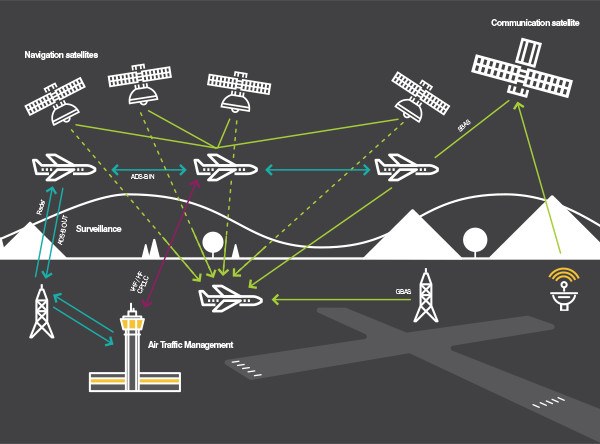
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| REGIONAL INSTITUTIONAL FRAMEWORK FOR THE DEPLOYMENT OF INTER-OPERABLE CNS/ATM SYSTEMS IN THE EASTERN AFRICA, SOUTHERN AFRICA, AND INDIAN OCEAN REGION CS/PROC/EU /SC.01 | Draft Final Report  2022/10/29 |

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Acronyms

|  |  |
| --- | --- |
| ABAS | Air Based Augmentation System |
| ACAS | Airborne Collision Avoidance System |
| ADF | Automatic direction finder |
| AFCAC | African Civil Aviation Commission |
| AFI | ICAO Africa and Indian Ocean Region |
| AIP | Aeronautical Information Publication |
| AMET | Advanced Meteorological Information |
| ANSP | Air Navigation Service Provider |
| ASBU | Aviation System Block Upgrade |
| ASEP | Airborne Separation |
| ASM | Air Space Management |
| ASUR | Alternative Surveillance |
| ATM | Air Traffic Management |
| BASA | Bilateral Air Service Agreement |
| CAA | Civil Aviation Authority |
| CAPEX | Capital Expenditures |
| CCO | Continuous Climb Operations |
| CDO | Continuous Decent Operations |
| CNS | Communications / Navigation / Surveillance |
| COMESA | COMESA |
| DAIM | Digital ATM |
| EA-SA-IO | Eastern Africa, Southern Africa, and Indian Ocean |
| EUR | ICAO AFI Region |
| FFICE | Flight and Flow Information for a Collaborative Environment |
| FIR | Flight Information Region |
| FL | Flight Level |
| FRTO | Free Route Operations |
| GAGAN | GPS Aided GEO Augmented Navigation |
| GANP | Global Air Navigation Plan |
| GBAS | Ground Based Augmentation System |
| IATA | International Air Transport Association |
| ILS | Instrument Landing System |
| ICAO | International Civil Aviation Organization |
| JPAP | Joint Prioritized Action Plan |
| LOA | Letter of Agreement |
| LOC | Locator |
| LOP | Letter of Procedures |
| LPV | Localiser Performance with Vertical Guidance Approach |
| NOPS | Network Operations |
| OPEX | Operational Expenditures |
| OPFL | Optimum Flight Levels |
| PBN | Performance Based Navigation |
| PIRG | Planning and Implementation Regional Group |
| REC | Regional Economic Communities |
| RPAS | Remotely Piloted Aircraft Systems |
| SAATM | Single Africa Air Transport Market |
| SARP’s | Standard and Recommended Practices |
| SBAS | Satellite Based Augmentation System |
| SATSD | Support to Air Transport Sector Development |
| SeMS | Security Management System |
| SeST | State Security Program |
| SMS | Safety Management System |
| SNET | Ground-Based Safety Nets |
| SSP | State Safety Program |
| SWIM | System-wide information management |
| TBO | Trajectory-Based Operations |
| ToR | Terms Of Reference |

Definitions and Terminologies

|  |  |
| --- | --- |
| Airspace capacity | Airspace capacity is determined by the combined capabilities of the communications, navigation, surveillance, and air traffic management systems (CNS/ATM) in place. These include ground-and aircraft-based systems and requirements vary according to the airspace being considered. |
| Interoperability | Within the ATM system, is the ability to transfer information or to effect a functionality across any discontinuity (perceived or otherwise), in order to enable operations, thereby eliminating the effect of the discontinuity. |
| Performance Based Navigation (PBN) | Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure, or in a designated airspace. |
| Reliability | The probability of performing a specified function without failure under given conditions for a specified time. |
| RNAV specification | A navigation specification based on area navigation that does not include the requirement for on-board performance monitoring and alerting, designated by the prefix RNAV, e.g., RNAV 5, RNAV 1. |
| RNP specification | A navigation specification based on area navigation that includes the requirement for on-board performance monitoring and alerting, designated by the prefix RNP, e.g., RNP 4, RNP APCH. |
| Performance requirements | Minimum requirements needed for the application to function properly under nominal (no fault) conditions, generally quantitative in nature. |
| Required Communication Performance | A set of requirements for air traffic services provision and associated ground equipment, aircraft capability, and operations needed to support performance-based communication |
| Required Navigation Performance | A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting |
| Required Surveillance Performance | A set of requirements for air traffic services provision and associated ground equipment, aircraft capability, and operations needed to support performance-based surveillance |
| “Principle Of Variable Geometry” | Principle of flexibility which allows for progression in co-operation among a sub-group of members in a larger integration scheme in a variety of areas and at different speeds. |

Executive Summary

Since 2004–2005, there have been significant changes in the global approach to ATM with the adoption of the ICAO Global Air Navigation Plan (GANP)[[1]](#footnote-2), development of the Aviation System Block Upgrade (ASBU) approach to CNS/ATM improvement and implementation, changes on the organisation and provision of Air Navigation Services and the establishment of State Safety Program (SSP) and formalised Safety Management System (SMS).

Bearing in mind the liberalization of the airspace and the expected growth of tourism and commercial business among the Member States it is expected air traffic’s increment, with substantial differences among the Member States in air traffic density, that needs to be accommodated in a seamless airspace with similar operational characteristics and requirements.

There are differences in current capabilities and foreseen needs among the Member States, “*one size doesn’t fit all*”, however, the interdependency of traffic flows in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region necessitates an integrated approach to avoid gaps in capabilities as traffic crosses state borders to ensure that “*No Country is Left Behind (NCLB)*”.

This study aims to develop a Regional Institutional Framework for the deployment of interoperable CNS/ ATM Systems towards achieving a Regional Seamless Upper Airspace in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO), this means a seamless provision of Air Navigation Services, a seamless Air Space Management and a Safety, Security and Quality Management aligned with the international standards and recommended practices.

Improving air navigation efficiency is found necessary to increase airspace capacity, but we have to keep in mind the increased access to airports, improve efficiency for both Aviation User’s and ANSP’s, and reduce environmental impacts while continuing to maintain, foster, and promote Safety is paramount.

Member States throughout their National Civil Aviation Authorities (CAA’s) and Air Navigation Service Providers (ANSP’s) entities must develop and implement National Air Navigation Plans aligned with the with Global Air Navigation Plan (GANP – ICAO Doc 9750) and with Regional Air Navigation Plans.

They may also develop strategic plans to address the growing needs and it is of the major importance that Member States consider on these strategic plans the upgrade(implementation of B0 and B1 ASBU blocks.

There are, however, substantial challenges in being able to effectively accommodate the aviation growth and expectations of its stakeholders.

This challenges and the specific objectives must be highlighted in the Regional Economic Communities (REC) goals for the next years and transition from today’s system include:

1. Improve airspace safety and efficiency;
2. Improve interoperability between CNS/ATM systems to foster Seamless Air Navigation Services across Member States;
   1. Infrastructure;
   2. Legal and Institutional Framework;
   3. Training Requirements;
   4. Safety Management System (SMS);
   5. Security Management System (SeMS);
   6. Quality Management System (QMS);
3. Increase airspace capacity to meet future demand requirements;
   1. Increase access to airports;
   2. Reduce environmental impact of increasing traffic;

The key elements of the interoperable CNS /ATM Study include:

1. Data collected from CAA’s and ANSPs and involved;
2. Provide an up-to-date picture of CNS/ATM developments;
3. Link ICAO Global Air Navigation Plan (GANP) and relevant ASBU with regional planning and individual Member States in the EA-SA-IO region current status, taking in consideration the ASBU framework implementation with a particular focus on B0 and B1 modules of Performance Improvement Area 2: Globally Interoperable Systems and Data through System Wide Information Management (SWIM);
4. Identify gaps in CNS/ATM in the region and set realistic objectives to support the deployment of interoperable CNS/ATM systems;
5. Formulate recommendations to enable REC’s to enhance its harmonization and planning for the region;
6. Implementation of the regional capacity and efficiency, and air navigation priorities defined in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region Air Navigation strategy;
7. Develop a regional organizational structure/ forum, policy, rules, procedures, and regulation for coordinated implementation of ICAO ASBU framework in Member States within the EA-SA-IO region in accordance with the AFI Air Navigation and Global Air Navigation Plans.

The project development will focus on the current situation diagnosis, mainly based in the literary review and stakeholders’ consulting

* CNS/ATM assessment
* Gap analysis and findings
* Recommendations
* Final report

**CNS/ATM assessment**

The consultant reviewed the available Aeronautical Information Publications (AIPs) applicable to the Member States in consultation with the Project Management Unit in COMESA to formulate survey questions to the stakeholders (CAA and ANSP).

The assessments addressed a comprehensive scope of Airspace, CNS infrastructure aspects and ATM procedures and capabilities while considering the needs and limitations of the Member States.

A major element to the assessment of the current operation was to gather and compare the ICAO and Regional Sub-Group requirements and guidelines as they express the core operational topics of CNS/ATM environment.

These requirements and guidelines were collected from GANP, CANSO Key Performance Indicators (KPIs), etc. The operational topics were further sub-divided, although not uniformly and across all operational topics, into sections that included categories:

1. General Regional Requirements
2. Specific Requirements
3. Current Provided Services
4. Current Capabilities
5. Quality of Services

Additionally, was assumed an effort to categorize the FIRs to support the concept of “*one size does not fit all*” and the ICAO Aviation System Block Upgrade (ASBU) methodology. FIRs were classified in groups of High, Medium, and Low traffic density if traffic statistics are available. Otherwise, if traffic statistics are not available, we will configure this groups accordingly to the “***Homogeneous Areas And Major Traffic Flows In The Afi Region***”.

**Gap analysis and findings**

Consultants decide to base the gap assessment on current capabilities and compare those to ICAO Block Update 0 and 1 capabilities and timeframes. The gap analysis can provide assessment to all phases of the study considering two essential factors safety and security.

With the data provided by Member States in the surveys, we can analyse the progress made towards reaching the objectives in the GANP ASBU plan in the Performance Improvement Areas 2 and 3:

* Globally Interoperable Systems and Data;
* Optimum Capacity and Flexible Flights

Gaps are presented by remarking the current status of Member States to meeting the targets in each of the Performance Improvement Areas and fields of:

* ANSP Interoperability;
* Airspace Policy/Procedures;
* Separation Standards;
* Route structure;
* Growth Planning;
* Civil-Military Liaison;
* Traffic Flow Management;
* Collaborative Decision Making;

Findings in current capabilities and services are primarily derived from the surveys and documents submitted by Member States. It was possible one direct observation as per a visit to the Arab Republic of Egypt and from the meetings with the ECAA - Egyptian Civil Aviation Authority e a NANSC – National Air Navigation Services Company it was possible to confirm the spin-off full interoperability of the Egyptian CNS/ATM system and of the Republic of Sudan CNS/ATM system. Another information was that Libya don’t has an automatic ATM system and the ATC operation is still procedural. Apart this visit was unable to conduct more direct observation of the ACC operations of other Member States and to have the responses to the surveys, the consultant trusted primarily on ICAO and EUROCONTROL documents, and limited amount of internal documentation provided.

Web searches for detailed air traffic control policies and procedures, as well as working practices, were attempted but granted little result.

The findings apply to all assessed Member States based on their existing and forecast traffic density and specify if the finding is either directly or indirectly linked to the Block Upgrade modules.

**Recommendations**

Mitigate the gaps identified are framed into four time periods:

Table 1 – ASBU Time Frame

|  |  |  |
| --- | --- | --- |
| **ASBU** | **Global Time Frame** | **Expected Time Frame** |
| Blocks 0 | 2018 | 2025 |
| Blocks 1 | 2023 | 2030 |
| Blocks 2 | 2028 | 2035 and forward |
| Blocks 3 | 2033 and forward |

The expected time frame is a recommendation based on document analyses and must be adjusted to the present evolution of each Member State CNS/ATM system and an economic evaluation of the capabilities of each Member State to implement changes.

Recommendations will be provided COMESA for their review, consideration, and comments. Member States involvement is necessary to express Regional and State recommendations that are particularly important to the deployment of a Seamless Upper Airspace.

Once the COMESA review period is completed, the consultant will aggregate and analyse the feedback to draw key recommendations. The key recommendations will inform COMESA of those areas where focused attention is required.

**Final report**

The objective of this report is to provide COMESA with an assessment of the current state of CNS/ATM systems and Air Navigation Services in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO).

Therefore, it is equally important to study each member state’s current institutional and regulatory framework. This evaluation was based on information available on public sites, complemented with data provided by the Member States.

However, several information was not provided, namely:

* LOP’s – Local Operating Procedure;
* LOA’s – Letters Of Agreement;
* MoU’s - Memorandums of Understanding;
* Training plans;
* Other material;

The consultant had to draw its own conclusions regarding ACC operations from the very limited amount of information contained in the survey provided to Member States.

1. Introduction

The main objective of this assignment is to develop a Regional Institutional Framework for the deployment of inter-operable CNS/ ATM Systems towards achieving a Regional Seamless Upper Airspace in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO).

Therefore, it is intended to establish a seamless upper airspace, above FL 245, within the Member States in the EA-SA-IO region, aligned with international standards and policies, ensuring a safe and continuous efficiency of the aviation system, based on the CNS/ATM current situation and its development, under the ASBU concept and evolution.

The conclusions of this project should be in line with the activities considered in the Pillar 4 (Aviation Infrastructure) of the 2020 version of the ***Joint Prioritized Action Plan*** for the ***Single Africa Air Transport Market (JPAP)***, that has the purpose of creating a ***Single African Sky Architecture***, which should include an AFI platform for ANSPs to consider ongoing initiatives in the development of a Seamless Airspace Architecture.

* 1. Purpose

The Single African Air Transport Market operationalization is expected to trigger an increase in air traffic within the region, which will demand an increasingly efficient Air Navigation Services (ANS) and a strong institutional and regulatory framework among Member States.

This report condenses the consulting work for the development of the interoperability of CNS/ ATM Systems will enhance data sharing among Member States and support the establishment of an upper seamless airspace in the region. The project was developed based on literary review which allow to obtain a current non-efficient situation diagnosis, which will support the main findings of the study and the main recommendations for the implementation phase.

To achieve the project’s objective, it is necessary to evaluate the available CNS/ATM System's current situation, which will allow to assess the needs and the most relevant opportunities and challenges involved in the creation of a Seamless Airspace Architecture.

This process is essential to define and foresee a sustainable and efficient Air Navigation Services, which could be a profitable business model for all the ANSP’s and ensure a robust Institutional and Regulatory framework for all the CAA’s, in compliance with international aviation standards and policies.

* 1. Scope of work

The scope of the consultancy mission will have the following priorities:

* Undertake an assessment of the existing regional institutional and legal frameworks and their capacity to support the deployment of interoperable CNS/ATM systems in the EA-SA-IO region.
* Undertake an assessment of the status of ICAO ASBU framework implementation within Member State’s in the EA-SA-IO region with a particular focus on B0 and B1 modules of Performance Improvement Area 2: Globally Interoperable Systems and Data through System Wide Information Management.

|  |  |  |
| --- | --- | --- |
| **Member State** | **Member State** | **Member State** |
| Angola | Kenya | Seychelles |
| Botswana | Lesotho | Somalia |
| Burundi | Libya | South Africa |
| Comoros | Madagascar | South Sudan |
| Djibouti | Malawi | Sudan |
| DRC | Mauritius | Tanzania |
| Egypt | Mozambique | Tunisia |
| Eritrea | Namibia | Uganda |
| Eswatini | Reunion | Zambia |
| Ethiopia | Rwanda | Zimbabwe |

* Develop a mechanism to facilitate establishment of interoperable CNS/ ATM Systems within the region.
* Develop a regional organizational structure/ forum, policy, rules, procedures, and regulation for coordinated implementation of ICAO ASBU framework in Member States within the EA-SA-IO region in accordance with the AFI Air Navigation and Global Air Navigation Plans.

The main tasks to be developed include:

1. Review all the relevant documents provided by the Program including the program description of action, the Log frame and any other source documents deemed necessary to complete the assignment.
2. Develop the methodology to undertake the assignment and submit to the Program Management Unit for review and approval by the COMESA Infrastructure and Logistics Division.
3. Review outcomes of the baseline study to establish the status of implementation of the ICAO Aviation System Block Upgrade (ASBU) and available regional institutional/legal frameworks within the region that could be used to facilitate the deployment of interoperable CNS/ATM Systems.
4. Review national air navigation plans of Member States within the region to establish the status of implementation of the ICAO Aviation System Block Upgrade (ASBU) framework in accordance with the AFI and Global Air Navigation Plans.
5. Formulate a regional institutional framework and appropriate enablers that will facilitate the deployment of interoperable CNS/ATM Systems within the EA-SA-IO region.
6. Develop concept of operation and scenarios to support adoption of the Regional Institutional framework for deployment of inter-operable CNS/ATM Systems within the EA-SA-IO region.
7. Review program results framework and log frame to refine and adapt program indicators and/or program targets based on the findings to allow effective monitoring of implementation status.
8. Prepare a final report with an in-depth analysis of the outcomes of the baseline study, assignment objectives, methodology, key findings, and recommendations.
9. Conduct workshops with Member States to validate the developed regional Institutional Framework for deployment of interoperable CNS/ATM Systems within the EA-SA-IO region.
10. Prepare and submit report on the outcomes of the validation workshop which should include key findings and recommendations among others.
    1. Project methodology overview

The deployment of interoperable CNS/ ATM Systems towards achieving a Regional Seamless Upper Airspace in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) consist in the following methodology:

* Diagnosis of the overall current situation and of each Member-State, through the analysis of existing documentation:
  + Support to Air Transport Sector Development (SATSD) in the Eastern Africa, Southern Africa, and Indian Ocean Region (FED/2020/419-862); Description of the Programme and Log frame
  + Study to Assess the Technical and Financial Feasibility of a Seamless Upper Airspace in the COMESA Region;
  + COMESA Airspace Integration Project; Establishment of Regulatory Framework and Agency for COMESA Unified Single Upper Airspace
  + Continental Study on the Benefits of the SAATM and Communication Strategy for SAATM Advocacy;
  + Technical Assistance to The African Union – NKE Support to AUC For CBA on SBAS Implementation in Africa
  + Transforming Intra-African Air Connectivity: The Economic Benefits of Implementing the Yamoussoukro Decision by InterVISTAS
  + COMESA Legal Notice #2: COMESA Regulations for the implementation of the Liberalized Air Transport Industry;
* Development of surveys to each Member-State, complemented with interviews, allowing to gather their perspectives and make a deeper analysis about their needs and objectives
  + Analyse the current CNS/ATM systems and propose changes in the system according with the following operational characteristics:
  + Infrastructure
  + Stakeholders' engagement
  + Legal and Institutional Framework
  + Training Requirements
  + Airline equipage (Airspace User's)
  + State Safety Program / Safety Management System (SMS)
* Workshop realization after the delivery of the draft report to gather the perspectives of each Member-State about the operationality of the suggested proposals and define their implementation time by Member-State.
  1. Structure of the document

The developed document has the following structure, that will allow to have a completely understanding of the current diagnosis and suggested proposals:

1. Background of the project
2. Overview of EA-SA-IO Member States’ Air Navigation Sector
3. Requirements for Deployment of Regional Interoperable CNS/ ATM Systems
4. Analysis of international Institutional Frameworks on established Airspace Integration
5. Current Regional legal and institutional frameworks and processes
6. Proposed Regional Institutional framework
7. General conclusions and recommendations
8. References
   1. Description of the New CNS/ATM System[[2]](#footnote-3)

All over the world, several programs are being developed, addressing the required modernisation efforts for future Air Traffic Management (ATM) systems such as: Single European Sky Air Traffic Management Research (SESAR) in the Europe, Next Generation Air Transport System (NextGen) (FAA, 2015) in the US are, CARATS in Japan, SIRIUS in Brazil, OneSky in Australia, and others in Canada, China, India, and Russian Federation.

The ASBU provide a baseline for the technology roadmap required in the Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM) and Avionics, and presents four performance improvement areas:

1. Airport operations
2. **Globally interoperable systems and data**
3. **Optimum capacity and flexible flight**
4. **Efficient flight paths**

These performance improvement areas map their development plans to ASBU modules, to ensure near- and long-term global interoperable systems and data exchange.

Interoperability is essential to the realisation of Communication, Navigation, Surveillance (CNS), Air Traffic Management (ATM), and Avionics concepts.

To perform information sharing and interoperation, ground systems should be interoperable with airborne systems. Furthermore, for optimal use of communication data links, for air-to-air surveillance information exchange or broadcast the on-board avionics should also be interoperable with the system.

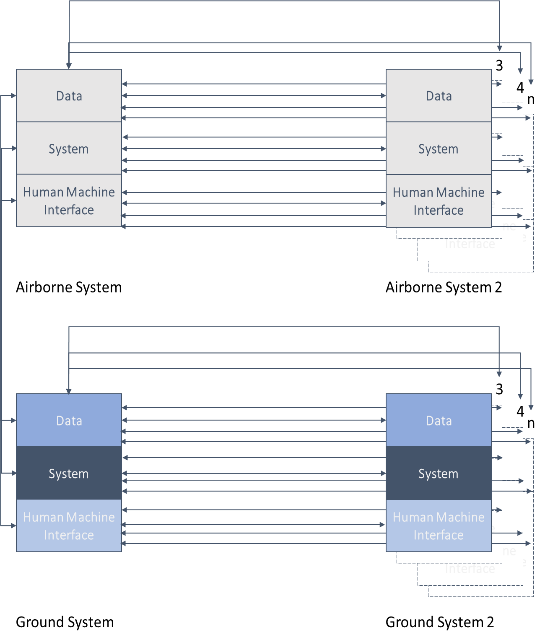


Figure 1 - CNS/ATM system interoperability requirements

Satellites provide both communication and navigation functions through SATCOM and SATNAV systems and consequently dealing with interoperability.

It’s expected that each Member State of the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) regions could implement CNS/ATM systems and adopt an institutional and regulatory framework in compliance with a high level of interoperability.

1. Background of the project

The Common Market for Eastern and Southern Africa (COMESA) Secretariat and the European Union (EU) signed a Grant Contribution Agreement amount of €8 million for the Support to Air Transport Sector Development (SATSD) in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Region. The SATSD is a four (4) year program that aims at supporting the operationalization of the Single African Air Transport Market (SAATM); strengthening the regulatory and institutional capacity of civil aviation institutions; and improving air navigation efficiency in the EA-SA-IO region.

The overall objective of the program is to contribute to the development of the air transport sector in the EA-SA-IO region. The specific objectives to achieve are the following[[3]](#footnote-4):

* Single African Air Transport Market operationalized;
* Strengthened regulatory and institutional capacity of civil aviation institutions in EA- SA-IO region;
* Improved air navigation efficiency in the EA-SA-IO region.

Each of these specific objectives should be implemented considering the following areas:

1. **Single African Air Transport Market operationalized:**
   1. Supported signing of Solemn Commitment by Member States (MS) in the EA-SA-IO region;
   2. Enabled operationalization of joint competition rules and regulations;
   3. Enhanced capacity for a regional model for sustainable air transport market development;
2. **Strengthened regulatory and institutional capacity of civil aviation institutions in the EA-SA-IO region:**
   1. Separation of Civil Aviation Authority regulatory functions from operational functions supported in several fast-moving countries;
   2. Enhanced managerial and technical skills for aviation oversight;
   3. Improved gender sensitivity and environment mainstreaming in the aviation sector;
3. **Improved air navigation efficiency in the EA-SA-IO region:**
   1. Enhanced airspace coordination for Regional Seamless Upper air space;
   2. Enabled data sharing through centralized regional aeronautical information databases.

The primary beneficiaries of the Support to Air Transport Sector Development (SATSD) program are Member States of the EA-SA-IO region, since improving quality of air transport services will, consequently enhance the demand for air transport services in each Member-State, which by itself will contribute to increase employment, contributing directly and indirectly to the aviation sector industries which are sources of inputs like fuel, spare parts, consumables, equipment, and other service providers.

Other sectors of the economy that will benefit are the tourism sector, industry and trade sectors which rely heavily on-air transport. Growth of these sectors will positively contribute to GDP growth and to increase population’s disposable incomes that henceforth can afford air travel tickets especially given the potential reduction in air fares. The huge size of the continent and its many physical barriers, coupled with limitations in land-based transport infrastructure will make air travel the preferred mode. Institutional reforms to be supported by the program will result in efficient and accountable institutions that will be able to support sustained growth of the sector.

Sustainable development of the air transport sector in the Eastern and Southern Africa will improve the quality of air transport services through improved efficiency, direct routing, improved connectivity, and reduced fares. This will stimulate the demand for air transport services and increase the use of this mode of transport. Increased demand for air transport services will contribute to increased direct, indirect, and induced employment through the positive impact on downstream aviation sector industries.

The convenience to travel and vibrancy of the aviation sector will attract investment to the EA-SA-IO region, a development which will boost production, employment, incomes, and GDP per capita. Thus, economic growth and development will be supported. This will sustain the demand for air transport services and promote investment in the sector. The sector will thus be able to generate revenues and achieve profitability levels to facilitate reinvestment of retained earnings.

Regional Economic Communities (RECS) recognize that sustainable development of the air transport sector is fundamental in achieving the aspirational goal of regional integration through economical and sustainable development of the natural and human resources for the good of African people. In pursuit of this objective, COMESA and the European Union signed a Contribution Agreement to implement the Support to Air Transport Sector Development Program (SATSD) in the Eastern Africa, Southern African and Indian Ocean Region.

* 1. SATSD Program

The overall objective of the program is to contribute to the development of the air transport sector in the EA-SA-IO region.

The specific objectives of the program are:

* Operationalize the Single African Air Transport Market;
* Strengthen regulatory and institutional capacity of civil aviation institutions in EA-SA-IO region;
* Improve air navigation efficiency in the EA-SA-IO region.
  + 1. Operationalize the Single African Air Transport Market;

The Single African Air Transport Market (SAATM) is an African Union (AU) Agenda 2063 Flagship Project. SAATM seeks to create one single air transport market in Africa through full liberalization of intra-African air transport services in terms of market access, traffic rights for scheduled and freight air services by eligible airlines thereby improving air services connectivity and air carrier efficiencies.

To achieve this, the program will undertake activities that will:

1. Support the signing of solemn commitment by Member States in the EA-SA- IO region,
2. Support the operationalization of joint competition rules and regulations and
3. Enhance capacity for a regional model for sustainable air transport market development.
   * 1. Strengthen regulatory and institutional capacity of civil aviation institutions in EA-SA-IO region;

For the air transport sector to grow and to be able to, effectively, play its economic role, it should focus on air transport market integration supported by effective regulatory and operational institutions.

To achieve these institutional reforms should be applied and aviation stakeholders should be strengthened, enhancing aviation sector’s managerial and technical capacity.

Functional separation between CAAs and Air Navigation Services Provider (ANSP), will be key to promoting effectiveness, transparency, and accountability.

This will enable the EA-SA-IO Member States to be better placed to comply with international aviation requirements and to compete at global level.

Development and review of national legislation will be necessary to facilitate the reforms.

To achieve this, the program will undertake activities that will:

1. Support the separation of Civil Aviation Authority regulatory functions from operational functions;
2. Enhance managerial and technical skills for aviation oversight;
3. Improve gender sensitivity and environment mainstreaming in the aviation sector.
   * 1. Improve air navigation efficiency in the EA-SA-IO region;

Seamless operations support aviation sector development in terms of market integration through improved air navigation efficiency and safety. Improved air navigation efficiency has a positive impact on costs, safety, travel time, connectivity, and the environment.

There is need to put in place regional frameworks and procedures for seamless operations supported by the right infrastructure and equipment, flexible use of the airspace, resource, and information sharing.

There is need to create awareness of the importance of the flexible use of airspace and training on its actual implementation.

Establishment of aeronautical regional databases will enhance information sharing required for seamless operations.

There will also be a need to adhere to the regulatory framework as espoused by ICAO. The program will support member states in the implementation of the ICAO Standards and Procedures as they relate to seamless operations.

To achieve this, the programme will undertake activities that will:

1. Enhance airspace coordination for Regional Seamless Upper Airspace;
2. Enable data sharing through Centralised Regional Aeronautical Information Databases;
   1. Region Economic Communities under the SATSD Program

The programme is being implemented by five Regional Economic Communities (REC):

1. Common Market for Eastern and Southern Africa (COMESA);
2. East Africa Community (EAC);
3. Intergovernmental Authority on Development (IGAD);
4. Indian Ocean Commission (IOC); and
5. Southern African Development Community (SADC);
   * 1. The Common Market for Eastern and Southern Africa (COMESA)

The Common Market for Eastern and Southern Africa (COMESA), which is composed by the following 21 Partner States, is the lead Regional Economic Community of the SATSD program.

* Uma imagem com mapa

  Descrição gerada automaticamenteRepublic of Burundi;
* Union of Comoros;
* Democratic Republic of the Congo;
* Republic of Djibouti;
* Arab Republic of Egypt;
* State of Eritrea;
* Kingdom of Eswatini;
* Federal Democratic Republic of Ethiopia;
* Republic of Kenya;
* State of Libya;
* Republic of Madagascar;
* Republic of Malawi;
* Republic of Mauritius;
* Republic of Rwanda;
* Republic of Seychelles;
* Federal Republic of Somalia;
* Republic of Sudan;
* Republic of Tunisia;
* Republic of Uganda;
* Republic of Zambia; and
* Republic of Zimbabwe;

In the following, a brief description about COMESA is made:

1. **COMESA objectives and priorities**

The history of COMESA began in December 1994 when it was formed to replace the former Preferential Trade Area (PTA) which had existed from the earlier days of 1981. COMESA (as defined by its Treaty) was established as an organisation of free independent sovereign states which have agreed to cooperate in developing their natural and human resources for the good of all their people’ and as such it has a wide-ranging series of objectives which necessarily include in its priorities the promotion of peace and security in the region. However, due to COMESA’s economic history and background its main focus is on the formation of a large economic and trading unit that is capable of overcoming some of the barriers that are faced by individual states. COMESA’s current strategy can thus be summed up in the phrase ‘economic prosperity through regional integration’. With its 21 Member States, population of over 583 million a Gross Domestic Product of $805 billion, a global export/import trade in goods worth US$ 324 billion, COMESA forms a major marketplace for both internal and external trading. Geographically, COMESA almost two thirds of the African Continent with an area of 12 Million (SQ Km).

1. **What COMESA Offers**

COMESA offers its members and partners a wide range of benefits which include:

1. A wider, harmonised, and more competitive market;
2. Greater industrial productivity and competitiveness;
3. Increased agricultural production and food security;
4. A more rational exploitation of natural resources;
5. More harmonised monetary, banking, and financial policies;
6. More reliable transport and communications infrastructure.
7. **COMESA Core Values**

These core values have been forged through over 20 years of existence. As a Regional Economic Community (REC), our commitment to these core values starts with our diversity in staff drawn from the 21 Member States and runs through the organization.

Our core values are:

1. We believe in satisfying our customers;
2. We take pride in our reputation for delivering services with professionalism, integrity, and innovation;
3. We believe in quality leadership, teamwork, and respect for each other in an enabling environment;
4. Our people care for our environment and uphold its social responsibility
5. **COMESA institutions**

An integral component of the COMESA success narrative has been its institutions. These are needs-based and respond to very specific niches in the region. In addition to providing expertise in specific areas, the institutions are involved in skills development and extensive market research that allows them to link evidence to their decision-making processes.

To support the integration program, COMESA has established financial institutions to provide not just the much-needed credit (the Trade and Development Bank), but also to provide insurance for non-commercial risks (the African Trade Insurance Agency), re-insurance (ZEP-Re (PTA) Reinsurance Company) and to facilitate international payments (the Regional Payment and Settlement System), and to underpin competition in the region (the COMESA Competition Commission).

* + 1. The East Africa Community (EAC)

The East African Community (EAC) is a Regional Economic Community composed by the following 7 Partner States:

* Uma imagem com mapa

  Descrição gerada automaticamenteRepublic of Burundi;
* Democratic Republic of the Congo;
* Republic of Kenya;
* Republic of Rwanda;
* Republic of South Sudan;
* Republic of Uganda; and
* United Republic of Tanzania;

The EAC is home to an estimated 283.7 million citizens, of which over 30% is urban population. With a land area of 4.8 million square kilometres and a combined Gross Domestic Product of US$ 305.3 billion, its realisation bears great strategic and geopolitical significance and prospects for the renewed and reinvigorated EAC.

The work of the EAC is guided by its Treaty which established the Community. It was signed on 30 November 1999 and entered into force on 7 July 2000 following its ratification by the original three Partner States - Kenya, Tanzania, and Uganda. The Republic of Rwanda and the Republic of Burundi acceded to the EAC Treaty on 18 June 2007 and became full Members of the Community with effect from 1 July 2007, while the Republic of South Sudan acceded to the Treaty on 15 April 2016 and become a full Member on 15 August 2016. The Community's newest member, the Democratic Republic of the Congo acceded to the EAC Treaty on 8 April 2022 and became a full member on 11 July 2022.

As one of the fastest growing regional economic blocs in the world, the EAC is widening and deepening co-operation among the Partner States in various key spheres for their mutual benefit. These spheres include political, economic, and social.

At the moment, the regional integration process is in full swing as reflected by the encouraging progress of the East African Customs Union, the establishment of the Common Market in 2010 and the implementation of the East African Monetary Union Protocol.

1. **Current status**

The process towards an East African Federation is being fast tracked, underscoring the serious determination of the East African leadership and citizens to construct a powerful and sustainable East African economic and political bloc. In May 2017, the EAC Heads of State adopted the Political Confederation as a transitional model of the East African Political Federation.

1. **Vision**

The vision of EAC is to be a prosperous, competitive, secure, stable, and politically united East Africa.

1. **Our Mission**

The mission of the Community is to widen and deepen economic, political, social, and cultural integration in order to improve the quality of life of the people of East Africa through increased competitiveness, value added production, trade, and investments.

1. **Our Values**

Underpinning the EAC is our commitment to our values:

1. Professionalism;
2. Accountability;
3. Transparency;
4. Teamwork;
5. Unity in Diversity;
6. Allegiance to EAC Ideals;
   * 1. Intergovernmental Authority for Development (IGAD)

**Uma imagem com mapa

Descrição gerada automaticamente**The Intergovernmental Authority for Development (IGAD) is a Regional Economic Community of 6 Partner States:

* Republic of Djibouti;
* Federal Democratic Republic of Ethiopia;
* Republic of Kenya;
* Federal Republic of Somalia;
* The Sudan;
* South Sudan
* Kenya and
* Republic of Uganda;

1. **History and Development**

The Intergovernmental Authority on Development (IGAD) in Eastern Africa was created in 1996 to supersede the Intergovernmental Authority on Drought and Development (IGADD) which was founded in 1986 to mitigate the effects of the recurring severe droughts and other natural disasters that resulted in widespread famine, ecological degradation, and economic hardship in the region. Djibouti, Ethiopia, Kenya, Somalia, Sudan, and Uganda – took action through the United Nations to establish the intergovernmental body for development and drought control in their region. Eritrea became the seventh member after attaining independence in 1993 and in 2011 South Sudan joined IGAD as the eighth member state.

With the new emerging political and socio-economic challenges, the assembly of Heads of State and Government, meeting in Addis Ababa in April 1995, resolved to revitalize IGADD and expand areas of cooperation among Member States. The new and revitalized IGAD was launched during the 5th Summit of IGAD Assembly of Heads of State and Government held on 25-26 November 1996 in Djibouti. The Summit endorsed the decision to enhance regional cooperation in three priority areas of food security and environmental protection, economic cooperation, regional integration and social development peace and security.

1. **Vision and Mission Statements**

The founding leaders of IGAD were motivated by a vision where the people of the region would develop a regional identity, live in peace, and enjoy a safe environment alleviating poverty through appropriate and effective sustainable development programmes. The IGAD Secretariat as the executive body of the Authority was given the mandate to achieve this goal.

1. **Vision**

A resilient, peaceful, prosperous, and integrated region where citizens enjoy high quality of life

1. **Mission**

Promote regional cooperation and integration to add value to Member States’ efforts in achieving peace, security, and prosperity.

1. **Goal**

Transformation towards sustainable development, resilience, and stability in the IGAD Region

1. **Theme**

Transformative regional capacities for sustainable development

* + 1. The Indian Ocean Commission (IOC)

Uma imagem com mapa

Descrição gerada automaticamenteThe Indian Ocean Commission (IOC) is a Regional Economic Community which brings together 5 Partner States:

* Union of the Comoros;
* France in respect of Reunion;
* Republic of Madagascar;
* Republic of Mauritius;
* Republic of Seychelles;

Created by the Port-Louis Declaration in 1982, the IOC was institutionalized in Seychelles in 1984 by the General Cooperation Agreement, better known as the “Victoria Accord”.

The only regional organization in Africa composed exclusively of islands, it defends the specificities of its Member States on the continental and international scenes. Benefiting from the active support of a dozen international partners, the IOC gives substance to regional solidarity through cooperation projects covering a wide range of sectors: preservation of ecosystems, sustainable management of natural resources, maritime security, entrepreneurship, public health, renewable energies or even culture.

While taking care to respect the principles of coordination, complementarity and subsidiarity, the IOC assumes a role of accompaniment, even of impetus, in areas where its Member States need specific support and where collective action constitutes an added value.

This experience accumulated over the course of the projects makes the IOC today a key player with recognized and useful expertise in achieving the Sustainable Development Goals. In addition, the IOC implements cooperation projects that go beyond the geographical framework of its Member States to cover the countries of Eastern and Southern Africa, and even the island countries on the western side of the continent.

Gaining in attractiveness and political stature, the IOC has not only strengthened and diversified its partnerships with the community of technical and financial partners but has also welcomed observer members since 2016.

Called upon on several fronts, the IOC has been driving collective action for more than thirty-five years in a region, Indian Oceania, which is vulnerable by nature and ambitious by choice.

* + 1. The Southern African Development Commission (SADC)

The Southern African Development Commission (SADC) is a Regional Economic Community of 16 Partner States:

* Republic of Angola;
* Republic of Botswana;
* Union of the Comoros
* Uma imagem com mapa

  Descrição gerada automaticamenteDemocratic Republic of the Congo;
* Kingdom of Eswatini;
* Kingdom of Lesotho;
* Republic of Madagascar;
* Republic of Malawi;
* Republic of Mauritius;
* Republic of Mozambique;
* Republic of Namibia;
* Republic of Seychelles;
* Republic of South Africa;
* United Republic of Tanzania;
* Republic of Zambia; and
* Republic of Zimbabwe;

1. **Objectives**

The main objectives of Southern African Development Community (SADC) are to achieve economic development, peace and security, and growth, alleviate poverty, enhance the standard and quality of life of the peoples of Southern Africa, and support the socially disadvantaged through Regional Integration. These objectives are to be achieved through increased Regional Integration, built on democratic principles, and equitable and sustainable development.

The objectives of SADC, as stated in Article 5 of the SADC Treaty (1992) are to:

* Achieve development and economic growth, alleviate poverty, enhance the standard and quality of life of the people of Southern Africa and support the socially disadvantaged through Regional Integration;
* Evolve common political values, systems, and institutions;
* Promote and defend peace and security;
* Promote self-sustaining development on the basis of collective self-reliance, and the inter-dependence of Member States;
* Achieve complementarity between national and regional strategies and programmes;
* Promote and maximise productive employment and utilisation of resources of the region;
* Achieve sustainable utilisation of natural resources and effective protection of the environment;
* Strengthen and consolidate the long-standing historical, social, and cultural affinities and links among the people of the Region;

1. **Vision, Mission & Mandate**

The Southern African Development Community (SADC) Secretariat is the body that facilitates the implementation of SADC programmes and activities to meet its objectives and overall goal of poverty eradication and regional integration.

1. **Vision**

A reputable, efficient, and responsive enabler of Regional Integration and Sustainable Development.

1. **Mission**

Provide strategic expertise and co-ordinate the harmonisation of policies and strategies to accelerate Regional Integration and Sustainable Development.

1. **Mandate**

The Mandate of the SADC Secretariat, as outlined in the SADC Treaty, is to provide the following:

* Strategic planning and management of the programme of SADC;
* Implementation of the decisions of the Summit and council;
* Organisation and management of SADC Meetings;
* Financial and general administration;
* Representation and promotion of SADC;
* Promotion and harmonisation of policies and strategies of Member States;

1. **Values**

The SADC Secretariat subscribes to the following values:

* Quality service and competency;
* Professionalism;
* Integrity;
* Commitment and passion;
* Team spirit;
* Mutual respect and trust;
* Courtesy;
* Equality of opportunity;
* Transparency and frankness;
  1. Context with regards to the regional air transport sector[[4]](#footnote-5)

The Single African Air Transport Market was established and launched during the 30th Ordinary Summit of the African Union Assembly of Heads of States and Government held in Addis Ababa, Ethiopia from 28th to 29th of January 2018.

Uma imagem com mapa

Descrição gerada automaticamenteSingle African Air Transport Market (SAATM) is a flagship project of the African Union Agenda 2063, an initiative of the African Union to create a single unified air transport market in Africa, the liberalisation of civil aviation in Africa through the full implementation of the Yamoussoukro Decision and as an impetus to the Continent’s economic integration agenda.

To date, 34 countries have signed up to the SAATM: Benin, Botswana, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Congo Brazzaville, Cote d’Ivoire, Egypt, Ethiopia, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea (Bissau), Guinea, Kenya, Lesotho, Liberia, Mali, Morocco, Mozambique, Namibia, Niger, Nigeria, Democratic Republic of Congo, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Tchad, Togo, Zimbabwe. These countries represent over 80% of the existing aviation market in Africa.

The contextualization of the regional air transport sector in EA-SA-IO region will focus on the following themes:

* Operationalizing the Single African Air Transport Market (SAATM);
* Regional Airspace Fragmentation and its impact on air traffic management;
* ICAO AFI Regional Air Navigation Plan/ ASBU Framework and description of new CNS/ ATM System Concept;
* Evolution and Implementation of interoperable CNS/ ATM systems.
  + 1. Operationalizing the Single African Air Transport Market (SAATM)[[5]](#footnote-6)

Aviation is a vital tool for development globally and has the potential to greatly transform and improve economic and social benefits across Africa.

SAATM is therefore a clear path for a more prosperous and secure African future. Aviation is the foundation of many established and emerging economies e.g., UAE, Singapore, Rwanda, Ghana, Cote D’Ivoire.

The African Civil Aviation Commission (AFCAC) being the AU Specialized Agency for all Continental Civil Aviation matters has been charged with the responsibility of being the Executing Agency (EA) of the Yamoussoukro Decision (YD) and the Single African Air Transport Market (SAATM).

African Civil Aviation Commission (AFCAC) has the following strategic objectives essential for establish a Seamless Upper Airspace and the deployment of an interoperable CNS/ATM system:

1. Coordinating civil aviation matters in Africa and cooperating with ICAO and all other relevant organizations and other bodies which are involved in the promotion and development of civil aviation;
2. Formulating and enforcing appropriate rules and regulations that give fair and equal opportunity to all stakeholders and promote fair competition;
3. Promoting understanding on policy matters between its Member States and States in other parts of the world;
4. Fostering inter alia, the implementation of ICAO Standards and recommended Practices for the safety, security, environmental protection and regulatory of the aviation sector;

On the air transportation supply side, changes in the regulatory framework and infrastructure capability, and on the air transportation demand side, changes such as economic liberalisation reforms and supporting infrastructure investment led to positive growth rates.

The harmonization of the regulatory framework, and the incorporation of all Council of Ministers’ regulations into individual state’s legal and administrative framework it’s essential for an effective implementation.

Support and continuous communication to all stakeholders on the Single Africa Air Transport Market is a key element towards the operationalization of the SAATM. This is the first pillar of the SAATM Prioritized Action Plan.

Status SAATM of Eastern Africa, Southern African and Indian Ocean Region Member States:

Table 2 - Member states' SAATM status

|  |  |  |  |
| --- | --- | --- | --- |
| **Member State** | **Status SAATM** | **Member State** | **Status SAATM** |
| Angola | NO | Mauritius | NO |
| Botswana | YES | Mozambique | YES |
| Burundi | NO | Namibia | NO |
| Comoros | NO | Reunion |  |
| Djibouti | NO | Rwanda | YES |
| DRC | YES | Seychelles | NO |
| Egypt | YES | Somalia | NO |
| Eritrea | NO | South Africa | YES |
| Eswatini | YES | South Sudan | NO |
| Ethiopia | YES | Sudan | NO |
| Kenya | YES | Tanzania | NO |
| Lesotho | YES | Tunisia | NO |
| Libya | NO | Uganda | NO |
| Madagascar | NO | Zambia | NO |
| Malawi | NO | Zimbabwe | YES |

* + 1. Regional Airspace Fragmentation and its impact on air traffic management

Fragmentation can be defined as referring to the division of Air Navigation Service provision. Under the Chicago Convention, the concept of Flight Information Regions (FIRs) defines homogenous regions of airspace, which should efficiently provide Air Navigation Services.

Up to now, air frontiers have been fixed by reference to land and sea frontiers. Against this background International Civil Aviation Organisation (ICAO) recommends that the delineation of internal airspace should be related to the need for efficient service rather than to national boundaries.

All the Member States from the different REC’s involved, with three exceptions[[6]](#footnote-7), have an entity, ANSP/CAA, responsible for the provision of Air Navigation Services in the upper air space.

Those entities in the coastal countries are also responsible for the provision in the oceanic airspace by delegation of ICAO and Regional Arrangements.

As our propose is only related to the upper airspace the provision of Air Navigation Services is provided by an Aera Control Centre, and depending on the traffic density, operational, and technical CNS/ATM characteristics of the Air Space Management and the unit organization its possible a fragmentation into control sectors.

Even though that the Article 28 allows one ICAO Member State to delegate the provision of Air Navigation Services above its territory in other ICAO Member State and that this does, in no way, undermine the principle of national airspace sovereignty, protected in Article 1, it’s our believe that this will not apply, for the moment, within the universe of the 30 Member States involved.

COMESA Treaty states on Article 87 3 g) that Member States hast to *“consider ways to develop, maintain and co-ordinate in common, their navigational, communications and meteorological facilities for the provision of safe air navigation and the joint management of their air space;”*, but not all the 30 Member States subscribe the treaty and stating a Seamless Upper Airspace is no the same of stating a Unified Airspace.

Unified management of upper airspace mean’s Air Traffic Management (ATM) provided by multinational Upper Area Control Centres (UACC). These UACC’s exist in the world but are the exception rather than the rule. The rule is instead that each State has responsibility over its own upper airspace through its ANSP/CAA.

Unified management of air space can have a positive financial impact but in operational issues and in State Security they are difficult to implement, and the negative impact is probably higher than the positive one, and these negative issues must be identified.

Taking this analyse in consideration its our recommendation that each Member State deploy it’s own system CNST/ATM associated with the operational development with an higher level of interoperability of the system and parts that integrate the system and can permit overlap information, and on other hand a positive adoption of a collaborative management of the Seamless Upper Airspace is rather recommended, and should assume the same strategic objectives:

* Safety;
* Security;
* Capacity;
* Cost-effectiveness;
* Flight efficiency;
* Environment;
* Military mission.

In the European Union was established European Upper Flight Information Region (EUIR) and the air space was reconfigured in Functional Airspace Block’s (FAB’s) based on operational requirements and established regardless of State boundaries, where the provision of air navigation services and related functions are performance-driven and optimized with a view to introducing, in each functional airspace block, enhanced cooperation among air navigation service providers or, where appropriate, an integrated provider.

Those FAB’s share common strategic objectives:

* Safety: ensure an improved safety level despite civilian traffic growth;
* Capacity: meet the demand of civil air traffic foreseen to increase;
* Cost-effectiveness: balance the cost of operations within FABs;
* Flight efficiency: improve flight efficiency through flight profiles and distances flown;
* Environment: reduce the impact on the environment through flight profiles and distances flown.
* Military mission effectiveness: improve military mission effectiveness.
  + 1. ICAO AFI Regional Air Navigation Plan/ ASBU Framework and description of new CNS/ ATM System Concept

The survey distributed to Member States can give us a picture about the implementation status of the National Air Navigation Plan, the deployment of new CNS/ATM and/or the implemented improvements to the existing ones.

So far we only had four answers to the questionnaires and this shortage makes the evaluation almost inconclusive and, on the other hand, the mission to Cairo brought some information regarding to three Member States, but still, and concerning the existence of plans, the information can only be considered regarding to Egypt.

There are three National Air Navigation Plans aligned with AFI Regional plan (ICAO Doc 7474) and the Global Air Navigation Plan (ICAO Doc 9750) and the absence of one.

We can assume, based on the information of development in course on Member States, the existence of others Plans but merely there is no information about the alignment with AFI Regional plan (ICAO Doc 7474) and the Global Air Navigation Plan (ICAO Doc 9750).

Must be reinforced the necessity of Member States to make an effort to provide answers to the questionnaires so, that more reliable conclusions can be drawn and so that the survey can function as a useful tool for decision-makers.

AFI Air Navigation Plan’s[[7]](#footnote-8) are detailed in three volumes and the volume 3 contains dynamic/flexible plan elements related to the implementation of the Air Navigation System and its modernization in line with the ICAO Aviation System Block Upgrades (ASBU) and associated technology roadmaps described in the Global Air Navigation Plan (GANP).

It’s recommended and adopted by the APIRG Conclusion 19/06:

*Adoption of AFI Regional Air Navigation System Implementation Plan aligned with the ICAO Aviation System Block Upgrades, that:*

*a) AFI States adopt the Regional Air Navigation System Implementation Plan aligned with the 18 Block 0 Modules of the ICAO Aviation System Block Upgrades (ASBU) Methodology, as provided at Appendix 3.0A to this report;*

*b) That AFI States implement the adopted modules based on their operational needs, the categorization and the prioritization defined in the Action Plan;*

*c) The Secretariat finalize the implementation targets set for the adopted ASBU Block 0 Modules, and ensure that these targets are aligned with existing regional programmes aimed at enhancing air navigation capacity and efficiency and aviation safety;*

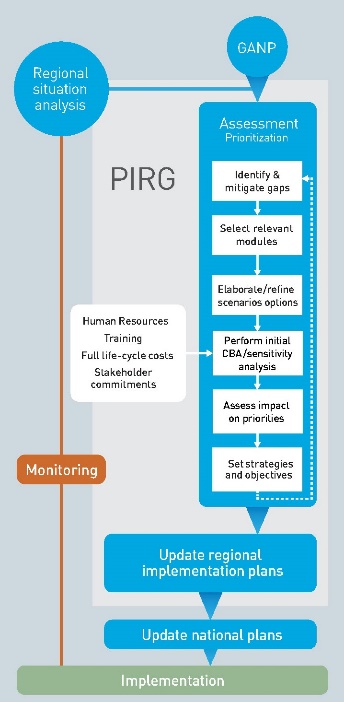
*d) The APIRG and the ICAO Regional Offices coordinate the implementation of the ASBU Block 0 Modules related to Safety Key Performance Area with regional aviation safety mechanisms (RASGAFI, AFI Plan) and other relevant safety initiatives for the AFI Region;*

*e) ICAO continually provide capacity building through workshops and seminars to AFI States and regional stakeholders as the needs arise in the different levels of ASBUs; and*

*f) The African Civil Aviation Commission (AFCAC), Regional Economic Communities and Financial institutions to provide their support and assist States the implementation of the AFI Regional Air Navigation System Implementation Action Plan.*

Considering the above recommendations each country should develop and implement a National Air Navigation Plan and that those plans should be integrate and complement the Regional Air Navigation Plan’s, throughout:

* Performance Targets;
  + RVSM Implementation;
  + PBN Implementation;
  + Enhancement of CNS Infrastructure;
  + Transition from AIS to AIM;
  + Improvement of the provision of Meteorological Services;
* Identification of Regional Air Navigation projects;
* Development of AFI States national ASBU Plans;
* Implementation and reporting through the AFI Regional Dashboards

According to the Global Air Navigation Plan (GANP), PIRGs should report, on an annual basis, the progress and effectiveness of ICAO regions and States against the priorities set out in their respective Regional and State air navigation plans to ICAO. It is envisaged that this would assist regions and States to adjust their priorities to reflect actual performance and address any emerging air navigation issues.

As recommended by the 12th Air Navigation Conference and the 38th Session of the ICAO Assembly (Resolution A38-11), ICAO is working on a Standardization Roadmap and GANP states that the regional national planning process should be aligned and used to identify those ASBU Modules which best provide solutions to the operational needs identified.

Depending on implementation parameters such as infrastructure constraints and the resources available, regional, and national implementation plans will be developed in alignment with the GANP. Such planning requires a collaborative approach (CDM)[[8]](#footnote-9) between stakeholders (CAA’s, ANSP’s and airspace users) to obtain commitments to effective implementation.

Figure 2 – GANP’s methodology to develop a regional planning

The ASBU framework was developed using this collaborative approach with cooperation from states, international organizations, and industry to meet the needs for current and future air navigation, resulting in the development of a customizable plan to meet the needs of each Member State. The ASBU framework provides a roadmap for ICAO Member States for air navigation modernization.

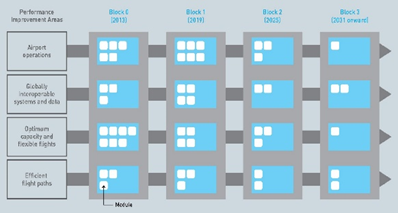


Figure 3 - Performance improvement areas and technology/procedure/capability modules, according with ASBU’s framework

The ASBUs consist of clearly defined, measurable operational Performance Improvement Areas (PIA), known as modules and are grouped together in blocks and included. Blocks are implemented according to a timetable.

For example, Block 0 consists of a set of modules available for implementation in 2013. Block 1 consists of modules that will be available for implementation in 2019 and subsequent blocks are planned for 2025 and 20131 onward.

To accomplish the project’s objectives the ASBU Performance Improvement Areas PIA 2 and PIA 3, and the threads associated, will be considered to establish the bases for the development of an interoperable CNS/ATM System and to define the necessary procedures for the implementation of a Seamless Upper Airspace in the Member States under the SATSD Programme.

Notwithstanding the project will focus on PIAs 2 and 3, PIA 4 will be also considered, when applicable. The areas that should be considered by each PIA are the following:

1. **PIA2: Globally Interoperable Systems & Data - Full FF/ICE**
   1. **AMET Advanced MET Information**
   2. **DAIM Digital ATM**
   3. **FICE FFICE**
2. **PIA3: Optimum Capacity & Flexible Flight – Complexity Management**
   1. **FRTO Free Route Operations**
   2. **ASEP Airborne Separation**
   3. **ASUR Alternative Surveillance**
   4. **OPFL Optimum Flight Levels**
   5. **NOPS Network Operations**
   6. ACAS Airborne Collision Avoidance System
   7. **SNET Ground-Based Safety Nets**
3. PIA 4: Efficient Flight Paths – Full Trajectory-Based Operations
   1. TBO Trajectory-Based Operations
   2. CDO Continuous Decent Operations
   3. CCO Continuous Climb Operations
   4. RPAS Remotely Piloted Aircraft System

The planning and implementation of the following Performance Improvement Areas consist of:

1. **PIA2: Globally Interoperable Systems & Data - Full FF/ICE**
2. B0-AMET (Advanced MET Information) Meteorological information supporting enhanced operational efficiency and safety Global, regional and local meteorological information provided by world area forecast centres, volcanic ash advisory centres, tropical cyclone advisory centres, aerodrome meteorological offices and meteorological watch offices in support of flexible airspace management, improved situational awareness and collaborative decision-making, and dynamically-optimized flight trajectory planning.
3. B0-DATM (Digital Aeronautical Information Management) prepares the world for digital information exchange;
4. B0-FICE (Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration) to improve coordination between air traffic service units (ATSUs) by using ATS interfacility data communication (AIDC).
5. AIDC is the necessary first step for all improvements in FF-ICE, ATFM and collaborative decision-making and the baseline of future advanced information management processes; and could be targeted in areas where radar coverage does not exist today but where the need to fly more direct routes or handling more traffic in each sector exists:
6. **PIA3: Optimum Capacity & Flexible Flight – Complexity Management**
7. B0-FRTO (Free Route Operations), improved operations through enhanced en-route trajectories To allow the use of airspace which would otherwise be segregated (i.e., special use airspace) along with flexible routing adjusted for specific traffic patterns. This will allow greater routing possibilities, reducing potential congestion on trunk routes and busy crossing points, resulting in reduced flight length and fuel burn.
8. B0-NOPS (Network Operations), improved flow performance through planning based on a network-wide view Collaborative ATFM measure to regulate peak flows involving departure slots, managed rate of entry into a given piece of airspace for traffic along a certain axis, requested time at a waypoint or an FIR/sector boundary along the flight, use of miles-in-trail to smooth flows along a certain traffic axis and rerouting of traffic to avoid saturated areas.
9. B0-ASUR (ADS-B out and MLAT), operationally, the lower costs of dependent surveillance infrastructure in comparison to conventional radars support business decisions to expand radar-equivalent service volumes and the use of radar-like separation procedures into remote or non-radar areas. Additionally, the nonmechanical nature of the ADS-B ground infrastructure allows it to be sited in locations that are difficult for radar installations. MLAT requires more ground stations than ADS-B and has larger geometric requirements than ADS-B but has the early implementation advantage of using current aircraft equipage.
10. B0-OPFL (Optimum Flight Levels), improved access to optimum flight levels through climb/descent procedures using ADS-B. This module enables an aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety. The main benefit of in-trail procedure (ITP) is fuel/emissions savings and the uplift of greater payloads;
11. B0-SNET (Ground-Based Safety Nets), increased effectiveness of ground-based safety nets to enable monitoring of flights while airborne to provide timely alerts to air traffic controllers of potential risks to flight safety (such as short-term conflict alerts, area proximity warnings and minimum safe altitude warnings).

The new CNS/ATM concept will put together interoperable ATM systems that integrate these ASBU concept elements for Block 0 and will continue their development accordingly.

* + 1. Evolution and Implementation of interoperable CNS/ ATM Systems

The evolution of the systems is dependent on the evolution intended and accepted by each of the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Member States.

This evolution will always have to be aligned with the objectives defined for the provision of Air Navigation Services in the Upper Seamless Airspace, and two principles need to be reinforced:

1. The necessary evolution will not be the same in all member states “*one size doesn’t fit all*”; and
2. The use of the “*variable geometry*” principle aimed by the EAC in its treaty.

According with ICAO[[9]](#footnote-10):

*“In order to better communicate with technical and high-level managers and to not leave any State or stakeholder behind, a multilayer structure, tailored for the various audiences, is proposed for the sixth edition of the GANP.”*

This multilayer structure of four layers:

1. Strategically;
2. Technical;
3. Regional; and
4. National.
5. **Strategically:**

Definition of high-level strategic direction for decision makers to drive the evolution of the Global Air Navigation System. To this end, the global strategic level includes a common vision, global performance ambitions and a conceptual roadmap.

This can correspond to the agreed integration of the different vision of each REC stated in the respective treaties in a unique Regulatory And Institutional framework.

1. **Technical:**

Implementation of basic services and new operational improvements in a cost-effective manner and according to specific needs, while ensuring interoperability of systems and harmonization of procedures. It contains:

1. Basic Building Blocks (BBB) framework, which outlines the foundation for a robust air navigation system by defining the essential air navigation services that shall be provided for international civil aviation; and
2. ASBU framework for scalable implementation, which provides the aviation community with the performance benefits expected from the implementation of specific air navigation operational improvements;
3. Performance framework, which includes performance objectives and key performance indicators; and
4. Collaborative implementation planning of air navigation operational improvements.
5. **Regional:**

Definition of global objectives to be transposed to the National level and/or the inclusion of the developments implemented, or in course to be implemented at National aligned with the global objectives.

1. **National:**

Related to the national planning. The development by States, in coordination with relevant stakeholders, of air navigation plans as a strategic part of their national development plans and aligned with regional and global plans is crucial to achieve the common vision being developed in the GANP. These air navigation plans should serve as reference documents for national investment in air navigation infrastructure.

Outlining ICAO Basic Building Block (BBB) framework is the identification of the essential services to be provided for international civil aviation in accordance with ICAO Standards:

1. Areas Of Aerodromes;
2. Air Traffic Management;
3. Search and Rescue;
4. Meteorology; and
5. Aeronautical Information Management.
6. Surveillance
7. Augmentation

Basic Building Block (BBB) framework identifies the necessary Communications, Navigation, and Surveillance (CNS) infrastructure to provide essential services.

The Basic Building Block (BBB) is a baseline defined by essential services recognized by ICAO Member States as necessary for international civil aviation to develop in a safe and orderly manner. Once these essential services are provided, they constitute the baseline for any operational improvement.

Regional Air Navigation Plans (ANPs) are a model to better align global and regional planning as well as the general and specific regional service requirements for international civil aviation operations in accordance with regional air navigation agreements, in the areas of communications, navigation and surveillance, air traffic management, meteorology, search and rescue and aeronautical information management.

Pursuant to Article 37 of the Chicago Convention:

*Each contracting State undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways, and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation.*

Each Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Member State must ensure that the essential air navigation services identified in the Basic Building Block (BBB) framework are provided.

This should be focus on verifying the implementation of the essential air navigation services outlined in the Basic Building Block (BBB) framework as the capability of the Member States to oversight these services is covered by the ICAO USOAP.

Align global and regional planning with the process of audit the implementation of essential services should be part of a gap analyses methodology to identify differences from the regional air navigation plans. This will ensure the provision of seamless Air Navigation Services throughout the deployment of interoperable systems and harmonized procedures.

According to the information gathered from the survey and from the mission to Cairo there is no information about the number Member States the Basic Building Block (BBB) implementation process, but there the necessity to leverage this implementation through their National Air Navigation Plans as a strategic part of their national aviation planning framework, and this will formulate future implementation of air navigation improvements to increase the quality of the services and meet the performance expectations of the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) aviation community. Under Basic Building Block (BBB) implementation the following areas should be considered:

* Air traffic management
* Aeronautical information management
* Meteorology
* Search and rescue
* Communications
* Navigation
* Air traffic management interoperability

What should be included in the above identified areas is described below:

Air Traffic Management

*The dynamic, integrated management of air traffic and airspace including air traffic services, airspace management and air traffic flow management — safely, economically, and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.[[10]](#footnote-11)*

*The aggregation of the airborne and ground-based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe and efficient movement of aircraft during all phases of operations.[[11]](#footnote-12)*

It’s expected that ATM system could:

* Provide an operating environment that ensures that all airspace users have access to the ATM resources needed to meet their specific operational requirements and should ensure to all users a seamless access to a given airspace or service.
* Exploit the essential capacity to meet airspace user demands at peak times and locations while minimizing restrictions on traffic flow and respond to future growth with corresponding increases in efficiency, flexibility, and predictability, while ensuring that there are no negative impacts on safety and security and must be resilient to service disruption and the resulting temporary loss of capacity.
* Consider charging airspace users for services when evaluating any proposal to improve ATM service quality or performance according to ICAO policies and principles regarding user charges.
* Contribute to the protection of the environment in the implementation and operation of the National and global ATM system.
* Consider the ability of all airspace users to modify flight trajectories dynamically and adjust departure and arrival times.
* Ensure the technical and operational interoperability of CNS/ATM systems based on global standards and uniform principles and facilitate homogeneous and non-discriminatory global and regional traffic flows.
* Have a continuous commitment in the planning, implementation, and operation to ensure that the evolution of the CNS/ATM system meets the expectations of the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) aviation community.
* Ensure the provision of consistent and dependable levels of performance.
* Ensure safety standards and risk and safety management practices throughout the implementation of a System Management Safety (SMS) in accordance wit ICAO policies and SARP’s.
* Ensure security standards and risk and security management practices throughout the implementation of a Security Management Safety (SeMS) in accordance wit ICAO policies and SARP’s and the Member State Security Program (SeST).
* Ensure audits to operation practices throughout the implementation of a Quality Management System (QMS) in accordance with ICAO policies and SARP.

States should ensure that the provision of Air Traffic Management on their own territories and delegated areas over the high seas for which it is responsible for the provision of air traffic services.

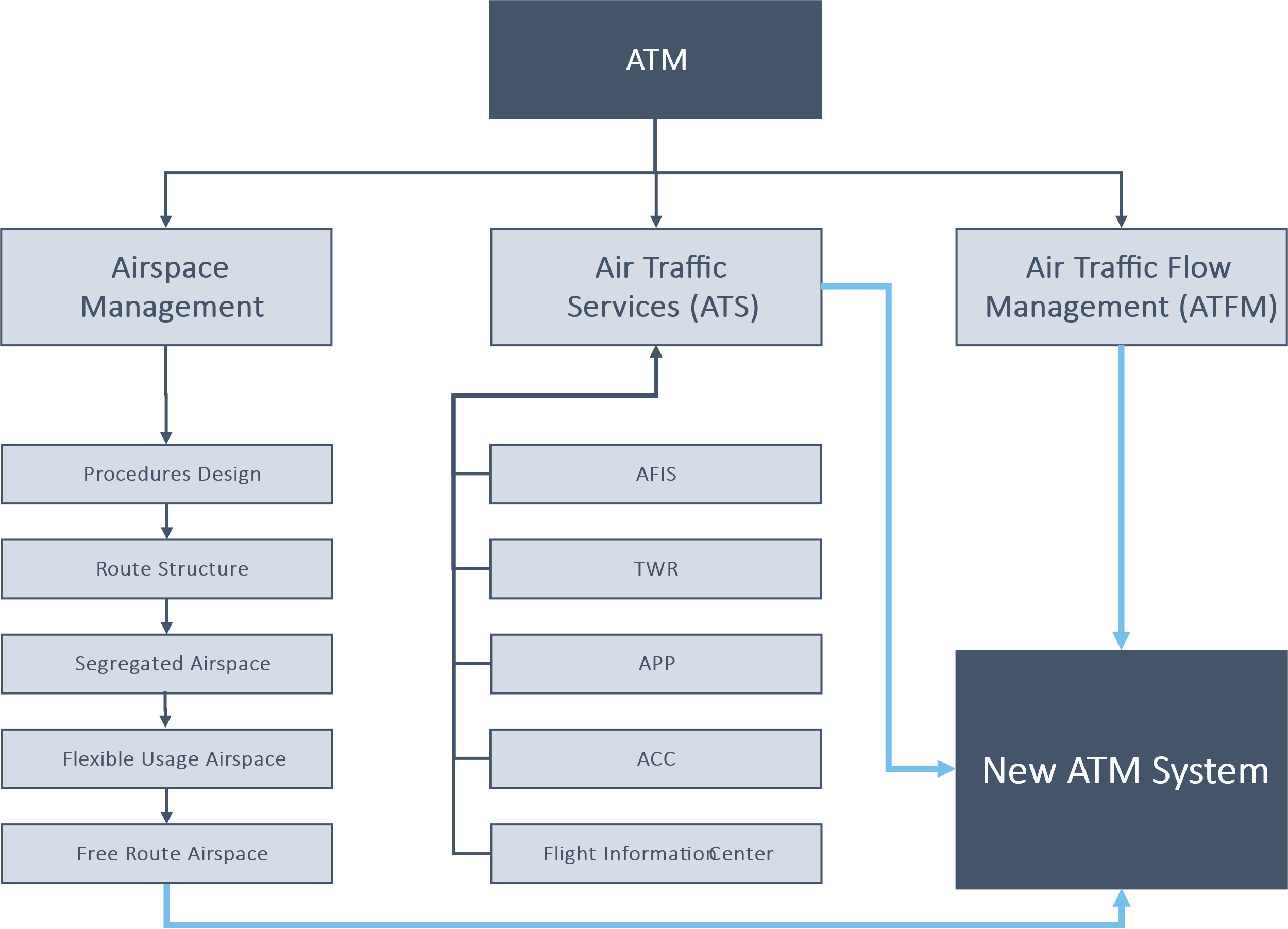


Figure 4 - ATM system and procedures

Aeronautical Information Management:

States should ensure that the provision of aeronautical data and aeronautical information covers its own territory and delegated areas over the high seas for which it is responsible for the provision of air traffic services.

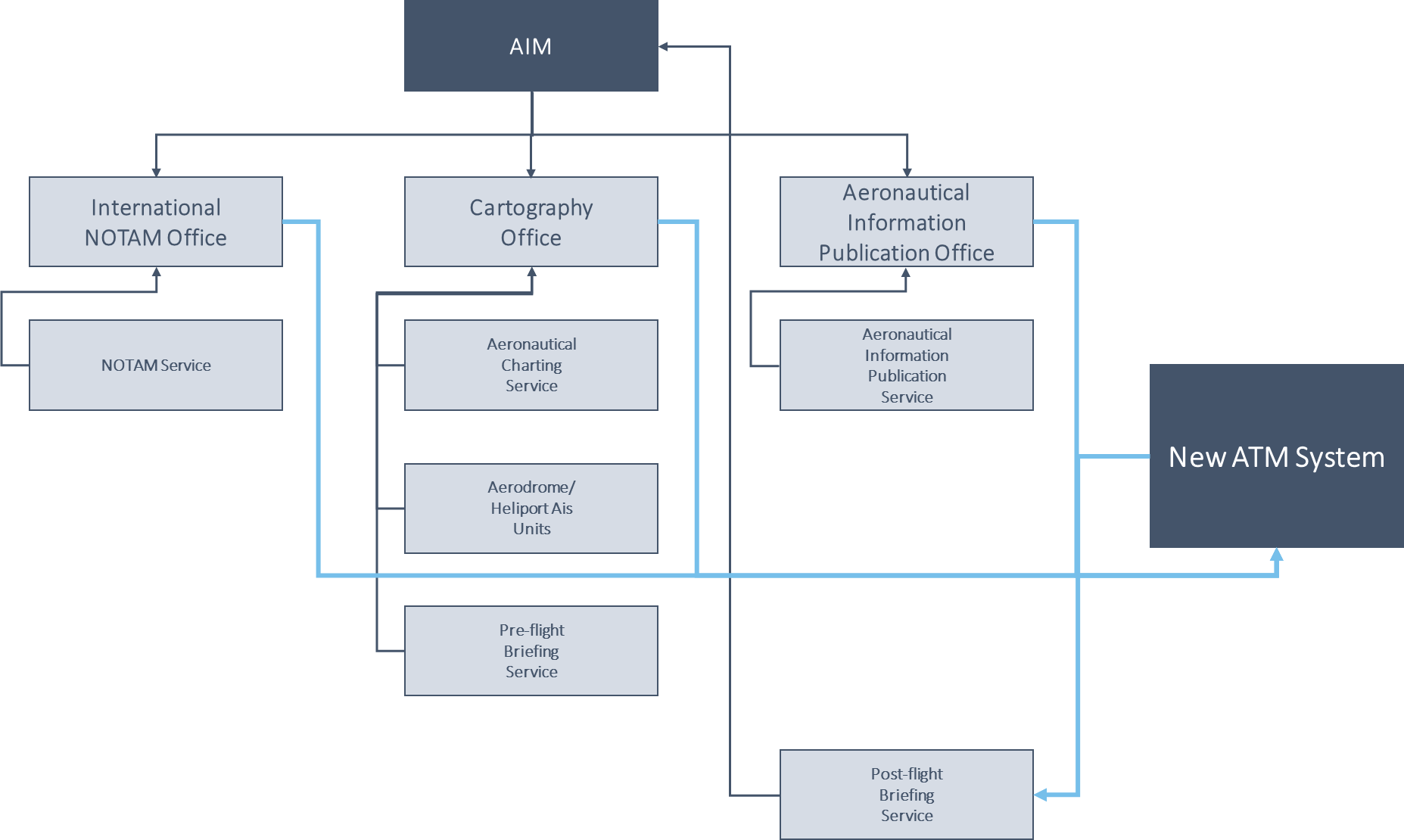


Figure 5 - AIM system and procedures

In a second stage it’s preconized the implementation of SWIM System Wide Information Management as natural evolution of the individual AIM systems of each Member State.

This will be according to the following major principles that must be archived in a collaborative and strategic manner by the Member States:

* Information must be shared securely on a system-wide basis;
* Pertinent information will be available when and where it is required;
* Information may be personalized, filtered, and accessed, as needed;
* Information sharing can be adjusted to mitigate any security concerns;
* Information management will use globally harmonized information attributes.

This presumes two ways of implementing SWIM:

* Share individual flight data through concerning processing AIM systems; and/or
* Establishing a dedicated centralized AIM database.

The first approach seems more likely to be implemented as it makes use of existing systems and provides more reliability considering the present strategic stage.

Meteorology:

Meteorological Terminal Air Report (METAR) must be made throughout the 24 hours of each day at intervals of one hour or half-hour at aerodromes.

Weather forecast is a statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace, and the following types of forecasts are regularly used in aviation:

1. Aerodrome Forecast;
2. Area or Route Forecast;
3. Special Forecasts; and
4. Other weather information.

Meteorological information must be disseminated by all the aviation stakeholders in all Member States.

Area and Route will be of crucial importance taking in consideration a future establishment of the FRA- Free Route Airspace and in a later stage of the 4D trajectory.

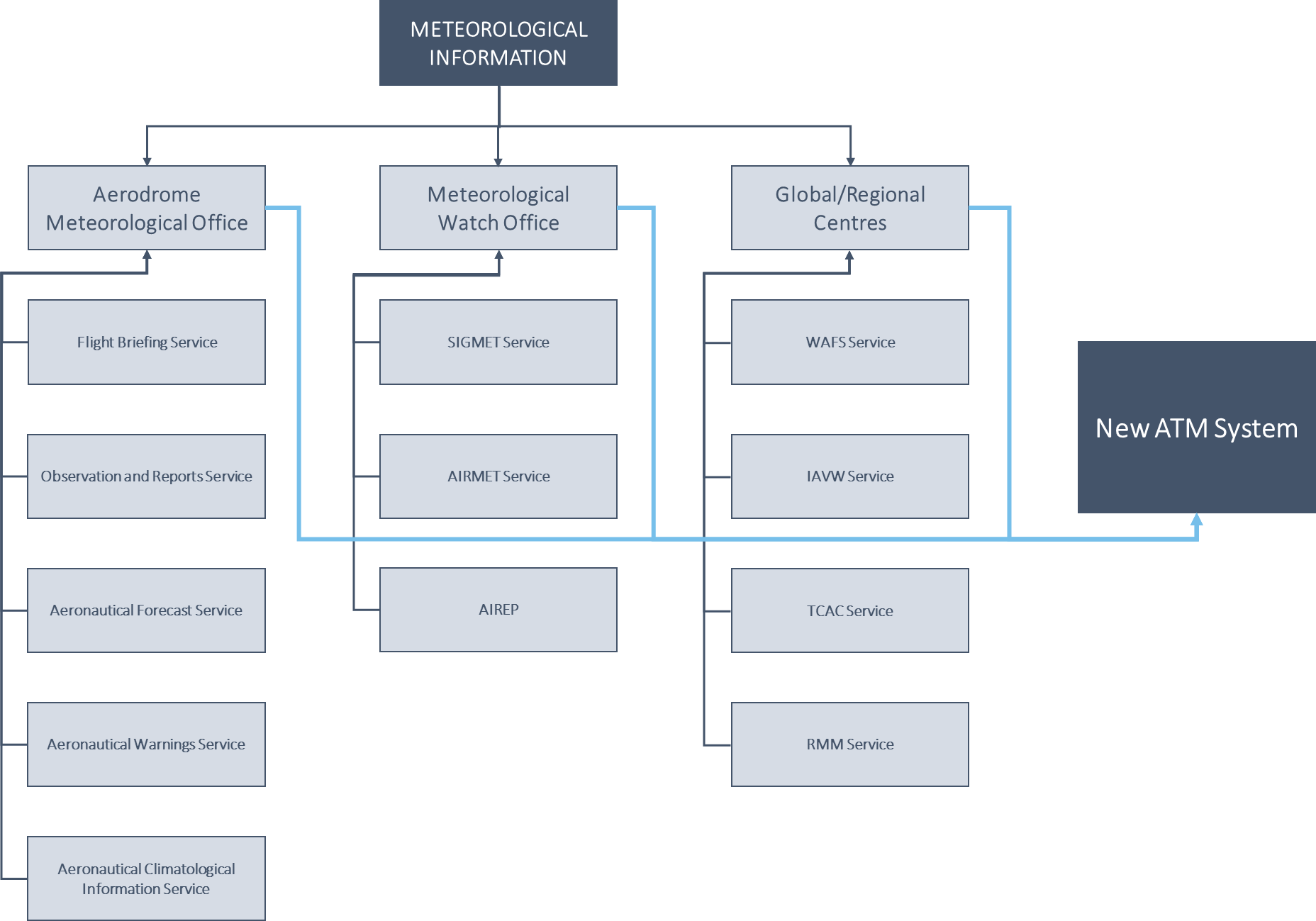


Figure 6 - Meteorological information systems and procedures

Search and Rescue

Each Member State should ensure that the provision of search and rescue services covers its own territory and those delegated areas over the high seas for which it is responsible for the provision of those services.

IAMSAR Manual (Doc 9731) provide guidance for a common aviation and maritime approach to organizing and providing SAR services and to ensure the interoperability and cooperation of Member States.

Member States that rely on military authorities and/or other sources for the provision of SAR facilities should ensure that adequate arrangements are in place for coordination of SAR.

Arrangements should be made to permit a call on any national services likely to be able to render assistance, and in cases where the minimum SAR facilities are temporarily unavailable, alternative suitable means should be made available.

It will be of fundamental importance the establishment of a regulatory and legal frameworks for a SAR joint operation by Member States taking in consideration the coordination for the use of Member States resources and improving the readiness of the SAR services.

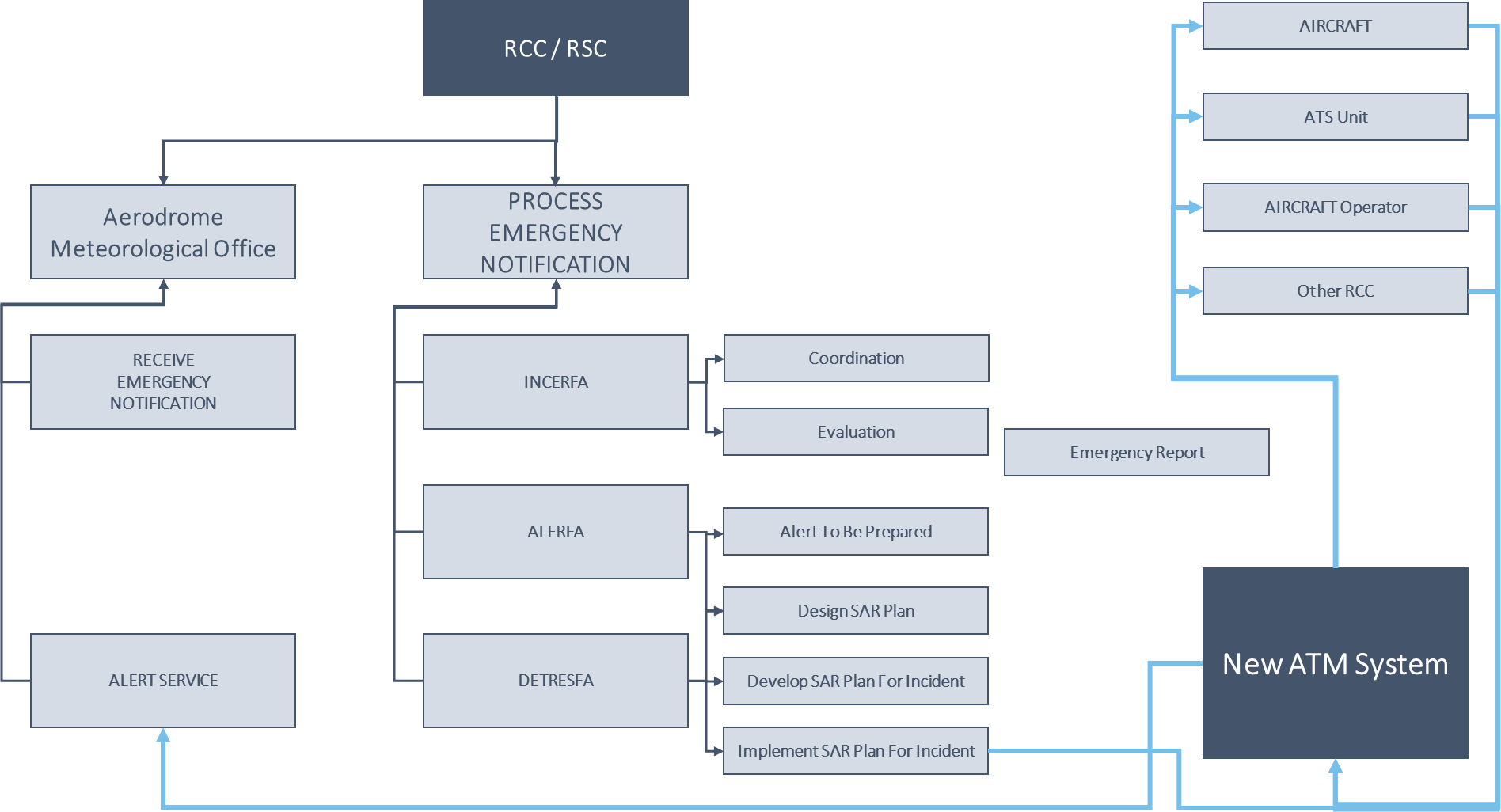


Figure 7 - Search and rescue procedures

Communications

The communications system must be reliable to allow for continuous operation without disruption.

Data circuits between ATS systems should provide for both high capacity and message integrity.

Voice over IP (VOIP) should be planned and/or implemented between ATS units for voice communications and should meet the ATS requirements.

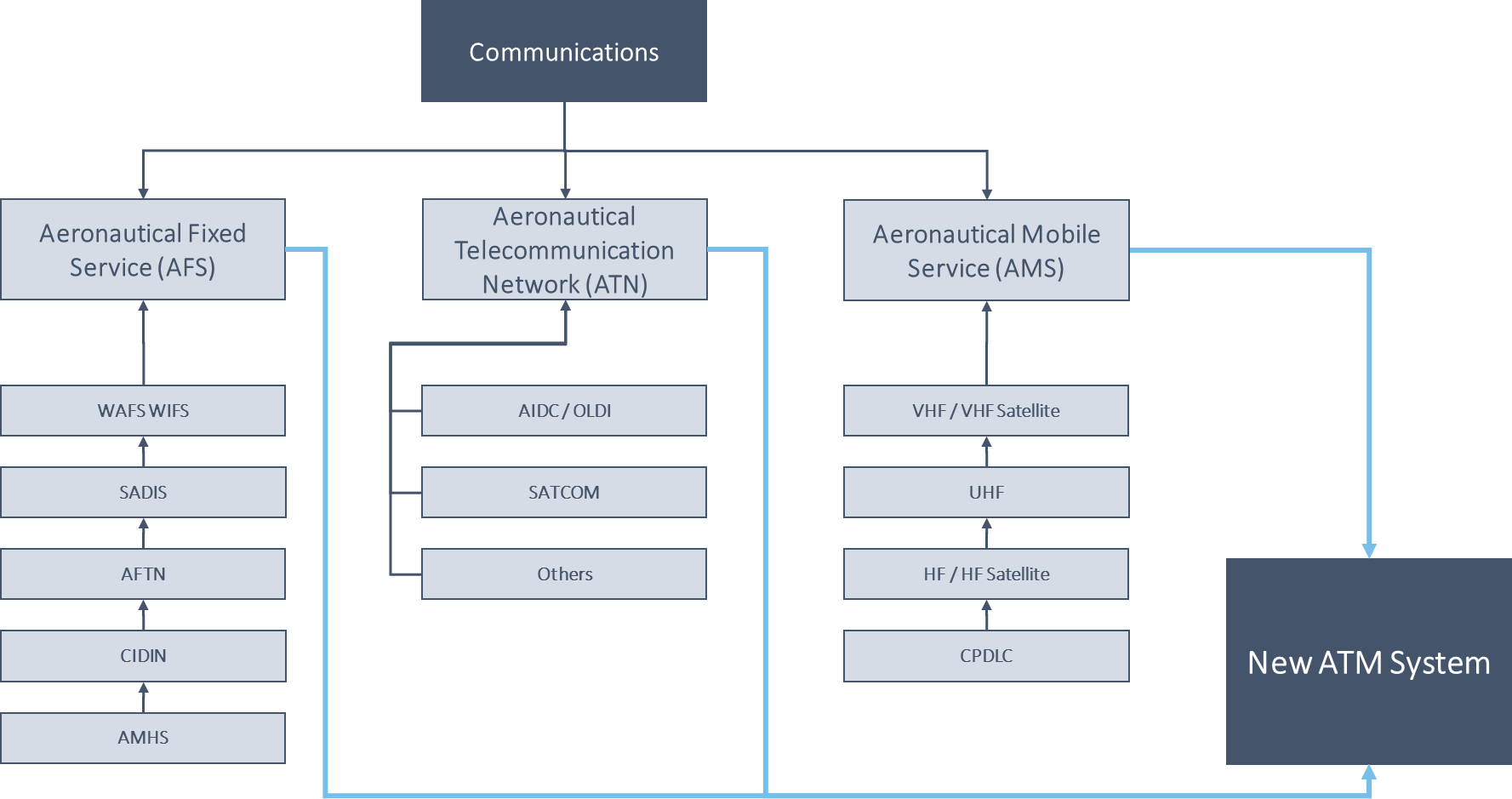


Figure 8 - Communications systems and procedures

One of the most important evolution to automated interoperable ATM systems is ATS Interfacility Data link Communications (AIDC) a datalink application that provides the capability to exchange tight data between automated ATM systems of different Air Traffic Services Units.

The installation of new ATM automation systems supporting AIDC data link application at various ATC units within the Member States will paved the way for implementing AIDC for automatic exchange of coordination messages with adjacent ATC units.

The implementation of AIDC application will significantly reduce the need for verbal coordination between ATS units allowing more time to controllers for resolving conflicts and processing flight crew requests.

Navigation

System should be composed of navigation aids, satellite-based navigation systems and airborne capabilities must meet the Performance-Based Navigation (PBN) requirements for all aircraft using Upper Airspace above FL245.

For the Seamless Upper Airspace it must be considered all the navigation aids with long range capabilities:

* VOR with and without associated DME;
* TACAN;
* NDB;

In relation to satellite-based navigation systems it must be considered:

* Basic GNSS, no augmentation;
* SBAS NAV/ADS-B;

PBN should be fully implemented according to the ICAO[[12]](#footnote-13) policies and SARP’s, and the expected evolution of the regional air navigation system will allow planning of airspace changes.

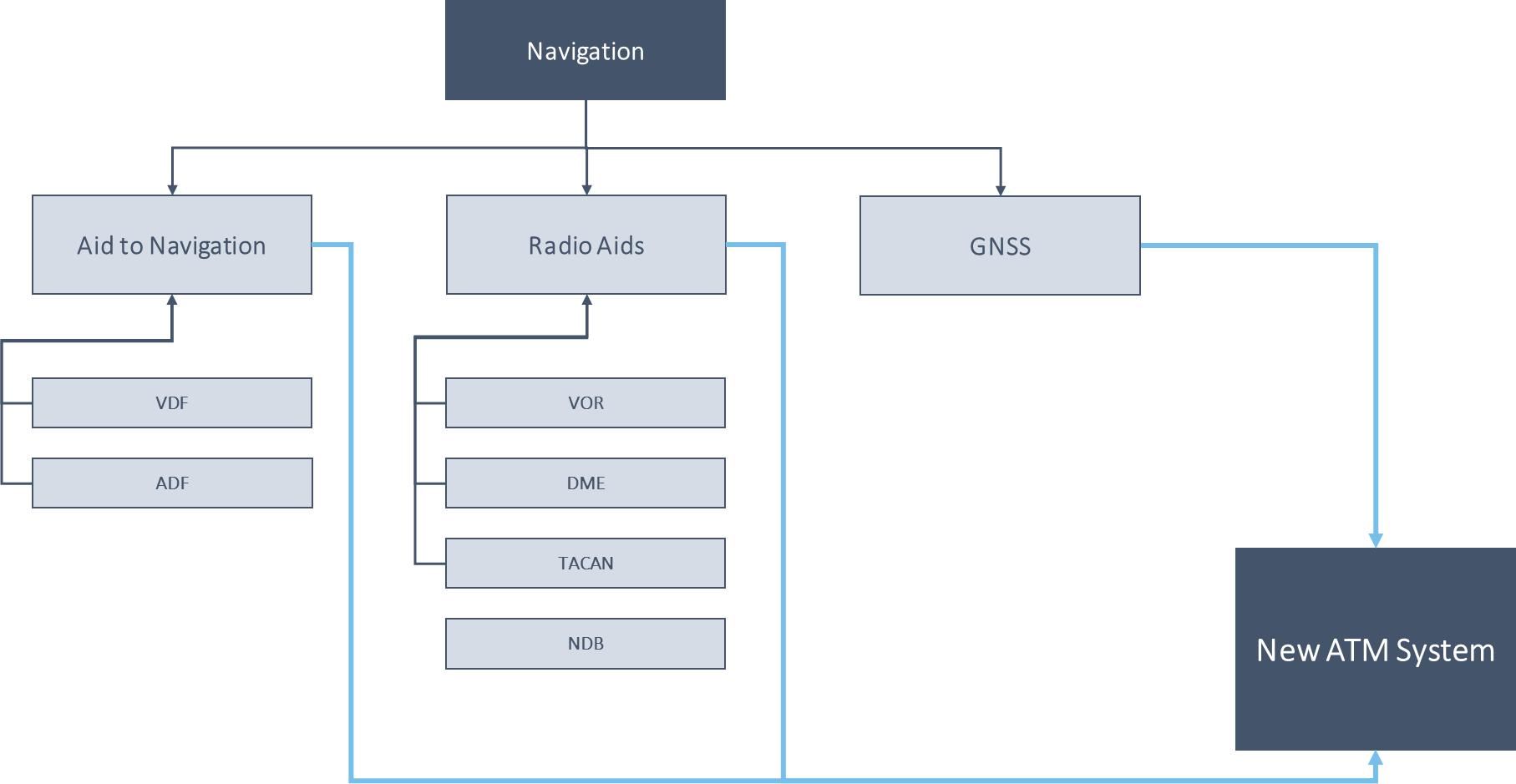


Figure 9 - Navigation systems and procedures

Surveillance

Planning of aeronautical surveillance systems should be made based on a system approach concept, where collaboration and sharing of data sources should be considered in support of an efficient use of the airspace.

Member States should ensure that implementation of Surveillance technologies is harmonised, and interoperable with respect to operational procedures, supporting data exchange *ASTERIX* language the *“All-Purpose Structured EUROCONTROL Surveillance Information Exchange”* for both civil and military applications.

Should be encourage the application of improved surveillance techniques that will reduce separation minima, enhance safety, increase capacity, and improve flight efficiency in a cost-effective manner.

In airspaces with radar surveillance implemented this must be integrated in the global ATM system.

Member States must give priority to the implementation of ADS-B systems in an initial phase and in a later phase complemented with WAM system where applicable.

Satellite based ADS-B and ADS-C must be implemented in remote and Oceanic Airspace.

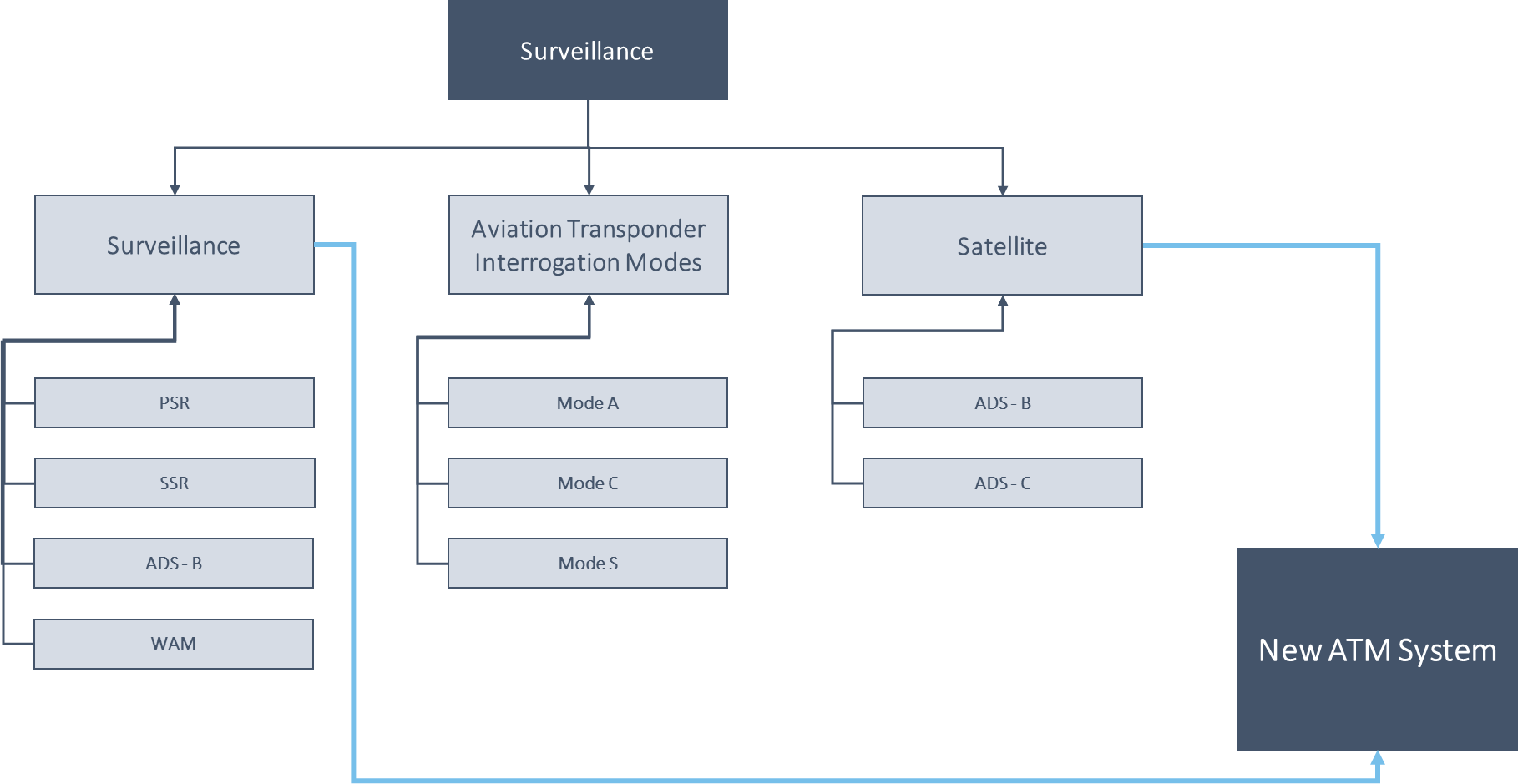


Figure 10 - Surveillance systems and procedures

Augmentation

The operating principles of ASEGNA SBAS[[13]](#footnote-14):

*Like the other satellite-based augmentation systems, ASEGNA SBAS aims to augment GNSS core constellations, such as GPS and GALILEO, by computing and broadcasting correction messages to the aircraft, thereby improving the navigation performances, and providing an integrity function.*

*GNSS core constellations have indeed important limitations, especially regarding the vertical accuracy and the availability, mainly for reasons related to observation of satellites. They do not guarantee the positioning, nor they alert users in case of errors.*

*GNSS core constellations are therefore only used for horizontal navigation operations, from en-route down to non-precision approaches, for which only lateral guidance is provided.*

*Through augmented performances, positioning with SBAS not only allows to provide a better horizontal guidance, but also and more importantly a vertical guidance, used for more advanced navigation operations such as precision approaches, equivalent to ILS CAT-I.*

*SBAS correction messages are computed by a ground segment and broadcasted to every aircraft in the service areas through one or several geostationary satellites, which constitutes the space segment. The correction messages are calculated by dedicated processing and check-set systems in the Mission Control Centres (MCC), using the GPS and GALILEO constellations data collected by a network of reference stations (NRS) whose geographic distribution allows to optimise the observations of the satellites and the propagation conditions of their signal. The messages are then transmitted to the space segment via the uplink stations (NBS).*

*Thus, this global infrastructure enables to provide a navigation service on a continental scale, without the need for local navigation and landing aids at airports.*

*The ionosphere of the equatorial region has a specific dynamic compared to high and mid- latitudes, leading to perturbations of GPS and GALILEO signals propagation. Dedicated and advanced correction algorithms have been developed, thanks to the research and development activities carried out together with the French Space Agency (CNES) in the frame of the SAGAIE project, positioning ASECNA at the cutting-edge of this technology issue in the world.*

*ASECNA SBAS signal will be compliant to ICAO and RTCA standards, and thus interoperable with the other SBAS, ensuring a seamless transition for aircraft flying to or arriving from other SBAS service areas.*

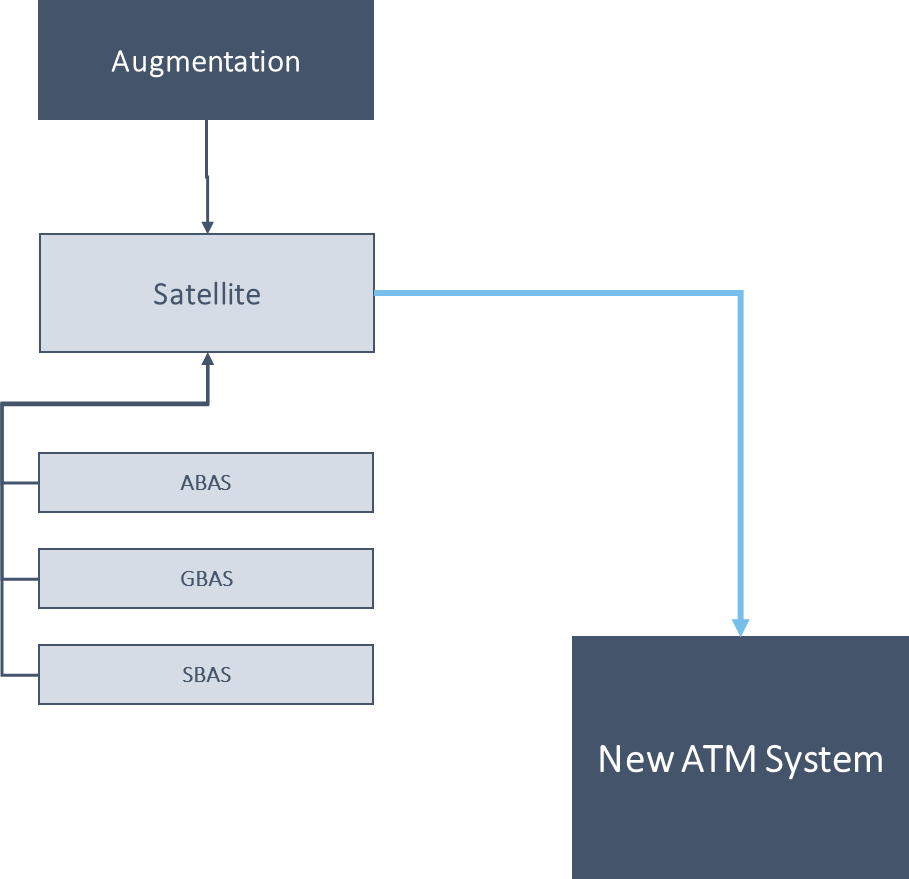


Figure 11 - Augmentation systems and procedures

Air Traffic Management interoperability

One of the biggest challenges is interoperability as the ability for two or more systems to work together seamlessly and allows a system to see itself as part of a larger whole, rather than an entity that operates in isolation from its surroundings.

This interoperability must be established in two different formats:

1. Throughout the Air Traffic Services Inter-Facility Data Communication (AIDC)[[14]](#footnote-15) ; and
2. Throughout the RAW information of some define elements of the National CNS/ATM system essential to the continuity of service and to maintain high levels of safety.

**Interoperability is Paramount.**

The ATM system should be fully compliant with ICAO CNS/ATM SARP’s to ensure the technical and operational interoperability and facilitate homogeneous and non-discriminatory global and regional traffic flows considering the following factors evaluation:

1. Interoperability and standardisation of Air Traffic procedures and systems;
2. Collaborative Decision-Making organisation and processes within Member States;
3. Procedures for the coordination of traffic;
4. Operational sectors capacity;
5. Individual operating and support systems interoperability.

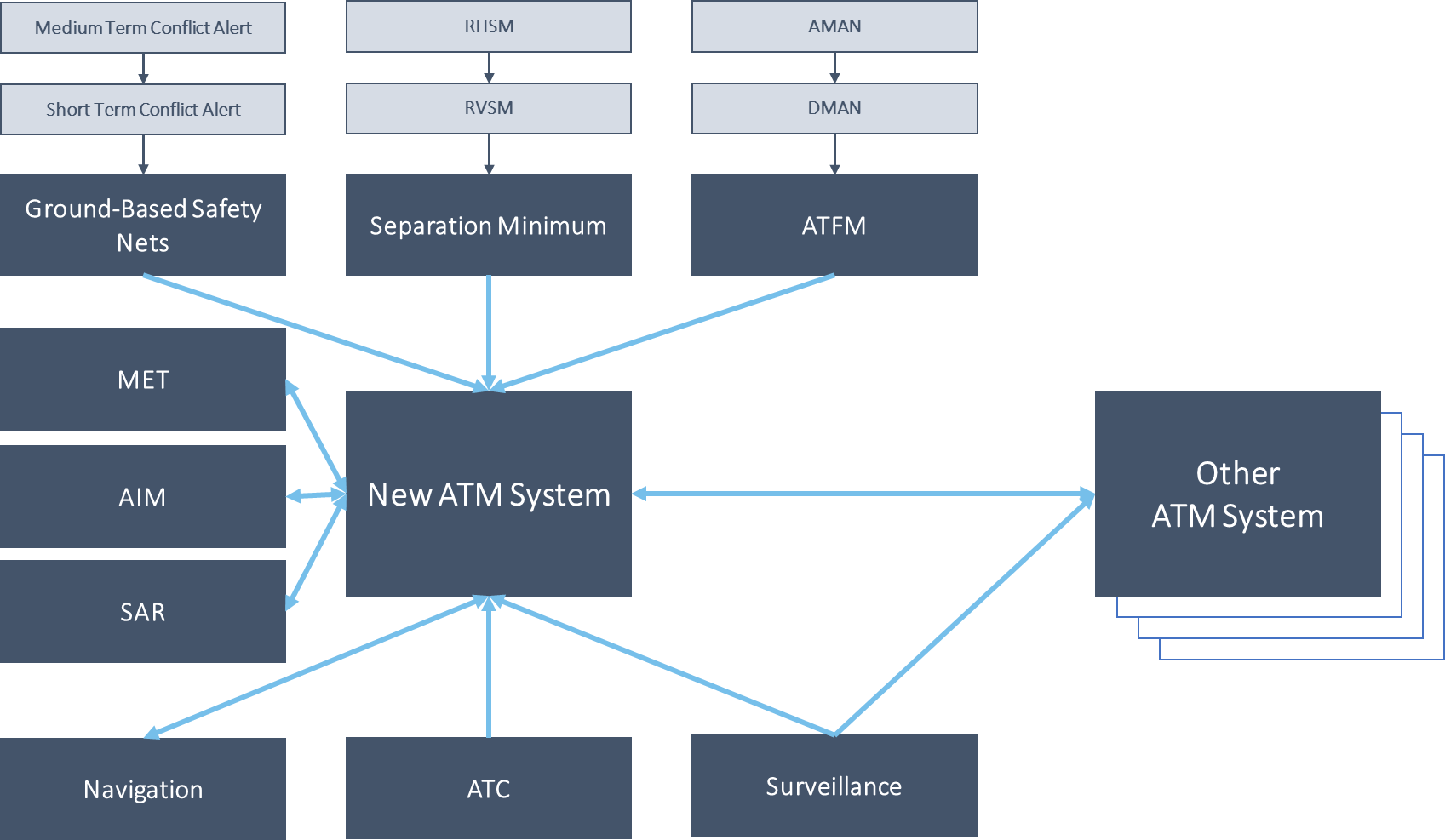


Figure 12 - ATM system interoperability deployment

The deployment of an interoperable CNS/ ATM system is the key to achieve an improved air navigation efficiency to support the projected traffic growth.

This interoperability can be reached by implementing the necessary changes to the actual Member States CNS/ ATM systems.

For this and according to our knowledge the following measures are recommended:

1. Implement a dedicated and centralized flight information system and/or joint entity to gather and distribute information to the Member States;
2. Standardisation of Air Navigation Services procedures, Local Operating Procedure (LOP’s);
3. Creating and/or strengthening existing agreements between adjacent;
4. Integrate various individual Member States CNS/ATM strategic planning efforts into a Regional CNS/ ATM strategic plan;
5. Establish a common framework for developing **Safety Management System (SMS)**, **Security Management System (SeMS)** and **Quality Management System (QMS)**;
   1. Previous and ongoing work/ studies on airspace integration in the EA-SA-IO Region

The tripartite agreement, 2008, between the three REC:

* Common Market for Eastern and Southern Africa (COMESA);
* East African Community (EAC);
* Southern African Development Community (SADC);

With 29 Member States, somehow, throughout the point “*9.2 Air Transport*” create the bases for the development and implementation of a regional air transport programmes covering:

* Upper Airspace Control Centre (UACC) project for communications, navigation, and surveillance/air traffic management (CNS/ATM) systems; EAC and SADC have completed studies for the creation of upper air spaces and COMESA is conducting a study to include non-EAC and non-SADC Member States in order to harmonise the air space;
* Air Transport Safety;
* Aviation Security; and
* Aviation Search and Rescue.

In the 22nd Meeting of the Africa-Indian Ocean Planning and Implementation Regional (Accra, Ghana, 29 July – 02 August 2019) it was presented an update to the tripartite agreement changing the concept of management a unified upper airspace to a seamless upper airspace.

In the current assignment the assumed position of five REC and the pertain projects of three REC have to be considered.

* + 1. COMESA Airspace Integration Project and key outcomes

The COMESA Airspace Integration Project was initiated in 2011 and comprises several components and consultancy services:

1. **The Establishment of a Cooperative Legal and Institutional Regional Framework:**

Consultancy services to support the COMESA countries concerned in determining the suitable legal, institutional, and operational framework; Secure agreement by the countries concerned to consolidate their upper airspaces into a seamless upper airspace; Build the partnerships needed for implementing the regional CNS/ATM;

1. **Technical and Financial Feasibility Study:**

Consultancy services to prepare detailed analysis of strategic technical and operations options for the provision of seamless upper airspace air navigation services using CNS/ATM systems and Make recommendations for implementation modalities (Egis study);

1. **Transaction Advisory Services:**

Consultancy services for the identification and structuring of a possible Public – Private Partnerships for the financing and implementation of CNS/ATM including prequalification, tendering, contract negotiations and overall legal, technical, and financial advice to the contracting authority up to financial close (not implemented);

1. **The Establishment of Regulatory Framework & Agency:**

The institutional capacity is intended to finance the formulation and harmonization of policies and regulations (e.g., safety, economic, environmental, performance regulations) and build the initial capacity to start up the multilateral regulatory agency for the seamless upper airspace. (NTU study);

1. **The Project Management, Monitoring and Evaluation and Audit:**

Supporting the setting up and operation of the PIU for project management, procurement, monitoring and evaluation. It also includes a provision for miscellaneous equipment, administration costs, and auditing of the technical assistance grant.

1. **Development of a Regional Institutional Framework For The Deployment Of Inter-Operable CNS/ATM Systems In The Eastern Africa, Southern Africa, And Indian Ocean Region**

In the framework of this Consultancy is the COMESA Unified Single Upper Airspace increasingly designated as the COMESA “Seamless” (Upper) Airspace which reproduces the COMESA Member States intentions to move towards the interoperability and harmonization between existing national CNS/ATM systems, and to a seamless, interoperable airspace, civil / military interface.

* + 1. EAC Seamless Upper Airspace Project and key outcomes

The EAC Treaty recognises the contribution of air transport in stimulating the region’s economy. Article 92 of the Treaty (Civil Aviation and Civil Air Transport) outlines a comprehensive system of co-operation among the Partner States in civil aviation and air transport. Specifically, Partner States are required to:

1. Adopt common policies for the development of civil air transport in the Community in collaboration with other relevant international organisations;
2. Undertake to make civil air transport services safe, efficient, and profitable;
3. Harmonise civil aviation rules and regulations, and establish common measures;
4. Establish a common EAC air space;
5. Establish common measures for the facilitation of passenger and cargo air services in the Community;
6. Co-ordinate the flight schedules of their designated airlines;
7. Consider ways to co-ordinate and jointly manage their air;
8. Encourage the joint use of ground services;
9. Agree to take common measures for the control and protection of the air space of the Community;
10. Adopt common aircraft standards and technical specifications for the types of aircraft to be operated in the Community; and
11. Co-ordinate measures and co-operate in the area of the security and rescue operations.

In 2007 the East Africa Community (EAC) established the Civil Aviation Safety and Security Oversight Agency (CASSOA) to provide a common framework and mechanism for the Member States to fulfil their international safety and security oversight obligations.

CASSOA’s main objectives can be summarised as to ensure co-ordinated development of the civil aviation safety and security oversight infrastructure in the Partner States through effective implementation of the international safety and security-related standards and recommended practices.

EAC develop a project for the “Establishment and Operationalisation of the EAC Unified Flight Information Region (UFIR)” with the objective to create a single block of upper airspace over Tanzania, Kenya, Uganda, Burundi, and Rwanda, operating from a single Area Control Centre (ACC).

Following the completion of the UFIR study and approval of the study report, EAC decided to undertake a follow-on study before the implementation of the project starts to address the following:

1. Expansion of the study to cover Burundi and Rwanda;
2. Sustainability of the lower airspace;
3. Safety analysis of the project; and
4. Implementation of the project.

In the Twenty Second Meeting of the Africa-Indian Ocean Planning and Implementation Regional (Accra, Ghana, 29 July – 02 August 2019) it was presented an update of the ongoing initiative within East African Community (EAC) in as far as management of the upper airspace over the Partner States is Concerned.

Implementation of seamless operations in upper airspace is a result of a successful study that addressed matters related to the establishment of an upper airspace system as outlined in the EAC treaty so as to ensure high level of safety and advantages in capacity, efficiency, and performance in the EAC Region Action:

EAC Treaty Chapter 15; Cooperation in Infrastructure and Services Article 92 (Civil Aviation and Civil Air Transport) requires the establishment of a Unified Upper Area Control System.

* A roadmap toward the establishment of an EAC Upper Flight Information Region (UFIR) controlled by one Upper Area Control Centre (UACC) was developed. USTDA funded a Feasibility Study for the EAC UFIR Project which included participation of FAA. The Feasibility Study was conducted by DORS Incorporated with final report presented in March 2009.
* Expansion of EAC to include Burundi and Rwanda, the need to assess sustainability of the lower airspace while keeping pace with technological advancement, necessitated EAC to undertake a Follow-On Study that was concluded and adopted for implementation in January 2016.
* The Follow-On study recommended seamless operations within EAC with Member States maintaining own FIR structure. Seamlessness will be achieved through utilization of existing and planned infrastructure and ATM systems in an interoperable manner without the need to establish a single large-scale unified Upper Area Control Centre system.

Beyond other conclusions and taking into account the investments within Member States to enable movement from ICAO ASBU Block 0 to Block 1, the project team redesigned the airspace that entails seamless operations. It is envisages sharing of CNS/ATM systems within Member States at the various control centres in a collaborative and interoperable manner.

* + 1. SADC And key outcomes

In 2011 the Minister’s responsible for Transport and Meteorology from the Southern African Development Community (SADC) adopted the SADC Model Civil Aviation Act and the SADC generic regulations and procedures for use by Member States as a basis for harmonisation of primary civil aviation legislation in SADC.

Ministers recommended to SADC Council of Ministers for approval the Draft Charter establishing the SADC Aviation Safety Organisation (SASO).

Ministers considered the implementation of the SADC Upper Airspace Control Centre (UACC) and directed the Secretariat to convene meetings of SADC-UACC stakeholders during 2012/13 to develop a strategy and roadmap for the implementation of the SADC –UACC Project.

In 2013 Minister’s responsible for Transport and Meteorology from the Southern African Development Community (SADC) recommend Member States to support implementation of the Tripartite CNS/ATM Systems Project in full collaboration with all stakeholders including Security Organisations at national and regional levels.

The results are the attainment of African seamless airspace and more usage of new technologies for better efficiency in CNS/ATM systems[[15]](#footnote-16).

* + 1. Consolidation of regional initiatives and outcomes

The integrated, single, unified airspace has been changed to a Seamless Upper Airspace above FL245 in all Member States, provided by national CAA’s and/or national ANSP’s Air Navigation Service Providers and interoperable CNS/ATM systems, co-operating towards air navigational safety and economic efficiency.

Was taken the decision to create a single Agency the Eastern and Southern Africa Airspace Agency (ESAAA), handling both safety and economic matters.

Separation of ANSP’s from the CAA’s enhances air traffic management (ATM) performance and instils public confidence in the ANSP and services provided.

Autonomy for the Air Navigation Services Provider (ANSP’s) and its separation from the Civil Aviation Authorities (CAA’s) is well-established in ICAO guidance material.

There is evidence that greater financial and operational autonomy of ANSP’s has encouraged a business approach to service delivery and an improved quality of service.

These challenges point out to regulatory and capacity constraints relating to:

* The absence of regionally harmonised regulation to stir market liberalisation and growth;
* The inadequate capacity to implement coordinated regional oversight of the sector; and
* The lack of strong national regulation to enforce international standards.

1. Overview of EA-SA-IO Member States’ Air Navigation Sector

* 1. Aviation stakeholders, survey and data gathering

Stakeholder engagement is vital to the success of any project and therefore it is important to document their influences and expectations and to develop an appropriate strategy to promote their engagement according to the power/interest matrix recommendations[[16]](#footnote-17).

The following selection of strategic stakeholders is proposed, which will support the analysis of the current CNS/ATM state.

According with IATA Continental Study, SAATM Stakeholders can be broadly classified under four major categories:

1. Supranational stakeholders, set the policy for the entire African continent;
2. National stakeholders, set policy in their home country and ensure implementation;
3. Development Partners, support the sustainable growth of African aviation through identified common aviation interests (e.g., safety, security, infrastructure, etc). and their financing activities tend to influence the decision-making process of the policy makers.
4. Regional Industry Stakeholders are responsible for the practical application of the agreed plan of action developed by the Policy Makers.

The project's stakeholders within the Member States will be grouped into three different groups depending on their degree of intervention in the project, namely:

1. **Global Strategic Definition:**
2. CAAs, to identify the institutional and regulatory framework and a future definition of changes, to be implemented, with the planned new definition for CNS/ATM and Air Space Management (ASM);
3. ANSPs, to identify the current CNS/ATM system and their capability to interoperate between flight information regions, Air Space Management Strategy and Area Navigation System implementation plan;
4. Designed Military Liaisons, to identify the existing means of coordination and identify the state of operational implementation of Air Space Management (ASM) and the possible changes to be implemented.
5. RECs, to identify their role, existing regional airspace management/ integration initiatives or frameworks and their level of maturity in supporting the establishment of a regional seamless upper airspace.
6. **Operational entities in the sector:**
7. Determine the current KPI’s employed to determine efficiency in Air Navigation Services
8. **Other Entities:**
9. Other stake holders designated by the Member States with relevance for the development of the CNS/ATM framework;
10. Designated development partners may be involved under COMESA proposal;
11. Some of the Member States delegates the provision Air Navigation Services and those should be considered as relevant.

The consultant and COMESA worked together in the design of a survey to gather stakeholders’ inputs, which was afterwards sent to the Member States CAA’s and ANSP’s to answer the questionnaires and facilitating follow-up discussions.

From all the Member States allocated to this study only four has answer the questionnaires:

* Ethiopia
* Mauritius
* Mozambique
* Zambia

From the inception of this study update, stakeholder interaction and support has been considered as two of the most critical factors to identify and collect the necessary data to this project’s successful development.

A detailed review was conducted of the data supplied and a research and analysis of available public data was made. As a result, conclusions were required by the consultant to determine which Member States provided sufficient and effective data in order to be able to conduct a timely and meaningful analysis, and the following criteria was adopted:

1. Group 1 – Member States included in the study;
2. Group 2 – Member States not included as they did not submit data;

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Member State** | **Group 1** | **Group 2** | **Member State** | **Group 1** | **Group 2** |
| Angola | AIP 2013 | No data released | Mauritius |  | No data released |
| Botswana |  | No data released | Mozambique |  | No data released |
| Burundi |  | No data released | Namibia | AIP 2021 | No further data released |
| Comoros | AIP 2022 | Upper Airspace Delegated | Reunion |  | Upper Airspace Delegated |
| Djibouti | AIP 2013 | Upper Airspace Delegated | Rwanda | AIP 2021 | No data released |
| DRC |  | No data released | Seychelles |  | No data released |
| Egypt |  | No data released | Somalia |  | No data released |
| Eritrea |  | No data released | South Africa | AIP 2022 | No data released |
| Eswatini |  | Upper Airspace Delegated | South Sudan | AIP 2021 | No data released |
| Ethiopia |  | No data released | Sudan |  | No data released |
| Kenya |  | No data released | Tanzania |  | No data released |
| Lesotho |  | No data released | Tunisia |  | No data released |
| Libya |  | No data released | Uganda |  | No data released |
| Madagascar | AIP 2022 | No further data released | Zambia |  | No data released |
| Malawi |  | No data released | Zimbabwe |  | No data released |

Survey Analise was not made as there was no answers to the survey, just as it was not possible perform interviews and confirm the effectiveness of the data provided due to the inexistent consultant visit

* 1. Functional mapping of Air Navigation Service Provision

Functional separation between CAAs and air navigation services providers (ANSP), will be essential to promote effectiveness, transparency, and accountability, which enable the EA-SA-IO Member States to be better placed to comply with international aviation requirements and to compete at global level.

Autonomy for the Air Navigation Services Provider (ANSPs) and its separation from Civil Aviation Authorities (CAAs) is well-established in ICAO guidance material.

According with ICAO recommendations:

*Autonomy for the air navigation services provider, and its separation from the regulatory oversight function is well-established in ICAO guidance material. It is evidenced that greater financial and operational autonomy for the ANSP has encouraged a business approach to service delivery and an improved quality of service.*

*Separation of ANS provision from the regulatory oversight function enhances ATM performance and instils public confidence in the ANSP and the services it provides. Separation of provision from regulation is consistent with principles of good governance; the regulatory oversight function must be seen as independent and transparent.*

It’s recommended that Member States take appropriate measures to observe ICAO guidance material and proceed with the spinoff of ANSP’s from regulatory bodies CAA’s.

In the following tables the member states that haven’t proceeded with activities’ spin-off and those that have already separated bodies are identified.

Table 3 -Member States without organizationally separation between ANSP and CAA

|  |  |  |  |
| --- | --- | --- | --- |
| **Member State** | **CAA / ANSP** | **Member State** | **CAA / ANSP** |
| Botswana | CAAB | Reunion | France AIP |
| Burundi | AACB | Seychelles | SCAA |
| Eritrea | ER-CAA | Somalia | SCAA |
| Ethiopia | ECAA | South Sudan | SSCAA |
| Kenya | KCAA | Sudan | SCAA |
| Libya | LYCAA | Tanzania | TCAA |
| Malawi | DCA | Tunisia | OACA |
| Mauritius | DCA | Uganda | UCAA |
| Mozambique | IACM | Zambia | ZCAA |
| Namibia | NCAA | Zimbabwe | CAAZ |

Table 4 - Member states with functionally separated ANSP

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Member State | Spin Off Date | CAA | ANSP |  |
| Angola | 2008 | ANAC | ENANA |  |
| Comoros | 2004 | ANACM | ASEGNA | Above FL245 ATC delegated to Madagascar |
| Djibouti | 2021 | AAC | D-APP | Above FL245 ATC delegated to Ethiopia |
| DRC | 2012 | ANAC | ASEGNA |  |
| Egypt | 2001 | ECAA | NANSC |  |
| Eswatini | 2019 | ECAA | AANS | Above FL245 ATC delegated to South Africa |
| Lesotho | 2009 | SACAA | ATNS | Above FL245 ATC delegated to South Africa |
| Madagascar | 2006 | ACM | ASEGNA |  |
| Rwanda | 2019 | RAC | RCAA |  |
| South Africa | 2009 | SACAA | ATNS |  |

* 1. Existing Infrastructure and Procedures

Since no information was released related to the infrastructure of member states’ ANS and which procedures are implemented on those ANS, the following theorical framework diagram is assumed, based on the consultant’s experience:

Uma imagem com texto, captura de ecrã, monitor, preto

Descrição gerada automaticamente

Figure 13 - Assumed existing ANS framework

This diagram will represent the following services included in ANS:

1. **Air Traffic Management (ATM);**
2. **Aeronautical Information Services (AIS);**
3. **Meteorologic Services (MET);**
4. Search And Rescue (SAR);
5. **Communications, Navigation and Surveillance (CNS)**
6. **Air Traffic Management (ATM) encompasses:**
   1. **Air Traffic Services (ATS);**
   2. **Air Traffic Flow Management (ATFM); and**
   3. **Air Space Organisation and Management (ASM).**
7. **Air Traffic Services comprise:**
   1. **Flight Information Services; and**
   2. **Alerting Services.**
   3. **Air Traffic Control:**
      1. **Area Control;**
      2. Approach Control;
      3. Tower control;

To complement the functional map, it’s necessary to evaluate the key elements of the CNS/ATM Study:

1. Data collected during the study from CAA’s and/or ANSP’s and involved / concerned stakeholders;
2. Provide an up-to-date picture of the provided ANS developments in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region;
3. Link International Civil Aviation Organization (ICAO) GANP and relevant ASBU B0 and/or B1 with regional plan’s and Member States activities, to identify areas for an interoperable harmonised CNS/ATM;
4. Identify gaps in CNS/ATM in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region and set rational objectives to build capability to solve the issues identified;
5. Formulate solid recommendations to enhance its coordination and planning taking in consideration regional and Member State’s initiatives in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region;
6. Evaluate and support the implementation of the capacity and proficiency of key elements such as PBN, ATFM, Aeronautical Information Service (AIS) and transition to Aeronautical Information Management (AIM), and Air Navigation Strategy for the region and for Member State’s.

None of these actions could be performed and so the consultant reviewed the available Aeronautical Information Publications (AIPs) applicable to the Member States, and complements his perception of airspace, ATM procedures and CNS infrastructure to assess the current and projected CNS and ATM capabilities in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO).

The assessments of current ATM capabilities that will deliver accurate ATM procedures for safe, orderly, and efficient ATM within the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) while considering the needs/limitations of the stakeholder community.

Performing the assessment of the current operation was to collect and compare the ICAO and Regional Sub-Group requirements and guidelines for the current and intended CNS/ATM systems.

These requirements and guidelines were collected from sources which include GANP, CANSO Key Performance Indicators (KPI’s), etc. The operational topics were further sub-divided, although not uniformly and across all operational topics, into sections that included categories:

1. General Regional Requirements
2. Specific Requirements
3. Current Provided Services
4. Current Capabilities
5. Quality of Services

In addition, an effort was made to categorize the FIRs to support the concept of “***one size does not fit all***” and the concept integration of ICAO ASBU methodology. Member States were grouped as High, Medium, and Low activity based AFI Air Navigation Plan, VOLUME II, “***Homogeneous ATM area / Major traffic flows / routing areas***”:

Table 5 - Area of routing identification

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Area of routing (AR)** | **Homogeneous Areas and/or Traffic flows** | **FIRs involved** | **Type of area covered** | **Remarks** |
| AR1 | Europe – South America (EUR/SAM) (oceanic) | Dakar Oceanic,  Sal Oceanic | Oceanic en-route low density in southern part and oceanic high density in northern part | Major traffic flow EUR/SAM |
| AR2 | Atlantic Ocean interface between the AFI, NAT and SAM Regions | Accra, Dakar, Johannesburg Oceanic Luanda,  Sal | Oceanic en-route low density | Homogeneous ATM area AFI/NAT/SAM |
| AR3 | Europe – Eastern Africa routes Including the area of the Indian Ocean | Addis Ababa Antananarivo, Asmara,  Dar-es-Salaam, Entebbe, Khartoum, Mauritius, Mogadishu, Nairobi, Seychelles | Continental en-route/ oceanic low density | Major traffic flow AFI/EUR |
| AR4 | Europe to Southern Africa | Beira, Brazzaville, Cape Town, Gaborone,  Harare, Johannesburg, Kano,  Kinshasa, Lilongwe,  Luanda,  Lusaka, N’Djamena, Niamey, Windhoek | Continental en-route low density | Major traffic flow AFI/EUR |
| AR5 | Continental Western Africa including coastal areas | Accra,  Dakar,  Kano,  N’Djamena, Niamey,  Roberts | Continental/oceanic low density | Homogeneous area AFI |
| AR6 | Trans-Indian | Antananarivo, Bombay, Johannesburg Oceanic,  Male,  Mauritius, Melbourne, Seychelles | Continental high density | Homogeneous ATM area AFI/ASIA |

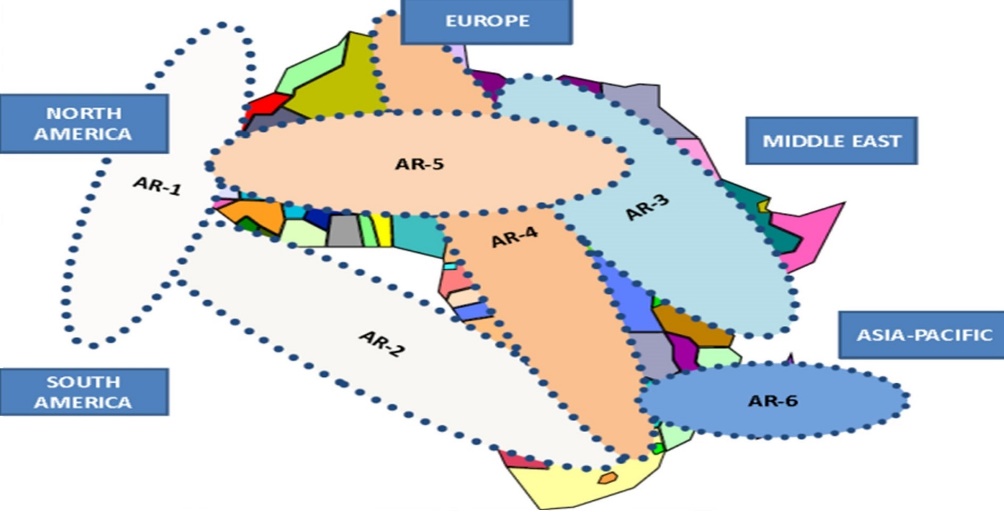


Figure 14 - Area of routing's location[[17]](#footnote-18)

* + 1. Gap Analysis and Findings

The key to a gap analysis is to decide on the points and the time at which the gap will be assessed.

In performing the gap analysis, two factors should be considered primarily and not to be compromised: safety and security. Evaluated gaps in functionalities to meet forecasted activity demand and expected ABSU integration model.

Using data provided by States in the surveys, the progress was analysed made towards reaching the objectives in the GANP ASBU plan in the two Performance Improvement Areas:

1. PIA 2 – Globally Interoperable Systems and Data;
2. PIA 3 – Optimum Capacity and Flexible Flights

Gaps are presented by noting the current status of the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Member States towards meeting the targets in each of the Performance Improvement Areas and in findings in the areas of:

1. ANSP Interoperability;
2. Airspace Policy/Procedures;
3. Separation Standards;
4. Routing;
5. Contingency and Growth Planning;
6. Civil-Military;
7. Traffic Flow Management;
8. Collaborative Decision Making;

The findings in current facilities and services are primarily derived from the surveys provided by the Member States and a review of any internal documents that were submitted.

Unable to conduct direct observation of the air traffic operations in the Member States, consultant depend primarily on the responses to the questions in the survey, ICAO documents, and the limited amount of internal documentation provided.

Web searches for detailed air traffic control policies and procedures, as well as working practices, were attempted but yielded little result.

None of the Member States provided responses to the survey allowing the opportunity to attempt to assess the picture of the current state.

* + 1. Navigation Systems in Member States

Assessment of the navigation systems, airspace organization, ATS Route Structure, and FUA was done largely through literature review.

The provision of navigation services in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Member States is currently comprised of:

1. Ground-based radio navigation equipment (e.g., VOR, TACAN, DME and NDB);
2. GNSS (GPS) capability.

The advent of Global Navigation Satellite Systems (GNSS), mainly in the specific form of GPS, has now brought a completely new opportunity to derive an accurate position over an area not restricted by the disposition of ground transmitters.

The following table describe various types of ground-based area navigation facilities[[18]](#footnote-19).

Table 6 - Ground based area navigation facilities

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **GNSS** | **VOR** | **DME** | **NDB** | **TACAN** | **VDF** | **Remarks** |
| Angola | YES | 5 | 5 | 26 |  |  |  |
| Botswana |  | 5 | 4 | 9 |  |  |  |
| Burundi |  |  | 1 | 8 |  |  | Above FL245 ATC delegated to Tanzania |
| Comoros |  |  | 1 | 2 |  |  | Above FL245 ATC delegated to Madagascar |
| Djibouti | NIL | YES | 1 | 1 | 1 | YES | Above FL245 ATC delegated to Ethiopia |
| DRC |  | 6 | 9 | 41 |  |  |  |
| Egypt |  |  | 18 | 18 |  |  |  |
| Eritrea |  |  | 1 | 2 |  |  |  |
| Eswatini |  | 1 | 1 | 2 |  |  | Above FL245 ATC delegated to South Africa |
| Ethiopia |  |  | 1 | 10 |  |  |  |
| Kenya |  |  | 10 | 0 |  | YES |  |
| Lesotho |  |  | 1 | 3 |  |  | Above FL245 ATC delegated to South Africa |
| Libya |  | 1 | 9 | 38 |  |  |  |
| Madagascar |  |  | 3 | 26 |  |  |  |
| Malawi |  |  | 4 | 7 |  |  |  |
| Mauritius |  |  | 5 | 9 |  |  |  |
| Mozambique |  | 1 | 5 | 12 |  |  |  |
| Namibia | YES |  | 4 | 11 |  |  |  |
| Reunion |  |  |  |  |  |  |  |
| Rwanda |  |  | 1 | 9 |  |  |  |
| Seychelles |  | 2 | 1 | 11 |  |  |  |
| Somalia |  |  |  |  |  |  |  |
| South Africa | NIL | 29 | 35 | 3 | YES | YES |  |
| South Sudan | YES |  | 2 |  |  |  |  |
| Sudan |  |  | 8 | 16 |  |  |  |
| Tanzania |  | 1 | 2 | 21 |  |  |  |
| Tunisia | YES | 3 | 12 | 8 |  |  |  |
| Uganda |  |  | 2 | 5 |  |  |  |
| Zambia |  | 1 | 3 | 17 |  |  |  |
| Zimbabwe |  |  | 6 | 29 |  |  |  |

* + 1. Existing Communication Systems in Member States

Assess the communication systems was done largely through literature review.

The following Member States information comes from the AIP analyses:

Table 7 - Member states implemented communication systems

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **VHF** | **UHF** | **HF** | **Data CPDLC** | **VHF Satellite** | **HF Satellite** | **SATCOM** | **AMHS** | **AIDC** | **Others\*** | **Remarks** |
| Angola | YES | YES | YES | YES |  |  |  | YES |  |  |  |
| Comoros | YES |  |  |  |  |  |  |  |  |  | Above FL245 ATC delegated to Madagascar |
| Djibouti | YES | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL | Above FL245 ATC delegated to Ethiopia |
| Eswatini | YES | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL | Above FL245 ATC delegated to South Africa |
| Lesotho |  |  |  |  |  |  |  |  |  |  | Above FL245 ATC delegated to South Africa |
| Madagascar | YES | YES | YES |  |  |  |  |  |  |  |  |
| Namibia | YES | YES |  |  | YES |  |  |  |  |  |  |
| Reunion |  |  |  |  |  |  |  |  |  |  |  |
| Rwanda | YES | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL | Above FL245 ATC delegated to Tanzania |
| South Africa | YES | YES | YES | YES |  |  |  | YES | YES | YES |  |
| South Sudan | YES | YES | YES |  |  |  |  |  |  |  |  |
| Tunisia | YES | YES |  |  |  |  |  |  |  |  |  |

This information expresses the indication of existing aeronautical telecommunication facilities, but there is no information about the conditions of the aeronautical telecommunications in terms of coverage and quality of services and if they meet the general regional/specific requirements.

* + 1. Status of Surveillance Systems implementation in Member States

Assess the surveillance systems, was done largely through literature review.

The following Member States information comes from the AIP analyses, and the “*COMESA Airspace Integration Project*”:

Table 8 - Member states implemented surveillance systems

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PSR** | **SSR** | **WAM** | **ADS-B** | **ADS-B Satellite** |  | **Modes A/C** | **Mode S** |  | **ADS-C** | **Remarks** |
| Angola | NIL | NIL | NIL | NIL | NIL |  | NIL | NIL |  | NIL |  |
| Comoros |  | YES |  |  | YES |  | YES |  |  | NIL | Above FL245 ATC delegated to Madagascar |
| Djibouti | NIL | YES | NIL | NIL | NIL |  | NIL | NIL |  | NIL | Above FL245 ATC delegated to Ethiopia |
| Egypt |  | YES |  |  |  |  | YES |  |  |  |  |
| Eswatini |  |  |  |  |  |  |  |  |  |  | Above FL245 ATC delegated to South Africa |
| Ethiopia |  | YES |  |  |  |  | YES |  |  |  |  |
| Lesotho |  |  |  |  |  |  |  |  |  |  | Above FL245 ATC delegated to South Africa |
| Libya |  | YES |  |  |  |  | YES |  |  |  |  |
| Namibia | NIL | YES | YES |  |  |  | YES |  |  |  |  |
| Reunion |  |  |  |  |  |  |  |  |  |  |  |
| Rwanda | NIL | YES | NIL | NIL | NIL |  | YES | YES |  | NIL | Above FL245 ATC delegated to Tanzania |
| South Africa | YES | YES |  |  |  |  | YES | YES |  | YES |  |
| South Sudan |  |  |  |  |  |  | YES | YES |  |  |  |
| Uganda | YES |  |  |  |  |  | YES |  |  |  |  |
| Zambia | YES |  |  |  |  |  | YES |  |  |  |  |
| Zimbabwe | YES |  |  |  |  |  | YES |  |  |  |  |

This information expresses the indication of existing surveillance facilities, but there is no information about the conditions of the surveillance facilities in terms of coverage and quality of services and if they meet the general regional/specific requirements.

ASECNA[[19]](#footnote-20) report this SSR coverage from his Member States, but for the present study only the part of Madagascar is included, but the service quality16 is reported as limited:



Figure 15 – Madagascar SSR coverage according to ASECNA

Beyond this information, South Africa[[20]](#footnote-21) is in the final phase of ADS-B implementation, but there no further information about this mandate.

Namibia is in course to implement a Wide Area Multilateration System (WAM) to cover all the territory, but there is no further information available.

* + 1. Air Traffic Management Systems in Member States

Integration of information and interoperability is the base for ATM systems, assess the current ATM systems was based on literature review.

The following table information arise from the AIP analyses:

Table 9 - Member-states with information about ATM systems conditions

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Member-state** | **ATS: Conflict management** | **Air Traffic Control** | **RHSM** | **RVSM** | **Alert detection**  **and warning systems** | **Search and Rescue** | **Decision support**  **systems (ATFM)** | **AMAN/DMAN** | **Remarks** |
| Angola | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL |  |
| Djibouti | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL | Above FL245 ATC delegated to Ethiopia |
| Eswatini |  |  |  |  |  |  |  |  | Above FL245 ATC delegated to South Africa |
| Lesotho |  |  |  |  |  |  |  |  | Above FL245 ATC delegated to South Africa |
| Namibia | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL |  |
| Rwanda | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL |  |
| South Africa | NIL | NIL | NIL | NIL | NIL | NIL | NIL | NIL |  |

* + 1. Aeronautical Information Services in Member States

Assess the current AIS systems was based on literature review.

One key enabler of the ATM system concept is interoperability. It is essential that the new definition of aeronautical data is provided in a common, system and platform independent format (or a set of harmonised formats attained by the Member States ATM systems) within an information management system to ensure consistency, authenticity, and appropriate coverage of the data, and to provide accessibility to the data by all users of the ATM network, both on the ground and in the air.

The enlarged scope of Aeronautical Information Management (AIM) includes all categories of information required to support the new ATM system.

Under the ICAO ATM Concept, global airspace will continue to evolve to become a virtual continuum to be efficiently organised and managed for the benefit of all airspace users, civil or military. Its management will fine tune airspace operations to maximise the use of available capacity and to deliver further increases in safety and efficiency for all phases of flight.

In consequence, traditional AIS will need to make the transition to AIM and then to Information Management, a process characterised by the increasing application of the “all embracing” System Wide Information Management (SWIM) principles. Information Management will be fully SWIM based; in fact it will become the instantiation of SWIM in the aeronautical environment.

Some of the Member States refers the transition from AIS to AIM and later to SWIM but there is no reliable information about this process.

* 1. Regional ASBU framework implementation timeline within Member States in the EA-SA-IO region

One expected timeline can be the following but of course it will depend of the harmonization of the timelines defined within the Member States:

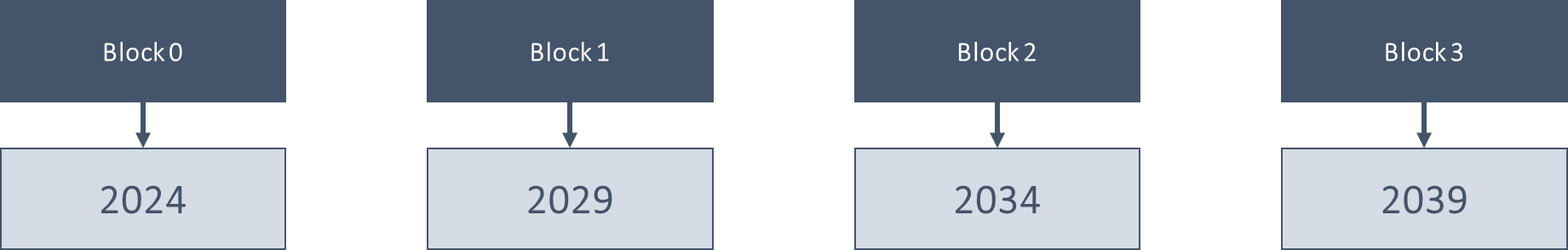


Figure 16 - ASBU implementation timeline

According with the ASBU implementation timeline a roadmap for the ASUR, NAVS, COMI and COMS implementation can be established as follows[[21]](#footnote-22):

* ASUR – Surveillance systems



Figure 17 - ASUR – Surveillance systems Roadmap

* NAVS – Navigation systems

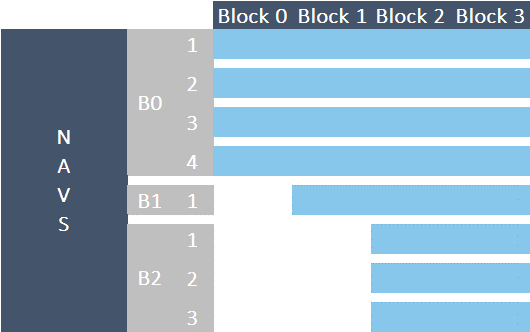


Figure 18 – NAVS – Navigation systems

* COMI – Communication infrastructure



Figure 19 – COMI – Communication infrastructure

* COMS – ATS Communication service



Figure 20 - ATS Communication service

1. Requirements for Deployment of Regional Interoperable CNS/ ATM Systems

In accordance with CANSO[[22]](#footnote-23) there are several Key Performance Indicators (KPI) that enable Civil Aviation Authorities (CAA) / Air Navigation Service Providers (ANSP) to identify Performance Improvement Areas and help CAA/ANSP to evaluate the actual benefits of implementing various Aviation System Block Upgrade (ASBU) modules.

Based on the Member States CAAs/ANSP’s current practice it’s, recommended to focus on assessing two primary goals:

1. Managing demand and capacity;
2. Meet safety and capacity utilization objectives.

CANSO recommended some KPI to improve procedures for enhancing capacity as well as flight efficiency, but it’s also recommended that Member States develop their own KPI that identifies to what inefficiency is attributable.

Some of the recommended KPI by CANSO are:

1. Capacity KPI to measure Member States CAA/ANSP’s operational efficiency goals ensuring that resources, such as available CNS/ATM system, are optimized;
2. KPI to measure flight trajectory efficiency;
3. KPI comparing actual trajectories against a reference ideal trajectory;
4. Delay KPI to record the causal reasons for a delay and allows the Member States CAA’s/ANSP’s to assess its influence in mitigating the delay and improving efficiency.

It must be evaluated the necessity to collect, measure, and monitor performance, and emphasizes the objective to recommend KPI’s that can be used across Key Performance Areas of capacity, flight efficiency, and predictability, and limit to those which an ANSP can apply influence.

The outline expectations for performance measures, frequently influences the establishment of Member States CAA/ANSP’s priorities on Key Performance Areas and Key Performance Indicators.

However, deploying a Seamless Upper Airspace implies system interdependencies that play a critical role in determining which Key Performance Areas and Key Performance Indicators should be used to handle management decisions. An insight of these interdependencies is essential for Member States CAA/ANSP and RECs to build the overall CNS/ATM for the Seamless Upper Airspace system performance. Key Performance Areas and Key Performance Indicators determine the ability of Member States CAA/ANSP and RECs to manage most effectively demand/capacity imbalances.

Table 11 - Recommended KPI for the key performance areas to assess member states’ priorities

|  |  |
| --- | --- |
| **KPA** | **Key Performance Indicators (KPI)** |
| **Capacity** | Declared Capacity |
| Capacity Efficiency |
| Delay Attributed to Capacity Limits |
| **Cost Effectiveness** | Average cost per flight |
| **Efficiency** | Gate Departure Delay |
| Terminal Departure Level Flight Efficiency |
| En-Route Direct Route Extension |
| Filed Flight Plan En-Route Extension |
| Arrival Flight Distance/Time Efficiency |
| ATM Attributable Delay |
| Average Flight Time |
| **Global Interoperability** | Level of compliance with ICAO CNS/ATM plans and global interoperability requirements. |
| **Capacity and Efficiency** | Operational Availability |
| **Predictability** | Capacity Variation |
| Travel Time Variation |
| Flight Plan Variation |
| **Safety** | Level of compliance with ICAO CNS/ATM Safety requirements. |
| **Security** | Level of compliance with ICAO CNS/ATM and Member State Security requirements. |

Although GANP does not provide specific performance indicator definitions for the Key Performance Areas and Key Performance Indicators, ICAO has developed a performance reporting framework, which does provide defined Key Performance Areas and Key Performance Indicators and is focused on the implementation of the ASBU Block 0 modules.

* 1. Planning Considerations

Deployment of Regional Interoperable CNS/ ATM Systems, considering the establishment of a Seamless Upper Airspace, must have in consideration those KPAs and KPIs related to the flight’s en-route phase.

Although only the upper airspace is considered, Member States should consider that CNS/ATM system elements also apply to the other phases of the flight.

The issue here is to build and harmonize systems to achieve the same provided services, in accordance with international standards, for the upper airspace.

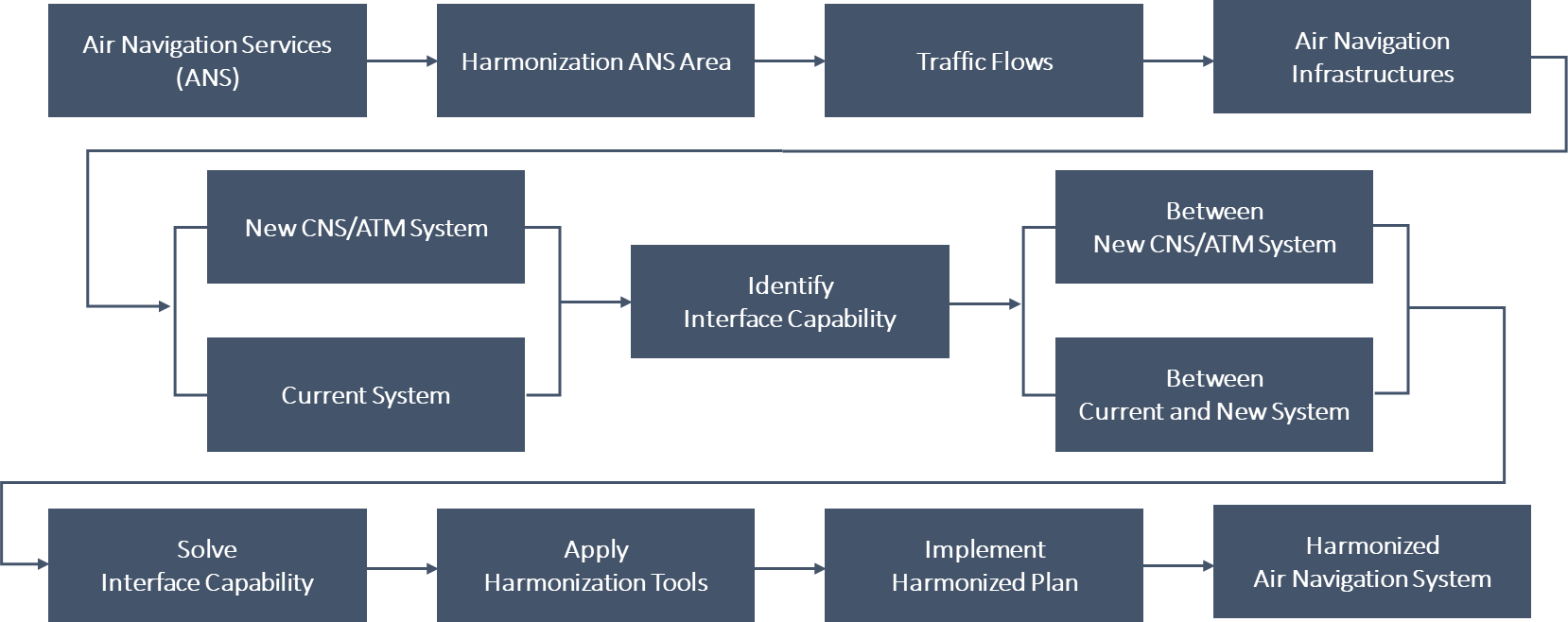


Figure 21 - Transition phases from Current CNS/ATM system to a new combined System

To implement a CNS/ATM system, a plan of action is needed, and the Global Coordinated Plan for transition to the ICAO CNS/ATM System provide the steps to proceed to its implementation. In 1996, the Council of ICAO determined that CNS/ATM system had matured, and a more concrete plan was needed which would include all developments and possible technical solutions, while putting the focus on regional implementation. The above table synthetize the steps needed for the transition.

Further steps in the planning and implementation of CNS/ATM Systems need to be addressed to meet the challenges of integration, interoperability and harmonization of the system thus leading to a Global Air Traffic Management (ATM) System. The operational concept and the global plan provide a road map for the next twenty-five years for use by States, sub-regional groups, and planning and implementation regional groups (PIRGS).

The implementation of Communications, Navigation, Surveillance and Air Traffic Management (CNS/ATM) systems is progressing worldwide. It is a complex process, involving multiple stakeholders and partners such as CAA’s, ANSP’s, airlines, air traffic management equipment and avionics suppliers and aircraft manufacturers, telecommunication services providers and passengers.

For the deployment of a CNS/ATM system within a Seamless Upper Airspace it’s of fundamental importance the engagement of stakeholder’s Member States CAA’s, ANSP’s, and REC’s to accomplish their main objectives, needs, concerns and motivations.

The main objective for CAA/ANSP is to meet operational and technical requirements. Its basic concern from a financial perspective is to be able to recover the investment through the provision of air navigation services. Any increase in possible airspace users charges would be off set by the operational efficiency achievements, enabling the airspace users to meet their preferred flight profiles and to reduce operational costs by reducing flight time and eliminating delays.

* + 1. Homogeneous ATM Areas and Major International Traffic Flows

It’s important for the deployment of a CNS/ATM system in a Seamless Upper Airspace to define main traffic flows and to establish homogeneous ATM areas to accommodate traffic and to achieve the overall air traffic management objectives.

Member States were grouped as High, Medium, and Low activity based in the AFI Air Navigation Plan, VOLUME II, “***Homogeneous ATM area / Major traffic flows / routing areas***”, as may be seen in the following table and figure, where the areas of routing (AR) are segregated according with the classification of type of area covered.

Table 13 - Classification of the areas of routing based on their flow density

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Area of routing (AR) | Homogeneous Areas and/or Traffic flows | FIRs involved | Type of area covered | Remarks |
| 1 | 2 | 3 | 4 | 5 |
| AR1 | Europe – South America (EUR/SAM) (oceanic) | Dakar Oceanic,  Sal Oceanic | Oceanic en-route low density in southern part and oceanic high density in northern part | Major traffic flow EUR/SAM |
| AR2 | Atlantic Ocean interface between the AFI, NAT and SAM Regions | Accra, Dakar, Johannesburg Oceanic Luanda,  Sal | Oceanic en-route low density | Homogeneous ATM area AFI/NAT/SAM |
| AR3 | Europe – Eastern Africa routes Including the area of the Indian Ocean | Addis Ababa Antananarivo, Asmara,  Dar-es-Salaam, Entebbe, Khartoum, Mauritius, Mogadishu, Nairobi, Seychelles | Continental en-route/ oceanic low density | Major traffic flow AFI/EUR |
| AR4 | Europe to Southern Africa | Beira, Brazzaville, Cape Town, Gaborone,  Harare, Johannesburg, Kano,  Kinshasa, Lilongwe,  Luanda,  Lusaka, N’Djamena, Niamey, Windhoek | Continental en-route low density | Major traffic flow AFI/EUR |
| AR5 | Continental Western Africa including coastal areas | Accra,  Dakar,  Kano,  N’Djamena, Niamey,  Roberts | Continental/oceanic low density | Homogeneous area AFI |
| AR6 | Trans-Indian | Antananarivo, Bombay, Johannesburg Oceanic,  Male,  Mauritius, Melbourne, Seychelles | Continental high density | Homogeneous ATM area AFI/ASIA |

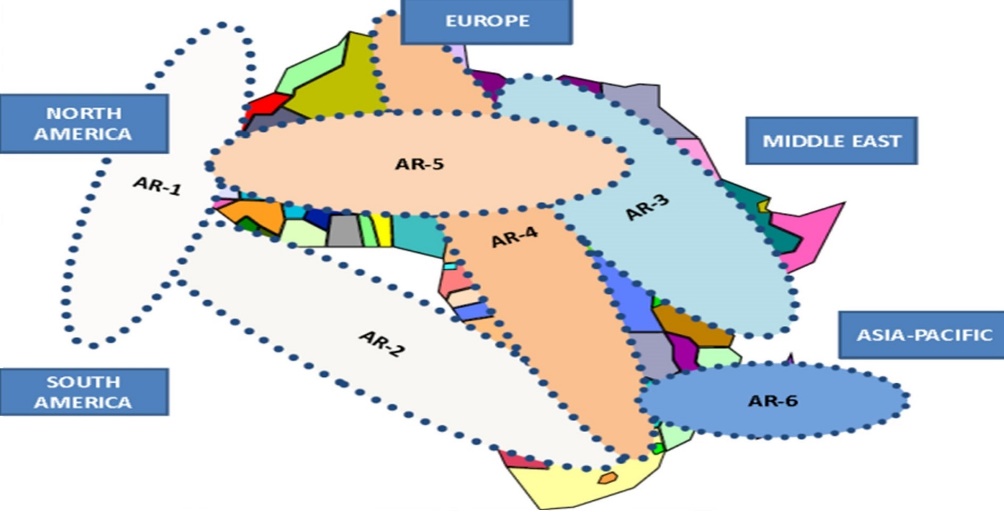


Figure 22 - Areas of routing location

* + 1. Deployment scenarios for interoperable CNS/ ATM Systems within the region

For developing a global interoperable CNST/ATM system for the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Seamless Upper Airspace only one scenario should be considered. This scenario can be accomplished for one different scenario for each Member State. The only condition is that each Member State’s scenarios must comply with interoperability, communication, and coordination issues.

The operational concept and the global plan provide a road map for the next twenty-five years for use by States, sub-regional groups, and planning and implementation regional groups (PIRGS).

RECs have a primordial role in coordinating the development of a Regional Implementation Plan in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region.

There are differences in current capabilities and projected needs among the Member States, “*one size doesn’t fit all*”, however, the interdependency of traffic flows in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region necessitates an integrated approach to ensure avoiding gaps in capabilities as traffic crosses state borders and that “*No Country is Left Behind (NCLB)*”.

Taking these principles in consideration Member States must adapt in a collaborative manner Regional implementation Plan to his State level keeping the same interoperability, communication, and coordination principles.

An aircraft flying across Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) regions receives services of several:

1. Air Navigation Service Providers (ANSP);
2. Air Traffic Control Operators (ATCO);
3. Airline Operations Centres (AOC).

To maintain a consistent level of operation, the aircraft systems must be interoperable with the various ground service providers connected to perform Collaborative Decision Making (CDM), so the interoperability between ground systems and airborne systems must be guaranteed to achieve information sharing.

Additionally, for:

1. Usage of communication data links;
2. Air-to-air surveillance information exchange or broadcast;
3. Cooperative collision avoidance and separation between aircraft;
4. On-board avionics should also be interoperable with one another.

Satellites provide both communication and navigation functions through SATCOM and SATNAV systems launching an additional aspect of interoperability, and so a new concept for interoperability of avionics is required.

On the other hand, this aircraft deals with different regulatory frameworks and operational procedures of the regions/Member States involved.

Therefore, the aircraft must be able to operate seamlessly with manned counterparts and ground systems, in all classes of airspace, and particularly in the upper airspace.

Airlines and airspace users must analyse the status of their fleet’s equipage and its upgrade’s implementation schedule to comply with the stablished requirements to fly in harmonize systems environments and achieve the same provision of services in accordance with international standards.

* 1. Areas of regional cooperation among EA-SA-IO Member States[[23]](#footnote-24)

Implementing a Seamless Upper Airspace in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region Member State must fulfil a full cooperation and collaborative program, that should engage technical cooperation between Member/Partner States and the existing regulatory and institutional framework.

A Single African Air Transport Market (SAATM) will lead to lower transportation costs and improved connectivity as a result of increased competition among air operators.

The pillars of air transport market integration include harmonisation, safety, enabling technology and capacity building.

* + 1. Technical Cooperation among Member/ Partner States in transition to seamless CNS/ATM Systems in EA-SA-IO Region

The Memorandum of Cooperation (MoC) provides, among Member States, the implementation of the Yamoussoukro Decision (YD) and the SAATM, International Treaties and Convention relating to aviation safety and security.

Under the MoC, Member States are obliged to share information for the propose of technical cooperation, training and capacity building, information management and data collection, resource mobilisation, coordination of joint activities, and management of the SAATM.

* + 1. Legal, Regulatory and Institutional Frameworks

The Memorandum of Cooperation (MoC) states that Member States are obliged to the harmonisation of laws, regulations, implementing procedures and standards.

This means that the deployment of interoperable CNS/ ATM System in the Seamless Airspace will be in compliance with harmonized Member States laws, regulations, and procedures.

From the survey we can arise the conclusion that there is not in course any National change that can be used to facilitate the deployment of interoperable CNS/ATM systems, even some member states are developing new CNS/ATM systems they don’t appear to have developed and integrate in their own legal system any regulations or procedures.

The model that is later recommended on the point **7.3** to follow is the European one.

* + 1. Other Legal Issues. (Determined from the project study)

The treaties of the RECs in the region provide the framework for policy coordination and harmonisation in the Information And Communications Technology (ICT) sector. The related medium term strategic plan (2016-2020) captures this as "*promoting the development and adaptation of regional harmonised national ICT policies, regulations and legislations aimed at creating secure competitive markets, which will reduce price, spur growth and increased usage of ICTs*".

In the EAC, cooperation in the communications sector is provided for under articles 89, 98 and 99 of the EAC Treaty.

The IOC Council adopted the e-IOC2020 strategy with the view to use ICT as one of the pillars of development of the region.

Digital SADC 2027 is the ICT Chapter of the SADC Regional Infrastructure Development Master Plan (RIDMP), which elaborates the prioritisation of the ICT sector.

* 1. Human Resource Development and Training Needs (From Baseline Study and TNA report)

Developing training solutions without properly identifying needs it’s a great risk “overdoing training, doing too little training, and/or missing the point completely”.

Training Needs Assessment (TNA) is essential to develop training solutions to meet the needs of each Member State and must be associated with the implementation of the associated ASBU modules in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO), particularly stablishing the focus in the training specifically related to procedures and integration of technology.

In ICAO Air Navigation Report (ICAO, 2014), the focus will be on training related goals including:

1. Need for guidance material, workshops, and symposia;
2. computer-based learning;
3. Training courses to ensure that PBN requirements and standards are fully understood and properly implemented;
4. Ensure harmonized and integrated implementation of related technologies and support tools to optimize performance capability objectives;

Training Needs Assessment (TNA) must essentially be aligned with:

1. Training in operational standards and procedures related to the ICAO ASBU modules;
2. Training key stakeholders to meet the performance capabilities of the ASBU modules;
3. Targeted audience to evaluate training needs will include three key stakeholder groups, Civil Aviation Authorities (CAA’s), Air Navigation Service Providers (ANSP’s), and flight crews;

Identifying training needs, associated with ASBU modules’ implementation, will provide important information for successful implementation of the ASBU strategy.

Beyond this evaluation to measure training effectiveness properly Key Performance Indicators (KPIs) must be established to evaluate the impact of learning, and the other indicates the change in performance, based on training.

Traditionally, parameters such as the number of people trained, passing scores, cost per employee, hours spent in training are employed. Training KPIs need to focus on driving project goals and, at the same time, must keep updated with technology and other training methodologies.

1. Time To Proficiency: the time taken to reach a certain level of proficiency.
2. Knowledge And Skill Retention: how rapidly we forget newly gained information if it is not revisited or used frequently. Evaluated by the difference between pre, and post-training assessments.
3. Transfer Of Training: the purpose of corporate training hinges on enabling employees to transform knowledge into skill.
4. Impact On Organizational Performance Metrics: the impact of training on employee performance and teams/departments helps structure future training and define performance goals.
5. Employee Engagement: measure employee satisfaction, confidence, and commitment, in getting the job done.
6. Net Promoter Score: indicator of whether the training rolled out for your employees is effective.
7. Stakeholder Satisfaction: a crucial indicator of effective training programs.

Each Member State has the flexibility to implement ASBU modules, but to perform the training gap analysis, it will be necessary to identify which ASBU modules were or are being planned to be implemented by each Member State.

Through the identification of areas for further training, gradual steps should be adopted to develop appropriate training solutions to fill identified gaps.

* + 1. Basic Training

Implementing in Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) a global framework for the modernization of air navigation requires to identify the training needs associated with implementation of the ASBU strategy to achieve the maximum benefits of this global initiative.

* + 1. ICAO ASBU Concept

The structure changes by the ASBU integration concept will affect the work of many skilled personnel in the air and on the ground, theoretically adjusting their roles and interactions and even requiring new proficiencies and skills to be developed.

Based on the ASBU concept it’s necessary to adjust the personnel to Member States and Regional goals, and this implies:

1. **Organizational Analysis**

The organization analysis must reflect the strategy, priorities, and key areas of the organization. This analysis achieves the training needs required at organizational, group and individual levels.

Analysis must focus on the organization’s goals and objectives, human resources, technological changes, organizational environment, strategic initiatives, and stakeholder feedback.

This will include the assessment of external elements, that can influence the performance, and strategically evaluating the organization’s potential and resource base.

SWOT analysis is an important part of organizational analysis to assess the performance and establish goals or objectives as internal weaknesses and strengths, together with external threats and opportunities, determine the success of any organization:

* + - **Strengths**

Assessing the strengths involves evaluating management, workforce, resources, as well as current goals, which means an internal analysis to the entity’s core competencies and resources, and the capability of the management team to make sound decisions as they formulate long-term objectives, financial objectives, strategic planning, and operational structure.

* **Weaknesses**

Assessing aspect that can affect performance by locating problems and implement beneficial changes to develop appropriate choices in its strategic planning process.

Potential weaknesses include poor financials, poor cost control, obsolete technology, and inefficient functions.

* **Opportunities**

Assessing the threats and opportunities that are present outside of an organization by evaluating the impact of technology on the performance of an organization and the impact of the innovation to create opportunities for business.

* **Threats**

Assessing all threats that can affect the performance, for instance prevailing economic conditions and National and International legislation and regulations set by the government and International entities.

After this assessment must be established a business model as a key parameter in the process of organizational analysis and the business model will explain how business functions and changes should occur to achieve the desired level of performance.

1. **Job Analysis knowledge, skills, and attitudes (KSA) job position**

Member States ANSP’s and CAA’s must conduct a job analysis to identify the necessary competencies and skills required to perform the jobs for the new ATM systems.

This job analysis will rely, for each job position of the new CNS/ATM system, on:

|  |  |
| --- | --- |
| **Technical Certified by International Standards** | |
| Professions operating that have regulations and standards of their international counterpart and have developed their own standards and practices.  Emerging or newly established professions may wish to adopt the regulations of counterpart professional bodies and even seek membership or affiliation where appropriate. | |
| **Technical Competencies** | To be defined According with Member States CNS/ATM system |
| **Core Competencies** |
| **Core Values** |
| **Learning and Development** |
|  | |
| 1. **Job Specifications** | |
| Designation | |
| Function | |
| 1. **Mission** | |
| 1. **Job Role** | |
| 1. **Academic Qualifications** | |
| 1. **Knowledge Requirements** | |
| 1. **Medical fitness** | |
| 1. **Skills Requirements** | |
| 1. **Professional Qualifications** | |
| Assessment | |
| Refresher Training | |
| 1. **Unit Requirements** | |
| Working Conditions | |
| 1. **Reporting and Organizational Relationships** | |
| Reports to, inside of the CAA / ANSP Member State | |
| Nature of Supervision, inside of the CAA / ANSP Member State | |
| 1. **Liaises With** | |
| Internally to the CAA / ANSP Member State | |
| Externally of the CAA / ANSP Member State | |
| 1. **Unit Competence Scheme** | |
| 1. **Authority to** | |
| 1. **Performance Criteria** | |

An in-depth job analysis will help CAA’s and ANSP’s to create in-depth job descriptions and get managers and employees to meet the same expectations, and as a guide for performance reviews and job departures.

Performing an effective job analysis requires a six-step process:

* Reviewing employee job responsibilities;
* Researching similar industry positions;
* Identifying and listing outcomes needed for the position;
* Identifying necessary skills, training, and education;
* Defining compensation and any applicable benefits;
* Continually iterating and improving the job analysis for each role

Previous points must be adjusted to increase organizational performance.

1. **Conclusion**

Assessing the training needs articulated with the ASBU block’s upgrade can be considered as an effective model of analyses.

Assessment of training needs through competency mapping for each ASBU block helps identifying the key competencies and identifies the training gap between the actual level of behaviour and the desired level of behaviour.

Competency mapping serves to integrate all the Human Resources functions like recruitment, training and development, and performance evaluation.

* + 1. CNS/ATM Systems Implementation Planning - Training Needs

ASBUs are organized in modules, categorized into clearly defined performance improvement areas and measurable operational improvements grouped in blocks.

The ICAO presents each module along with key implementation information such as required technologies, procedures, performance measures, and training requirements.

Corporate Resource Management (CoRM), Evidence Base Training (EBT), and Competence Based Training and Assessment (CBTA) are essential and should be incorporate in basic training.

* + 1. Proposed Training Plan

Upgrade the system according to the ASBU concept is critical to evaluate the impact in the current human performance associated with the change of operational procedures to implement and anticipate the assessment of training needs according to the ICAO recommendation and the organizational culture.

* 1. Cost-Benefit and Economic Impacts

*“Investments in aviation infrastructure are hardly reversible (requiring upgrades as and when required) and any gap in technological interoperability generates consequences in the medium and long-term considerations[[24]](#footnote-25)”*.

According to ICAO Document 9161, *Manual on Air Navigation Services Economics - PART F — SPECIAL FINANCING ASPECTS OF CNS/ATM SYSTEMS IMPLEMENTATION*, point 6.61:

*Financing of CNS/ATM systems components, in particular at the national level, is normally approached in a manner similar to that applied to conventional air navigation systems. A characteristic, however, of most CNS/ATM systems components, which sets them aside from the majority of conventional air navigation systems, is their multinational dimension. Consequently, and because of the magnitude of the investments involved, financing of basic systems components (e.g., satellite-based augmentation systems, satellite-based ground-ground data and voice communications networks) may in most instances need to be a joint venture by the States involved at the regional or global level.*

Development of Cost Benefit Analysis (CBA) would be the first step in the implementation of CNS/ATM systems in the Seamless Upper Airspace to be carried out by Member States CAA/ANSP.

This Cost Benefit Analysis (CBA) should be made at the Member State level and then coordinated at a regional level.

For each of the ASBU block and model there are key elements to be evaluated, according with the ICAO Doc 9750-AN/963:

1. Applicability;
2. Access and Equity;
3. Capacity;
4. Efficiency;
5. Environment;
6. Flexibility;
7. Interoperability;
8. Participation;
9. Predictability;
10. Safety;
11. Costs/Benefits Associated;
12. Other key factors considered relevant at National and International level.

For example lets consider the **B0-AMET**:

|  |  |
| --- | --- |
| **Meteorological information supporting enhanced operational efficiency and safety** | |
| Global, regional and local meteorological information:   * forecasts provided by world area forecast centres (WAFCs), volcanic ash advisory centres (VAACs) and tropical cyclone advisory centres (TCAC); * aerodrome warnings to give concise information of meteorological conditions that could adversely affect all aircraft at an aerodrome, including wind shear; and * SIGMETs to provide information on occurrence or expected occurrence of specific en-route weather phenomena which may affect the safety of aircraft operations and other operational meteorological (OPMET) information, including METAR/SPECI and TAF, to provide routine and special observations and forecasts of meteorological conditions occurring or expected to occur at the aerodrome.   This information supports flexible airspace management, improved situational awareness and collaborative decision making, and dynamically-optimized flight trajectory planning.  This module includes elements which should be viewed as a subset of all available meteorological information that can be used to support enhanced operational efficiency and safety | |
| **Applicability** | |
| Applicable to traffic flow planning, and to all aircraft operations in all domains and flight phases, regardless of level of aircraft equipage. | |
| **Benefits** | |
| **Capacity** | Optimized use of airspace capacity;  **Metric: ACC and aerodrome throughput** |
| **Efficiency** | Harmonized arriving air traffic (en-route to terminal area to aerodrome) and harmonized departing air traffic (aerodrome to terminal area to en-route) will translate to reduced arrival and departure holding times and thus reduced fuel burn;  **Metric: Fuel consumption and flight time punctuality** |
| **Environment** | Reduced fuel burn through optimized departure and arrival profiling/scheduling;  **Metric: Fuel burn and emissions** |
| **Flexibility** | Supports pre-tactical and tactical arrival and departure sequencing and thus dynamic air traffic scheduling;  **Metric: ACC and aerodrome throughput.** |
| **Interoperability** | Gate-to-gate seamless operations through common access to, and use of, the available WAFS, IAVW and tropical cyclone watch forecast information;  **Metric: ACC throughput** |
| **Participation** | Common understanding of operational constraints, capabilities and needs, based on expected (forecast) meteorological conditions;  **Metric: Collaborative decision-making at the aerodrome and during all phases of flight** |
| **Predictability** | Decreased variance between the predicted and actual air traffic schedule;  **Metric: Block time variability, flight-time error/buffer built into schedules** |
| **Safety** | Increased situational awareness and improved consistent and collaborative decision-making;  **Metric: Incident occurrences** |
| **Cost** | |
| Reduction in costs through reduced arrival and departure delays (viz. reduced fuel burn);  **Metric: Fuel consumption and associated costs** | |

The balance between the initial, and update of systems investments, the operational costs and the benefits must be calculated as per a CBA Cost Benefits Analysis taking in consideration all the ASBU blocks and modules.

* + 1. Business Case Evaluation

Implementing CNS/ATM systems implies that CAA/ANSP from Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Member States have to invest in ground and satellite-based infrastructure and airspace users/airlines must invest in CNS avionics.

Depending on the organization of the Air Navigation Services on each Member State, business cases for implementation of CNS/ATM systems can be delivered from different perspectives considering major stakeholders or partners. While business cases may be performed together or separately, an integrated business case would be the most desirable.

If the implementation of CNS/ATM systems can be considered State investments, they are generally justified on the basis of benefits for the users. An alternative is to consider external funding for CAA/ANSP and airspace users/airlines to finance the implementation of the new systems. This funding can put a significant financial liability effort in the organizations and must be evaluated.

Cost Benefit Analysis (CBA) assesses the project from an economic perspective, including non-cash and/or external costs and benefits, and must provide a cash flow analysis illustrating the ability to pay back the loan. A risk analysis has also to be performed to demonstrate the long-term investment's feasibility to the lenders.

Air navigation services providers impose user charges to finance their investments as stated of ICAO Policy on CNS/ATM Systems Implementation and Operation, approved by the ICAO Council in March 1994, addresses cost-recovery as follows:

*“In order to achieve a reasonable cost allocation between all users, any recovery of costs incurred in the provision of CNS/ATM services shall be in accordance with Article 15 of the Convention and shall be based on the principles set forth in the Statements by the Council to Contracting States on Charges for Airports and Air Navigation Services (Doc 9082), including the principle that it shall neither inhibit nor discourage the use of the satellite-based safety services. Cooperation among States in their cost-recovery efforts is strongly recommended.”*

* + 1. Other Economic Effects of CNS/ATM Systems Implementation

Depending on the institutional and regulatory framework adopted the for the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Seamless Upper Airspace the establishment of air navigation charges must be done in a coordinated and collaborative manner to avoid competition between different providers.

On the other hand, the establishment of air navigation charges must be balanced to avoid a sudden rise that makes operational costs for users unbearable and could endanger the operation and even jeopardize Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) national and regional growth objectives.

* 1. Financial Aspects

The primary investment decisions are financial in nature and a business case for the implementation of CNS/ATM systems should be driven in simultaneous with a market evaluation and a technical analyse.

Member States and the different stakeholders in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) must reached a consensus on the financial aspects to establish a Seamless Upper Airspace and on the implementation of CNS/ATM systems.

Once the operational concept is developed, the requirement for infrastructure upgrades can be suggested and then commitments between Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Member states should be established.

The development of a business case for the implementation of CNS/ATM systems has to focus on the Seamless Upper Airspace, considering current and foreseen traffic flows and densities, the operational requirements and resources / equipment configurations suitable that meet operational requirements.

Such analysis could be carried out at state, sub-regional or regional levels, taking in consideration the multiple implementation options, so a procedure allowing for their identification, definition, evaluation, and ranking has to be put in place.

The evaluation and ranking are performed both on an operational and financial basis. For every option, the operational assets are identified, and the costs and benefits are analysed.

* + 1. Determination, Cost Recovery and Financing

The financial analysis considers the life cycle costs and revenues cash flow streams. Lifecycle costs for the facilities and equipment are acquisition and installation costs as well as operation and maintenance costs.

For each component, two categories of costs must be calculated: facilities and equipment costs and operation and maintenance costs.

Cost recovery policy must be stablished with consensus between Member States in accordance with ICAO’s Policies on Charges for Airports and Air Navigation Services, Doc 9082/6, and through:

1. The establishment of an effective cost and revenue accounting system;
2. A sound methodology for determining the cost basis for the charges; and
3. An effective mechanism for the collection of the charges.

Financing implementation of CNS/ATM systems and a Seamless Upper Airspace Operation in Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) has to be considered in a cooperative and collaborative manner between Member States.

This collaborative principle must be extended to the Airline Operators considering the changes to be implemented on their fleets and the new possibilities, for them, to explore new regional and international markets.

From the report “***CBA SBAS Report***”, and taking in consideration the part related to the En-route phase of the flights we can conclude for a positive benefit with the implementation of an CNS/ATM interoperable system.

1. Analysis of International Institutional Frameworks on established Airspace Integration

It is important to compare, and probably follow other institutions and/or areas of the globe that have joined on solutions identical to those being studied now.

The European Union (EU) has, somehow, resembled the current circumstances of the thirty Member States of the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO), present in the current study, related to the political and legal independence of the Member States, but at the same time the possibility of adopting similar institutional and regulatory frameworks in terms of aviation development.

The establishment of a legal framework for a Single European Sky and its subsequent amendments may correspond to the needs of the current project to establish a Seamless Upper Airspace operation in Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO).

There have been successes and constraints in adopting the necessary measures, but the changes and reworking the initial idea have led to a successful structure of an interoperable CNS/ATM between the various countries of the EU and extended to countries that are not EU members, which can configure the possibility to be adopted by Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) community.

* 1. EUROCONTROL

Is a pan-European, civil-military organization committed to implement the European Union’s vision for a Single European Sky that will deliver the Air Traffic Management (ATM) performance required for the twenty-first century and beyond.

It’s an intergovernmental organization of 41 Member States and 2 states with observer status, governed by an international convention, in the process of ratification, and known as the "Revised Convention" (1997).

Overlap of organisational memberships among EUROCONTROL members:

* ECAC, EUROCONTROL, ECAA, EU;
* ECAC, EUROCONTROL, ECAA;
* ECAC, EUROCONTROL;
* ECAC, ECAA;
* ECAC

To be considered for membership of EUROCONTROL, a country must meet all the following criteria:

* Be European
* Member of the Council of Europe
* Have existing accreditation to both ICAO and ECAC

The Organization is divided into three bodies:

1. Two governing bodies, the EUROCONTROL Commission and the Provisional Council;
2. One executive body, the Agency.

The governance structure also comprises specialized entities which report to or advise these three bodies and supports its Member States and its stakeholders (including Air Navigation Service Providers, Civil and Military Airspace Users, Airports, and Aircraft/Equipment Manufacturers) in a joint effort to make aviation in Europe safer, more efficient, more cost-effective, and environmentally sustainable.

Acting as Network Manager has extended the role of the former Central Flow Management Unit and now proactively manages the entire European ATM Network (with nearly ten million flights every year), in close liaison with the air navigation service providers, airspace users, the military and airports.

Supports the European Commission, the European Union Aviation Safety Agency (EASA) and National Supervisory Authorities in their regulatory activities, the pan-European network management and deployment activities, the implementation of the Single European Sky and the SESAR program and provides a unique platform for civil-military aviation coordination in Europe. The Central Route Charges Office handles the billing, collection, and redistribution of aviation charges.

EUROCONTROL provides a set of different services:

1. Maastricht Upper Area Control Centre (MUAC);
2. Network Manager Operations Centre (NMOC) – coordinates flight plans and actual traffic;
3. EAD – centralised access to AIS information;
4. Central Route Charges Office (CRCO) – collects en-route (and aerodrome approach) charges on behalf of Air Navigation Service providers (ANSPs);
5. EUROCONTROL Innovation Hub (EIH)– research, simulations, drones and UAM;
6. EUROCONTROL Aviation Learning Centre (ALC) – training and e-learning.

EUROCONTROL also concludes the so-called Comprehensive Agreements, which enhances the organisation's cooperation with non-European countries that are closely tied to the continent's aviation network.

* 1. Single European Sky (SES)

Single European Sky (SES) initiative was launched in 2000 by the European Commission, the Commission drafted a legislative package at the end of 2001, and the package was adopted by the European Parliament and Council in March 2004:

The regulations provide the framework for the creation of additional capacity and for improved efficiency and interoperability of ATM system in Europe:

1. The Framework regulation (EC No 549/2004) - laying down the framework for the creation of the single European sky;
2. The Service provision regulation (EC No 550/2004) - on the provision of air navigation services in the Single European sky;
3. The Airspace regulation (EC No 551/2004) - on the organisation and use of airspace in the Single European sky;
4. The Interoperability regulation (EC No 552/2004) - on the interoperability of the European Air Traffic Management network.

The above four basic regulations are complemented by more detailed implementing rules adopted by the European Commission after discussion within the Single Sky Committee.

Industry is invited to advise the European Commission on actions to be taken based on the regulations through an Industry Consultation Body.

The following implementing rules have been adopted by the European Commission pursuant to the stipulations of the four basic SES regulations:

1. Air Navigation Service Provision: Regulation 2017/373 - Requirements for providers of ATM/ANS and other ATM network functions and their oversight.
2. Common charging scheme for air navigation services: Regulation (EC) N° 482/2008 (repealed by Regulation 2017/373 in 2020) of 30 May 2008 establishing a software safety assurance system to be implemented by air navigation service providers and amending Annex II to the now repealed Regulation (EC) N° 2096/2005
3. Airspace: Regulation (EC) No 2150/2005 of 23 December 2005 laying down common rules for the flexible use of airspace and Regulation (EC) No 730/2006 of 11 May 2006 on airspace classification and access of flights operated under visual flight rules above flight level 195, repealed by Regulation 2016/1185 in 2020.
4. Interoperability: Regulation (EC) No 1033/2006 of 4 July 2006 laying down the requirements on procedures for flight plans in the pre-flight phase for the single European sky; Regulation (EC) No 1032/2006 of 6 July 2006 laying down requirements for automatic systems for the exchange of flight data for the purpose of notification, coordination, and transfer of flights between air traffic control units; Regulation (EC) N° 633/2007 of 7 June 2007 laying down requirements for the application of a flight message transfer protocol used for the purpose of notification, coordination, and transfer of flights between air traffic control units; Commission Implementing Regulation (EU) N° 1079/2012 of 16 November 2012 laying down requirements for voice channels spacing for the single European sky; Regulation 2015/340 - Technical Requirements and Administrative Procedures relating to Air Traffic Controllers' Licences

Member States’ CAA are responsible for the correct implementation of the EC rules and ensure that services are delivered to the highest standards in accordance with the legal requirements.

The actions defined in the regulations also reinforce the integration of civil and military air traffic control. This will ensure that the needs of both the civil and military communities are respected and properly considered, where there are areas of common interest, yet safeguarded where there may be specific requirements.

EUROCONTROL supports actively the implementation of the Single Sky and produces technical specifications and implementation guidance materials, EUROCONTROL Safety Regulatory Requirements (ESARRs) have become Community law.

The Framework regulation requires that European Commission periodically reviews the application of the SES legislation and reports on the progress of its implementation. Based on the report findings, the Commission came forward with proposals for a second Single Sky legislative package, including extension of European Aviation Safety Agency (EASA) and adoption of the European ATM Master Plan.

* 1. Single European Sky (SES) II

Going beyond interoperability rules, the SESAR project was launched as the technological and industrial component of the Single European Sky.

However, the SES has not delivered the expected results in important areas, like integration of the airspace in Functional Airspace Blocks (FAB) and improvement of cost-efficiency of European ATM network.

The second SES package has been put forward by the European Commission in order to make the European sky safer and more sustainable by:

1. Introducing a performance framework for European ATM with quantified target setting;
2. Creating a single safety framework to enable harmonised development of safety regulations and their effective implementation;
3. Opening the door to new technologies enabling the implementation of new operational concept and increasing safety levels by a factor of ten;
4. Improving management of airport capacity.

**Implementation of a Performance Scheme**

The regulation reinforces the performance-oriented approach to ANS, principally through the adoption of EU-wide performance targets and binding national/FAB performance plans and monitoring the performance of the system in four key performance areas: safety, capacity, environmental impact, and cost-efficiency. Regulation 390/2013 - Performance Scheme for Air Navigation Services and Network Functions.

**Integration of Service Provision**

The European Commission will support current initiatives to set up FABs as an instrument for regional integration by:

1. Setting firm deadlines for implementation;
2. Extending the scope to lower airspace up to the airport;
3. Clearing national legal and institutional obstacles.

**Network Management**

Implementing rules will be developed to ensure optimal management of the European ATM network and provide global interoperability and cooperation with neighbouring countries, subject to regulation:

1. European route network design;
2. Management of Scarce Resources;
3. Traffic Flow Management, slot coordination and allocation;
4. Management of the deployment of SESAR technologies and the procurement of European-wide infrastructure elements.

**Single Sky Safety Framework**

Differences in application of and compliance with non-binding aviation safety rules throughout the Member States lead to diverging processes and different level of safety standards applied.

Safety challenges had to rest in the establishment of one single European safety entity, known as the European Union Aviation Safety Agency (EASA).

European Commission proposed in 2008 to extend the competence of the Agency to the remaining key safety fields of aerodromes and Air Traffic Management / Air Navigation Services.

The proposal for the extension of EASA remit to ATM, ANS and airports was adopted in Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009.

**Deployment of New Technologies**

Development of its air traffic control system to respond to the challenges and synchronise both airborne and ground deployments the EU States launched in 2005 the “Single European Sky ATM Research (SESAR)” programme.

SESAR future operational concept represents a paradigm change, creating a form of collaborative information system for aviation operations.

EU Transport Council endorsed on 30 March 2009 the European ATM Master Plan, that will be used by the SESAR Joint Undertaking to manage and organise the development activities of the SESAR programme.

The implementation of SESAR will overcome fragmentation in equipment for both air navigation service providers and airspace users and speed up the pace of technological progress.

SESAR governance structures have been put in place by Regulation (EC) No 219/2007 of the European Council of 27 February 2007 on the establishment of a Joint Undertaking to develop the new generation European air traffic management system.

**Management of Airport Capacity**

The European Parliament and the Council have endorsed an ‘Action plan for airport capacity, efficiency, and safety in Europe (full text can be viewed here). The action plan contains several measures to increase the output and optimise the planning of airport infrastructures, while at the same time raising safety and environmental standards:

* New technologies, derived from SESAR, will increase the safety and efficiency of airport operations;
* Priority should be given to optimising the use of existing capacities; better account will be taken of environmental constraints;
* Close coordination with planning for rail and road networks will ensure the design and construction of truly complementary transport networks at minimum cost;
* European Commission will set up an Observatory, composed of Member States, relevant authorities, and stakeholders. It will advise the Commission on the development and implementation of Community airport capacity and assist in network management tasks.

**Related Articles**

* Regulation (EC) No 1070/2009 - Improving the Performance of European Aviation System
* Regulation (EC) No 1108/2009 extending EASA Remit to Airports, ATM and ANS
  1. SESAR

SESAR stands for “Single European Sky ATM Research”. SESAR is the technological element of the Single European Sky, aims at developing the new generation air traffic management (ATM) system capable of ensuring the safety and fluidity of air transport worldwide over the next 30 years

The European Commission states that the reliability and safety rates for air transport, if maintained, require a qualitative leap for the future as the capacity limit becomes critical.

In the view of the Commission, current air traffic control systems are close to becoming obsolete and are ill-suited for the rapid, economic, and reliable development of aviation in Europe, particularly as expectations have changed:

1. Passengers want efficient, affordable, and safe transport;
2. Respect for the environment is becoming a major constraint;
3. 11 September 2001 showed that airplanes can be a threat to the security of the population.

The implementation of SESAR will have required several stages. Given the differences between the various air traffic control systems in Europe and the diverse nature of the fleet currently in service, a transitional period was necessary. The implementation of SESAR therefore is being carried out in three phases:

1. Definition phase (2005-2008), in which the air traffic modernisation plan - the SESAR ATM Master Plan has been developed, establishing the different technological stages, priorities and timetables;
2. Development phase (2008-2013) will make it possible to develop the basic technologies which will underpin the new generation of systems;
3. Deployment phase (2014-2020 and beyond), which will see the large-scale installation of the new systems and the widespread implementation of the related functions.

SESAR system should triple capacity in comparison to the current situation, with safety increased tenfold and unitary operating costs far lower than current levels.

* 1. Agency for Air Navigation Safety in Africa and Madagascar (ASECNA)

The Agency for Air Navigation Safety in Africa and Madagascar (ASECNA) is an international public organization composed of 18 Member States; 17 African States and France (Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo, Ivory Coast, Equatorial Guinea, France, Gabon, Guinea-Bissau, Madagascar, Mali, Mauritania, Niger, Senegal, and Togo).

Created in 1959, its main mission is to provide air navigation services, aeronautical information services and aeronautical meteorology services within the airspace under the jurisdiction of its Member States and to oceanic airspace in central Atlantic Ocean, Gulf of Guinea and Indian Ocean entrusted by the international community.

To ensure its community mission in Member States, ASECNA has representation in the 17 African Member States and a delegation in Paris. ASECNA has delegations to ICAO in Montreal and the African Union in Addis Ababa for close cooperation with these two institutions.

ASECNA has three training schools to train its staff and third parties:

* African School of Meteorology and Civil Aviation (EAMAC) in Niamey, Niger;
* Regional School of Fire Fight (ERSI) in Douala, Cameroon; and
* Regional School of Air Navigation and Management (ERNAM) in Dakar, Senegal.
  1. ASECNA launch pre-operational SBAS service

The first essential step of ASECNA’s SBAS services provision plan, the broadcasting tests for our pre-operational service, has started. Its main objectives are to carry-out technical trials, to build competencies for operations and to undertake field demonstrations in the aviation domain for aircraft and rotorcraft, and for the additional services under study such as Precise Point Positioning (PPP) and Emergency Warning Services to populations (EWS).

The installation of this tertiary SDP allows ASECNA to receive triple-redundant data to all six ASECNA controlled Flight Information Regions (FIRs)- Antananarivo, Brazzaville, Dakar Oceanic, Dakar Terrestrial, Niamey, and N’Djamena – over three independent telecommunications lines. Each line is also feeding data into the ASECNA AFISNET Very-Small-Aperture Terminal (VSAT) network, making space-based ADS-B highly available in the region.

Space-based ADS-B is being used throughout their airspace, augmenting ground sensors. With the upcoming African ADS-B mandate, this technology will facilitate a more dynamic, safe, and efficient airspace and allow these multiple FIRs to operate as one, harmonious airspace, furthering the objectives Single African Sky initiative.

Connection to the AFISNET VSAT network will make it easier for Member States to access full air traffic surveillance data and coordinate with regions throughout the continent.

According to Mohamed Moussa, ASECNA Director General, “Single African Sky is the fundamental goal of ASECNA. By deploying Aireon data throughout our region, we are maintaining the highest level of safety and providing the most robust data to all member states through the AFISNET VSAT network.

ASECNA is leading the global aviation community by eliminating the reliance on ground-based surveillance and transitioning it to satellites, in line with a complete satellite CNS strategy that also includes satellite-based augmentation system – SBAS – for Africa.

***Every region, no matter how remote, now has access to this data.***

EUROCONTROL signed cooperation agreements with ASECNA (Agency for Security of Aerial Navigation in Africa and Madagascar), Algeria, and Morocco.

* 1. European Union Aviation Safety Agency (EASA)

The European Union Aviation Safety Agency (EASA) is an agency of the European Union established in 2002 by Regulation (EC) No 216/2008 of the European parliament and the Council to ensure a high and uniform level of safety in civil aviation, by the implementation of common safety rules and measures.

EASA has taken over the responsibilities of the former Joint Aviation Authorities (JAA) system which ceased on 30 June 2009, and states that their mission is to promote the highest common standards of safety and environmental protection in civil aviation.

The agency’s responsibilities are being acquired progressively. In 2008, after the implementation of a new EASA Regulation (EC) No 216/2008, EASA’s role was extended beyond its previous scope to cover Flight Operations and Flight Crew Licensing.

As part of the second aviation package of measures for Single European Sky (SES II), the European Community adopted Regulation (EC) No 1108/2009 amending Regulation (EC) No 216/2008 and extending EASA’s remit to encompass the field of aerodromes, air traffic management and air navigation services.

The agency’s responsibilities include:

1. Expert advice to the EU on the drafting new legislation;
2. Certification of personnel and organisations involved in the operation of aircraft;
3. Certification of organisations providing pan-European ATM/ANS services;
4. Certification of organisations located outside the territory subject to the EC law and responsible for providing ATM/ANS services or ATCO training in the Member States where EC law applies;
5. Authorisation of third country (non-EU) operators;
6. Safety analysis and research, including publication of an Annual Safety Review;
7. Developing, implementing, and monitoring safety rules, including inspections in the Member States;
8. Type-certification of aircraft and components, as well as the approval of organisations involved in the design, manufacture, and maintenance of aeronautical products.

The Agency's tasks are:

1. Help the Community legislature draw up common standards to ensure the highest possible levels of safety and environmental protection;
2. Ensure that they are applied uniformly in Europe and that any necessary safeguard measures are implemented;
3. Promote the spread of standards worldwide.

The EASA assists organisations representing aviation personnel, manufacturers, commercial and general aviation operators, maintenance industry, training organisations and air sports, and applies transparent procedures for the adoption of opinions, acceptable means of compliance and guidance material.

EASA conducts inspections in the Member States to verify that safety regulations and the implementing rules are applied correctly at national level and is authorised to conduct the investigations required to issue the relevant certificates and ensure continued safety oversight.

* 1. Other initiatives and associated frameworks

**Support to EGNOS in Africa - The Joint Programme Office (JPO)[[25]](#footnote-26)**

The Joint Office of EGNOS-Africa Program, commonly called JPO (Joint Program Office) EGNOS-Africa is the result of the implementation of the Africa-EU Joint Strategy which calls for the provision of satellite navigation services in the Infrastructure Development.

Amadou Ousmane Guitteye, Director General of ASECNA recalled that: “*the main mission of the JPO is to ensure that Africa can have adequate skills and is able to coordinate the implementation of the development and the deployment of GNSS / EGNOS services and applications on the Continent*.”

The establishment of the Office of the EGNOS-Africa Joint Programme is an important step towards strengthening cooperation between Africa and the European Union in the field of satellite navigation.

EGNOS (European Geostationary Navigation Overlay Service) is the first European SBAS, which enhances the performances of the existing satellite navigation systems (GPS and GLONASS). EGNOS is currently operational: the EGNOS Service Provider has been certified during July 2010 and the EGNOS entered operation for Safety of Life in March 2011.

Currently, the EGNOS system is based on three satellites and a series of ground facilities in Europe and North Africa. Since the satellites already cover Europe and the entire African continent, EGNOS could easily extend the provision of its service to the African continent with some adaptations and the sole installation of ground facilities (stations) on the African territory.

These stations could be connected to the European network or, alternatively, to an independent EGNOS-like African system.

This progress should not hinder the growing use of EGNOS services, free of charge, in other domains, particularly road and agriculture and potentially many others.

This major upgrade of the EGNOS system, known as EGNOS V3, provides a unique opportunity for African States and Regional Economic Communities (RECs) to align their navigation infrastructures at an affordable cost considering the EGNOS GEOs footprint encompasses already the African Continent.

It is important to highlight that the EGNOS V3 technical requirements include the expandability of the EGNOS service area to the African continent provided the needed complementary infrastructures can be implemented.

* 1. Successes & Challenges of each framework

All projects achieved success in different areas of development.

EUROCONTROL was initially created to be the ANSP of the upper airspace of five countries, but two of them, France and the United Kingdom do not continue with the provision of control services.

Most important challenge facing the Agency is the part it plays in the implementation of the Single European Sky initiative. But the expertise gained over five decades of success and crisis makes it a hugely rich depository of knowledge and experience on which Europe’s politician can rely for creating a single sky for Europe.

EUROCONTROL carry out activities included the study of the standardization of national regulations governing air traffic and the promotion of common action to be taken regarding the program SES / SESAR, although with some constraints and changes to the initial definition, is the most developed and has followed a path of strong collaboration between Member States.

Belonging to the European Union, which marks many political affinities, has led to its great development and consequent success.

SES/SESAR are programs that intended the deployment of the Single European Sky, and despite some constraints and uncertainties are currently, with the changes introduced by the new regulatory framework, taking firm steps in the construction of an operating system with the same legal, institutional, and regulatory frameworks that are the basis for implementing the same operational characteristics.

* 1. Constraints & best practices i.e., from ICAO, CANSO, etc

The interoperability of systems implies the sharing of information regarding flights that are within the coverage of ground stations or the satellites, and the remaining information, AIS, MET, etc. that arrives to each ATM systems.

This sharing must be done in a collaborative way so that the operation takes place within unique patterns throughout the entire system.

The same picture that is reflected in an ATM system must be the same across all the other’s ATM systems.

This implies the use of best practices agreed between the all the Member States:

1. National and Regional Collaborative Decision Making (CDM) should be encouraged, to avoid instability in the CNS/ATM systems;
2. Harmonization of existing initiatives;
3. Procedures accepted or prescribed as correct or most effective way and with optimal results;
4. Technique or methodology through experience proven to lead to the same desired result;
5. Technique consistently showing superior results;
6. Methods consistently and officially accepted as being the most effective and with prudent course of action;
7. Marketing strategies should be put on place to advertise the improved image;
8. Harmonization of the benefits package between fields and among sectors is encouraged to reduce the unbalance.
9. The need to shift the management culture to include the same practices and policies;
10. Professional development programs, and continuous training;
11. Development of initiatives like the AFI Human Resources Development Fund (HRDF) programs would be of added value to put in place a centre to share knowledge and experience to assist states in the implementation of programs;
12. Adding value and creativity through research programs.

The major constraints are that Member States could implement CNS/ATM system at a different pace that could affect the overall integrity of the project.

On the other hand, draft model regulations to implement CNS/ATM system should include the notion of compliance and need to be transpose into their national regulations/air law.

* 1. Conclusions

The methodology of different programs makes possible to adopt the experiences of other Member States to the one’s of Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) community.

CANSO’s Seamless Airspace Workgroup (SAWG) proposes the following definition for Seamless Airspace:

*Seamless airspace is contiguous airspace that is technically and procedurally interoperable, universally safe, and in which all categories of airspace users transition between Flight Information Regions, or other vertical or horizontal boundaries, without requiring a considered action to facilitate that transition and without any noticeable change in:*

* 1. *Type or quality of service received;*
  2. *Air navigation and communications performance standards; and*
  3. *Standard practices to be followed.*

The European Union’s Single European Sky model is based on seamless operations where air navigation services is provided by entities based on operational requirements without any need to modify FIR boundaries.

This approach is fully in line with Assembly Resolution A38-12 Appendix G and met the requirement of interoperability and flexibility in airspace design.

The implemented changes by the SES 2 package reflect the European Member States opposition to implement a non manageable approach and provides a “seamless” assurance that the European Union SES 2/SESAR model and the structure so can be adopted among the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) community.

What do you propose for the EA-SA-IO region to be validated in the workshop and what do you think will be the challenges to be encountered and how are they to be resolved…this is what should come out.

1. Current regional legal and institutional framework and processes

Implementing regional Seamless Upper Airspace operations requires the deployment of regional interoperable CNS/ATM systems aligned with a regional regulatory and institutional framework to be fully transposed into national member states legal framework.

Analysing the regional legal and institutional frameworks is critical to define the harmonization and integration of a regulatory framework for the deployment of a Seamless Upper Airspace within the Member States airspace in the continent or delegated in high seas regions.

This evaluation is necessary to determine how *Model Regulations* can be approved and integrated into National regulations/air law, and for this the Decision-Making Process is very important.

The Regional Economic Communities (REC) are regional groups of African states and are the pillars of the African Union (AU). All were formed prior to the launch of the AU and have developed individually with differing roles and structures.

The main purpose of the RECs is to facilitate regional economic integration between members of the individual regions and through the wider African Economic Community (AEC), which was established under the Abuja Treaty (1991).

This Treaty, which has been in operation since 1994, ultimately seeks to create an African Common Market using the RECs as building blocks.

The AU recognises the following RECs namely incorporated in this study:

1. Common Market for Eastern and Southern Africa (COMESA);
2. East African Community (EAC);
3. Southern African Development Community (SADC);
4. Tripartite COMESA-EAC-SADC;
5. Intergovernmental Authority on Development (IGAD);
6. Commission de l'Océan Indien (IOC).

The thirty Member States included in this study have subscribed and are integrated in different Regional Economic Communities (REC) as shown in the following table:

Table 14 - - Integration of each member state in the REC

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Country** | | **COMESA** | **EAC** | **SADC** | **IGAD** | **IOC** | **Nº of REC** |
| Angola | |  |  | X |  |  | 1 |
| Botswana | |  |  | X |  |  | 1 |
| Burundi | | X | X |  |  |  | 2 |
| Comoros | | X |  | X |  | X | 3 |
| Djibouti | | X |  |  | X |  | 2 |
| D. R. Congo | | X | X | X |  |  | 3 |
| Egypt | | X |  |  |  |  | 1 |
| Eritrea | | X |  |  |  |  | 1 |
| Eswatini | | X |  | X |  |  | 2 |
| Ethiopia | | X |  |  | X |  | 2 |
| Kenya | | X | X |  | X |  | 3 |
| Lesotho | |  |  | X |  |  | 1 |
| Libya | | X |  |  |  |  | 1 |
| Madagascar | | X |  | X |  | X | 3 |
| Malawi | | X |  | X |  |  | 2 |
| Mauritius | | X |  | X |  | X | 3 |
| Mozambique | |  |  | X |  |  | 1 |
| Namibia | |  |  | X |  |  | 1 |
| Reunion | |  |  |  |  | X | 1 |
| Rwanda | | X | X |  |  |  | 2 |
| Seychelles | | X |  | X |  | X | 3 |
| Somalia | | X |  |  | X |  | 2 |
| South Africa | |  |  | X |  |  | 1 |
| South Sudan | |  | X |  |  |  | 1 |
| Sudan | | X |  |  | X |  | 2 |
| Tanzania | |  | X | X |  |  | 2 |
| Tunisia | | X |  |  |  |  | 1 |
| Uganda | | X | X |  | X |  | 3 |
| Zambia | | X |  | X |  |  | 2 |
| Zimbabwe | | X |  | X |  |  | 2 |
| **Nº of Member State per REC** | | **21** | **7** | **16** | **6** | **5** |  |
| **% of Member State per REC** | | **70%** | **23%** | **53%** | **20%** | **17%** |  |
|  | |  |  |  |  |  |  |
| **40%** | **12** |
| **37%** | **11** |
| **23%** | **7** |

From the above table the following analysis may be taken:

* A great number of Member States belong to COMESA (70%);
* 40% of Member States belongs to only 1 REC;
* 37% of Member States belongs to only 2 REC;
* 23% of Member States belongs to only 3 REC.

If ratified[[26]](#footnote-27) COMESA – EAC - SADC Tripartite 29 Member States (97%) will be aligned with the same decision-making process.

* 1. COMESA legal and institutional frameworks and processes

Legal and Institutional framework is established by the COMESA Treaty that, in relation to the Air transport, states:

*ARTICLE 87 Air Transport*

*1. In order to promote the provision of better and efficient air transport, the Member States shall promote the establishment of joint ventures for co-operation in the use of equipment, in the pooling of aircraft maintenance and training facilities, in the acquisition and use of fuel and spare parts, in insurance schemes, in the coordination of flight schedules and the improvement of managerial techniques and skills.*

*2. The Member States shall take necessary steps to promote the establishment of joint air services operations by their designated airlines on intercontinental routes and the joint use by them of wide body aircraft as steps towards the eventual establishment of a Common Market airline.*

*3. The Member States shall in particular:*

1. *adopt common policies for the development of air transport in the Common Market in collaboration with other relevant international organisations including the African Civil Aviation Commission, the African Airlines Association, the International Air Transport Association, and the International Civil Aviation Organisation;*
2. *undertake to make air transport services efficient and profitable through, inter-alia, autonomous management;*
3. *liberalise the granting of air traffic rights for passengers and cargo operations with a view to increasing the efficiency and profitability of their airlines;*
4. *harmonise civil aviation rules and regulations by implementing the provisions of the Chicago Convention on International Civil Aviation, with particular reference to Annex 9 thereof;*
5. *establish common measures for the facilitation of passenger and cargo air services in the Common Market;*
6. *co-ordinate the flight schedules of their designated airlines;*
7. *consider ways to develop, maintain and co-ordinate in common, their navigational, communications and meteorological facilities for the provision of safe air navigation and the joint management of their airspace;*
8. *encourage the joint use of maintenance and overhaul facilities and other services for aircraft, ground handling equipment and other facilities;*
9. *agree to take common measures for the control and protection of the Common Market air space;*
10. *agree to charge the same rates and apply the same rules and regulations relating to scheduled air transport services among themselves;*
11. *take measures directed towards aircraft standardization including co-operation in the preparation of technical specifications for the type of aircraft to be operated; and*
12. *coordinate measures and cooperate in the maintenance of the high security of air services operations.*

Article 87(3) of the COMESA Treaty providing that COMESA Member States shall develop, maintain and coordinate in common, their navigational, communications, and meteorological facilities for the provision of safe air navigation and the joint management of their air space.

**Decision Making Process**

COMESA has involved a comprehensive decision-making structure at the top of which is the Authority of the Heads of State and Government of the 21 member countries. There is then a Council of Ministers responsible for policy making, 12 technical committees and a series of other advisory bodies (including specific relations with partner countries and the business community).

In addition, each member state appoints liaison persons in their appropriate ministries who form part of the day-to-day communication process.

Overall co-ordination is achieved through the Secretariat, based in Lusaka, Zambia.

**The Heads of State and Government**

This is also known as the COMESA Authority and is made up of the 21 Heads of State and Government of Member States. It is the supreme Policy Organ and is responsible for the general policy, direction, and control of the performance of COMESA’s executive functions.

The Authority is concerned with the strategic trajectory of the region as well as the bloc’s achievement of its aims.

Decisions and directives of the Heads of State are by consensus and are binding on all subordinate institutions, except the Court of Justice.

**The Council of Ministers**

The Council of Ministers is COMESA’s second highest policy organ. It comprises ministers designated by the Member States.

The Council is responsible for ensuring the proper functioning of COMESA in accordance with the provisions of the Treaty. It also takes policy decisions on COMESA programmes and activities, including the monitoring and reviewing of its financial and administrative management. As provided for in the Treaty, Council decisions are made by consensus, failing which they are made by a two-thirds majority of the Council members.

* 1. EAC legal and institutional frameworks and processes

Legal and institutional framework is established by the EAC Treaty that, in relation to the Civil Aviation and Civil Air Transport, states:

***Article 92 – Civil Aviation and Civil Air Transport***

1. *The Partner States shall harmonise their policies on civil aviation to promote the development of safe, reliable, efficient, and economically viable civil aviation with a view to developing appropriate infrastructure, aeronautical skills, and technology, as well as the role of aviation in support of other economic activities.*
2. *The Partner States shall take necessary steps to facilitate the establishment of joint air services and the efficient use of aircraft as steps towards the enhancement of air transportation within the Community.*
3. *The Partner States shall in particular:*
4. *adopt common policies for the development of civil air transport in the Community in collaboration with other relevant international organisations including the African Civil Aviation Commission (AFCAC), the African Airlines Association (AFRAA), the International Air Transport Association (IATA), and International Civil Aviation Organisation (ICAO);*
5. *undertake to make civil air transport services safe, efficient, and profitable through, inter alia, autonomous management;*
6. *liberalise the granting of air traffic rights for passengers and cargo operations with a view to increasing efficiency;*
7. *harmonise civil aviation rules and regulations by implementing the provisions of the Chicago Convention on International Civil Aviation, with particular reference to Annex 9 thereof; (e) establish a Unified Upper Area Control system;*
8. *establish common measures for the facilitation of passenger and cargo air services in the Community;*
9. *co-ordinate the flight schedules of their designated airlines;*
10. *consider ways to develop, maintain and co-ordinate in common, their navigational, communications and meteorological facilities for the provision of safe air navigation and the joint management of their air space;*
11. *encourage the joint use of maintenance and overhaul facilities and other services for aircraft, ground handling equipment and other facilities;*
12. *agree to take common measures for the control and protection of the airspace of the Community;*
13. *apply the ICAO policies and guidelines in determining user charges and apply the same rules and regulations relating to scheduled air transport services among themselves;*
14. *adopt common aircraft standards and technical specifications for the types of aircraft to be operated in the Community; and*
15. *co-ordinate measures and co-operate in the maintenance of the high security required in respect of air services operations and operate joint search and rescue operations.*

East African Community (EAC) establishes the “*principle of variable geometry*” that states for the principle of flexibility which allows for progression in co-operation among a sub-group of members in a larger integration scheme in a variety of areas and at different speeds.

***THE SUMMIT***

***ARTICLE 10 Membership of the Summit***

1. *The Summit shall consist of the Heads of State or Government of the Partner States.*
2. *If a member of the Summit is unable to attend a meeting of the Summit and it is not convenient to postpone the meeting, that member may, after consultation with other members of the Summit, appoint a Minister of Government to attend the meeting. A Minister so appointed shall, for purposes of that meeting, have all the powers, duties, and responsibilities of the member of the Summit for whom that person is acting.*

***ARTICLE 11 Functions of the Summit***

1. *The Summit shall give general directions and impetus as to the development and achievement of the objectives of the Community.*
2. *The Summit shall consider the annual progress reports and such other reports submitted to it by the Council as provided for by this Treaty.*
3. *The Summit shall review the state of peace, security and good governance within the Community and the progress achieved towards the establishment of a Political Federation of the Partner States.*
4. *The Summit shall have such other functions as may be conferred upon it by this Treaty.*
5. *Subject to this Treaty, the Summit may delegate the exercise of any of its functions, subject to any conditions which it may think fit to impose, to a member of the Summit, to the Council or to the Secretary General.*
6. *An Act of the Community may provide for the delegation of any powers, including legislative powers, conferred on the Summit by this Treaty or by any Act of the Community, to the Council or to the Secretary General.*
7. *Subject to the provisions of any Act of the Community, the acts and decisions of the Summit may be signified under the hand of the Secretary General or of any officer in the service of the Community authorised in that behalf by the Summit.*
8. ***The Summit shall cause all rules and orders made by it under this Treaty to be published in the Gazette; and any such rules or orders shall come into force on the date of publication unless otherwise provided in the rule or order.***
9. *The delegation of powers and functions referred to in paragraphs 5 and 6 of this Article, shall not include:*
10. *the giving of general directions and impetus;*
11. *the appointment of Judges to the East African Court of Justice;*
12. *the admission of new Members and granting of Observer Status to foreign countries; and*
13. *assent to Bills.*

***THE COUNCIL***

***Article 13 Membership of the Council***

*The Council shall consist of:*

* 1. *the Minister responsible for East African Community affairs of each Partner State;*
  2. *such other Minister of the Partner States as each Partner State may determine; and*
  3. *the Attorney General of each Partner State.*

***Article 14 Functions of the Council***

1. *The Council shall be the policy organ of the Community.*
2. *The Council shall promote, monitor, and keep under constant review the implementation of the programmes of the Community and ensure the proper functioning and development of the Community in accordance with this Treaty.*
3. *For purposes of paragraph 1 of this Article, the Council shall:*
   1. ***make policy decisions for the efficient and harmonious functioning and development of the Community;***
   2. *initiate and submit Bills to the Assembly;*
   3. *subject to this Treaty, give directions to the Partner States and to all other organs and institutions of the Community other than the Summit, Court, and the Assembly;*
   4. ***make regulations, issue directives, take decisions, make recommendations, and give opinions in accordance with the provisions of this Treaty;***
   5. *consider the budget of the Community;*
   6. ***consider measures that should be taken by Partner States in order to promote the attainment of the objectives of the Community;***
   7. *make staff rules and regulations and financial rules and regulations of the Community;*
   8. *submit annual progress reports to the Summit and prepare the agenda for the meetings of the Summit;*
   9. *establish from among its members, Sectoral Councils to deal with such matters that arise under this Treaty as the Council may delegate or assign to them and the decisions of such Sectoral Councils shall be deemed to be decisions of the Council;*
   10. *establish the Sectoral Committees provided for under this Treaty;*
   11. ***implement the decisions and directives of the Summit as may be addressed to it;***
   12. ***endeavour to resolve matters that may be referred to it; and***
   13. ***exercise such other powers and perform such other functions as are vested in or conferred on it by this Treaty.***
4. ***The Council may request advisory opinions from the Court in accordance with this Treaty.***
5. ***The Council shall cause all regulations and directives made or given by it under this Treaty to be published in the Gazette; and such regulations or directives shall come into force on the date of publication unless otherwise provided therein.***

***Article 16 Effects of Regulations, Directives, Decisions and Recommendations of the Council***

***Subject to the provisions of this Treaty, the regulations, directives, and decisions of the Council taken or given in pursuance of the provisions of this Treaty shall be binding on the Partner States, on all organs and institutions of the Community other than the Summit, the Court, and the Assembly within their jurisdictions, and on those to whom they may under this Treaty be addressed.***

***Article 17 Composition of the Co-ordination Committee***

***The Co-ordination Committee shall consist of the Permanent Secretaries responsible for East African Community affairs in each Partner State and such other Permanent Secretaries of the Partner States as each Partner State may determine.***

***Article 18 Functions of the Co-ordination Committee***

*The Co-ordination Committee:*

* 1. *shall submit from time to time, reports, and recommendations to the Council either on its own initiative or upon the request of the Council, on the implementation of this Treaty;*
  2. ***shall implement the decisions of the Council as the Council may direct;***
  3. *shall receive and consider reports of the Sectoral Committees and coordinate their activities;*
  4. *may request a Sectoral Committee to investigate any particular matter; and*
  5. *shall have such other functions as are conferred upon it by this Treaty.*
  6. SADC legal and institutional frameworks and processes

Legal and Institutional framework is established by the SADC Protocol on Transport, Communication and Meteorology that, in relation to the Air transport, states:

***CIVIL AVIATION***

***Article 9.1 Objectives***

1. *Member States, recognizing the importance of air transport as a means of serving the national interests of the SADC Member States and the importance of promoting social and business relations amongst their nationals, shall ensure the provision of safe, reliable, and efficient services in accordance with the ICAO SARPs, with a view to improving levels of service and cost-efficiency in support of the socio-economic development of the region.*
2. *Member States recognise further that in order to overcome the constraints of small national markets, market restrictions and the small size of some SADC airlines and further to ensure the competitiveness of regional air services in a global context, there is a need for enhanced co-operation within the regional air transport market.*

***Article 9.4 ICAO Standards and Recommended Practices***

1. *Member States, recognizing that co-operation is indispensable to the realisation of the national, regional, continental, and international objectives of the civil aviation sector, shall ensure compliance with ICAO Standards in accordance with the Convention on International Civil Aviation, 1944, and shall encourage compliance with ICAO Recommended Practices.*
2. *For the purposes of attaining the objective set out in paragraph 1, Member States agree to establish co-operative means and develop regional strategies for complying with ICAO Standards in accordance with the Convention on International Civil Aviation, 1944, and ICAO Recommended Practices.*
3. *Member States shall encourage recognition of each other's licences and certificates of airworthiness, provided they comply with ICAO SARPs.*

***Regulatory Challenges***

*Air transport is an integrated, global enterprise that requires strict adherence to international standards, conventions, and recommended practices. While SADC officially ascribes to the International Civil Aviation Organisation’s Standards and Recommended Practices, domestic airlines within Member States may follow other standards.*

*Although many industry organisations operate within the region – the Airlines Association of Southern Africa, Airports Council International, and the Civil Air Navigation Service Organisation, for instance – there is no regional governing body and no unified policy or strategic framework specific to civil aviation.*

*The African Civil Aviation Commission serves to promote harmonised aviation policies in line with those of the International Civil Aviation Organization, but it itself has no decision-making capabilities*[[27]](#footnote-28)*.*

*The Transport Sector Plan component of SADC’s Regional Infrastructure Development Master Plan urges the need for establishing a regional coordinating body responsible for overseeing policy and implementation of a concerted civil aviation strategy. In response to this need, SADC initiated the Cooperative Development of Operational Safety and Continuing Airworthiness Program in 2008. Charged with assisting Member States in harmonising their national civil aviation regulations and technical procedures, this program serves as a forerunner to an eventual permanent organisation overseeing air transport in the region. However, this program has made little progress since its inception.*

* 1. COMESA – EAC - SADC Tripartite legal and institutional frameworks and processes

Legal and Institutional framework is established by the COMESA – EAC - SADC Tripartite SUMMIT that has no particular statement in relation to the Civil Aviation and Civil Air Transport, but states:

***COMESA-EAC-SADC Tripartite Framework***

*Against this background and in order to accelerate this process the Chairpersons of the COMESA Authority and the SADC Summit met in Cairo, Egypt and agreed to set up a joint COMESA-SADC Task Force at the Secretariat level to discuss and agree on harmonisation of programmes of the two organisations. In 2005, the Task Force was expanded as the EAC was co-opted to establish a Tripartite Task Force. The Task Force has met several times under the guidance of the Chief Executive Officer (CEOs) and the discussions and cooperation programmes have focused on harmonisation of programmes in the area of trade, customs, free movement of people and infrastructure development.*

*In recognition of the importance of greater member states ownership, in 2007 the Tripartite Task Force agreed and recommended that a tripartite* ***Summit of Heads of State and Government of COMESA, EAC and SADC be convened to give political endorsement and direction to the process of cooperation and harmonization.*** *The recommendation was accepted by COMESA Summit in May 2007, EAC Summit in Kigali in June 2008 and SADC Summit in August 2007. The date for the Tripartite Summit was set for 20 October 2008 in Kampala, Uganda.*

***Establishing Trade Arrangements among COMESA, EAC and SADC***

*Given that regional integration has a number of objectives which translate into economic benefits to RECs and its member/partner states, the same applies to establishment of inter-REC trade co-operation which mirrors similar objectives and benefits at wider perspective. The objectives of inter-REC trade arrangements are to:*

*i) promote trade in the region through creation of a wider market;*

*ii) increase inter-REC and extra-REC investment flows;*

*iii) enhance competitiveness of the region in the globalized environment due to improved production efficiency and value addition;*

***iv) develop cross-regional infrastructure;***

*v) develop inter-REC financial and capital architecture which will deepen financial intermediation; and*

*vi) strengthen the region’s negotiating positions in multilateral and bilateral trade arrangements.*

***Status of regional infrastructure and services***

***Air Transport***

*Air transport in the region has improved considerably with the implementation of liberalised air transport policies within the framework of the Yamoussoukro Decision (YD) and improved competition regulations. In 2005 the growth in Africa’s air traffic, at 11%, was the highest in the world. There are now many more daily flights between city pairs than there were five years ago, and the air transport fares, and cargo rates have declined in real terms. Although a number of national carriers have collapsed, capacity has increased owing to the privatisation of some national air carriers and new private sector entrants into the market.*

*COMESA, EAC and SADC jointly initiated the implementation of the YD. In this regard, the region has adopted common Air Transport Services Liberalisation Regulations; Guidelines, Provisions and Procedures for the implementation of the common regulations and established a Joint Competition Authority (JCA) to oversee the air transport liberalisation process. This means that the region has completed the legal and institutional framework that is required for the commencement of the full implementation of YD by 1st January 2009. The JCA will represent the region at the Africa-wide Executive Agency of the YD.*

***Partner States are also engaged in various airport projects to support the expanded operations. Further, the region is cooperating in the development and implementation of a regional air transport programmes covering:***

* ***Upper Airspace Control Centre (UACC) project for communications, navigation, and surveillance/air traffic management (CNS/ATM) systems[[28]](#footnote-29);***

***EAC and SADC have completed studies for the creation of upper airspaces and COMESA is conducting a study to include non EAC and non-SADC Member States in order to harmonise the airspace;***

* ***Air Transport Safety;***
* ***Aviation Security; and***
* ***Aviation Search and Rescue.***

***Recommendations[[29]](#footnote-30)***

*The Tripartite Summit is invited to:*

* + - * 1. *Launch the Joint Competition Authority (JCA) which will oversee the full implementation of the Yamoussoukro Decision on Air Transport in the three RECs.*
        2. *Direct the three RECs to:*

*develop a Single Seamless Upper Airspace;*

*develop a joint programme for the implementation of an accelerated, seamless inter-regional ICT Broadband Infrastructure network;*

*develop a harmonised policy and regulatory framework that will govern ICT and infrastructural development in the three RECs*

*Coordinate and harmonize the Regional Transport Master Plans of the three RECs.*

*Coordinate and harmonize the Regional Energy Priority Investment Plans and the Energy Master Plans of the three RECS;*

* + - * 1. *Direct the three RECs to develop a joint financing and implementation mechanism for infrastructure development.*

***Establishment of a formal legal and institutional framework***

* 1. *The ongoing cooperation amongst the three RECs has occurred under the general provisions of the Treaties of the organisations and within the framework of the African Economic Integration provided for in the African Union Constitutive Act and the Abuja Treaty. Although, at the Secretariat level there has already been established the Tripartite Task Force, there is still needed to establish a formal and legal institutional framework for the cooperation amongst the three RECs.*
  2. *The proposed legal and institutional framework will outline the principles, objectives and main areas of cooperation and integration to be pursued as well as the institutional arrangements for their implementation. It is proposed that the three RECs enter into a Memorandum of Understanding (MoU) the principles, objectives, and main areas of cooperation. A proposed MOU between the RECs is hereby attached as Annex I.*
  3. *The institutional structures of the Tripartite Framework shall comprise:*
     1. *Tripartite Summit of Heads of State and Government*
     2. *Tripartite Council of Ministers*
     3. *Tripartite Sectoral Ministerial Committee on Trade, Customs and Economic Matters*
     4. *Tripartite Sectoral Ministerial Committee on Infrastructure*
     5. *Tripartite Task Force of the Chief Executives Officers of RECs*
  4. IGAD legal and institutional frameworks and processes

Legal and Institutional framework is established by the Agreement Establishing The Inter-Governmental Authority On Development (IGAD) that has no particular statement in relation to the Civil Aviation and Civil Air Transport, but states:

***Article 7 Aims and Objectives***

*The Aims and Objectives of the Authority shall be to:*

1. *Promote joint development strategies and gradually harmonize macro-economic policies and programmes in the social, technological, and scientific fields;*
2. *Harmonize policies with regard to trade, customs, transport, communications, agriculture, and natural resources, and promote free movement of goods, services, and people and the establishment of residence;*
3. *Create an enabling environment for foreign, cross-border and domestic trade and investment;*
4. *Achieve regional food security and encourage and assist efforts of Member States to collectively combat drought and other natural and man-made disasters and their consequences;*
5. *Initiate and promote programmes and projects for sustainable development of natural resources and environment protection;*
6. ***Develop and improve a coordinated and complementary infrastructure, particularly in the areas of transport and energy;***
7. *Promote peace and stability in the sub-region and create mechanisms within the sub-region for the prevention, management, and resolution of inter and intra-State conflicts through dialogue;*
8. *Mobilize resources for the implementation of emergency, short-term, medium-term, and long-term programmes within the framework of sub-regional cooperation;*
9. ***Promote and realize the objectives of the Common Market for Eastern and Southern Africa (COMESA) and the African Economic Community;***
10. *Facilitate, promote, and strengthen cooperation in research, development, and application in the fields of science and technology.*
11. *Develop such other activities as the Member States may decide in furtherance of the objectives of this Agreement.*

***Article 8 Structure and Operation***

*The Authority shall comprise the following organs:*

1. *An Assembly of Heads of State and Government;*
2. *A Council of Ministers;*
3. *A Committee of Ambassadors;*
4. *A Secretariat*

***Article 9 The Assembly of Heads of State and Government***

1. *The Assembly of Heads of State and Government is the supreme organ of the Authority.*
2. *The functions of the Assembly shall be to:*
3. ***Make policy, direct, and control the functioning of the Organisation;***
4. *Determine the main guidelines and programmes of cooperation;*
5. *Give guidelines and monitor political issues especially on conflict prevention, management, and resolution;*
6. *Appoint the Executive Secretary upon the recommendation of the Council of Ministers;*
7. *Approve the scale of assessment of contributions of Member States to the budget the Authority upon the recommendation of the Council of Ministers.*
8. *The Assembly shall meet at least once a year and at any time upon the request of any of the Member States upon agreement of the majority of its members.*
9. ***The decisions of the Assembly of Heads of State and Government shall be reached by consensus.***
   1. IOC legal and institutional frameworks and processes

Legal and Institutional framework is established by the “PORTANT RÉVISION DE L’ACCORD GÉNÉRAL DE COOPÉRATION ENTRE LES ÉTATS MEMBRES DE LA COMMISSION DE L’OCÉAN INDIEN” that has no particular statement in relation to the Civil Air Transport, but states:

Table 15 - Commission de l'Océan Indien (COI) cooperation agreement

|  |  |
| --- | --- |
| **French Version** | **English Translation[[30]](#footnote-31)** |
| ***Article 2 - Missions***  ***La COI vise à promouvoir notamment :***  *– la coopération diplomatique ;*  *– la paix, la stabilité, la gouvernance et l’Etat de droit ;*  *– la défense des intérêts insulaires ;*  *– la coopération économique et commerciale ;*  *– la coopération dans le domaine de l’agriculture, de la conservation des ressources et des écosystèmes ;*  *– l’économie bleue ;*  *– la coopération dans le domaine culturel, scientifique, universitaire et éducatif ;*  *– la coopération juridique et en matière de justice ;*  *– la sécurité alimentaire et sanitaire ;*  *– la sécurité maritime et la lutte contre la criminalité transnationale organisée ;*  ***– la connectivité aérienne, maritime et numérique pour le rapprochement des peuples ;***  *– le changement climatique ;*  *– la protection civile ;*  *– la circulation des personnes et des biens dans l’espace de la COI.*  *D’autres domaines de compétences peuvent être décidés d’un commun accord par les instances de la COI*  *Article 4 : Institutions*  *Les organes de la COI sont :*  *– le sommet des chefs d’Etat et de gouvernement ;*  *– le conseil des ministres ;*  *– le comité des officiers permanents de liaison (O.P.L.) ;*  *– le secrétariat général.*  *Des comités composés d’experts des Etats membres peuvent être institués et appelés à l’examen de questions techniques, sectorielles ou spécifiques.*  ***Article 5 - Mode de décision***  ***La COI se prononce à l’unanimité de ses Etats membres.***  ***Article 7 - Le conseil des ministres***  ***Les décisions du conseil des ministres s’inscrivent dans le cadre des grandes orientations politiques du sommet, en conformité avec les objectifs de la COI.***  ***Le conseil des ministres est l’organe décisionnel principal de l’Organisation.***  *A. Composition*  *Le conseil est composé des ministres des Etats membres en charge des Affaires étrangères ou de leur représentant. Le Président du conseil des ministres réunit le conseil deux fois par an.*  *La présidence du conseil des ministres est exercée à tour de rôle suivant l’ordre alphabétique des Etats signataires et pour une durée d’un an par le ministre en charge des Affaires étrangères ou un autre membre du gouvernement de l’un des Etats Parties.*  *Le président du conseil des ministres a un rôle d’impulsion, de suivi et de représentation de la COI.*  *Le président du conseil des ministres assure la représentation de la COI dans les relations internationales. En cas d’empêchement de celui-ci, le pays qui assurera la prochaine présidence exercera cette fonction.*  *B. Fonctionnement*  *Les décisions du conseil des ministres sont arrêtées par celui-ci au cours de ses sessions ou selon une procédure écrite.*  ***Les décisions prises par le conseil des ministres dans les cas prévus par le présent accord sont exécutoires.***  *Le conseil des ministres établit le Règlement intérieur de la COI.* | ***Section 2 - Tasks***  ***The IOC aims to promote in particular:***  *– diplomatic cooperation;*  *– peace, stability, governance, and the rule of law;*  *– the defence of island interests;*  *– economic and commercial cooperation;*  *– cooperation in the field of agriculture, conservation of resources and ecosystems;*  *– the blue economy;*  *– cooperation in the cultural, scientific, academic, and educational fields;*  *– legal and justice cooperation;*  *– food and health security;*  *– maritime security and the fight against transnational organized crime;*  ***– air, sea, and digital connectivity to bring people together;***  *- climate change;*  *– civil protection;*  *– the movement of people and goods in the IOC area.*  *Other areas of competence may be decided by mutual agreement by the IOC authorities*  *Clause 4: Institutions*  *The organs of the IOC are:*  *– the Summit of Heads of State and Government;*  *- the Council of Ministers;*  *– the Committee of Permanent Liaison Officers (OPL);*  *– the General Secretariat.*  *Committees made up of experts from the Member States may be set up and called upon to examine questions*  *technical, sectoral, or specific.*  ***Section 5 - Decision method***  ***The IOC decides unanimously by its Member States.***  ***Section 7 - The Council of Ministers***  ***The decisions of the Council of Ministers fall within the framework of the major political orientations of the summit, in accordance with the objectives of the IOC.***  ***The Council of Ministers is the main decision-making body of the Organization.***  *A. Composition*  *The Council is made up of the Ministers of the Member States in charge of Foreign Affairs or their representing. The President of the Council of Ministers convenes the council twice a year.*  *The presidency of the Council of Ministers is exercised in turn according to the alphabetical order of the States signatories and for a period of one year by the Minister in charge of Foreign Affairs or another member of the government of one of the States Parties.*  *The President of the Council of Ministers has a role of impetus, monitoring and representation of the IOC.*  *The President of the Council of Ministers represents the IOC in international relations. In case if he is prevented from doing so, the country holding the next presidency will exercise this function.*  *B. Operation*  *The decisions of the Council of Ministers are adopted by the latter during its sessions or according to a procedure written.*  ***The decisions taken by the Council of Ministers in the cases provided for in this Agreement are binding.***  *The Council of Ministers establishes the Rules of Procedure of the IOC.* |

* 1. Main conclusion with respect to existing frameworks and processes to support the regional airspace integration and particularly deployment of interoperable CNS/ ATM Systems

Implementing a Seamless Upper Airspace operation requires the deployment of an interoperable CNS/ATM system aligned with a Regulatory and Institutional framework that should be integrally transposed into National Member States Legal framework.

East African Community (EAC) stablishes the “*principle of variable geometry*” that states for the principle of flexibility which allows for progression in co-operation among a sub-group of members in a larger integration scheme in a variety of areas and at different speeds.

This principle is of the most importance and must be enshrined in the regulatory framework to be adopted by all member states in the deployment of an interoperable CNS/ATM system aligned with a Regulatory and Institutional framework.

The consultant’s evaluation is that biding the Regulatory and Institutional framework will be possible in a direct form if the Tripartite becomes in force as 29 Member States are included, and the only Member State that’s out of the agreement is France for the part of Reunion.

Taking this into account, Member States should make every effort to carry out the approval / ratification of the Tripartite agreement, at least with regard to the Air Transport as the great, if not the greatest, driver of economic development in the EA-IO-SA Region.

This, in my opinion, and considering the actual state of art of the known CNS/ATM systems, will permit to develop a National and a Regional Institutional / Regulatory framework capable of deploy a seamless operation in the upper airspace.

Nevertheless, and according with the define *principle of variable geometry*, the twenty one Member States parties of COMESA Treaty can start implementing a Seamless Upper Airspace operation according to article 87/3 of the treaty as, and according with the decision-making process, ***decisions and directives of the Heads of State are by consensus and are binding on all subordinate institutions***.

In the meanwhile the other nine Member States can take all the necessary measures to perform the necessary changes in their National Regulatory / Legal frameworks to implement the Seamless Upper Airspace operation.

Only with the involvement and alignment of all Member States in the program of deployment interoperable CNS/ATM systems it will be possible a universal seamless upper airspace operation and permit developing the air transport as the progress instrument for the economies of the Member States involved.

1. Proposed Regional Institutional framework

The goal of this project is to define a “***Regional Institutional Framework for the Deployment of Inter-Operable CNS/ATM Systems in the Eastern Africa, Southern Africa, and Indian Ocean Region****”* that secures an agreement among Member States to agree sharing the synergies to build a Seamless Upper Airspace with a harmonized operation.

A Regional Institutional framework must be complemented by a regulatory framework to secure the deployment of a regional CNS/ATM systems, and this must be binding in the legal framework of the Member States themselves.

It also means the necessity of establishing a regional entity to implement and oversight the application of both the frameworks in conjunction with the Member States CAAs.

The project strategy is oriented towards this goal and must include workshops and stakeholder involvement that ensures all interests are represented and specific constraints addressed.

According with the approved report “***Establishment of Regulatory Framework and Agency for COMESA Unified Single Upper Airspace***” it is necessary to establish certain criteria that all draft model regulations had to meet, for these benchmarks were reviewed by the Member States during the two workshops mentioned above and amended as appropriate. They were then used as a backdrop when developing the draft model regulations:

*The European Union’s Single European Sky model is based on seamless operations wherein air navigation services could be provided by entities based on operational requirements without any need to modify FIR boundaries. This approach, which is fully in line with Assembly Resolution A38-12 Appendix G, met with the COMESA planning requirement of flexibility in airspace design and it is also the most modern approach. Furthermore, European political resistance to implementing the SES seems to be manageable which provides some assurance that the project can be successfully implemented.*

Having agreed that the European Union SES/SESAR model was supported by ICAO provisions or policy, and it could provide a framework to meet the project objectives we can go on with that decision and use European Union SES/SESAR as a planning model, having in mind that the structure “*would be emulated, not copied”*.

Seamless Air Traffic Management (ATM) operations are defined as operations in contiguous airspace that is technically and procedurally provided by an interoperable CNS/ATM system, universally safe, and in which airspace users transition between Flight Information Regions, or other vertical or horizontal boundaries, is made without any noticeable change in:

1. Type or quality of service received;
2. Air navigation and communications performance standards; and
3. Standard procedures.

The implementation of the draft model regulations in conjunction with robust Safety Management Systems (SMS), Security Management Systems (SeMS), and Quality Management Systems (QMS) regulation will need to be put in place to ensure the integrity of the model regulations.

Building a Seamless Upper Airspace concept means that Air Navigation Services regulations and directives must be aligned in all Members States, but they always retain the rights and obligation to adopt regulations and directives relating to the provision of Air Navigation Services and it’s imperative that the model safety regulations can be implemented by all States, regardless of their legal system.

As many Member States are part of the Tripartite Agreement[[31]](#footnote-32) and adopt the agreement, the same rules would apply providing a uniform area of seamless operational principles.

This will allow the Member States to adjust service provision areas to meet operational requirements without any need to modify national regulations or FIR boundaries.

* 1. Appropriate Regulatory/ legal environment

In the approved report “***Establishment of Regulatory Framework and Agency for COMESA Unified Single Upper Airspace***” eight draft models of regulation are developed essential for the establishment of the Seamless Upper Air Traffic Management (ATM) operations and the deployment of the CNS/ATM interoperable systems.

As part of the ways and means to create the Seamless Upper Airspace, measures should be adopted to ensure that the safe and efficient provision of air navigation services are consistent with the organization and use of airspace and are in line with ICAO SARP’s.

To ensure that this objective is met, air navigation service providers should be subject to certification, to ensure the effective compliance with ICAO SARP’s a Quality Management System (QMS) must be established to perform regular audits and propose necessary changes to be developed.

These draft models were developed with a view to their application to COMESA, but in truth, they are extensible and applicable to the entire Eastern Africa, Southern Africa, and Indian Ocean Region Member States Seamless Upper Airspace:

1. ***Draft model regulation on requirements for air navigation services providers for the Seamless Upper Airspace of the COMESA Region (COMESA REG 2016/1)***

*This draft model regulation establishes the obligation for all air navigation service providers intending to provide air navigation services in the Seamless Upper Airspace of the Eastern Africa, Southern Africa, and Indian Ocean Region Member States to meet specific requirements to ensure that such services are carried out in a safe and efficient manner. The requirements, which are all in conformance with the provisions of the Chicago Convention, include specific Articles that address the following:*

* 1. *certification and on-going compliance of air navigation service providers;*
  2. *technical and operational competence and capability;*
  3. *organizational structure and management;*
  4. *financial transparency;*
  5. *charging;*
  6. *human resources;*
  7. *contingency plans;*
  8. *designation of air traffic service providers;*
  9. *designation of meteorological service providers;*
  10. *designation aeronautical information service providers; and*
  11. *designation of communications navigation surveillance (CNS) service providers*

*This draft model regulation is a pillar for the implementation of integrated and seamless air navigation services as it provides a baseline that all service providers must meet.*

1. ***Draft model regulation on rules of the air for the Seamless Upper Airspace of the COMESA Region (COMESA REG 2016/2)***

*This draft model regulation is mostly regulatory but the Rules of the Air themselves can be considered as implementation rules.*

*No flexibility should be considered regarding the implementation of the Rules of the Air at the delegated airspace; however, a certain amount of flexibility is allowed for at the Eastern Africa, Southern Africa, and Indian Ocean Region Member States level.*

1. ***Draft model regulation on requirements for the provision of air traffic services in the Seamless Upper Airspace of the COMESA Region (COMESA REG 2016/3)***

*This draft model regulation is mostly regulatory but the Air Traffic Services provisions themselves can be considered as implementation rules. No flexibility should be considered regarding the implementation of the regulation at the delegated airspace; however, a certain amount of flexibility is allowed for at the Eastern Africa, Southern Africa, and Indian Ocean Region Member States level.*

1. ***Draft model regulation on the architecture of the Seamless Upper Airspace of the COMESA Region (COMESA REG 2016/4)***

*It is recognized that airspace is a common resource for all categories of users that needs to be used flexibly by all, thus ensuring fairness and transparency whilst considering security and defence needs of States; it is further recognized that efficient airspace management is fundamental to increasing the capacity of the air traffic services system.*

*The configuration of Eastern Africa, Southern Africa, and Indian Ocean Region Member States Seamless Upper Airspace should be based on operational requirements regardless of existing national boundaries.*

*This draft model regulation shall apply to airspace within the Eastern Africa, Southern Africa, and Indian Ocean Region Member States Seamless Upper Airspace and can be considered as an implementation rule and offers flexibility in the areas of design and optimization of ATS routes and sectors to ensure harmonization and seamless transitions, it does not offer flexibility as regards the division level and airspace classification.*

1. ***Draft model regulation on the requirements for the licensing of air traffic services personnel providing air navigation services in the Seamless Upper Airspace of the COMESA Region (COMESA REG 2016/5)***

*The draft model regulation address eligibility requirements, prohibitions, recency requirements, privileges, and validity of Air Traffic Control Licenses (ATC) licenses.*

*English language proficiency and issues related to medical certificates are also addressed. Training, in a very narrow sense, including instructor endorsement, has been included as have matters related to suspension of licenses.*

It’s necessary to review this draft in order to include Air Traffic Control Licenses (ATC) ratings, Aeronautical Station Operator and Aeronautical Meteorological Personnel, and other endorsements.

1. ***Draft model regulation on the interoperability of the Seamless Upper Airspace of the COMESA Region (COMESA REG 2016/6)***

*Certification of air traffic management systems should be subject to verification of compliance with the essential requirements and relevant implementing rules for interoperability.*

*It is in the interest of Eastern Africa, Southern Africa, and Indian Ocean Region Member States Seamless Upper Airspace to develop a new partnership approach allowing the balanced involvement of all parties and stimulating synergies and the sharing of knowledge, experience, and risks; such partnerships should aim at defining, in cooperation with industry, a coherent set of harmonised specifications.*

*Interoperability regulations are determined on the basis of defined essential requirements and implementing rules for systems whenever necessary to complement or further refine the ICAO provisions; these rules also address the need to facilitate the coordinated introduction of new, agreed, and validated concepts of operation or technologies as defined in the ICAO Global Air Navigation Plan (GANP). Due consideration was given to the ICAO Aviation System Block Upgrades (ASBU) which are part of the framework of the GANP.*

*This draft model regulation lays down the interoperability requirements of the air traffic management systems within the Eastern Africa, Southern Africa, and Indian Ocean Region Member States and applies to the following:*

* 1. *Systems and procedures for airspace management;*
  2. *Systems and procedures for air traffic flow management;*
  3. *Systems and procedures for air traffic services, in particular flight data processing systems, surveillance data processing systems and human-machine interface systems;*
  4. *Communications systems and procedures for ground-to-ground, air-to-ground and air-to-air communications, including datalink;*
  5. *Navigation systems and procedures;*
  6. *Surveillance systems and procedures;*
  7. *Systems and procedures for aeronautical information services;*
  8. *Systems and procedures for the use of meteorological information.*

1. ***Draft model regulation on the flexible use of airspace in Seamless Upper Airspace of the COMESA Region (COMESA REG 2016/7)***

*The APIRG concluded that, to facilitate civil/military cooperation, States, inter alia, should adopt a Flexible Use of Airspace (FUA) approach in establishing prohibited, restricted or danger areas so that these areas are managed on a temporary basis, considering the needs of civil aviation. APIRG also agreed that States establish a legal framework to support effective coordination between civil and military authorities (APIRG Conclusion 20/12).*

*Consideration was also taken of Assembly Resolution A38-12 Appendix I regarding Civil/Military coordination. The Resolution states, inter alia, that the common use by civil and military aviation of airspace and of certain facilities and services shall be arranged so as to ensure the safety, regularity, and efficiency of civil aviation as well as to ensure that the requirements of military air traffic are met.*

*This draft model regulation harmonizes the application of the concept of the flexible use of airspace to facilitate airspace management and air traffic services provision within the limits of the Seamless Upper Airspace of the Eastern Africa, Southern Africa, and Indian Ocean Region Member States. It also sets out rules to promote the cooperation between civil and military entities responsible for air traffic management that operate in the airspace under the responsibility of Member States.*

1. ***Draft model regulation on safety management systems for the Seamless Upper Airspace in the COMESA Region (COMESA REG 2016/8)***

*This draft model regulation aims to improve aviation safety by ensuring that relevant safety information relating to civil aviation is reported, collected, stored, protected, exchanged, disseminated, and analysed.*

*The draft model regulation emphasizes that the sole objective of occurrence reporting is the prevention of accidents and incidents and not to attribute blame or liability.*

*Provisions are made to protect the reporters and to instil the concept of a “Just Culture”.*

*The draft model regulation partially supports the transposition of Annex 19 into national regulations/law and is in line with the decision of the AFI Regional Air Navigation Meeting (AFI/7 Recommendation 5/26) concerning the collection and reporting of ATM incidents.*

* 1. The overall Regional Institutional structure for deployment of CNS/ ATM Systems in the EA-SA-IO Regional

It is our belief that, like the EU, a regulatory and supervisory authority can and must be established to standardize and oversight operations within the Eastern Africa, Southern Africa, and Indian Ocean Region Member States Seamless Upper Airspace. The Tripartite Treaty, which encompasses 29 member states, proposes the establishment of the JCA Joint Competition Authority with various supervisory functions.

In the approved report “***Establishment of Regulatory Framework and Agency for COMESA Unified Single Upper Airspace***” in Kigali workshop, in June 2016, three different models of organizations / agencies were presented, but we only consider two:

* 1. *An Upper Airspace Oversight Organization:*

*This model based upon ICAO’s RSOO[[32]](#footnote-33) is already particularly prevalent in Africa. The RSOO model has proven its value in Africa, although it has not been used yet for the purposes of upper airspace control. The model that seems to come closest to what COMESA needed, happens to be CASSOA.*

An upper airspace oversight body for Eastern Africa, Southern Africa, and Indian Ocean Region could be created throughout the mechanisms stated in the Tripartite Treaty. This model seems appropriate for the developmental stage of Seamless Upper Airspace operations in the Eastern Africa, Southern Africa, and Indian Ocean Region.

* 1. *An Upper Airspace “Integration” Agency:*

A supranational Agency model like EASA (European Union Aviation Safety Agency) could perhaps be modelled under Tripartite Treaty mechanisms and similar to the preview JCA Joint Competition Authority upon Eastern Africa, Southern Africa, and Indian Ocean Region.

This authority should have an essential role in coordinating the deployment of the different CNS/ATM systems among the Member States to achieve the necessary interoperability and the final defined goal achievement.

It does not seem to the consultant that it is acceptable to define a CNS/ATM system for all Member States, but rather that each one defines its own system considering the interoperability principles determined and accepted by all.

There could be other assignments to this agency and as proposed in the report a separate body for:

1. Air navigation charges and collection;
2. Central flow management system;
3. Liaison mechanisms with international organizations;
4. Other assignments consider essential
   1. Functions, Roles, and Responsibilities of the key organs/departments/committees etc. of the proposed structure

A supranational entity model like EASA (European Union Aviation Safety Agency) could be modelled under Tripartite Treaty mechanisms and should monitor and advise Eastern Africa, Southern Africa, and Indian Ocean Member States in their deployment of CNS/ATM system.

An independent entity should be implemented to model the technical and economical aspects following a similar EUROCONTROL model, of which the technical and economic value has been proven.

This entity will provide the Strategic Guidance for the Eastern Africa, Southern Africa, and Indian Ocean Member States in their deployment of CNS/ATM throughout the entity experts involved in long term and medium-term AFI ATM Master planning that will accommodate the forecasted demand and respond to Stakeholder needs and development of the Master Plan and how to achieve the set targets for each Member State:

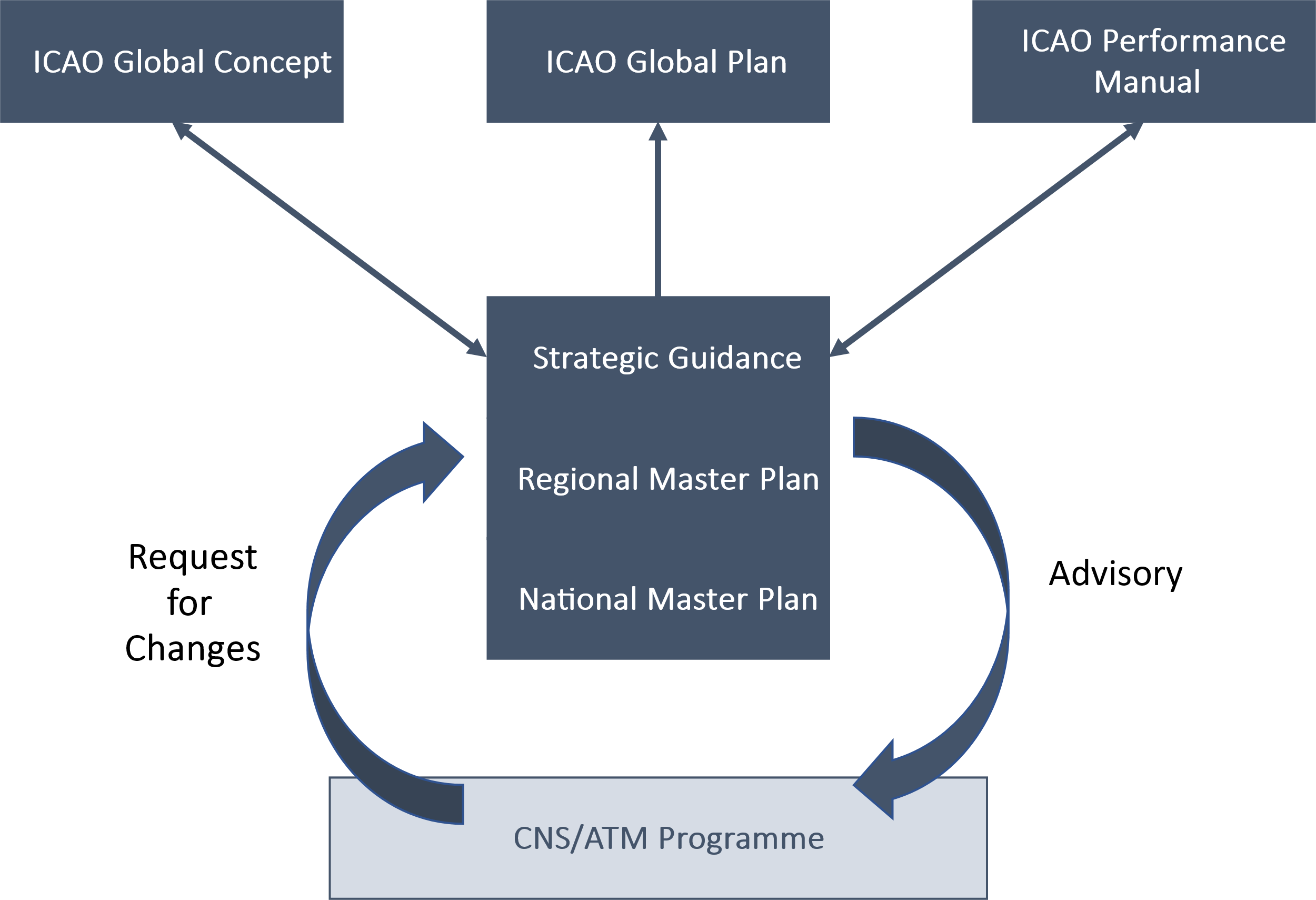


Figure 23 – CNS/ATM deployment guidance

This entity will be responsible to ensure that the Strategic Guidance is aligned with the intended CNS/ATM performance framework, the target concept and architecture, the deployment sequence, and the master plan.

This in general terms means to replace, update, and restructure existing CNS/ATM Systems due to the changed CNS/ATM context and the need to issue up-to-date material which replaces the old strategy while integrating recently updated and approved Strategies in Airspace and Navigation context.

Developing this entity will be crucial to the technical and operational development of the CNS/ATM programme for all Member States.

This proposed structure will have costs that will need to be evaluated and financed within the economic/financial framework defined by the Member States and may include the reorganization of similar structures that already exist, taking into account their organizational and regulatory/legal frameworks.

Until its establishment, it may be replaced by an intermediate structure composed of the civil aviation authorities of each of the member states affected by the same planned objectives.

This intermediate situation will have to be established within a regulatory and legal framework approved within the Member States and will have in mind the coordination of the implementation of interoperability between the CNS/ATM systems of the different Member States with the objective of the future deployment of a Seamless Upper Airspace in the EA-SA-IO region.

Taking this consideration in mind our proposition for the entity Structure will be:

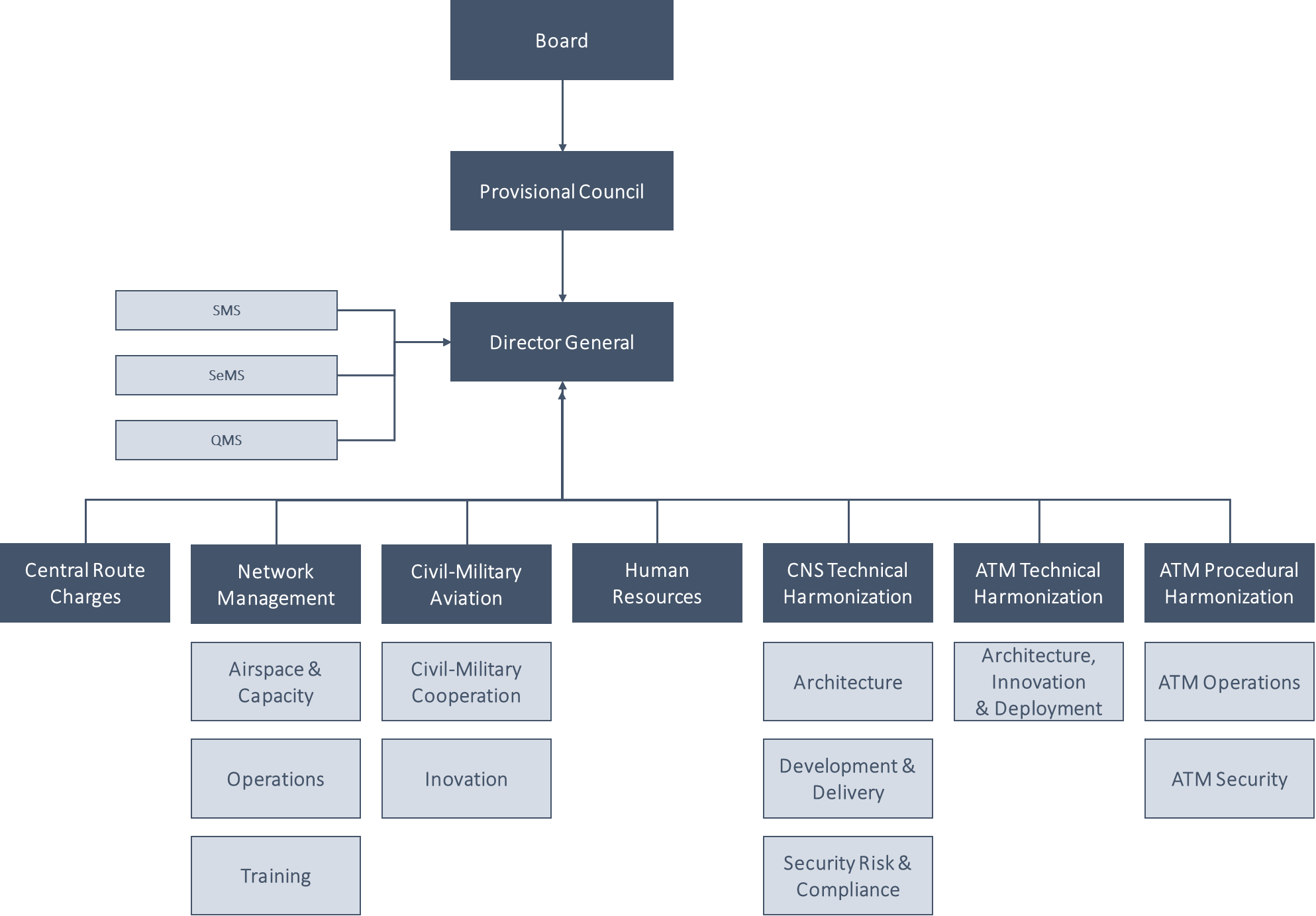


Figure 24 - Structure of the entity that would promote the deployment of CNS/ATM

This is a preliminary proposed structure for the entity that will promote the implementation of the technical and operational part of the Eastern Africa, Southern Africa, and Indian Ocean Member States in their deployment of CNS/ATM as well as the National and Regional Master plans.

The Board is expected to be constitute by appointed Ministers and Military Authorities from Member States with executive power aligned with the tripartite decision-making process, and the provisional council is expected to be constitute by Civil & Military Member States’ Representatives.

Director General should be designated by the Board and will be responsible for the maintenance and enforcement of Safety and Security Policies, as well as for the quality program to audit the Seamless Upper Airspace.

It also promotes the liaison between Civil and Military Authorities, as well as in conjunction define the Security Management System and the Flexible Usage of Airspace (FUA) for the Seamless Operation of the Upper Airspace.

It’s expected that the Member States develop an ATM Master Plan aligned with the ICAO Doc 9750 Global Air Navigation Plan (GANP) and this entity will promote the development of the Regional ATM Master Plan based on the National Member States Master Plans and will provide the necessary support for future developments of the National/Regional ATM master plan and the expected deployment of CNS/ATM plan and the associated ASBU development.

* 1. Interaction with other non EA-SA-IO States and International Organization

It’s necessary to evaluate the level of interoperability existent between all systems.

Establish Letter of Agreement (LoA’s) and/or Letters of Operations (LoO’s) between the different non EA-SA-IO States.

* 1. Guidance Framework for the implementation of the Regional Interoperable CNS/ ATM Systems

Interoperability means making aviation systems, procedures, equipment, and training compatible around the region, and improve air navigation efficiency to airspace users.

The implementation of a Regional CNS system is always associated with an ATM system. Both systems must be interoperable sharing all the promoted conditions:

1. Communications: It is expected that they can be used by the ATM system in compliance with the conditions and standards defined for the Seamless Upper Airspace and they must be interoperable in contingency, distress, and emergency conditions;
2. Navigation: It is an expected applicable airworthiness requirement to be met by the airborne RNP system installation in order to be in compliance with the airworthiness approval for the RNP specifications for the Seamless Upper Airspace;
3. Surveillance: It is expected that they can be used by the ATM system according with the conditions and standards defined for the Seamless Upper Airspace and they must be interoperable with Member States ATM systems;
4. Airborne Systems: It is expected to be in compliance with the specifications and requirements to fly in the Seamless Upper Airspace;
5. Augmentation, although all Satellite-Based Augmentation Systems (SBAS) are regional systems, it is important to ensure that they are interoperable and that SBAS providers cooperate with each other and coordinate their actions. Compatibility will make each system more effective and ensure that all the systems can be integrated into a seamless worldwide navigation system;
6. ATM systems must be interoperable with all the integrated components and between other ATM systems that are part of the Seamless Upper Airspace;
7. AIM systems must be interoperable with other AIM system and with AIS systems that do not perform the transition from AIS to AIM;
8. METEO systems must be interoperable between all the system they provide METEO information.

The interoperability between these systems must be regulated bearing in mind:

*Interoperability regulations are determined on the basis of defined essential requirements and implementing rules for systems whenever necessary to complement or further refine the ICAO provisions; these rules also address the need to facilitate the coordinated introduction of new, agreed, and validated concepts of operation or technologies as defined in the ICAO Global Air Navigation Plan (GANP). Due consideration must be given to the ICAO Aviation System Block Upgrades (ASBU) which are part of the framework of the GANP.*

It's necessary to evaluate the “***Draft model regulation on the interoperability of the Seamless Upper Airspace of the COMESA Region (COMESA REG 2016/6)****”:*

*This draft model regulation lays down the interoperability requirements of the air traffic management systems and applies to the following:*

1. *Systems and procedures for airspace management;*
2. *Systems and procedures for air traffic flow management;*
3. *Systems and procedures for air traffic services, in particular flight data processing systems, surveillance data processing systems and human-machine interface systems;*
4. *Communications systems and procedures for ground-to-ground, air-to-ground and air-to-air communications, including datalink;*
5. *Navigation systems and procedures;*
6. *Surveillance systems and procedures;*
7. *Systems and procedures for aeronautical information services;*
8. *Systems and procedures for the use of meteorological information.*

This Draft Model probably considers all the necessary conditions and requirements to establish the regulatory and Institutional framework for the deployment of a Regional Interoperable CNS/ ATM Systems.

* 1. Conclusion

The aim of the Interoperability regulatory framework is to:

1. Achieve interoperability between different systems and procedures in the Eastern Africa, Southern Africa, and Indian Ocean Member States CNS/ATM network by establishing a harmonised system for certification of components and systems;
2. Ensure the introduction of new agreed and validated concepts of operations and technology.

This means to deploy CNS/ATM ground and airborne elements and the space equipment to support Air Navigation Services during all phases of flight systems with functional, technical, and operational properties and procedures to ensure safe, efficient, and Seamless Upper Operation in the Eastern Africa, Southern Africa, and Indian Ocean Member States CNS/ATM Upper Airspace Network.

1. Systems and their elements must meet essential requirements:
2. Seamless operation;
3. Support new concepts of operation;
4. Safety;
5. Security;
6. Civil/Military coordination;
7. Environmental constraints;
8. Logical architecture of systems and construction of systems;
9. Structures and procedures for airspace management;
10. Structures and procedures for air traffic flow management;
11. Structures and procedures for air traffic services
12. Communications structures and procedures for ground-to-ground, air-to-ground and air-to-air communications;
13. Navigation procedures;
14. Surveillance structures and procedures;
15. Structures and procedures for aeronautical information services and for the use of meteorological information.

Implementing rules for interoperability must determine specific requirements regarding safety, coordinated introduction of new concepts of operation, compliance assessment procedures to consider the use components, as well as for the verification of structures and the conditions of implementation.

Regional requirements must consider standards for systems and/or structures, relevant procedures drawn and approved by designated regional entities throughout a declaration of verification, confirming compliance, issued by both Regional and National Supervisory Authority.

1. Conclusions and Recommendations

Firstly, it should be noted that everything that has been done was based on literature review and analysis as there has been only four answers from member states and information on local conditions was also almost non-existent.

The trip to Cairo bring some information about interoperability of the CNS/ATM systems from Egypt and Sudan but still insufficient to arise some conclusions related to the best way to develop an Institutional / Regulatory framework at Regional level to be adopted by Member States as a guide to develop their owns.

The few AIP's that were able to have access provide some information but still nothing is mentioned about the actual performing conditions and in relation to the development of new systems.

Limited feedback from Member States, lead to an evaluation that can be considered with a lower positive impact and the developing based on such a lower information can drive to a poor Institutional / Regulatory framework and in consequence a negative impact on the deployment of a seamless upper airspace operation.

These necessary guidelines are essential for the elaboration of regulatory and institutional frameworks that can be applied to all Member States.

It is expected that National CAA’s remains as essential partners for establishing National and Regional Institutional / Regulatory frameworks and that the ANSPs in the Eastern Africa, Southern Africa, and Indian Ocean Member States will remain as they currently are i.e., in most cases controlling both the upper and lower airspaces in the existing FIRs.

Developing upper airspace does not seem feasible without the necessary development of lower airspace and to provide the greatest possible efficiency of operations in the Seamless Upper Airspace operational procedures and technical upgrades should be aligned in both airspaces as far as is possible.

It is essential to assess what exists in each of the Member States and, from there, adjust the necessary management decisions to be taken.

These decisions will have to go through the ASBU program so that there is a standardization of action, and this development is consolidated by all Member States.

Without this evaluation, decisions may assume an unpredictability that will then be difficult to reconcile.

* 1. Introduction

Aircraft consumes fossil fuels and leads to a wide range of emissions which contribute to the “greenhouse effect” and to climate change. The implementation plan for achieving a better Air Navigation efficiency must be based on concepts that will facilitate more efficient design of airspace and procedures, which will result inter alia in a reduction of the impact on environment.

It is recommended that during the implementation phase the Member States seek the harmonization of environmental regulations throughout a common policy and regulatory framework.

If implemented as planned, the ASBU modules have a number of environmental benefits, principally in reduction of fuel consumption, hence lower emissions and reduced regional Carbon footprint.

Various sources have been used to identify best practices in the implementation of these concepts, including from ICAO, EUROCONTROL, the African Indian Ocean (AFI) Planning and Implementation Regional Group (APIRG), and airlines.

It is recommended that the references provided are applied as more in-depth guidance and recommendations for implementation.

Collaboration among Member States will also enable best practices for implementation in the area to be identified, taking into account the requirements of the region.

The following technical areas are covered:

1. Communication,
2. Surveillance,
3. Navigation, and
4. Automated Systems;

And the following operational concepts are covered:

1. PBN implementation,
2. FUA implementation,
3. ATFM implementation,
4. CDM implementation,
5. Transition to AIM,
6. SWIM implementation,
   1. ATM structure

Automated ATM systems assist in the performance of Air Traffic Management (ATM), Air Traffic Control (ATC) and Air Traffic Flow Management (ATFM) systems, it’s necessary to define the architecture design, characteristics, and attributes of the operational requirements based on the current provided service levels and intended service levels to achieve.

It’s necessary to evaluate the requirements and operational concept, plan and develop to:

1. Identify the automation level required according to Air Traffic Services (ATS) functions;
2. Define the exchange of data, and functional interfaces for data exchange. For data exchange consultant recommend that all components can exchange data throughout the All-Purpose Structured EUROCONTROL Surveillance Information Exchange (ASTERIX) that enable it to transmit all the information needed, with the smallest data load possible, and is being adopted by the industry;
3. Define the current and future operational applications needs;
4. Determine the short-term requirements;
5. Determine the future operational requirements;
6. Bilateral and multilateral agreements as appropriate;
7. Standards, procedures, and guidance material required for the functional operation;
8. Develop a human resources training plan on a National and Regional basis;
9. Detail an action plan permitting the interoperable implementation;
10. Develop procedures for certification.

It’s necessary for the implementation process:

1. Systems certification;
2. Regulatory approvals;
3. Operational test and evaluation;
4. Performance monitoring.
   1. Communications structure

The ATN[[33]](#footnote-34) should have sufficient capacity to meet the minimum requirements for data communications for the Aeronautical services (ATS, AIS/AIM, MET, SAR):

It’s necessary to evaluate the requirements and operational concept, plan and develop to:

1. Air Ground Communications for ATS
   1. Require the minimum number of frequency and channel changes;
   2. Minimum amount of coordination between ATS Units;
2. Air Ground Data Link Communications:
   1. Interoperable Global and Regional implementation;
3. Aeronautical Fixed Services (AFS):
   1. Avoiding simultaneous loss of circuits where ATS and Data communications links between any two points are provided;
4. AMHS
   1. Interoperability;
   2. AFTN and AMHS expected to co-exist for a considerable period of time;
5. AIDC[[34]](#footnote-35)
   1. Definition of ATS Operational requirements;
   2. Studies of existing systems;
   3. Confirmation of service Environment (Current ATS environment);
   4. Conceptual Design;
   5. Technical feasibility study;
   6. System Design review;
   7. Preparation for operation;
   8. Development of training courses;
   9. Safety Assessment;
6. ADS-C and CPDLC Data Links
   1. Definition of ATS Operational requirements;
   2. Studies of existing systems;
   3. Confirmation of service Environment (Current ATS environment);
   4. Conceptual Design;
   5. Technical feasibility study;
   6. System Design review;
   7. Preparation for operation
   8. Development of training courses;
   9. Safety Assessment;
7. VHF Coverage
   1. Definition of ATS Operational requirements;
   2. Studies of existing systems;
   3. Confirmation of service Environment (Current ATS environment);
   4. Conceptual Design;
   5. Technical feasibility study;
   6. System Design review;
   7. Preparation for operation;
   8. Development of training courses;
   9. Safety Assessment.
   10. Navigation structure

Improvements in navigation include the progressive introduction of area navigation (RNAV) capabilities along with the global navigation satellite system (GNSS).

The total system composed of station-referenced navigation aids, satellite-based navigation systems and airborne capabilities should meet the PBN requirements for all airspace users.

To fly in the Seamless Upper Airspace aircraft, should meet the PBN requirements and GNSS capabilities.

Member States should focus on developing procedures and air traffic management based on operational requirements, the capabilities of GNSS and operational approvals.

Regional Navigation Requirements:

1. Station-referenced navigation aids and Frequency Usage;
2. Satellite based navigation systems; and
3. Airborne capabilities should meet the PBN requirements for all aircraft;
4. Evaluate GNSS vulnerabilities
5. System responsiveness
   1. Surveillance structure

Planning the aeronautical surveillance systems should be done in a collaborative concept of sharing data sources for the support of an efficient use of airspace. Aircraft will automatically transmit operational information contained in the flight management system, via satellite or other communication links, to an ATM system.

Member States should ensure the implementation of Surveillance technologies is harmonised, compatible, and interoperable with respect to operational procedures, supporting data link with the ATM systems.

Surveillance across the whole Eastern Africa, Southern Africa, and Indian Ocean Member States airspace should be essentially based on ADS-B and WAM systems, which are cost effective and easier to deploy than radar surveillance.

Depending on the type of operational requirements of the Member States, and where there is no mandate for other type of surveillance, ground based ADS-B In/Out will be the proposed principal means of surveillance in continental areas and ADS-B Satellite based in remote areas and highs seas.

Even that ADS-C cannot be considered a surveillance mean it should be implemented in remote areas and high seas.

It’s a consultant recommendation that WAM should be implemented in a later phase and dependent on operational conditions evaluation.

Existent PSR and SSR should be maintain until the end of it’s lifecycle and then must be evaluated the necessity of renew the structure based on operational requirements.

Member States should identify areas where the implementation of ADS-B while taking into account Regional developments and implementation of ADS-B in adjacent Member States.

ADS-B and WAM Requirements and operational concept:

1. Construct Operational concept;
2. Identify Operational requirements;
3. Identify Technical requirements;
4. Develop Safety Case;
5. Equipment development, test, and evaluation;
6. Develop procedures;
7. Conduct operational test and evaluation;
8. Systems certification;
9. Regulatory approvals;
10. Implementation transition;
11. Performance monitoring.
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Annex 1 – Survey

Section I: CAA – Civil Aviation Authority

**Member state:**

**Please consider the following questions in relation to your CAA operations**

**Questions:**

**Please fill out this form, selecting the best answers that fit to your entity’s procedures.**

1. A seamless airspace allows for harmonised rules and procedures and availability of interoperable CNS/ ATM Systems. Is this applicable within your Flight Information Region?

**Yes**

**No**

1. If **YES** **to** **Question 1**, can this be extended to the neighbouring Flight Information Region?

**Yes**

**No**

1. If **NO to Questions 1 or 2**, what are the challenges?
2. How does the CAA classify the implementation of a seamless airspace in the EA-SA-IO region?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Very Appropriate** | **Appropriate** | **Medium** | **Inappropriate** | **Very Inappropriate** |
|  |  |  |  |  |

1. Does the CAA have a national plan for all relevant services and functional areas, already implemented or expecting to be implemented?

**Yes**

**No**

1. If **YES to Question 5**, is the national plan aligned with Regional and Global Plans?

**Yes**

**No**

1. If **NO to Question 5**, how are these relevant services and functional areas implemented?
2. If **NO to Question 6**, what are the challenges in aligning the national plans with Regional and Global Plans?

1. Is your State involved or in the process of being involved in any regional agreements on Airspace integration or improvement of CNS/ATM system?

**Yes**

**No**

1. If **NO to Question 9**, does the State envisage getting involved in these regional agreements?

**Yes**

**No**

1. If **NO to Question 10**, what are the reasons?

1. Has the State implemented or is in the process of implementing relevant regulations to support use of Satellite Navigation within its Airspace?

**Yes**

**No**

1. If **NO to Question 12**, what are the reasons?

1. Does the State meet the regionally agreed Effective Implementation (EI) percentage under ICAO USOAP between 60% ≤ EI ≤ 70%?1

**Yes**

**No**

1. If **YES to question 14,** will the state be able to achieve the required 80% by 2022?

**Yes**

**No**

1. If the answer is **NO to questions 14 or 15**, what are the challenges?

1. Is the current State institutional and regulatory framework aligned with the existing CNS/ATM Infrastructure and management?

**Yes**

**No**

Section II: ANSP – Air Navigation Service Provider

**Member state:**

1. **Have you delegated the provision of Air Navigation Services above FL 245 in your airspace?**

**Yes**

**No**

If **Yes,** please identify the reasons.

**Please consider the following questions in relation to your ANSP operations**

**Questions:**

Please fill out this form, selecting the best answers that fit to your entity’s procedures. Some questions may have more than one possible answer.

1. **General questions**
   1. A seamless airspace allows for harmonised rules and procedures and availability of interoperable CNS/ ATM Systems. Is this applicable within your Flight Information Region?

**Yes**

**No**

* 1. If **YES to question 1.1,** can this be extended to the neighbouring Flight Information Region?

**Yes**

**No**

* 1. If **NO** to **questions 1.1 or 1.2**, what are the challenges?
  2. How does the ANSP perceive the implementation of a seamless airspace in the EA-SA-IO?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Very Appropriate** | **Appropriate** | **Medium** | **Inappropriate** | **Very Inappropriate** |
|  |  |  |  |  |

* 1. Does the ANSP have a national plan for all relevant services and functional areas, already implemented or expected to be implemented?

**Yes**

**No**

* 1. If **YES to Question 1.5**, is this national plan aligned with Regional and Global Plans?

**Yes**

**No**

* 1. If **NO to Question 1.5**, how are these relevant services and functional areas implemented?
  2. If **NO to question 1.6**, what are the challenges in aligning the national plans with Regional and Global Plans?

* 1. Is your State involved or in the process of being involved in any regional agreements on Airspace integration or improvement of CNS/ATM system?

**Yes**

**No**

* 1. If **NO to Question 1.9**, does the State envisage getting involved in these regional agreements?

**Yes**

**No**

* 1. Is Safety Management System (SMS) implemented in your entity?

**Yes**

**No**

* 1. If **YES to Question 1.11**, is it in compliance with the Regional Plan?

**Yes**

**No**

* 1. Is Security Management System (SeMS) implemented in your entity?

**Yes**

**No**

* 1. If **YES to question 1.13**, is it in compliance with the Regional Plan?

**Yes**

**No**

* 1. Is Quality Management System (QMS) implemented in your entity?

**Yes**

**No**

* 1. If **YES to question 1.15**, is it in compliance with the Regional Plan?

**Yes**

**No**

1. **Institutional and regulatory framework**
   1. Have you updated the LOP / LOA accordingly with the current CNS/ATM system?

**Yes**

**No**

* 1. Has the State implemented or in the process of implementing relevant infrastructure and procedures to support use of Satellite Navigation within its Airspace?

**Yes**

**No**

* 1. If **NO to question 2.2**, what are the reasons?
  2. Does the State have a PBN Plan?

**Yes**

**No**

* 1. If **YES to question 2.4**, what is the level of implementation in accordance with the regional implementation plan?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **1% - 20%** | **20% - 40%** | **40% - 60%** | **60% - 80%** | **80% - 99%** | **100%** |
|  |  |  |  |  |  |

* 1. If **NO to question 2.4**, what are the challenges?

1. **Air navigation infrastructure**
   1. Which elements the current air navigation infrastructure above FL 245 contains? (tick where appropriate).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Communication** | | **Navigation** | | **Surveillance** | | **Augmentation** | | **Air Traffic Management** | | **ASM** | |
| VHF |  | GNSS |  | PSR |  | ABAS |  | ATS: Conflict management |  | Airspace organization |  |
| UHF |  | VOR |  | SSR |  | GBAS |  | Air Traffic Control |  | ATS Route structure |  |
| HF |  | DME |  | Modes A/C |  | SBAS |  | RHSM |  | FUA |  |
| Data CPDLC |  | NDB |  | Mode S |  |  |  | RVSM |  |  |  |
| VHF Satellite |  |  |  | WAM |  |  |  | Alert detection and warning systems |  |  |  |
| HF Satellite |  |  |  |  |  |  |  | Search and Rescue |  |  |  |
| SATCOM |  |  |  | ADS-B |  |  |  | Decision support systems (ATFM) |  |  |  |
| AMHS |  |  |  | ADS-B Satellite |  |  |  | AMAN/DMAN |  |  |  |
| AIDC |  |  |  |  | |  |  |  |  |  |  |
| Others\* |  |  |  | ADS-C |  |  |  |  |  |  |  |

\*(please specify)

1. **Communications**
   1. Do you have VHF communications coverage for the entire airspace above FL 245?

**Yes**

**No**

* 1. If YES, how reliable is the VHF communications coverage?

|  |  |  |  |
| --- | --- | --- | --- |
| **Extremely Reliable** | **Reliable** | **Quasi-reliable** | **Nonreliable** |
|  |  |  |  |

* 1. If **NO to Question 4.1**, how do you mitigate for areas not covered by VHF communications?

* 1. Do you have coordination procedures between ATS units?

**Yes**

**No**

* 1. If **YES to question 4.4**, how do you classify coordination procedures between ATS units?

**Extremely Reliable**

**Reliable**

* 1. If **NO to Question 4.4**, what are the reasons?

1. **Navigation**
   1. What is the route classification in your airspace above FL 245?

**PBN**

**Conventional**

**Others**

* 1. How efficient is the existent route system?

**Efficient**

**Not Efficient**

* 1. What are the navigation specifications for the routes in the airspace above FL 245? (Tick where appropriate)

|  |  |
| --- | --- |
| **RNAV** | **RNP** |
| 10 5 | 4 2 |

* 1. Do you think changing actual institutional and Regulatory framework for PBN implementation is?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Very Appropriate** | **Appropriate** | **Medium** | **Inappropriate** | **Very Inappropriate** |
|  |  |  |  |  |

* 1. The performance of Global Navigation Satellite Systems (GNSS’s) can be improved by regional Satellite Based Augmentation Systems (SBAS). How do you consider the need of SBAS above FL 245?

**Important**

**Not Important**

* 1. The implementation of Satellite Based Augmentation System (SBAS) will bring additional costs, how do you consider these costs:
* In terms of CAPEX?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Very High** | **High** | **Medium** | **Low** | **Very Low** |
|  |  |  |  |  |

* In terms of OPEX?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Very High** | **High** | **Medium** | **Low** | **Very Low** |
|  |  |  |  |  |

1. **Air Traffic Management (ATM)**
   1. Do you have an Air Traffic Management (ATM) System implemented?

**Yes**

**No**

Annex 2 – Draft final report Structure

The **structure described is merely informative and subject to change** according with the development of the project:

**Acronyms**

**Definitions and Terminologies**

**Executive summary**

1. **Introduction**
   1. Purpose of document
   2. Scope of the project
   3. Project methodology overview
   4. Objectives and structure of the document
   5. Description of the New CNS/ATM Systems
2. **Background of the project** 
   1. SATSD Programme
   2. Region Economic Communities under the SATSD Programme
      1. The Common Market for Eastern and Southern Africa (COMESA)
      2. The East Africa Community (EAC)
      3. Intergovernmental Authority for Development (IGAD)
      4. The Indian Ocean Commission (IOC)
      5. The Southern African Development Commission (SADC)
   3. Context with regards to the regional air transport sector
      1. Operationalizing the Single African Air Transport Market
      2. Traffic Forecasts in EA-SA-IO Region (Based on feedback from Member States)
      3. Forecasts by the International Air Transport Association (IATA).
      4. Regional Airspace Fragmentation and its impact on air traffic management
      5. Shortcomings of the Present CNS/ATM Systems in the EA-SA-IO Region

(highlight air navigation inefficiency among other shortcomings).

* + 1. ICAO AFI Regional Air Navigation Plan/ ASBU Framework and description of new CNS/ ATM System Concept

(Global and regional industry policy to address the shortcoming)

* + 1. Evolution and Implementation of interoperable CNS/ ATM Systems

(Conclude with the need to evolve and deploy interoperable CNS/ ATM as a critical enabler for establishing systems to improve air navigation efficiency in order to support the projected traffic growth)

* 1. Previous and ongoing work/ studies on airspace integration in the EA-SA-IO Region
     1. COMESA Airspace Integration Project and key outcomes
     2. EAC Seamless Upper Airspace Project and key outcomes
     3. SADC??? And key outcomes
     4. IOC (If any)
     5. IGAD (If any)
     6. Consolidation of regional initiatives and outcomes
  2. Conclusions on Regional Air Transport Sector and need for Regional Airspace integration/ harmonization to create efficiency in the regional air navigation system

1. **Overview of EA-SA-IO Member States’ Air Navigation Sector**
   1. Scope of the analysis
   2. Aviation stakeholders
   3. Functional mapping of Air Navigation Service Provision
      1. Member States with ANSP organizationally separation of ANSP from CAA
      2. Member State with Functionally separated ANSPs
   4. Existing Infrastructure and Procedures
      1. Existing Communication Systems in Member States
         1. Introduction
         2. Limitations of current Communications Systems implemented in the region
      2. Navigation Systems in Member States
         1. Introduction
         2. Current operational GNSS Framework for the EA-SA-IO Region
         3. Operational GNSS Framework for the Member/ Partner States.
         4. Operational GNSS Framework for Regional Economic Community (Where available)
      3. Status of Surveillance Systems implementation in Member States
         1. Introduction
         2. Secondary Surveillance Radar (SSR)
         3. Primary Radar Surveillance (PSR)
         4. Automatic Dependent Surveillance (ADS)
         5. Space Based ADS-B
         6. Wide Area Multilateration (WAM)
         7. Limitation of current surveillance systems implemented in the region
      4. Air Traffic Management Systems in Member States
         1. ATM objectives
         2. Limitations of the Current ATM Systems in the EA-SA-IO Region
      5. Meteorology Systems in Member States
         1. Introduction.
         2. Limitations in the Meteorological systems implemented in the EA-SA-IO MS
      6. Aeronautical Information Services in Member States
         1. Introduction.
         2. Overview of global AIS and MAP Support to International Civil Aviation.
         3. Limitations of the Current AIS/MAP Systems implemented in the EA-SA-IO region
   5. Regional ASBU framework implementation within MS in the EA-SA-IO region
      1. Performance Improvement Areas
      2. Block 0 Modules and implementation timelines
      3. Block 1 Modules and implementation timelines
      4. CNS/ ATM Systems Evolution and timelines
         1. Communication Systems evolution and timelines
         2. Navigation Systems evolution and timelines
         3. Surveillance System evolution and timelines
         4. ATM Services evolution and timelines
         5. Meteorological Systems evolution and timelines to Support CNS/ATM system interoperability
         6. AIS/MAP Systems evolution and timelines to Support the transition to CNS/ATM Systems
   6. Main conclusions extracted from the analysis
2. **Requirements for Deployment of Regional Interoperable CNS/ ATM Systems**
   1. Planning Considerations
      1. Introduction
      2. Homogeneous ATM Areas and Major International Traffic Flows
      3. Deployment scenarios for interoperable CNS/ ATM Systems within the region
      4. Development of a Regional implementation Plan for deployment of interoperable CNS/ ATM Systems
      5. Domestication of regional Plan at Member/ Partner States level
      6. Airlines Plans (Based on literature review to bring out need)
   2. Areas of regional cooperation among EA-SA-IO Member States
      1. Introduction
      2. Technical Cooperation among Member/ Partner States in transition to seamless CNS/ATM Systems in EA-SA-IO Region
   3. Legal, Regulatory and Institutional Frameworks
      1. Introduction
      2. Legal and Regulatory framework to support deployment of interoperable CNS/ ATM System
      3. Other Legal Issues. (Determined from the project study)
   4. Human Resource Development and Training Needs (From Baseline Study and TNA report)
      1. Introduction
      2. Basic Training
      3. ICAO ASBU Concept
      4. CNS Systems Implementation Planning - Training Needs
      5. ATM Operational Implementation Planning - Training Needs
      6. Proposed Planning of Training
   5. Cost-Benefit and Economic Impacts
      1. General
      2. Business Case Evaluation
      3. Other Economic Effects of CNS/ATM Systems Implementation
   6. Financial Aspects
      1. Introduction
      2. Determination, Cost Recovery and Financing
3. **Analysis of international Institutional Frameworks on established Airspace Integration** 
   1. EUROCONTROL and the Single European Sky
   2. ASECNA
   3. Any other initiatives and associated frameworks e.g., Maastricht Upper Area Control Centre (MUAC)
   4. Successes & Challenges of each framework
   5. Constraints & best practices i.e., from ICAO, CANSO, etc
   6. Conclusions
4. **Current Regional legal and institutional frameworks and processes** 
   1. COMESA legal and institutional frameworks and processes
   2. EAC legal and institutional frameworks and processes
   3. SADC legal and institutional frameworks and processes
   4. COMESA- EAC- SADC Tripartite legal and institutional frameworks and processes
   5. IGAD legal and institutional frameworks and processes
   6. IOC legal and institutional frameworks and processes
   7. Main conclusion with respect to existing frameworks and processes to support the regional airspace integration and particularly deployment of interoperable CNS/ ATM Systems
5. **Proposed Regional Institutional framework** 
   1. Appropriate Institutional/ legal environment for deployment of interoperable CNS/ ATM Systems in the EA-IO-SA Region
   2. Justification of the proposal (advantages, disadvantages)
   3. The overall Regional Institutional structure for deployment of CNS/ ATM Systems in the EA-SA-IO Regional
   4. Functions, Roles, and Responsibilities of the key organs/departments/committees etc of the proposed structure
   5. Obligations of EA-SA-IO Member State
   6. Interaction with other non-EA-SA-IO States and International Organization
   7. Guidance Framework for the implementation of the Regional Interoperable CNS/ ATM Systems
6. **General conclusions and recommendations**
7. **References**

**Annex 1: Mechanism or guidance framework to facilitate the implementation of the Regional Institutional Framework**

**Annex 2: Regional policy framework/ Statement of Policy on CNS/ATM Systems Implementation and Operation**

**Annex 3: Draft Charter on the Rights and Obligations of States Relating to GNSS Services.**

Annex 3 – Terms of Reference

1. **Background**

The Common Market for Eastern and Southern Africa (COMESA) Secretariat and the European Union (EU) signed a Grant Contribution Agreement amounting to €8million for the Support to Air Transport Sector Development (SATSD) in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) Region. The SATSD is a four (4) year programme that aims at supporting the operationalization of the Single African Air Transport Market (SAATM); strengthening the regulatory and institutional capacity of civil aviation institutions; and improving air navigation efficiency in the EA-SA-IO region.

The overall objective of the programme is to contribute to the development of the air transport sector in the EA-SA-IO region.The specific objectives are to achieve the following:

* Single African Air Transport Market operationalised.
* Strengthened regulatory and institutional capacity of civil aviation institutions in EA- SA-IO region; and
* Improved air navigation efficiency in the EA-SA-IO region.

The program integrates three key result areas which will be implemented with sub result areas as follows:

**Result 1: Single African Air Transport Market operationalised**

Sub result 1.1: Supported signing of Solemn Commitment by Member States (MS) in the EA-SA-IO region

Sub result 1.2: Enabled operationalisation of joint competition rules and regulations

Sub result 1.3: Enhanced capacity for a regional model for sustainable air transport market development.

**Result 2: Strengthened regulatory and institutional capacity of civil aviation institutions in the EA-SA-IO region**

Sub result 2.1: Separation of Civil Aviation Authority regulatory functions from operational functions supported in a number of fast-moving countries.

Sub result 2.2: Enhanced managerial and technical skills for aviation oversight.

Sub result 2.3: Improved gender sensitivity and environment mainstreaming in the aviation sector.

**Result 3: Improved air navigation efficiency in the EA-SA-IO region**

Sub result 3.1: Enhanced airspace coordination for Regional Seamless Upper air space

Sub result 3.2: Enabled data sharing through centralised regional aeronautical information databases.

The primary beneficiaries of the Support to Air Transport Sector Development (SATSD) programme are Member States of the EA-SA-IO region, through improved quality of air transport services that will stimulate demand for air transport services. Increased demand for air transport services will contribute to increased employment, direct and indirect contribution through the positive impact on downstream aviation sector industries which are sources of inputs like fuel, spare parts, consumables, equipment, and other service providers. Other sectors of the economy that will benefit are the tourism sector, industrial and trade sectors which rely heavily on-air transport. Growth of these sectors will positively contribute to GDP growth. Citizens will have increased disposable incomes as a result of growth in GDP and GDP per capita hence can afford air travel especially given the potential reduction in air fares. The huge size of the continent and its many physical barriers, coupled with limitations in land-based transport infrastructure will make air travel the preferred mode. Institutional reforms to be supported by the programme will result in efficient and accountable institutions that will be able to support sustained growth of the sector.

**2. DESCRIPTION OF THE ASSIGNMENT**

**2.1 Global objective**

The global objective is to develop a Regional Institutional Framework for the deployment of inter-operable CNS/ ATM Systems towards achieving a Regional Seamless Upper Airspace in the Eastern Africa, Southern Africa, and Indian Ocean (EA-SA-IO) region focusing on the current status of the three Result Areas of the SATSD Programme.

**2.2 Specific objective(s)**

The specific objectives of the assignment include the following:

1. Undertake an assessment of the existing regional institutional and legal frameworks and their capacity to support the deployment of interoperable CNS/ATM systems in the EA-SA-IO region.
2. Undertake an assessment of the current status of ICAO ASBU framework implementation within MS in the EA-SA-IO region with a particular focus on Performance Improvement Area 2: Globally Interoperable Systems and Data through System Wide Information Management.
3. Develop a mechanism to facilitate establishment of interoperable CNS/ ATM Systems within the region.
4. Develop a regional policy, rules, procedures, and regulation for coordinated implementation of ICAO ASBU framework in Member States within the EA-SA-IO region in accordance with the AFI Air Navigation and Global Air Navigation Plans.

**2.3 Requested services including suggested methodology**

Specifically, the expert will review the status of the air transport sector focusing on but not limited to the following aspects:

* 1. Infrastructure;
  2. Legal and institutional framework;
  3. Skills gap/Training requirements
  4. Performance Based Navigation (PBN) implementation plans;
  5. Airline equipage;
  6. State Safety Programme/ Safety management;
  7. ICAO AFI and Global air navigation plans.

The main tasks include but not limited to the following: -

1. Review all the relevant documents provided by the Programme including the programme description of action, the log frame and any other source documents deemed necessary to complete the assignment.
2. Develop the methodology to undertake the assignment and submit to the Programme Management Unit for review and approval by the COMESA Infrastructure and Logistics Division.
3. Review outcomes of the baseline study to establish the status of implementation of the ICAO Aviation System Block Upgrade (ASBU) and available regional institutional/ legal frameworks within the region that could be used to facilitate the deployment of inter-operable CNS/ATM Systems.
4. Review national air navigation plans of Member States within the region to establish the status of implementation of the ICAO Aviation System Block Upgrade (ASBU) framework in accordance with the AFI and Global Air Navigation Plans.
5. Formulate a regional institutional framework and appropriate enablers that will facilitate the deployment of interoperable CNS/ ATM Systems within the EA-SA-IO region.
6. Develop concept of operation and scenarios to support adoption of the regional institutional framework for deployment of inter-operable CNS/ ATM Systems within the EA-SA-IO region.
7. Review programme results framework and log frame to refine and adapt programme indicators and/or programme targets based on the findings to allow effective monitoring of implementation status.
8. Prepare a final report with an in-depth analysis of the outcomes of the baseline study, assignment objectives, methodology, key findings, and recommendations.
9. Conduct workshops with Member States to validate the developed regional Institutional Framework for deployment of interoperable CNS/ ATM Systems within the EA-SA-IO region.
10. Prepare and submit report on the outcomes of the validation workshop which should include key findings and recommendations among others.

In carrying out the above assignment, the consultant is expected to adopt a consultative approach that involves the following:

* Descriptive and analytic Desk Reviews.
* In-depth interviews with Member/Partner States (Ministries/departments and agencies involved in Air Transport) in consultation with COMESA, EAC, IGAD, IOC and SADC Secretariats.
* The interviews may be face to face and/virtual. A standard questionnaire will be designed and discussed with COMESA during the inception phase on behalf of the other four REC’s.
* It is expected that the consultant will consult all Member/Partner States virtually during the course of this assignment, being facilitated by the PMU staff at the COMESA Secretariat. The findings of the Consultants will be validated through a regional workshop that will be attended by a number of stakeholders (COMESA, EAC, IOC, IGAD, SADC, Member/Partner States, EU, and other stakeholders).
* The day-to-day management of the Consultant’s work will be coordinated and supervised by COMESA Infrastructure and Logistics Division through the Programme Management Unit.
* The SATSD Programme Team Leader will address all day-to-day technical issues relating to the study. COMESA Infrastructure and Logistics Division will provide regular oversight role in particular on the progress of the assignment.
* COMESA will coordinate and manage the missions to Member/Partner States and will be responsible for all protocols related to experts travel and their contacts with Member/Partner States in liaison with the other RECs.

**2.4 Deliverables**

The document to be produced should meet all conditions specified in 2 above. The deliverables of the assignment should include:

1. Inception Report
2. Draft Final Report
3. Final Report
   * 1. **Inception Report**

The consultant shall prepare an Inception Report outlining the strategy and detailed workplan for fulfilling the Terms of Reference (ToRs). This shall include a comprehensive list of key documents for review, list of stakeholders to consult and a proposed schedule for stakeholder consultations (in Member/Partner States and REC Secretariats), methods of data collection and analysis. The Inception Report will be presented to COMESA, fifteen (15) days after commencement of assignment. The Inception Report shall be discussed with and approved by COMESA as the Lead REC for the SATSD Programme.

* + 1. **Draft final Report**

The consultant shall submit a Draft Final Report within ***Ninety (90) days*** after Inception The report will bring out results on all aspects highlighted under section 2.3, providing details and relationships among them including annexes to clearly guide the readers. The Consultant will be expected to share their draft report with COMESA in an agreed format for preliminary review and validation. Furthermore, the consultant is expected to participate and present the findings and recommendations at agreed technical and policy platforms to discuss and validate the report.

* + 1. **Final Report**

The final report will be submitted within ***fourteen (14) days*** after receiving comments from Member/Partner States and the RECs. The Report will comprise an Executive Summary, main body (methodology, key findings, and recommendations) and relevant Annexes. The final report will be submitted together with the validation Workshop Report.

1. **TIMELINES**
2. **Commencement Date and Period of Implementation**

The assignment shall be completed within a period of ***one hundred and twenty (120) calendar days,*** commencing from the date of receipt of the Notice of award.

1. **Table of Deliverables**

The timing of the deliverables for the assignment is as indicated in the table below. The Inception report, draft final report and final report shall be submitted electronically.

|  |  |
| --- | --- |
| **Deliverables** | **Timeline** |
| Inception Report including Detailed Work plan | 15 days from receipt of letter of award |
| Draft final Report | 90 days from receipt of letter of award |
| Final Report | 120 days from receipt of letter of award |

1. **MANAGEMENT**

**4.1 Contracting**

The Contract for the Assignment shall be signed between COMESA Secretariat and the Consultant.

**4.2 Language of the Specific Contract**

All documents shall be in English language.

**4.3 Supervision**

It is expected that the consultant will work in very close coordination with the COMESA Secretariat, providing regular, unsolicited updates, and responding promptly and flexibly to the needs and demands of COMESA and the corresponding timelines. Overall reporting will be to Director of Infrastructure and Logistics and supervision will be administered through regular meetings and communication to monitor progress of the study and provide general and specific guidance. All reports shall be in electronic format in MS Word, Excel or PowerPoint as the case may be.

**4.4 Reporting**

All reports shall be in English submitted in both electronic and printed format on A4 paper. The Final Draft including all background documents will be submitted in five (5) bound hard copies as well as in electronic format to the COMESA Secretariat. The secretariate shall translate the documents in both French and Portuguese languages.

**4.5 Location**

The location of the assignment is home-based with field visits to COMESA, EAC, IGAD, IOC and SADC if virtual meetings are not possible with at least two travel missions to COMESA, and at least one visit to each of the other four RECs and selected Member/Partner States for information gathering.

**4.6 Duration**

The total number of days allocated for this assignment is ***one hundred and twenty (120) calendar days*** inclusive of travel days. The consultant will be required to have completed the study and submit the Final Report within this period.

1. **QUALIFICATIONs AND EXPERIENCE**
   1. **Academic Requirements**
2. Master’s degree in Air Transport, Aviation Law, Engineering, Economics, Business Administration or a relevant, directly related discipline.
   1. **Professional Requirements**
3. At least 10 years of progressively relevant experience in sustainable air transport development, air transport policy, airspace management, planning, strategy, and regulation as well as programme/project management with a minimum of 5 years in managerial position.
4. Demonstrated experience in formulation of institutional and legal frameworks for civil aviation sector entities, governments, or regulators,
5. Knowledge of ICAO Standards and Recommended Practices, Procedures of Air Navigation Services, and aviation sector reform debate
6. Experience in the implementation of the ICAO Aviation System Block Upgrade framework in accordance with the ICAO Global Air Navigation Plan
7. Experience in civil aviation regulations related to aviation safety, air navigation capacity and efficiency, security, and environmental protection to assist African States in the practical interpretation and implementation of the African Civil Aviation Policy,
8. Knowledge of the roles of the Regional Economic Communities (RECs) in the EA-SA-IO region and/or the African Union on sustainable development of air transport and aviation in general
9. Experience in dealing with air transport liberalization frameworks.
10. Experience in facilitating seminars and workshops.
11. Strong writing and presentation skills.
12. Relevant experience working in similar donor funded regional programmes, preferably (but not limited to) EU-funded programmes, in developing countries in general and in Sub-Saharan Africa in particular would be an additional asset.

1. Doc 9750-AN/963 Fifth Edition – 2016 [↑](#footnote-ref-2)
2. ”*Together with people outside the field of aviation, we find ourselves moving in a vicious cycle, where the machine, which depend on modern man for its invention, has made modern man dependent on its constant improvement for his security - even for his life*“ Charles A. Lindbergh in “The Spirit of St. Louis”, 1953 [↑](#footnote-ref-3)
3. <https://www.comesa.int/support-to-air-transport-sector-development-satsd-in-the-eastern-africa-southern-africa-and-indian-ocean-ea-sa-io-region/> [↑](#footnote-ref-4)
4. The SAATM Handbook [↑](#footnote-ref-5)
5. <https://au.int/en/saatm> and [IATA - The Single African Air Transport Market (SAATM)](https://www.iata.org/en/about/worldwide/ame/saatm/) [↑](#footnote-ref-6)
6. Union of the Comoros, under the FIR of Antananarivo – Madagascar, Republic of Djibouti, under the FIR of Addis Ababa – Ethiopia, and Swaziland, under the FIR of Johannesburg – South Africa. [↑](#footnote-ref-7)
7. <https://www.icao.int/ESAF/Pages/default.aspx> [↑](#footnote-ref-8)
8. Manual on Collaborative Decision-Making (CDM) [↑](#footnote-ref-9)
9. [Home - ICAO GANP Portal](https://www4.icao.int/ganpportal/) [↑](#footnote-ref-10)
10. ICAO Doc 4444 PANS-ATM [↑](#footnote-ref-11)
11. Regulation 549/2004 - SES Framework [↑](#footnote-ref-12)
12. Doc 9613, Performance-based Navigation (PBN) Manual [↑](#footnote-ref-13)
13. <https://canso.org/asecna-launch-pre-operational-sbas-service/> [↑](#footnote-ref-14)
14. <https://www.icao.int/APAC/Documents/edocs/AIDC_IGD%20Guidance.pdf> [↑](#footnote-ref-15)
15. Thabani Mthiyane CEO, ATNS South Africa – World ATM Congress - 09 MARCH 2016 [↑](#footnote-ref-16)
16. (i) Low power and low interest: Monitor; (ii) Low power but high interest: Keep informed; (iii) High power but low interest: Keep satisfied; (iv) High power and high interest: Manage carefully [↑](#footnote-ref-17)
17. AFI Plan – Volume 2 [↑](#footnote-ref-18)
18. *Study to Assess the Technical and Financial Feasibility of a Seamless Upper Airspace in the COMESA Region* [↑](#footnote-ref-19)
19. COMESA Airspace Integration Project [↑](#footnote-ref-20)
20. <https://www.aeronautical.co.za/south-african-ads-b-final-phase> [↑](#footnote-ref-21)
21. <https://www4.icao.int/ganpportal/ASBU> [↑](#footnote-ref-22)
22. Civil Air Navigation Services Organisation on his document, ”*Recommended Key Performance Indicators for Measuring ANSP Operational Performance*” [↑](#footnote-ref-23)
23. Action Document for Support to Air Transport Sector Development (SATSD) in the Eastern Africa, Southern Africa, and Indian Ocean region (EA-SA-IO) / 11th EDF EA-SA-IO Regional Indicative Programme. [↑](#footnote-ref-24)
24. ICAO 2013 [↑](#footnote-ref-25)
25. <http://www.gnss-africa.org/?page_id=23> [↑](#footnote-ref-26)
26. According to <https://www.bilaterals.org/?eac-comesa-sadc-tripartite-not> Tripartite is not yet signed by the minimum Member States and is not ratified. <https://www.tralac.org/resources/by-region/comesa-eac-sadc-tripartite-fta.html> [↑](#footnote-ref-27)
27. <https://www.sadc.int/pillars/air-aviation> [↑](#footnote-ref-28)
28. FIRST COMESA-EAC-SADC TRIPARTITE SUMMIT - 20th OCTOBER 2008 (Page 18)

    <http://repository.eac.int/bitstream/handle/11671/1633/Tripatite%20Working%20Document-%20Trade%20and%20Infrastructure%20Master.pdf?sequence=1&isAllowed=y> [↑](#footnote-ref-29)
29. FIRST COMESA-EAC-SADC TRIPARTITE SUMMIT - 20th OCTOBER 2008 (Page 23)

    <http://repository.eac.int/bitstream/handle/11671/1633/Tripatite%20Working%20Document-%20Trade%20and%20Infrastructure%20Master.pdf?sequence=1&isAllowed=y> [↑](#footnote-ref-30)
30. Nonofficial translation of documents parts [↑](#footnote-ref-31)
31. France by part of Reunion, is not part of this agreement but is the consultant conviction that will not oppose to binding the agreed regulatory and institutional framework in Reunion’s legal framework. [↑](#footnote-ref-32)
32. Regional Safety Oversight Organizations [↑](#footnote-ref-33)
33. Aeronautical Telecommunication Network [↑](#footnote-ref-34)
34. Air Traffic Services Inter-facility Data Communication [↑](#footnote-ref-35)