM PBN Roadmap and the ATS route network optimisation programme.	2012 - 2013	Regional Project States	Valid
	e) Assess the status of implementation of the en-route PBN action plan.	2012	States	Valid
	f) Complete the implementation of RNAV 5 continental routes.	2012 - 2014	States	Valid
	g) Implement non-permanent routes in defined continental airspaces.	2012 - 2016	States	Valid
	h) Prepare Version 03 of the ATS route network.	2013	Regional Project States	Valid
	i) Implement trunk routes between city pairs and/or selected airspaces, with RNP 4 specification for oceanic airspaces and RNP 2 in selected continental airspace.	2013 – 2018	States	Valid
	j) Define and implement the spacing between route centre lines as required	2013 - 2014	Regional Project States	Valid
	k) Implement random routes in defined continental airspaces.	2013 – 2018	States	Valid
	l) Assess safety before each implementation.	(*) - 2018 +	CARSAMMA States	In progress
	m) Monitor implementation progress.	2011 - 2018 +	GREPECAS	Valid
Relation-ship with GPIs	GPI/5: peformance-based navigation, GPI/7: management of dynamic and flexible ATS routes, GPI/8: collaborative airspace design and management.			

(*) Indicates that the task has started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 02 TMA AIRSPACE STRUCTURE OPTIMISATION	
Benefits	
Safety	• Implementation of continuous descent (CDO) operations • Increased safety during landing, thus reducing the incidence of CFIT • Strengthens airspace safety.
Environmental protection and sustainable development of air transport	• Reduces miles flown, fuel consumption and, consequently, CO2 emissions into the admosphere; • Increases airspace capacity, since it permits the establishment of separate arrival/departure flows, and even the segregation of IFR from VFR flights; • Takes advantage of aircraft capacity for flying optimum paths; • Airport arrival/departure under any meterological condition.
Metrics	• Number of TMAs with SIDs/STARs already implemented. • Number of TMAs that have implemented CDO operations.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM AUO CM	a) Assess the progress made in the terminal area PBN action plan.	2012	States	Valid
	b) Implement standard RNAV 1 arrival/departure routes in selected TMAs with ATS surveillance.	(*) - 2013	States	In progress
	c) Implement RNAV 1 and/or RNP 1 standard arrival/departure routes in all the TMAs of international airports.	2012 – 2016	States	Valid
	d) Implement CDO operations in all the TMAs of international airports.	2013 - 2018	States	Valid
	e) Implement RNAV1/RNP1 exclusionary airspace in high-density TMAs.	2015 – 2018 +	States	Valid
	f) Assess safety during stages prior to implementation	(*) - 2018	States	In progress
	g) Monitor progress during implementation.	(*) - 2018	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace, GPI/5: performance-based navigation, GPI/7: management of dynamic and flexible ATS routes, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs, and GPI/12: functional integration of ground and airborne systems.			

(*) Indicates that the task has been started before the period contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 03 IMPLEMENTATION OF RNP APPROACHES	
Benefits	
Safety	• Increases safety during landing, reducing the incidence of CFIT • Permits the establishment of safe approach procedures at airports with limitations due to rough terrain.
Environmental protection and sustainable development of air transport	• Reduces miles flown, fuel consumption, and thus CO2 emissions into the atmosphere; • Takes advantage of aircraft capacity for flying optimum paths; • Improved airport operational minima.
Metrics	• Number of RNP APCH procedures that have been implemented, including APV Baro VNAV.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AUO** **AO**	a) Assess progress of PBN action plan on approach procedures.	2012	SAMIG	Valid
	b) Implement RNP APCH procedures (or RNP AR APCH when operationally advantageous), including APV BARO VNAV, at least at all international airports.	(*) – 2018+	States	In progress
	c) Start-up of the implementation of GLS procedures (GBAS landing) at selected airports.	2015 – 2018 +	States	Valid
	d) Assess safety during the stages before implementation.	(*) - 2018+	States	In progress
	e) Monitor the progress made during implementation.	(*) - 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace, GPI/5: performance-based navigation, GPI/8: collaborative airspace design and management, GPI/12: functional integration of ground and airborne systems and GPI/14; runway operations.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 04 IMPROVEMENTS IN CIVIL/MILITARY COORDINATION AND COOPERATION	
Benefits	
Safety	• Strengthens airspace safety.
Environmental protection and sustainable development of air transport	• Permits a more efficient ATS route structure and increased airspace capacity. • Greater availability for civil aviation of restricted airspace at times when there is no military activity
Metrics	• Number of committees or similar civil/military coordination bodies implemented • Number of civil/military coordination and cooperation agreements implemented

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM	a) Develop guidance material on civil/military coordination and cooperation, for the definition of policies, procedures and national standards;	(*) - 2012	Regional Project States	In progress
	b) Establish committees or similar civil/military coordination bodies;	(*) - 2012	States	In progress
	c) Make arrangements to have a permanent Relationship and close cooperation between ATS civil units and the appropriate air defence units;	(*) - 2012	States	In progress
	d) Establish procedures for coordination of temporary reservation of airspace (TRA) and issuance of NOTAMs, when so required for ANSPs.	2012	States	Valid
	e) Conduct a regional review of special use airspace;	(*) - 2014	Regional Project States	In progress
	f) Develop a regional strategy and work programme for the implementation of the flexible use of airspace, through a phased approach, starting with a more dynamic sharing of restricted airspace.	2012 - 2018	Regional Project States	Valid
	g) Integration of aviation, civil and military activities.	2012 - 2015	States	Valid
	h) Monitor progress during implementation.	(*) - 2013	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace; GPI/18: Aeronautical information.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 05 FLIGHT PLAN IMPLEMENTATION	
Benefits	
Safety	• Improved safety management
Enviromental protection and sustainable development of air transport	• Expanded airspace capacity; • Improved implementation in terms of profitability; • Enhanced operational efficiency.
Metrics	• Number of States that have implemented the new FPL.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
SDM ATM	a) Guides on the transition to the new format of the filed flight plan.	(*)	ICAO	In progress
	b) Develop a regional strategy for the transition to the new format of the filed flight plan.	(*)	ICAO	In progress
	c) Identification of stakenolders and possible impact of the implementation of the new format of the filed flight plan (FPL/RPL/CPL).	(*)	States	In progress
	d) Assessment of current/future flight plan processing capabilities with respect to the new flight plan format.	(*)	States	In progress
	e) Behaviour trials between systems capable of processing the NEW flight plan.	(*)	States	In progress
	f) Development of contingency procedures and determination of technical/operational considerations for the transition.	(*)	States	In progress
	g) Identification of the main parties involved in FP data flow and the definition of the transition steps based on: - Systems capable of processing both formats: current and NEW. - Systems to be modernised / implemented before 2012 and that will be capable of processing the new format of the filed flight plan.	(*)	States	In progress
	h) Publication of transition actions, trials and other publications for users and interested parties	(*)	GREPECAS	In progress
	i) Assess transition actions and make adjustments.	(*)	States	In progress
	j) Implement the transition plan.	(*)	States	In progress
	k) Monitor transition activities.	(*)	ICAO	In progress
Relation-ship with GPIs	GPI/4: alignment of upper airspace classifications; GPI/1: flexible use of airspace; GPI/6 air traffic flow management; GPI/7: dynamic and flexible ATS route management; GPI/9: situational awareness; GPI/13: aerodrome management and design; GPI/14: runway operations; GPI/16: decision support and alerting systems; GPI/17: implementation of Data link applications; GPI/18: aeronautical information; GPI/19: meteorological systems; GPI/21: navigation systems; GPI/22: communication infrastructure			

NOTE: This PFF is based on the format presented to the CNS/ATM/SG/1 in March 2010. This Subgroup is responsible for the development of tasks.

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 06 ATFM IMPLEMENTATION	
Benefits	
Enviromental protection and sustainable development of air transport	• Less delays caused by meteorological and traffic conditions, leading to a reduced consumption of fuel and emission of pollutants; • Improved and more fluid traffic flows; • Improved prediction; • Improved management of the demand that exceeds service in ATC sectors and aerodromes; • Operational efficiency; • Incresed airport capacity; • Improved airspace capacity;
Metrics	• Number of flights delayed due to measures implemented by ATC

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
DCB **AO** **AOM** **CM**	a) Assess the progress made in the ATFM implementation work programme	2012	States	Valid
	b) Develop a regional method for establishing demand/capacity forecasts	(*) - 2013	States	In progress
	c) Develop and implement regional procedures for an efficient and optimum use of aerodrome and runway capacity;	(*) - 2014	States	In progress
	d) Develop and implement methods for improving efficiency, as required, through airspace management (AOM), CNS systems, ATS coordination.	(*) - 2015	States	In progress
	e) Develop a strategy and frame of reference for the implementation of the centralised ATFM unit;	(*) - 2015	States	In progress
	f) Implement the centralised ATFM unit;	2015 – 2018+	States	Valid
	g) Develop and implement operational procedures between Centralised ATFM units for inter-regional demand/capacity balancing;	2015 – 2018+	States	Valid
	h) Monitor progress during implementation.	(*) – 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace; GPI/6: air traffic flow management; GPI/7: dynamic and flexible management of ATS routes; GPI/9: situational awareness; GPI/13 aerodrome design and management; GPI/14: runway operations; and GPI/16: decision support and alerting systems.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 07 IMPROVE ATM SITUATIONAL AWARENESS	
Benefits	
Safety	• Reduces number of CFIT accidents • Enhances safety.
Enviromental protection and sustainable development of air transport	• Improved air traffic demand • Contributes to collaboration between the flight crew and the ATM system • Contributes to collaborative decision-making (CDM) through the sharing of aeronautical data • Reduced workload for pilots and controllers • Increases airspace capacity • Availability of electronic terrain and obstacle data in the cockpit • Contributes to operational efficiency
Metrics	• Number of interconnected ATC automated systems • Number of ACCs with AIDC • Number of ACCs with CPDLC tools

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
ATM-SDM AO	a) Develop a guide and an action plan for improving situational awareness of pilots and controllers.	(*) - 2012	Regional Project	In progress
	b) Implement flight plan data processing systems (new FPL format) and data communication tools between ACCs.	(*) – 2014	States	In progress
	c) Implement ATS surveillance technologies and their applications as required.	2012 – 2018+	States	Valid
	d) Implement air-ground communication systems through Data link.	(*) – 2018+	States	In progress
	e) Implement advanced automation support tools to contribute to aeronautical information sharing.	2015 – 2018+	States	Valid
	f) Monitor the implementation	(*) – 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace; GPI/6: air traffic flow management; and GPI/7: dynamic and flexible ATS route management; GPI/9: situational awareness; GPI/13: aerodrome design and management; GPI/14: runway operations; y GPI/16: decision support and alerting systems; GPI/17: implementation of Data link applications; GPI/18: aeronautical information; GPI/19: meteorological systems, GPI/22: communication infrastructure.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 08 IMPROVEMENTS TO THE AERONAUTICAL FIXED SERVICE IN THE SAM REGION	
Benefits	
Safety	• Reduction of operational coordination errors between adjacent ACCs. • Increased ATM situational awareness. • Reduced pilot and controller workload.
Environmental protection and sustainable development of air transport	• Increased capacity and availability of aeronautical fixed service in support of ATS, MET, AIS and SAR applications. • Support to ATFM / CDM.
Metrics	• Number of States interconnected to the AMHS. • Number of States that have operationally implemented AIDC. • Percentage of phases implemented for improving the regional ATN network.

2012 – 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM ATM-SDM DCB CM AUO	a) Complete the implementation of AMHS systems in those States that do not have such systems yet.	(*) - 2013	States	In progress
	b) Agreement for AMHS interconnection through the establisment of MoUs	(*) - 2014	States	In progress
	c) Implement communication services for the centralised ATFM	2015 - 2018+	States	Valid
	d) Implement AIDC in the automated centres of the SAM Region;	(*) - 2013	States	In progress
	e) The operational implementation of AIDC for the automatic hand-off of flight plans between ACCs of adjacent States.	(*) - 2014	States	In progress
	f) Improve the regional ATN network	2012 -2015	States	Valid
	g) Monitor implementation progress	2012-2017	GREPECAS	Valid
Relation-ship with GPIs	GPI/6: ATFM, GPI/9: situational awareness, GPI/ 16: decision support and alerting systems, GPI/18: aeronautical information, GPI/17: data link applications, GPI/19: meteorological systems, GPI/22: communication infrastructure.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 09 IMPROVEMENTS TO THE AERONAUTICAL MOBILE SERVICES IN THE SAM REGION	
Benefits	
Safety	• Reduction of operational coordination errors between adjacent ACCs, making ATS coordination more efficient. • Reduction of pilot and controller workload;
Environmental protection and sustainable development of air transport	• Assured coverage and quality of communications in ATS service; • Increased availability of communications for the ATS service; • Support to AIM/MET service; • Assured radio frequency spectrum assigned to aviation for the communication service;
Metrics	• Percentage of compliance with FASID Table 2-A. • Number of CPDLC systems implemented. • Number of D-ATIS systems implemented.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **ATM-SDM** **DCB** **CM**	a) Complete the implementation of the services required in Table CNS 2-A "Aeronautical Mobile Service - AMSS"	(*) - 2014	States	In progress
	b) Continental en-route: Complete coverage of VHF communications in the lower airspace, when operations so require.	2012- 2015	States	Valid
	c) Oceanic en-route: Maintain the HF service according to the requirements of Table CNS 2B HF network designators for CAR/SAM aeronautical stations.	2012-2017	States	Valid
	d) Implement CPDLC in oceanic areas.	(*) - 2018	States	In progress
	e) Implement CPDLC in selected continental areas.	2012- 2018	States	Valid
	f) Terminal area: Implementation of different VHF channels for control tower and APP services at all aerports where a single channel is used for APP and control tower services.	(*) - 2015	States	In progress
	g) Implementation of D-ATIS services.	2012-2017	States	Valid
	h) Protection of the radio frequency spectrum used for current and foreseen communication services	2012-2018	States ICAO	Valid
	i) Monitor implementation progress	2012-2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/6: ATFM, GPI/9: Situational awareness, GPI/17: Data link applications, GPI/19: Meteorological systems, GPI/22: Communication infrastructure, GPI 23: Aeronautical radio spectrum.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 10 IMPROVEMENTS TO NAVIGATION SYSTEMS IN THE SAM REGION				
Benefits				
Safety	• Support to aircraft spacing; • Reduced pilot and controller workload; • Increased landing safety, avoiding CFIT			
Environmental protection and sustainable development of air transport	• Increased airspace capacity and structure; • Assurance of the radio frequency spectrum assigned to aviation for the air navigation service; • Increased integrity of the GNSS system • Support to PBN implementation.			
Metrics	• Number of deactivated NDBs • Number of deactivated VORs. • Number of GLS implemented. • Percentage of VOR/DME systems coverage in support of PBN applications			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM **ATM-SDM** **TS** **AUO**	a) Complete NDB phase-out.	2012- 2018+	States	Valid
	b) Maintain VOR/DME infrastructure in selected TMA.	2012-2018+	States	Valid
	c) Begin deactivation of VOR systems for en-route operations.	2015-2018	States	Valid
	d) Maintain ILS infrastructure.	2012- 2018	States	Valid
	e) Implement GLS (GBAS landing) at airports with sufficient operational demand.	2015-2018+	States	Valid
	f) Modernise flight trial platforms for GNSS applications.	2012-2017	States	Valid
	g) Protection of the radio frequency spectrum used for current and future radio navigation services	2012-2018	States ICAO	Valid
	h) Implementation of new VOR/DME systems in support of PBN	(*) - 2013	States ICAO	Valid
	i) Monitor implementation progress	2012-2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/5: RNAV and RNP; GPI/6: ATFM; GPI/7: dynamic and flexible ATS route management; GPI/10: terminal area design and management; GPI/11: RNP and RNAV SIDs and STARs; GPI/12: functional integration of ground and airborne systems; GPI/13: aerodrome design and management; GPI/14: runway operations; GPI/21: navigation systems; GPI 23: aeronautical radio spectrum.			

REGIONAL PERFORMANCE OBJECTIVE: SAM 11 IMPROVEMENTS TO THE ATS SURVEILLANCE SERVICE IN THE SAM REGION	
Benefits	
Safety	• Increased ATM situational awareness; • Improved ATS coordination, reducing coordination errors between adjacent ACCs; • Reduction of pilot and controller workload;
Environmental protection and sustainable development of air transport	• Facilitates ATS planning; • Increased airspace capacity; • Assurance of the radio frequency spectrum assigned to aviation for the air surveillance service; • Supports the implementation of PBN and random routes.
Metrics	• Number of ADS-C systems implemented in oceanic FIRs. • Number of adjacent ACCs with exchange of ATS surveillance data. • Percentage of enoure airspace for upper levels with ADS-B coverage. • Number of A-SMGS systems implemented.

2012 – 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AO** **TS** **CM** **ATM-SDM**	a) implement ADS-B and/or MLAT systems in terminal areas and en-route.	2012-2018	States	Valid
	b) Implement surface movement guidance and control systems (A-SMGCS) at airports with high complexity and traffic.	2013- 2018+	States	Valid
	c) Implement the ADS-C service in all States with responsibility over an oceanic FIR.	(*) - 2018	States	In progress
	d) Implement the exchange of ATS surveillance data between adjacent ACCs.	(*)- 2018+	States	In progress
	e) Protection of the radio frequency spectrum used for current and future radio navigation services	2012 - 2018	States ICAO	Valid
	f) Monitor implementation progress	2012-2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/5: RNAV and RNP; GPI/6: ATFM; GPI/9: situational awareness; GPI/10: terminal area design and management; GPI/11: RNP and RNAV SIDs and STARs with; GPI/12: functional integration of ground and on-board systems; GPI/13: aerodrome design and management; GPI/14: runway operations; GPI/17: data link applications, GPI/22: communication infrastructure, GPI 23: aeronautical radio spectrum.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 12 IMPLEMENTATION OF THE MET SERVICE QUALITY MANAGEMENT SYSTEM				
Benefits				
Safety	• Ensure the quality of meteorological data and products provided to all the users of the ATM community • Improve the trust of the user with respect to meteorological data used for flight planning and re-planning.			
Metrics	• Number of States with implemented MET-QMS.			
2012 – 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM, AO AUO ATMSDM DCB	a) Validate the MET-QMS guide	(*) - 2012	States	In progress
	b) Establish a programme for the implementation of a quality management system for aeronautical meteorological services (MET-AMS)	2012-2013	Regional Project States	Valid
	c) Execute the programme for the implementation of a quality management system.	2012-2013	Regional Project States	Valid
	d) Develop the LAR-MET	2012-2015	Regional Project States	Valid
	e) Certification of the MET/QMS quality management system by an approved organisation.	2013-2015	States	Valid
	f) Monitor the process of implementation of the quality management system of aeronautical meteorological services.	2012-2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/18: Aeronautical information and GPI/19: Meteorological systems.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 13 IMPROVEMENTS IN MET FACILITIES				
Benefits				
Safety	• Provide more reliable products to all the ATM community. • Assistance in decision-making for the planning of new air routes. • Assurance of timely access by user to meteorological data and products • Contribute to situational awareness of aeronautical users for all weather operations (AWO).			
Metrics	• Number of aerodromes with operative AWOS. • Number of MWOs with the required equipment and systems. • Number of States with revised and updated weather tables.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM **DCB** **AO** **AUO** **ATM-SDM** **CM**	a) Establish a regional plan for the automation of meteorological data at all aerodromes of the AOP Table. b) Establish a regional plan to strengthen Meteorological Watch Offices (MWOs) with the infrastructure required for an effective surveillance in the FIRs.	2012	States	Valid
	c) Implement regional plans for the automation of MET data and strengtheninig of MWOs	2012-2013	States	Valid
	d) Establish programmes for periodic inspection and calibration of meteorological instruments and EMA(s)	2012-2014	States	Valid
	e) Develop a programme for reviewing and updating aerodrome meteorological tables.	2012	States	Valid
	f) Implement the programme for revising and updating aerodrome meteorological tables.	2012-2013	States	Valid
	g) Monitor implementation programmes	2013-2017	GREPECAS States	Valid
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/14: Runway operations, GPI/18: Aeronautical information and GPI/19: Meteorological systems.			

REGIONAL PERFORMANCE OBJECTIVE: SAM 14
IMPROVEMENTS IN THE IMPLEMENTATION OF INTERNATIONAL AIRWAYS VOLCANO WATCH (IAVW), SURVILLANCE OF THE ACCIDENTAL RELEASE OF RADIOACTIVE MATERIAL AND THE ISSUANCE OF SIGMETs

Benefits	
Safety	• Increased flight safety due to the supply of information on volcanic ash and severe phenomena that may affect flight safety.
Enviromental protection and sustainable	• Contributes to pre-flight planning, optimising air routes with respect to volcanic ash and the accidental release of radioactive material. • Contributes to the planning of new air routes in a safe and sustainable manner.
Metrics	• Number of States with IAVW and their implemented evolutions. • Regional contingency plan for volcanic ash and accidental release of radioactive material, developed.

2012 – 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AO** **AUO** **ATMSDM** **DCB** **CM**	a) Develop a plan for the implementation of improvements in the international airways volcano watch and the accidental release radioactive material into the atmosphere.	2012	Regional Project	Valid
	b) Develop a guide for IAVW implementation in the Region, based on ICAO Document 9766.	(*) - 2013	RO LIMA/States	In progress
	c) Update the letters of agreement between CAAs/MET/State vulcanologic bodies, describing the responsibilities of each institution in case of volcanic activity and accidental release of radioactive material.	2012-2013	Estado	Valid
	d) Where applicable, develop written agreements with national meteorological services (NMS) in case of accidental release of radioactive material.	2012-2014	States	Valid
	e) Update the letters of operational agreement between ATS/MET units, and sign agreements with AIS and AGA (include the cases of volcanic ash deposition and accidental release of radioactive material in aerodrome emergency plans)	2012-2013	States	Valid
	f) Implement the VONA form for the transfer of information on volcanic or precursor activity by vulcanologic bodies.	2012-2013	States	Valid
	g) Review and update the national emergency plan for cases of volcanic activity and accidental release of radioactive material.	2012-2013	States	Valid

	h) Develop a regional contingency plan for cases of volcanic activity and/or accidental release of radioactive material.	2012-2013	Regional Project	Valid
	i) Update the procedures in MWOs and VAACs according to the evolution of IAVW.	2013-2017	States	Valid
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/14: Runway operations, GPI/16: Decision support and alerting systems, GPI/18: Aeronautical information and GPI/19: Meteorological systems.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 15 IMPROVEMENTS IN OPMET DATA EXCHANGE AND FOLLOW-UP OF WAFS EVOLUTION				
Benefits				
Safety	• Timely provision of duly coded OPMET data to the ATM community • Increased regional use of meteorological forecasts (upper wind, turbulence, icing, convective clouds).			
Environmental protection and development of air transport	• Increased efficiency of operations and reduced carbon emissions			
Metrics	• Increased availability of OPMET data (in percentage) of the States at regional and international level. • Number of States that have implemented WAFS and its evolutions.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM **DCB** **AO** **AUO** **ATMSDM** **CM**	a) Establish a regional procedure to ensure timely availability of duly coded OPMET meteorological data	(*) -2018	States / Brasilia OPMET database	In progress
	b) Develop contingency procedures for the dissemination of OPMET data through the Internet in case of communication system failure.	2012 - 2013	States	Valid
	c) Implement the new turbulence, icing, WINTEM and convective cloud forecasts	(*) - 2013	States	In progress
	d) Develop a transition plan for OPMET data coding in XML code	2013-2014	Regional Project	Valid
	e) Implement a plan for the transition of OPMET data to the XML format	2014-2018	States	Valid
	f) Establish plans for the migration to ISCS G3 and implementation of WIFS.	(*) - 2014	States	In progress
	g) Develop, together with COM units, a migration plan that permits WAFS products to be compatible with the future NextGEN/SESAR environment.	2013-2018+	Regional Project	Valid
	h) Develop and implement regional procedures in support of ATM.	(*) - 2018+	ICAO States	In progress
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/14: Runway operations, GPI/18: Aeronautical information and GPI/19: Meteorological systems.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 16 COOPERATION AND COORDINATION OF SAR SERVICES AT REGIONAL LEVEL				
Benefits				
Safety	• Favours the application of practical risk management principles			
Environmental protection and development of air transport	• Ensure cooperation and coordination amongst the interested parties			
Metrics	• Number of letters of agreement established for SAR • Number of SAR exercises conducted			
2012 - 2018 Strategy				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
N/A	a) Assess SAR requirements at regional level	2011	ICAO-States	Valid
	b) Adopt SAR requirements at regional level	2012 - 2014	States	Valid
	c) Comply with risk and quality management practical principles	(*) - 2017	States	In progress
	d) Develop, update, establish and ratify SAR agreements between States	(*) - 2017	States	In progress
	e) Harmonise SAR training plans	(*) - 2013	CATC	In progress
	f) Conduct annual SAR exercises at regional level	(*) - 2015	States	In progress
	g) Monitor implementation progress	2012 - 2018	GREPECAS	Valid
Relation-ship with GPIs	Not applicable			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 17 QUALITY, INTEGRITY AND AVAILABILITY OF ELECTRONIC AERONAUTICAL INFORMATION	
Benefits	
Safety	• Assures data integrity and resolution • Favours information traceability
Environmental protection and development of air transport	• Assures timely awareness of significant changes in information
Metrics	• Number of States that meet the AIRAC calendar • Number of States that have implemented QMS

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AO** **DCB** **AUO**	a) Assess the status of implementation and update of the AIM Action Plan	2012	Regional Project	Valid
	b) Effective compliance with the AIRAC system	(*) - 2013	States	In progress
	c) Establish a quality management system (QMS)	(*) - 2017	States	In progress
	d) Complete the use of WGS-84, taking into account the new data products	(*) - 2017	States	In progress
	e) Develop guidelines on service level agreements (SLAs) between data originators and AIM	2012 - 2013	Regional Project	Valid
	f) Establish agreements with data originators (SLAs)	2013 - 2015	States	Valid
	g) Monitor the implementation of the AIM Action Plan	2012 - 2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/16: Decision support and alerting systems, GPI/18: Aeronautical information, GPI/20: WGS-84, GPI/21: Navigation systems.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 18 TRANSITION TO THE PROVISION OF ELECTRONIC AERONAUTICAL INFORMATION				
Benefits				
Safety	• Support to ground proximity warning systems (GPWS) and procedure design and optimisation tools.			
Environmental protection and development of air transport	• Integration of dynamic and static information into a single display to facilitate situational awareness. • Access to information during all flight phases.			
Metrics	• Number of States that have implemented the transition plan			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM **AO** **CM** **DCB** **TS** **AUO** **ATM-SDM**	a) Prepare a transition plan for the provision of electronic aeronautical information	2012	Regional Project	Valid
	b) Implement the transition plan for the provision of electronic aeronautical information	2013 - 2018+	States	Valid
	c) Develop and establish a programme to facilitate AIS - MET interoperability	2016 - 2018+	Regional Project	Valid
	d) Monitor the implementation of the transition plan for the provision of electronic aeronautical information	2012 - 2018+	GREPECAS	Valid
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/16: Decision support and alerting systems, GPI/18: Aeronautical information, GPI/19: Meteorological systems, GPI/20: WGS-84.			

REGIONAL PERFORMANCE OBJECTIVE: SAM 19 AERODROME DATA QUALITY REQUIREMENTS				
Benefits				
Safety	• Less aircraft accidents at the aerodrome; • Improved aircraft safety at the aerodrome;			
Environmental protection and development of air transport	• Efficient aerodrome operations based on aerodrome data quality assurance.			
Metrics	• Number of deficiencies related to non-compliance of the information contained in FASID Table AOP 1. Doc. 8733, Vol. II.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AO **CM** **AUO**	a) Develop a regional action plan to improve the quality of, and update, aerodrome information.	(*) - 2012	States/ICAO	In progress
	b) Update aerodrome obstacle data in the WGS-84 system.	(*) - 2012	States/ICAO	In progress
	c) Establish a letter of agreement with AIM for the provision of aerodrome data with the corresponding quality requirement.	(*) - 2012	States	In progress
	d) Monitor the implementation of the regional action plan for improving the quality of, and updating, aerodrome information.	(*) – 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/9: situational awareness, GPI/10: terminal area design and management, GPI/13: aerodrome design and management; GPI/14: runway operations, GPI/18: aeronautical information, GPI/20: WGS-84.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 20 AERODROME CERTIFICATION				
Benefits				
Safety	• Less aircraft accidents at the aerodrome;			
Environmental protection and development of air transport	• Efficient aerodrome operations based on compliance with the SARPs;			
Metrics	• Number of aerodromes with temporary certification; • Number of aerodromes with a validated certification.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AO **CM** **AUO** **DCB**	**PHASE I – Temporary certification** a) Develop a regional strategic plan for aerodrome certification.	(*) -2012	Regional Project	In progress
	b) Implement the regional strategic plan for aerodrome certification.	2012 – 2013	States	Valid
	c) Grant temporary certificates to aerodromes that meet the SARPs	2014 - 2015	States	Valid
	d) Establish a process of internal audits at aerodromes and SMS assurance.	2015 - 2018+	States	Valid
	PHASE II – Certification validation e) Develop the rules, procedures and documentation of the Latin American Aeronautical Regulations ofr Aerodromes (LAR-AGA).	(*) - 2013	Regional Project.	In progress
	f) Implement the LAR-AGA in the States of the Region.	2014 - 2015	States	Valid
	g) Validation of aerodrome certificates	2015 – 2018+	States	Valid
	h) Monitor the certification process.	2013 – 2018+	GREPECAS	Valid
Relation-ship with GPIs	GPI/9: situational awareness, GPI/10: terminal area design and management, GPI/13: aerodrome design and management. GPI/14: Runway operations.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 21 SAFE OPERATIONS AT AERODROMES THAT DO NOT MEET ICAO SARPS (CERTIFICATION WITH LIMITATIONS)	
Benefits	
Safety	• Disponer del SMS para aeródromos no certificables; • Reduce los accidentes de aeronaves en el aeródromo.
Environmental protection and development of air transport	• Operaciones de aeródromo eficientes.
Metrics	• Number of aerodromes certified with limitations.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AO **CM** **AUO**	a) Identify the regional airports with physical characteristics that do not comply with ICAO SARPs.	(*) – 2012	Regional Project	In progress
	b) Develop guidance for certification with limitations.	(*) - 2013	Regional Project	In progress
	c) Apply the guidance for the certification with limitations.	2013 - 2018	States	Valid
	d) Monitor the implementation of the process.	2012 - 2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/9: situational awareness, GPI/13: aerodrome design and management. GPI/14: runway operations, GPI/9: situational awareness, GPI/13: aerodrome design and management. GPI/14: runway operations.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 22 OPTIMISATION OF AERODROME CAPACITY				
Benefits				
Safety	• Increases safe aircraft operations.			
Environmental protection and development of air transport	• Guides and operational criteria that increase capacity with efficiency; • Traffic fluidity in the movement areas.			
Metrics	• Number of aerodromes in which capacity has been optimised.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AO **CM** **AUO**	a) Assess the aerodromes whose runway and apron installed capacity is near saturation.	(*) - 2012	Regional Project	In progress
	b) Develop guidance that includes procedures to optimise aerodrome runway and apron capacity	(*)-2013	Regional Project	In progress
	c) Apply procedures for optimising aerodrome runway and apron capacity	2013-2018	States	Valid
	d) Establish letters of agreement according to requirements	2013-2018	States	Valid
	e) Monitor the optimisation of runway and apron capacity	(*)-2018	GREPECAS	In progress
Relation-ship with GPIs	GPI/9: situational awareness; GPI/13: aerodrome design and management; GPI/14: Runway operations.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 23 PREVENTION OF RUNWAY EXCURSIONS				
Benefits				
Safety	• Reduces runway excursions • Improves aircraft safety on the runway;			
Environmental protection and development of air transport	• Efficient aerodrome operations			
Metrics	• Number of aerodromes with action plans for runway excursion risk management • Number of runway excursions per year			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AO **CM** **AUO**	a) Develop a regional action plan for the identification of runway surface safety requirements.	(*) - 2012	Regional Project	In progress
	b) Assist States in the implementation of procedures for coordination among users, providers and authorities in relation to excursion prevention.	(*) - 2012	States	In progress
	c) Monitor the implementation of the regional action plan.	(*) – 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/9: situational awareness, GPI/13: aerodrome design and management. GPI/14: Runway operations, GPI/18: Aeronautical information, GPI/20: WGS-84.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 24 MANAGEMENT OF NAVIGATION SERVICE PERSONNEL COMPETENCE				
Benefits				
Safety	• Reinforces safety			
Environmental protection and development of air transport	• Information available with a level of quality that is appropriate to the requirements. • Personnel duly trained as instructors in the ATM operational concept. • Personnel duly trained for managing the ATM operational concept. • Increases situational awareness of the personnel. • Provides for quality air navigation services.			
Metrics	• Number of air navigation service personnel trained in the ATM Operational Concept. • Number of CATCs that participate in the training programme.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM, AO AUO DCB ATM-SDM CM TS	a) Develop the training programme for air navigation service personnel to respond to the new challenges, taking into account ICAO documentation.	2012-2013	Regional Project	Valid
	b) Follow up the activities of the New Generation of Aviation Professionals (NGAP) Special Team and implement the results	2012 - 2016	States	Valid
	c) Prepare a programme for instructors on training, planning and the ATM Operational Concept.	2013-2014	Regional Project	Valid
	d) Prepare guides for training, planning and the ATM Operational Concept.	2013-2014	Regional Project	Valid
	e) Strengthen Civil Aviation Training Centres (CATCs) of the Region.	2012 – 2014	States	Valid
	f) Implement courses on training, planning and the ATM Operational Concept	2013-2016	States	Valid
	g) Monitor the training and updating of air navigation personnel	2016-2018+	GREPECAS States	Valid
Relation-ship with GPIs	*The updating and training of aeronautical personnel is a cross-cutting issue for all ATM system areas.*			

REGIONAL PERFORMANCE OBJECTIVE: SAM 25 SAFETY				
Benefits				
Safety	• Strengthens safety			
Metrics	• Number of States that have implemented SSPs • Number of international airports that have implemented SMS • Number of ATS services that have implemented SMS.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM AUO	a) Follow up of the RASG-PA work programme, as a refernce for the activities of the region.	(*) – 2018+	States	In progress
	b) Prepare guidelines for the implementation of SMS in ATS services and international aerodromes.	(*) - 2012	Regional Project	In progress
	c) Assist in the implementation of State safety programmes (SSPs).	2012	Oficina Regional	Valid
	d) Develop regional safety databases	2012 - 2013	Regional Project	Valid
	e) Formulate guidelines for the protection of safety data	2012 - 2014	Regional Project	Valid
	f) Effective implementation of SMS in ATS and international airports.	(*) - 2014	States	In progress
	g) Develop and implement a training plan concerning the development and application of a safety case	(*) - 2012	States	In progress
	h) Continuous monitoring and periodical assessment of safety efficacy and SMS and SSP implementation	2012 - 2018	GREPECAS	Valid
Relation-ship with GPIs	The systemic safety approach is holistic, applied to the whole ATM system.			

(*) Indicates that the task has been started before the date contemplated in this planning.

MATRIX OF INTER-RELATIONSHIP BETWEEN PFFs (*)

		ATM	**CNS**			**MET**	**AGA/AOP**	
		PFF06	PFF07	PFF09	PFF10	PFF13	PFF18	PFF22
ATM	PFF03			SAM03: c) SAM09: e)				
	PFF05		SAM05: e), f) SAM07: c)					
	PFF06			SAM06: d) SAM09: d),e)	SAM06:c) SAM10: a), c), d)			
AIS	PFF16					SAM13: e) SAM16: f)	SAM16:f) SAM18:c)	SAM16:f) SAM22:b)
	PFF17	SAM06:e) SAM17:b)						

(*) This matrix relates the PFFs of different specialties that have interconnected tasks (the task of each PFF is indicated in parenthesis), so that the planner may know that, when fulfilling the tasks of a given PFF, they must be coordinated with another area in order to harmonise the implementation of the final service.

For example:
ATM: SAM 05: e), f)→ Indicates the development of a strategy and frame of reference for the implementation of an Centralised ATFM unit and its implementation
CNS: SAM 07: c) → Indicates that, in its planning, the CNS area must implement communication services for the centralised ATFM.

The final objective of these tasks is the implementation of the Centralised ATFM unit.

ATTACHMENT E

GLOSSARY OF ACRONYMS

ABAS	Aircraft-based augmentation system
ACC	Area control centre
ADS	Automatic dependence surveillance
ADS-B	ADS-broadcast
ADS-C	ADS-contract
AFTN	Aeronautical fixed telecommunication network
AGA	Aerodromes and ground aids
AIDC	ATS interfacility data communication
AIM	Aeronautical information management
AIRAC	Aeronautical information regulation and control
AIS	Aeronautical information service
AIXM	Aeronautical information exchange model
AMHS	ATS message handling system
ANP	Regional air navigation plan
ANS	Air navigation services
ANSP	Air navigation service provider
AO	Aerodrome operations
AOM	Airspace organisation and management
AOP	Aerodrome operations
APP	Approach control office or service
A-SMGCS	Advanced surface movement guidance and control system
ATC	Air traffic control
ATFM	Air traffic flow management
ATM	Air traffic management
ATMCP	Air traffic management operational concept panel
ATM SDM	ATM service delivery management
ATN	Aeronautical telecommunication network
ATS	Air traffic services
AUO	Airspace user operations
AWOS	Automated Weather Observing Systems
CAR / SAM	Caribbean and South American Regions
CDO	Continuous descent operations
CFIT	Controlled flight into terrain
CATC	Civil aviation training centre
CM	Conflict management
CNS	Communications, navigation and surveillance
CNS/ATM	Communications, navigation and surveillance/air traffic management
CO2	Carbon dioxide
CPDLC	Controller-pilot Data link communications

D-ATIS	Data link-automatic terminal information service
DCB	Demand/capacity balancing
DME	UHF distance-measuring equipment
eAIP	Aeronautical information publication
eTOD	Terrain and obstacle database
FANS	Future air navigation systems
FASID	Regional plan facilities and services implementation document (Document 8733)
FIR	Flight information region
FL	Flight level
FMS	Flight management system
FUA	Flexible use of airspace
GIS	Geographical information system
GLS	GPS-based *landing* system
GML	Geography markup language
GNSS	Global navigation satellite system
GPI	Global Plan initiatives
GPS	Global positioning system
GPWS	Ground proximity warning system
GREPECAS	CAR/SAM regional planning and implementation group
HF	High frequencies
HFDL	HF Data link
IAVW	International Airways Volcano Watch
IFR	Instrument flight rules
ILS	Instrument landing system
IMC	Instrument meteorological conditions
ISO	International Standards Organisation
IVATF	International Volcanic Ash Task Force
KPI	Key performance indicators
LAR	Latin American aeronautical regulations
MET	Meteorological services for air navigation
METAR	Aviation routine weather report, which provides the meteorological conditions prevailing at an aerodrome.
METWSG	Meteorological Warnings Study Group
MLAT	Multilateration – Surveillance system
MSAW	Minimum safe altitude warning
MWO	Meteorological Watch Office
NDB	Non-directional radio beacon
NGAP	New generation of aviation professionals
NM	Nautical miles
NPA	Non-precision approach
NOTAM	Notice to personnel concerned with flight operations
ICAO	International Civil Aviation Organization
OLDI	Direct data interchange

OMA	Automatic weather office
WMO	World Meteorological Organization
OPMET	Operational meteorological information
PDC	Predeparture clearance
PFF	Performance Framework Form
PIRG	Planning and implementation regional group
PSR	Primary surveillance radar
QMS	Quality management system
RASG-PA	Regional aviation safety group - Pan-American
REDDIG	South American digital communication network
RNAV	Area navigation
RNP	Required navigation performance
RVR	Runway visual range
RVSM	Reduced vertical separation minimum
SADIS	Satellite distribution system for information relating to air navigation
SAM	South American Region
SARPS	Standards and recommended practices
SID	Standard instrument departure
SIGMET	Significant weather
SLA	Service level agreement
AMSS	Aeronautical mobile-satellite service
SMGCS	Surface movement guidance and control system
SPECI	Special aviation weather report
SSR	Secondary surveillance radar
STAR	Standard instrument arrival
TMA	Terminal control area
TRA	Temporary reservation of airspace
TS	Traffic synchronisation
TWR	Aerodrome control tower or aerodrome control
VDL	VHF digital Relation-ship
VFR	Visual flight rules
VHF	Very high frequency
VOLMET	Meteorological information for aircraft in flight
VOR	VHF omnidirectional radio range
WAFS	World area forescast system
WATRS	Western Atlantic route system
WGS-84	World geodetic system — 1984
XML	Extensible markup language

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