SOUTH AFRICAN

NATIONAL AIRSPACE MASTER PLAN

2011 – 2025

Version 1.1

REVISION INDEX

Version	Revision	Date	Reason for Change	Pages Affected
Draft	0.1	28/01/2010	New Document	All
Draft	0.2	10/02/2010	Incorporation of comments from drafting team	All
Draft	0.2.1	10/03/2010	Comments by ATNS ATM Department	All
Draft	0.2.2	11/03/2010	Comments by ATNS ATM Department	All
Draft	0.3	23/03/2010	Comments by the working group	All
Draft	0.4	23/03/2010	Comments by the meeting of 23 March 2010	All
Draft	0.5	23/04/2010	Comments by DOT/CAA/ATNS on V0.3 & V0.4	All
Draft	0.6	29/04/2010	Comments by the working group on V0.5	All
Draft	0.7	27/05/2010	Comments by the working group on V0.6	All
Draft	0.7.1	23/06/2010	Comments made via the NAMP website on V0.7	All
Draft	0.7.2	24/06/2010	Comments by the working group on V0.7 & V0.7.1	All
1	-	24/06/2010	V0.7.2 accepted by working group as Version 1	All
1.1	-	11/11/2010	Amendment of signature page by NASCOM	3

ENDORSEMENT AND RECOMMENDATION

This South African National Airspace Master Plan (NAMP) introduces strategies to achieve a long term (15 years plus) desirable future. The NAMP is the highest level of strategic guidance for use in developing and implementing airspace and associated Air Traffic Management (ATM) initiatives.
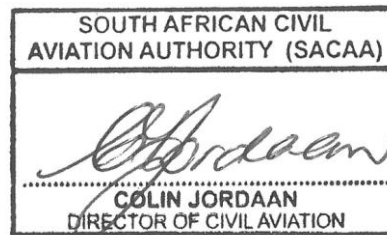
Endorsement of the NAMP implies agreement to the vision, mission, goals, key strategies and commitment to participate in the cooperative planning process.

Given the dynamic nature of the air traffic environment, the NAMP may be reviewed and updated annually to reflect the changing situation and to include the contributions of additional stakeholders.

The NAMP was formally endorsed by the National Airspace Committee (NASCOM) and recommended to the Director of Civil Aviation for consideration.

The Director of Civil Aviation hereby endorses this document as the South African National Airspace Master Plan.

SACAA

SOUTH AFRICAN CIVIL
AVIATION AUTHORITY (SACAA)

COLIN JORDAAN
DIRECTOR OF CIVIL AVIATION

Dated   2010 -12- 0 2   DCA

SOUTH AFRICAN

CIVIL AVIATION
AUTHORITY

APPROVAL

The Director-General: Transport hereby approves and endorses this document as the South African National Airspace Master Plan.

DOT

Dated   09/12/2010   DG

transport
Department:
Transport
REPUBLIC OF SOUTH AFRICA

EXECUTIVE SUMMARY

The National Airspace Master Plan (NAMP) is compiled in accordance with the National Civil Aviation Policy, as amended, which requires the creation of the NAMP. The Civil Aviation Regulations (CARS) provide the regulatory framework for the establishment of the National Airspace Committee (NASCOM) as well as the designation and classification of airspace. The Constitution of the NASCOM requires that the need for the review of the NAMP should be considered on an annual basis. Amendments to the NAMP are recommended by NASCOM to the Director of Civil Aviation and approved by the Director-General of Transport. All stakeholders represented at NASCOM have participated in the review of this edition of the NAMP, which was subsequently endorsed by NASCOM.

The NAMP provides the strategic view and direction of airspace organization and management within South Africa. The airspace organisation function will provide the strategies, rules and procedures by which the airspace will be structured to accommodate the different types of air activity, traffic volume, differing levels of service and rules of conduct. The organisation, flexible allocation and use of airspace will be based on the principles of access and equity.

The NAMP also supports regional interoperability and harmonization in that it provides for the needs and expectations of the airspace users, and at the same time, ensures the alignment of national efforts towards the achievement of the Key Performance Areas (KPAs) i.e. the expectations as outlined in the Global ATM Operational Concept (ATMOC), the Global Performance Indicators (GPI's) as set out in the Global Air Navigation Plan (GANP). These expectations addressed in the NAMP are: Access and Equity; Capacity; Cost effectiveness; Efficiency; Environment; Flexibility; Global Interoperability; Participation by the ATM Community; Predictability; Safety and Security.

Performance Requirements are also recorded in the NAMP as user expectations and again align with the global requirements as articulated in the South African, Regional and Global PBN Roadmaps. The NAMP also addresses the notion of Performance-based transition planning and implementation. It is to this end that planning choices are to be justified in advance, through the analysis of anticipated performance requirements and achievements, to underscore the transition process and promote transition planning both at global, regional and local level.

The NASCOM will in the execution of its mandate, measure all activities against the NAMP's stated KPAs, performance objectives, indicators and targets, when contemplating amendments to airspace, procedures and infrastructure.

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ABBREVIATIONS

AFI	Africa-Indian Ocean
AFI-RAN	Africa-Indian Ocean (AFI) Regional Air Navigation (RAN)
ANSP	Air Navigation Service Provider
APIRG	AFI Planning and Implementation Regional Group
ATC	Air Traffic Control
ATM	Air Traffic Management
ATM/cns	Air Traffic Management/ communication navigation surveillance
ATMOC	Air Traffic Management Operational Concept
ATS	Air Traffic Service
CARs	Civil Aviation Regulations
CDM	Collaborative Decision Making
FUA	Flexible Use of Airspace
GANP	Global Air Navigation Plan
GPIs	Global Performance Indicators
ICAO	International Civil Aviation Organisation
IMC	Instrument Meteorological Conditions
KPAs	Key Performance Areas
NASCOM	National Airspace Committee
NAMP	National Airspace Master Plan
PBN	Performance-based Navigation
RNAV	Area Navigation
RNP	Required Navigation Performance
SARPS	Standards and Recommended Practices
VMC	Visual Meteorological Conditions

GLOSSARY OF TERMS

Air Navigation Service Provider (ANSP). An ANSP is the organisation that separates aircraft both on the ground and in flight in a dedicated block of airspace on behalf of a state or a number of states. Air Navigation Service Providers are either government departments; state owned companies, or privatised organisations.

Air Traffic Management (ATM). The dynamic, integrated management of air traffic and airspace — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.

Air Traffic Service (ATS). A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service, area control service, approach control service or aerodrome control service.

Area Navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

> *Note — Area navigation includes performance-based navigation as well as other RNAV operations that do not meet the definition of performance-based navigation.*

ATM Community. The aggregate of organizations, agencies or entities that may participate, collaborate and cooperate in the planning, development, use, regulation, operation and maintenance of the ATM system.

ATM Operational Concept (ATMOC). The ATMOC is a high-level description of the ATM services necessary to accommodate traffic at a given time horizon; a description of the anticipated level of performance required from, and the interaction between, the ATM services, as well as the objects they affect; and a description of the information to be provided to agents in the ATM system and how that information is to be used for operational purposes. The operational concept is neither a description of the air navigation infrastructure nor a technical system description nor a detailed description of how a particular functionality or technology could be used.

ATM System. A system that provides ATM through the collaborative integration of humans, information, technology, facilities and services, supported by air and ground- and/or space-based communications, navigation and surveillance.

ATS Route. A specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services.

> *Note — The term ATS route is used to mean variously, airway, advisory route, controlled or uncontrolled route, arrival or departure route, etc.*

"City pairs" Concept. This refers to the concept of city pairs in South Africa with inter-related procedures and operations. In the context of this document this relates to for e.g. but is not limited to the city pairs of Johannesburg – Cape Town; Cape Town – Durban and Durban – Johannesburg.

Collaborative Decision Making (CDM). For the purposes of this document CDM will be understood as meaning the following:

A process of collaboratively considering alternative understandings of a problem, an issue or a topic, whilst recognising competing interests, priorities or constraints. Fundamental to this process is a requirement to articulate in a concise and agreed upon manner the problem, issue or topic. This process is aimed at improving the ATM system through increased information exchange among and brings together the various parties in the ATM community. This process will result in an agreed to application of the most appropriate action.

Danger Areas. An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

Demand. The number of aircraft requesting to use the ATM system in a given time period.

Efficiency. The ratio of the cost of ideal flight to the cost of procedurally constrained flight.

Equity. The first aircraft ready to use the ATM resources will receive priority, except where significant overall safety or system operational efficiency would accrue or national interests dictate that priority be provided on a different basis. Equity is ensured for all airspace users that have access to a given airspace or service by the global ATM system.

Flexible use of airspace (FUA). Within the context of this document, FUA is understood to mean;

Airspace is no longer designated as purely "civil" or "military" airspace, but considered as one continuum and allocated according to user requirements. Any necessary airspace segregation is temporary, based on real-time usage within a specific time period. Contiguous volumes of airspace are not constrained by national boundaries.

Gate-to-Gate. A concept where the air traffic operations of ATM community members are such that the successive planning and operational phases of their processes are managed and can be achieved in a seamless and coherent way.

Homogeneous ATM area. An airspace with a common air traffic management interest, based on similar characteristics of traffic density, complexity, air navigation system infrastructure requirements or other specified considerations wherein a common detailed plan will foster the implementation of interoperable CNS/ATM systems.

> *Note — Homogeneous ATM areas may extend over States, specific portions of States, or groupings of smaller States. They may also extend over large oceanic and continental en-route areas. They are considered as areas of shared interest and requirements.*

IMC and VMC Capacities. The maximum number of aircraft that can be accommodated in a given time period by the system or one of its components (throughput).

Instrument Meteorological Conditions (IMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions.

Key Performance Areas (KPAs). The *ATM community expectations* fall into eleven categories, called *Key Performance Areas.* These are (in alphabetical order): Access and Equity, Capacity, Cost Effectiveness, Efficiency, Environment, Flexibility, Global Interoperability, Participation by the *ATM community*, Predictability, Safety, and Security.

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.

> *Note — Performance requirements are expressed in navigation specifications in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.*

Performance Based Transition. A method for *transition planning*, in which planning choices are justified in advance by a thorough analysis of anticipated *performance* needs and achievements.

RNP specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Prohibited Areas. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

Restricted Areas. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

The Plan. This document, The National Airspace Master Plan (NAMP).

Trajectory or flight profile. This is a description of the movement of an aircraft, both in the air and on the ground, including position, time and, at least via calculation, speed and acceleration.

Visual Meteorological Conditions (VMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

4D Trajectory. A four-dimensional (x, y, z and time) trajectory of an aircraft from gate-to-gate, at the level of fidelity required for attaining the agreed ATM System performance levels

INTRODUCTION

1. Purpose

The establishment of a National Airspace Master Plan (NAMP) (hereafter referred to as The Plan), strategically harmonised with the global, regional and Air Traffic Management (ATM) Community and community members' plans is fundamental to the designation of airspace and the support of performance based ATM. The primary driver for The Plan is to achieve an interoperable, globally harmonised ATM System for all users during all phases of flight as articulated by the ATM Community in South Africa that:

- meets agreed levels of safety;
- provides for optimum economic operations;
- is environmentally sustainable; and,
- meets national security requirements.

The Plan supports the notion of performance based Air Traffic Management/communication, navigation and surveillance (ATM/cns) and transition strategies and aims to provide a consolidated, agreed to, set of principles and guidelines along which the ATM Community can plan strategically, within the vision of the global, regional and national service provision. The Plan furthermore describes the organisation and where appropriate, the physical construction of the airspace, associated services, responsibilities, technologies and infrastructure up until 2025. This accommodates the expected traffic growth and complements regional and global plans.

2. Legislation

The Plan is compiled in accordance with the National Civil Aviation Policy (as amended) which requires a NAMP. The Civil Aviation Regulations (CARs) provide the regulatory framework for the designation and classification of airspace.

3. Global Alignment and Harmonisation

The publication of the Global Air Navigation Plan (GANP), the Global ATM Operational Concept (ATMOC), the ATM System Requirements and Performance Based Transition Guidelines are recognised and considered in The Plan. The Plan further incorporates and supports the regional plans and initiatives as formulated by Africa-Indian Ocean - Regional Air Navigation (AFI-RAN) and AFI Planning and Implementation Regional Group (APIRG).

4. Scope

A variety of components, guiding principles and expectations are described in the various International Civil Aviation Organisation (ICAO) documents. The Plan focuses primarily on the requirements of airspace organisation and management. The other aspects must be considered holistically when designation and classification of airspace is contemplated. ATM community plans are considered as supportive of the NAMP. The development of and advances in technology are not the primary drivers of The Plan, cognisance is however taken of those advances and efficiencies.

5. Objectives

The objectives of the NAMP are as follows:

- To service the airspace in accordance with ICAO Standards and Recommended Practices (SARPS) in such a way that it meets the requirements of all users and particularly, the international community.

- To rationalize all managed airspace in accordance with ICAO SARPS in such a way that it meets the requirements of all users by a consultative process, strategically and tactically.

- To minimize all permanent Prohibited, Restricted and Danger areas in accordance with ICAO SARPS and to facilitate the flexible use of airspace to the benefit of all users.

- To continually maintain information (uncontrolled) airspace in accordance with ICAO SARPS in such a way that it meets the requirements of all users.

The Plan will direct national efforts towards the achievement of the components and expectations of the ATMOC. These expectations are considered to be the Key Performance Areas (KPAs) for The Plan and are described under expectations and KPAs.

These KPAs will form the basis of and will be addressed through the ATM community members' individual roadmaps and implementation plans (e.g. the South African Performance-based Navigation (PBN) Implementation Roadmap and the ATNS ATM Roadmap). These roadmaps, when developed will address any associated training requirements.

The KPAs will be used as the guidelines to address the 23 Global Performance Indicators (GPI) as set out in the Global Air Navigation Plan (ICAO doc 9750). In the following table the 23 GPIs are linked to the seven focus areas of the ATMOC (ICAO doc 9854);

Table Key:

AOM	-	-	Airspace organization and management
DCB	-	-	Demand/capacity balancing
AO	-	-	Aerodrome operations
TS	-	-	Traffic synchronization
CM	-	-	Conflict management
AUO	-	-	Airspace user operations
ATM SDM	-		ATM service delivery management

Global Performance Indicator		En-route	Terminal Area	Aerodrome	Supporting Infra-structure	Related Operational Concept Components
GPI-1	Flexible use of airspace	X	X			AOM, AUO
GPI-2	Reduced vertical separation minima	X				AOM, CM
GPI-3	Harmonisation of level systems	X				AOM, CM, AUO
GPI-4	Alignment of upper airspace classifications	X				AOM, CM, AUO
GPI-5	RNAV and RNP (PBN)	X	X	X		AOM, AO, TS, CM, AUO
GPI-6	Air traffic flow management	X	X	X		AOM, AO, DCB, TS, CM, AUO
GPI-7	Dynamic and flexible ATS route management	X	X			AOM, AUO
GPI-8	Collaborative airspace design and management	X	X			AOM, AUO
GPI-9	Situational awareness	X	X	X	X	AO, TS, CM, AUO
GPI-10	Terminal area design and management		X			AOM, AO, TS, CM, AUO
GPI-11	RNP and RNAV SIDs and STARs		X			AOM, AO, TS, CM, AUO
GPI-12	Functional integration of ground systems with airborne systems		X			AOM, AO, TS, CM, AUO
GPI-13	Aerodrome design and management			X		AO, CM, AUO
GPI-14	Runway operations			X		AO, TS, CM, AUO
GPI-15	Match IMC and VMC operating capacity		X	X	X	AO, CM, AUO
GPI-16	Decision support system and alerting systems	X	X	X	X	DCB, TS, CM, AUO
GPI-17	Data link applications	X	X	X	X	DCB, AO, TS, CM, AUO, ATMSDM
GPI-18	Aeronautical information	X	X	X	X	AOM, DCB, AO, TS, CM, AUO, ATMSDM
GPI-19	Meteorological systems	X	X	X	X	AOM, DCB, AO, AUO
GPI-20	WGS-84	X	X	X	X	AO, CM, AUO
GPI-21	Navigation systems	X	X	X	X	AO, TS, CM, AUO
GPI-22	Communication infrastructure	X	X	X	X	AO, TS, CM, AUO
GPI-23	Aeronautical radio spectrum	X	X	X	X	AO, TS, CM, AUO, ATMSDM

6. Airspace Organisation and Management

All airspace will be the concern of ATM and will be considered a usable resource. The organisation, flexible allocation and use of airspace will be based on the principles of access and equity. On this basis, any restrictions on the use of any particular volume of airspace will be considered to be transitory. The airspace will be organized and managed in a manner that will accommodate all current and potential new uses of airspace, inter alia, remotely piloted aircraft and transiting space-vehicles.

While acknowledging sovereignty, airspace will be organised globally. Homogeneous ATM areas and routing areas will be kept to a minimum, with consideration given to consolidating adjacent areas. The ATM community members concerned will undertake strategic planning for any defined area. The Air Navigation Service Provider (ANSP) managing that particular airspace will effect tactical changes in that specific airspace.

Coordinated planning between adjacent areas will be conducted with the objective of achieving a single airspace continuum. The airspace within that continuum shall be free of operational discontinuities and inconsistencies. Airspace shall be organised to accommodate the needs of the different types of users on a timely basis. Transition between areas will be transparent to users at all times.

Airspace organisation and management will provide the first layer of conflict management while endeavouring to match Instrument Meteorological Conditions (IMC) and Visual Meteorological Conditions (VMC) capacities. Effective airspace organisation and management will enhance the ability of the ANSP and airspace users to accomplish conflict management and will also increase ATM system safety, capacity and efficiency.

South Africa will address Performance-based Navigation (PBN) implementation in accordance with the agreed to South African PBN Roadmap, which is aligned with Regional and Global PBN Implementation Roadmaps. The evolution of the South African airspace and associated procedures will be aligned to the requirements as described in the South African PBN Roadmap.

In both en route and terminal airspace, an Airspace Configuration refers to the pre-defined and co-ordinated organisation of the Air Traffic Service (ATS) Route structure and/or Terminal Routes and their associated airspace structures (including temporary airspace reservations, if appropriate) and Air Traffic Control (ATC) sectorisation.

In the en route airspace, airspace configurations are to be comprised of pre-defined fixed and flexible routing options or optimised 4D trajectories and optimum ATC sectorisation capable of being dynamically adapted to traffic demand. Airspace configurations will be activated, through a Collaborative Decision Making (CDM) process, depending upon the driving Strategic Objective(s) for a particular geographic area and/or time period. Flexible routeings may still be provided by tactical ATC intervention when appropriate.

In terminal airspace, airspace configurations may be activated depending upon the runway configuration in use at one or more airports and the driving Strategic Objective(s) of a particular time period. Flexible routings may still be provided by tactical ATC intervention when appropriate.

Airspace configurations will offer a level of adaptability matching the demands of airspace users to the extent possible while maintaining cost effectiveness and optimising overall efficiency. This will allow the most effective balance between capacity, mission effectiveness and flight efficiency, whilst reducing environmental impact, where possible.

The above necessitates a coordinated and systematic approach to selecting and changing airspace within the national context.

6.1   Airspace Organisation

The airspace organisation function will provide the strategies, rules and procedures by which the airspace will be structured to accommodate the different types of air activity, volume of traffic, and differing levels of service and rules of conduct. The principles of organisation will be applicable regardless of airspace complexity. The organisational principles underlying these strategies, rules and procedures include the following:

- Airspace management will be dynamic, flexible and based on service demand and availability. Airspace organisational boundaries, divisions and categories will be adapted to traffic patterns and changing situations and will support the efficient operation of the other ATM services. Flexibility within airspace organisation will include regular strategic planning processes and will allow actual operations to dictate the optimum configuration;
- Airspace will be organised to facilitate the seamless handling of flights and the ability to conduct flights along optimum 4D trajectories from gate to gate with minimum restriction or delay;
- Airspace planning will be based on accommodating dynamic 4D trajectories whenever practicable. Structured route systems will be established only in areas where the demand for dynamic trajectories cannot be accommodated;
- Airspace shall be organised to be easily learned, understood and used by the ATM community as appropriate.
- Airspace concept design shall take cognisance of the city-pairs concept where the inter-dependencies of such airports are accommodated as far as possible, and
- Airspace shall also be refined on a regional and sub regional basis to ensure efficiencies.

Airspace organisation will be based on the principle that all airspace is managed, and all related activity within airspace will be known to the ATM system in varying degrees. "Managed" means that a strategic or tactical decision as to the level of service to be provided will have been taken by the appropriate authority.

Although there will generally be minimal permanent or fixed constrained airspace, certain airspace will be subjected to service limitations, including denying access over an extended period. This action will be motivated by national interests or safety issues and appropriately considered in coordination with the ATM community.

There will always be airspace that is primarily used or organised for a specific purpose (e.g. 4D trajectory-oriented airspace, high-density airspace, special-use airspace). However, aircraft neither operating in that particular mode, nor equipped accordingly for such airspace, will be accommodated by the system where deemed safe and appropriate. Accommodation will be made without constraining the primary use of that airspace.

Priority for the use of specific airspace will not be constrained by the primary usage or equipage on a routine basis. While it is recognised that airspace designation is useful, it should not be organised in a manner that permanently precludes the possibility of mixed usage/mixed equipage operations. Relevant technological advances should be incorporated where practicable, whilst preventing any negative impact on overall system efficiency and/or capacity.

6.2   Airspace Management

Airspace management is the process by which airspace organisation options in the provision of services will be selected and applied to best meet the needs of airspace users. Competing interests for the use of airspace will make airspace management a highly complex exercise, necessitating a process that equitably balances those interests.

The management of airspace will follow these guiding principles and strategies:

- All airspace will be managed flexibly. Airspace boundaries will be adjusted to particular traffic flows and should not be constrained by national or facility boundaries;
- Airspace management processes will accommodate dynamic 4D trajectories and provide optimum system solutions;
- When conditions require that different types of traffic be segregated by airspace organization, the size, shape and time regulation of that airspace will be set to minimize the impact on operations;
- Airspace use will be coordinated and monitored in order to accommodate the conflicting legitimate requirements of all users and to minimize any constraints on operations;
- Airspace reservations will be planned in advance with changes made dynamically whenever possible. Subject to the CDM process and Agreement being reached among the ATM community, the ATM System will also accommodate unplanned requirements;
- Structured route systems will be applied only where required to enhance capacity or to avoid areas where access has been limited or where hazardous conditions exist;
- Uniform airspace organisation and management principles will be applicable to all regions. Global principles will be applicable at all levels of density and will affect total traffic volume. Complex operations may limit the degree of flexibility; and
- Areas that should strive for the earliest and shortest implementation are those where ATM community expectations are not being met.

EXPECTATIONS AND KEY PERFORMANCE AREAS

7. Expectations of the National Airspace Master Plan

Key to the ATMOC is a clear statement of the expectations of the ATM community. The expectations for the global ATM system have been discussed among the ATM community in general terms for many years. These expectations stem from efforts to document ATM "user requirements." The expectations hereafter are interrelated and cannot be considered in isolation. Furthermore, while safety is the highest priority, the expectations are shown in alphabetical order. The stakeholders of The Plan have needs based on safety, capacity, efficiency and economic considerations. Within the regional and global context The Plan needs to provide for harmonization and interoperability.

The expectations of the local ATM community are expressed through eleven agreed to Key Performance Areas (KPAs). These KPAs will be addressed through the CDM process within the local ATM community and achieved through the development of implementation plans and roadmaps by individual ATM community members. The agreed to KPAs are as follows:

7.1   Access and Equity

The Plan provides an operating environment that ensures that all airspace users have the right of access to ATM resources needed to meet their specific operational requirements; and ensures that the shared use of the airspace for different airspace users can be achieved safely. It ensures equity for all airspace users that have access to a given airspace or service. In principle, the first aircraft ready to use the ATM resources will receive priority, without jeopardising the overall system efficiency. There may be exceptions to this principle where significant overall safety or system operational efficiency would accrue and where national defence considerations or interests dictate priority changes.

7.2   Capacity

The Plan describes an ATM system, airspace organisation and management principles that exploit the inherent capacity to meet airspace user demand at peak times and locations while minimizing restrictions on traffic flow. To respond to future growth, capacity must increase, along with corresponding increases in efficiency, flexibility, and predictability while ensuring that there are no adverse impacts to safety giving due consideration to the environment. The ATM system must be resilient to service disruption and resulting temporary capacity reduction.

7.3 Cost Effectiveness

The airspace planning and subsequent ATM system should be cost-effective, while balancing the varied interests of the ATM community. The cost of service to airspace users should be considered when evaluating any proposal to improve the quality and performance of ATM and the designation of airspace.

7.4 Efficiency

Efficiency addresses the operational and economic cost-effectiveness of gate-to-gate flight operations from a single-flight perspective and the associated collaborative decisions. It is recognised that airspace users want to depart and arrive at the times they select and fly the 4D trajectory they determine to be optimum in all phases of flight. The NAMP considers overall system efficiency as a driver for airspace concept development and change.

7.5 Environment

The ATM system should contribute to the protection of the environment by considering noise, gaseous emissions, and other environmental issues in the implementation and operation of the National ATM system. The Plan provides for the designation of airspace with due consideration of environmental concerns. Whilst taking environmental concerns into consideration, safety of the airspace users will at all times be the paramount consideration in this plan.

7.6 Flexibility

Flexibility addresses the ability of all airspace users to modify flight trajectories dynamically and adjust departure and arrival times thereby permitting them to exploit operational opportunities as they occur.

7.7 Global Interoperability

The National ATM System is based on global standards and uniform principles to ensure the technical and operational interoperability with Global ATM Systems and facilitate homogeneous and non-discriminatory global and regional traffic flows.

7.8 Participation by the ATM Community

The ATM community has a continuous involvement in the planning, implementation, and operation of the system to ensure that the evolution of the National ATM System meets the expectations of the local ATM community.

7.9   Predictability

Predictability refers to the ability of the airspace users and ATM service providers to provide consistent and dependable levels of performance. Predictability is essential to airspace users as they develop and operate their schedules.

7.10   Safety

Safety is the highest priority in aviation, and ATM plays an important part in ensuring overall aviation safety. Uniform safety standards and risk and safety management practices are applied systematically to the ATM system. In implementing elements of the global aviation system, safety must be assessed against appropriate criteria, in accordance with appropriate and globally standardised safety management processes and practices.

7.11   Security

Security refers to the protection against threats which stem from intentional (e.g. terrorism) or unintentional (e.g. human error, natural disaster) acts affecting aircraft, people or surface installations. Adequate security is a major expectation of the ATM community and of citizens. The ATM system should therefore contribute to security, and the ATM system, as well as ATM related information, should be protected against security threats.

PERFORMANCE BASED PLANNING AND TRANSITION

8. The need for performance based planning and transition

ICAO Document 9883, Manual on Global Performance of the Air Navigation System Part I – Performance-Based Transition Guidelines, raises awareness for the need to change the way in which the evolution of ATM is planned at local, regional and global level. In the past, planning was very much technology or solution driven, with insufficient advance knowledge of resulting performance improvement. In the future, planning choices increasingly need to be justified in advance by a thorough analysis of anticipated performance requirements and achievements. Such explicit management and planning of ATM performance is necessary to ensure that throughout the transition process, the expectations of the ATM community are met. The document further promotes a globally harmonised and agreed approach to transition planning so Regions and States may work collaboratively in developing their future transition arrangements towards the ATM system envisioned in the Global ATMOC.

8.1 Overview of the transition planning process

Transition planning is a cyclic process executed at global, regional and local level. It is typically repeated at predetermined intervals to take into account changing forecasts, up-to-date information on implementation progress, new performance assessments, changed performance expectations and policies (resulting in revised performance targets), and any other relevant change. Exceptional changes may lead the ATM community to decide to start a new transition planning cycle before the predetermined interval has elapsed. Each iteration results in updated versions of transition roadmaps, research plans and implementation plans.

8.2 Overview of the performance based transition approach

The figure on page 23 provides an overview of the performance based transition approach. It contains five steps with questions, which must be answered as part of applying the approach:

- Step 1 (questions 1 - 5): translate ATM community expectations into quantified performance targets.
- Step 2 (questions 6 - 8): conduct performance assessment and use performance targets to identify current and anticipated performance gaps.
- Step 3 (questions 9 - 12): update transition roadmaps and plans to mitigate identified performance gaps.
- Step 4 (not shown in the figure): analyze steps 1-3 and generate lessons learned
- Step 5 (not shown in the figure): maintain the guidance material and the overall planning process itself.
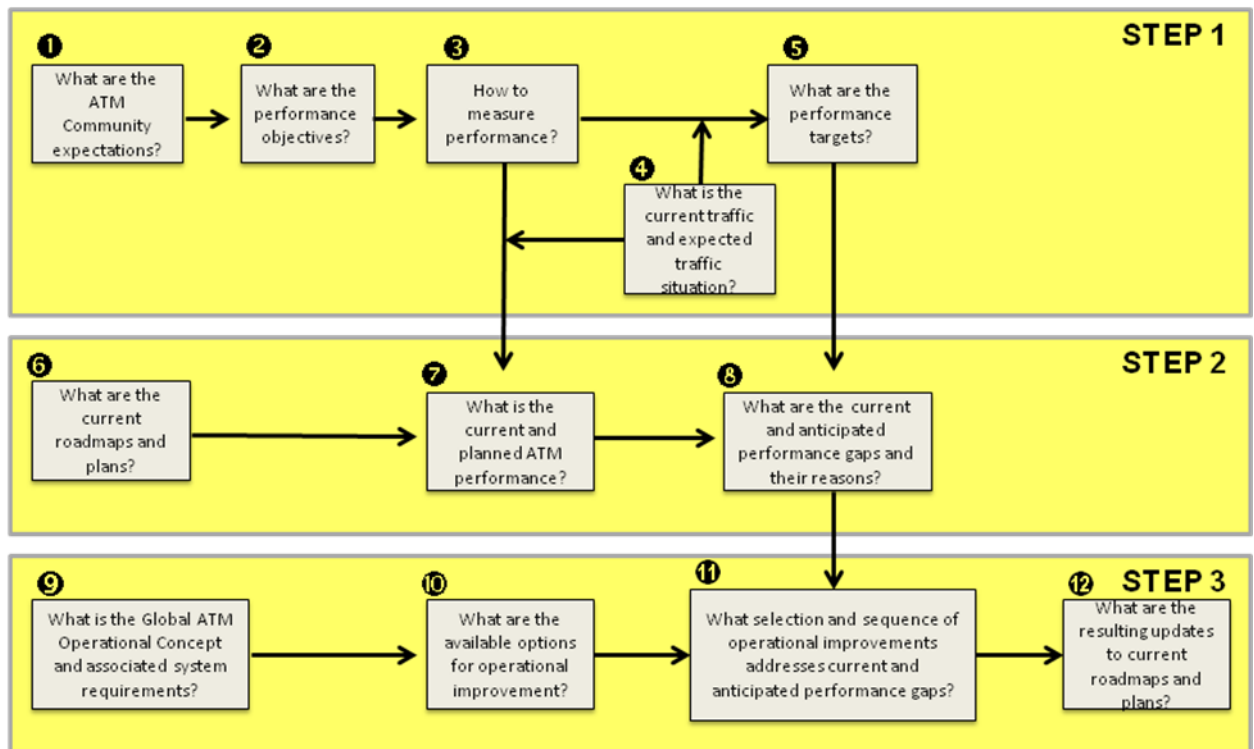
Performance based transition approach

8.3   ATM Community expectations

The ATM community expectations are a set of general, high level expectations listed in ICAO Doc. 9854 (Global Air Traffic Management Operational Concept). These expectations are used in performance management as the framework for KPAs as defined in paragraph 7. These are;

- KPA 01 – Access and Equity
- KPA 02 – Capacity
- KPA 03 – Cost Effectiveness
- KPA 04 – Efficiency
- KPA 05 – Environment
- KPA 06 – Flexibility
- KPA 07 – Global Interoperability
- KPA 08 – Participation by the ATM Community
- KPA 09 – Predictability
- KPA 10 – Safety
- KPA 11 – Security

8.4   Performance objectives

The ATM community expectation embodied by each Key Performance Area will be met by pursuing more specific performance objectives. These are defined to assist the ATM community in producing relevant and timely enhancements to the South African airspace, in order to satisfy the ATM community expectations.

Performance objectives are expressed in qualitative terms, and may include a desired or required trend for a performance indicator (e.g., reduce the cost per kilometre flown) while not yet expressing the performance objective in numeric terms (this is done as part of performance target setting). Care has to be taken to ensure that the agreed performance objectives are "SMART" — (specific, measurable, achievable, relevant and timely).

8.5   Measuring performance

In order to be able to measure performance, a number of definitions, methods and facilities must be put in place. For each performance objective, performance indicators need to be defined to measure the achievement of the performance objective. For example, the performance objective of "reducing cost per kilometre flown" requires the "cost per kilometre flown" performance indicator. Performance indicators should be chosen to convey meaningful information about ATM performance for a given performance objective, and be suitable to trigger improvement and change. In addition, a set of supporting metrics must be defined. In the prior example, total cost and total distance flown are required metrics to compute the performance indicator. Supporting metrics determine which data needs to be collected to calculate values for the performance indicators.

8.6   Performance targets

The above-mentioned performance indicators are the agreed way for quantifying how well performance objectives have been achieved. Performance targets are closely associated with performance indicators. They represent the values of performance indicators that need to be reached or exceeded to consider a performance objective as being fully achieved. Note that performance targets can be set as a function of time (e.g. to plan year-on-year improvement); they can also vary by geographic area. A decision-making/policy-making process needs to be in place to collaboratively agree on performance objectives, performance indicators and the values of performance targets.

APPLICABILITY

9. Applicability of the National Airspace Master Plan

The NAMP as detailed in this document sets out at a strategic level, the manner in which airspace organisation, management and development will be affected within South Africa. The NASCOM will in the execution of its mandate, measure all activities against the stated KPAs, performance objectives, indicators and targets, when contemplating amendments to airspace, procedures and infrastructure.

REFERENCES

ICAO Documents as amended;

Doc 4444	Procedures for Air Navigation Services – Air Traffic Management
Doc 9613	Performance-Based Navigation Manual
Doc 9750	Global Air Navigation Plan
Doc 9854	Global Air Traffic Management Operational Concept
Doc 9882	Manual on Air Traffic Management System Requirements
Doc 9883	Manual on Global Performance of the Air Navigation System Part I – Performance-Based Transition Guidelines

White Paper on National Policy on Airports and Airspace Management, 1997
National Airspace Master Plan (valid until 31 December 2010)
NASCOM Constitution