International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)

WORKING PAPER

GREPECAS/23 — WP/6.1
20/01/26

Fifth GREPECAS–RASG-PA Joint Meeting (GREPECAS-RASG-PA/5) and Twenty-Third Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/23)

Virtual Phase (Asynchronous, 19 January to 17 February 2026)
In-Person Phase (Mexico City, Mexico, 4 to 6 March 2026)

Agenda Item 6: Progress on Regional and National Air Navigation Planning

DEVELOPMENT FOR KPIS MANAGEMENT

(Presented by Secretariat)

EXECUTIVE SUMMARY	
This working paper presents the results of the work carried out by the GREPECAS Ad-hoc Group for the Development of Key Performance Indicators (GADHOC), in collaboration with European Union Aviation Safety Agency (EASA), in response to Decision GREPECAS/22/19.	
Action:	Section 3.
Strategic Objectives 2026-2050:	• Every flight is safe and secure • Aviation is environmentally sustainable • Aviation delivers seamless, accessible, and reliable mobility for all • No country left behind • The International Civil Aviation Convention and Other Treaties, Laws and Regulations Address All Challenges • The Economic Development of Air Transport Assures the Delivery of Economic Prosperity and Societal Well-Being for All
References:	• Final Report GREPECAS/22 • Global Air Navigation Plan (GANP)

1. Introduction

1.1 At the Twenty-second Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/22), held in Lima, Peru, in November 2024, Decision GREPECAS/22/19 was approved with the objective of promoting performance-based planning aligned with the GANP, strengthening Volume III of the CAR/SAM Regional Air Navigation Plan (RANP), and fostering collaborative work with implementation groups, industry, and other stakeholders to enhance States' capabilities in the management of Key Performance Indicators (KPIs), in preparation for the application of the new indicators of the Eighth Edition of the GANP and the NANP model, starting in 2026.

1.2 Consequently, in compliance with Decision GREPECAS/22/19, the GADHOC Group was established in 2025. Under the coordination of the NACC and SAM Regional Offices, and in collaboration with the European Union Aviation Safety Agency (EASA), the GADHOC Group proposed the documents presented in this working paper for consideration and approval at the GREPECAS/23 meeting.

2. Context

2.1 During the in-person meeting of GREPECAS/22, a discussion was held in the second working table to analyze the effective implementation of "Performance-based planning and KPI management of the Global Air Navigation Plan (GANP)". As a result of this discussion, the meeting approved Decision GREPECAS/22/19 to strengthen the implementation of Volume III of the CAR/SAM Regional Air Navigation Plan (RANP).

2.2 In this context, Decision GREPECAS/22/19 decides to activate an Ad-hoc Group, "*which members are Bahamas, Brazil, Chile, Colombia, Cuba, Dominican Republic, Ecuador, Panama, Peru, Trinidad and Tobago, United States, IATA and IFATCA, for the development of Key Performance Indicators KPI of the GANP*" and established that the following tasks should be presented for the GREPECAS/23 meeting:

> *a)* "*prepare a regional CAR/SAM guidelines and standardized training material on the methodology of performance indicators, data collection and management and calculations;*
> *b) formulate an Action Plan for the progressive implementation of KPIs, identifying priorities and resources required, harmonized with the progress of the implementation groups;*
> *c) implement a Communications Plan and adequate means of dissemination (dashboards, etc.) of the KPIs; and*
> d) *Formulate a regional and/or interregional initiative for KPIs benchmarking activities*".

2.3 Accordingly, the ICAO NACC and SAM Regional Offices, through State Letters E.OSG-NACC115684, 6 May 2025, and SA208-2025, 30 April 2025, requested the designation of representatives by the Member States and International Organizations to the GADHOC Group, which held the following virtual meetings:

- **September 12, 2025** - Meeting held with the agenda for the presentation and discussion of the draft terms of reference and the status of implementation of the GANP KPIs in the CAR and SAM region.

- **December 5, 2025** - Meeting held with the agenda for the presentation and discussion of guidance materials prepared by EASA in collaboration with the ICAO NACC and SAM Regional Offices.

2.4 Therefore, under the coordination of the NACC and SAM ICAO Regional Offices, and in collaboration with the European Union Aviation Safety Agency (EASA), the GADHOC Group proposed the following documents for consideration and approval at the GREPECAS/23 meeting:

- GADHOC Terms of Reference (**Appendix A**).
- CAR/SAM Regional guidance material on the methodology for implementation of GANP KPIs (**Appendix B**).
- CAR/SAM Action Plan for the progressive implementation of GANP KPIs (**Appendix C**).
- Communications Plan detailing the adequate means of dissemination of the KPIs (**Appendix D**).

2.5 Subsequently, the following draft Decision is proposed to comply with the GREPECAS Decision 22/19, with the objective of further strengthening the implementation of Volume III of the CAR/SAM Regional Air Navigation Plan (RANP):

<table>
<tr><td colspan="3">DECISION
GREPECAS/23/XX Regional material for the development of KPIs</td></tr>
<tr><td colspan="2">What:

The meeting approves the following documents:
• GADHOC Terms of Reference (Appendix XX of this report).
• CAR/SAM Regional guidance material on the methodology for implementation of GANP KPIs (Appendix XX of this report).
• CAR/SAM Action Plan for the progressive implementation of GANP KPIs (Appendix XX of this report).
• Communications Plan detailing the adequate means of dissemination of the KPIs (Appendix XX of this report).</td><td>Expected impact:
☐ Political / Global
☒ Inter-regional
☒Economic
☒ Environmental
☒Operational/Technical</td></tr>
<tr><td colspan="3">Why:
To comply with the GREPECAS Decision 22/19 with the objective of further strengthening the implementation of Volume III of the CAR/SAM Regional Air Navigation Plan (RANP), and to be prepared for the GANP 8th edition.</td></tr>
<tr><td>When: Immediate</td><td colspan="2">Status: ☒ Valid / ☐ Superseded / ☐ Completed</td></tr>
<tr><td>Who: ☒ States ☒ ICAO ☒ Other:</td><td colspan="2">IATA, CANSO</td></tr>
</table>

3. Suggested actions:

3.1 The Meeting is invited to:

a) Take note of the information in this Working Paper;

b) analise and approve the Draft Decision in paragraph 2.5; and

c) propose some other actions as needed.

— END —

APPENDIX A

AD-HOC GROUP FOR THE DEVELOPMENT OF KPIS OF GANP (GADHOC)

TERMS OF REFERENCE

1. BACKGROUND

At the Twenty-second Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/22), held at the ICAO SAM Regional Office in Lima, Peru, in March 2025, the AD-HOC Group for the Development of KPIS of the GANP (GADHOC) was established pursuant to Decision GREPECAS/22/19, in order to strengthen the implementation of Volume III of the CAR/SAM Regional Air Navigation Plan (RANP).

2. OBJECTIVE

GADHOC, as part of GREPECAS, is tasked with the development of Key Performance Indicators (KPIs) of the GANP to support and strengthen the implementation of Volume III of the CAR SAM RANP.

3. GENERAL FUNTIONS

3.1. The functions of the GADHOC are as follows:

3.2. Develop regional CAR/SAM guidelines and standardized training material on the methodology for performance indicators, data collection and management and calculations;

3.3. Formulate an Action Plan for the progressive implementation of KPIs, identifying priorities and resources required, harmonized with the progress of the implementation groups.

3.4. Develop a Communications Plan and propose adequate means of dissemination (dashboards, etc.) of the KPIs.

3.5. Formulate interregional initiative for KPIs benchmarking activities;

3.6. Promote close cooperation among States, Territories, users, and International Organizations to optimize the use of experience and available resources, avoiding duplication of work;

3.7. Coordinate activities with GREPECAS and consolidate regional information to support the work of the NACC/WG and SAM/IG; and

3.8. Efficiently lead activities with minimum formality and documentation, using electronic tools (TEAMS channels, teleconferences, email, etc.) and telephone calls to ensure exchange of information when required.

4. MEMBERSHIP

4.1. The member States of the AD-HOC Group for the Development of KPIS of GANP (GADHOC) are Bahamas, Brazil, Chile, Colombia, Cuba, Ecuador, United States of America, Panama, Peru, Dominican Republic, Trinidad and Tobago, IATA and IFATCA.

5. STAKEHOLDERS

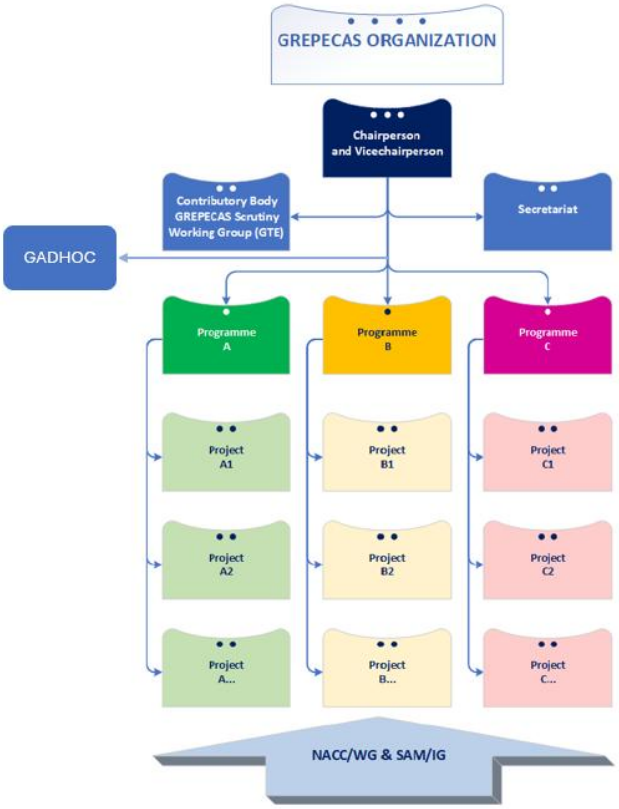
5.1. All ICAO States, Territories and International Organizations accredited to the CAR and SAM Regional Office.

5.2. Other stakeholders in the CAR and SAM regions are encouraged to actively participate.

5.3. In the cases in which the State and/or Territory agree, the airport services and air navigation services providers in the CAR and SAM region may participate as guests.

5.4. States nominating members to the GADHOC are required to provide adequate support and to possess the necessary authority to make decisions on behalf of the State they represent.

5.5. The GADHOC will coordinate and work together with other groups and projects as shown below:



6. WORKING METHODS

6.1. The GADHOC members will coordinate work as follows:

6.1.1. The ICAO Regional Officers NACC and SAM will act as the Secretariat of the GADHOC and will convene Members with a minimum anticipation of three months before holding the face-to-face meeting, or with at least one month before carrying out the virtual meeting

6.1.2. Any Member State, Territory, or International Organization may, at any time, offer to host a GADHOC Meeting, provided that the meeting is held face-to-face.

6.1.3. Follow-up will be conducted through calls and e-mails between Members and the Secretariat to monitor the Action Plan and monitor the implementation of KPIs

— END —

APPENDIX B

KPIS CAR/SAM REGIONAL GUIDANCE MATERIAL

Executive summary

The present document compiles the CAR/SAM regional guidance material on the methodology to support and guide the CAR/SAM region states in the calculation of the GANP Key Performance Indicators (KPIs) for the CAR/SAM Regional Air Navigation Plan, Volume III.

These guidelines have been developed as part of the assistance provided by the European Union Aviation Safety Agency (EASA), in collaboration with the ICAO NACC and SAM Regional Offices, and in the context of the GREPECAS Ad-hoc Group for the Development of Key Performance Indicators (GADHOC).

The GANP KPIs are core elements of any Air Navigation Plan, as part of the required Performance-based Approach, which convert the planning objectives in quantifiable indicators, in order to allow the measurement of the existing needs and opportunities of the Air Navigation system in the different performance areas, the establishment of clear performance targets and the monitoring of the operational improvements and progress obtained by the effective implementation of the Air Navigation Plan proposed enablers and solutions.

A common regional approach for defining and implementing regional KPIs is even more necessary in the CAR/SAM region considering the transversal challenges that the region will face in the short and mid-term regarding airport and airspace capacity, flight efficiency, operations predictability and environmental sustainability, among others. In particular these challenges would be more evident considering the high increase of traffic expected for the region in the coming years and decades.

The establishment of CAR/SAM regional guidelines for the implementation of GANP KPIs represents a valuable opportunity to provide comprehensive and harmonized guidance, incorporating methodologies, and best practices consistent with ICAO recommendations. These guidelines will facilitate alignment among CAR and SAM States by supporting the development of KPI baselines and ensuring synchronism in their calculation across the region. Furthermore, they will promote more effective communication and reinforce GREPECAS's involvement in the monitoring and management of KPIs.

The proposed approach for the CAR/SAM region builds on the work already undertaken by GREPECAS and States in defining and implementing GANP KPIs in the region, as well as existing efforts on operational and ATFM indicators, both at SAM and CAR regions, ensuring coherence between planning and operational KPIs. Recognizing the different levels of progress and resources across States, these guidelines recommend a phased implementation, beginning with a limited set of KPIs and gradually expanding coverage. The methodology emphasizes the reuse of existing practices, simple and transparent tools such as Excel for initial data collection and calculation, and a future transition to platforms like Power BI for regional integration. Moreover, it incorporates flexibility in data sources, formulas, and calculation frequency to accommodate varying national capacities, particularly in the early stages of implementation.

The proposed list of KPIs to be developed in the region is defined considering the KPIs already included in the current version of the CAR/SAM RANP Volume III (version 0.1) and adding those that have been identified as priorities by the CAR/SAM states in previous GREPECAS meetings and related workshops

and activities. The selected KPIs are grouped in three groups considering their related proposed implementation phases:

- Group 1 (short- term implementation): KPI01 Departure punctuality (Variant 2A), KPI06 En-route airspace capacity (Variant 1), KPI09 Airport peak capacity, KPI10 Airport peak throughput, KPI14 Arrival punctuality
- Group 2 (mid-term implementation): KPI02 Taxi-out additional time, KPI05 Actual en-route extension, KPI08 Additional time in terminal airspace, KPI13 Taxi-in additional time, KPI15 Flight time variability, KPI23 Loss of separation (Variant 3)
- Group 3 (long-term implementation): KPI04 Filed flight plan en-route extension, KPI07 En-route ATFM delay, KPI17 Level-off during climb, KPI19 Level-off during descent

The process of calculating the CAR/SAM Regional KPIs is structured in 9 steps, involving both the States at national level and the ICAO Regional Offices at regional level:

1. Selection of the KPI
2. Understanding the KPI
3. Identifying the data sources:
4. Input data collection and consolidation
5. Calculation of indicators
6. Integration of KPIs at regional level
7. Data visualization and monitoring:
8. Data analysis:
9. Interpretation of results and recommendations

The current version of these guidelines provides a detailed methodology and practical examples for the calculation of each of the indicators to be deployed in the initial implementation phase (KPI01, KPI06, KPI09, KPI10, KPI14).

Following editions of these guidelines will incorporate the detailed information for the rest of the KPIs proposed to be implemented in the mid and long-term phases.

As conclusions, these Guidelines provide a harmonized but flexible methodology for implementing GANP KPIs in the CAR/SAM Region. They allow States to adapt the calculation methods to their own data availability and resources, making it possible for all to participate in regional monitoring while also creating in-house expertise and producing KPIs that support their National Air Navigation Plans. The Guidelines are designed as a living document, beginning with simple tools such as Excel templates and progressively evolving toward advanced platforms like Power BI.

The main recommendations are that States begin with indicators where data is already available, integrate the methodology into their national planning frameworks, and focus on building sustainable technical capacity. They should apply minimum standards for data quality and validation, use a progressive approach to the adoption of tools, and engage actively in the periodic review process. By doing so, the Guidelines will not only ensure regional harmonization but also strengthen each State’s ability to monitor and improve its own air navigation performance.

Table of contents

List of acronyms

ACI	Airports Council International
A-CDM	Airport Collaborative Decision Making
ACC	Area Control Center
ADEP	Airport of Departure
ADES	Airport of Destination
AOBT	Actual Off-Block Time
AODB	Airport Operational Database
AO	Airspace Optimization
ANP	Air Navigation Plan
ANSP	Air Navigation Service Provider
ASBU	Aviation System Block Upgrade
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
CAR	Caribbean Region
CARSAM	Caribbean and South American Regions
CDM	Collaborative Decision Making
COCESNA	Corporación Centroamericana de Servicios de Navegación Aérea
CT	Controller Workload Time
EASA	European Union Aviation Safety Agency
EOBT	Estimated Off-Block Time
EU–LAC APP	European Union–Latin America and Caribbean Air Transport Project
FAA	Federal Aviation Administration
FIR	Flight Information Region
FPL	Flight Plan
FPV	Flight Progress View/Record
GADHOC	GREPECAS Ad-hoc Group for the Development of Key Performance Indicators
GANP	Global Air Navigation Plan
GESEA	Grupo de Estudio e Implantación del Espacio Aéreo SAM
GREPECAS	CAR/SAM Regional Planning and Implementation Group
ICAO	International Civil Aviation Organization
KPA	Key Performance Area
KPI	Key Performance Indicator

LAC	Latin America and Caribbean
MAC	Mid-Air Collision
NACC	North American, Central American and Caribbean Region
NC	Non-Commercial (flight type)
NOPS	Network Operations
OCC	Operations Control Center
PBN	Performance-Based Navigation
RASG-PA	Regional Aviation Safety Group – Pan America
RANP	Regional Air Navigation Plan
SAM	South American Region
SES	Single European Sky
SOBT	Scheduled Off-Block Time
TCAS	Traffic Collision Avoidance System
TCOM	Time of Communication (ATCO–aircraft)
TTS	Time for Secondary Tasks

1. Introduction

The present document, Deliverable 1 – CAR/SAM Regional guidance material on the methodology for implementation of GANP KPIs, is the first deliverable of the assistance provided by EASA, through the EU-LAC APP II programme, to support the ICAO NACC Regional Office in the development and implementation of the GANP KPIs for the CAR/SAM Regional Air Navigation Plan, Volume III.

This deliverable compiles the CAR/SAM regional guidance material on the methodology for the calculation of the GANP Key Performance Indicators, including the related data collection and management processes. It also provides practical examples of the application of the proposed methodology for a set of selected KPIs.

These guidelines have been promoted by the ICAO NACC Regional Office, and have been developed in close coordination and collaboration with the ICAO SAM Regional Office, as response to the conclusions and actions agreed at the GREPECAS/22 meeting.

The target audience of this guidance material are the Civil Aviation Authorities of the CAR/SAM States, and in particular the departments in charge of the Air Transport Planning activities. Additionally, the guidance material is recommended for the key stakeholders that should be involved in the process of data gathering or/and KPIs calculation, such as Air Navigation Services Providers, Airport Operators, Airlines and other required stakeholders, depending on each specific case.

This guidance material establishes minimum requirements and baseline recommendations to support States in the implementation of the CAR/SAM KPIs. States are expected to incorporate these provisions into their internal processes, while retaining the flexibility to introduce additional measures that may enhance the effectiveness of implementation.

These guidelines have been developed taking into account as baseline the work done so far on GANP KPIs in the CAR/SAM regions and with the objective to provide a consolidated and harmonized approach. Additionally, the proposed methodology for the GANP KPIs implementation in the CAR/SAM region is aligned, when applicable, with the existing initiatives for the calculation of ATFM and other operational indicators in the SAM and CAR regions. See additional details in the context and background section below.

This document is complemented by the other two deliverables, as part of the assistance provided by EASA:

- Deliverable 2 – Action Plan for the progressive implementation of GANP KPIs, identifying priorities and resources required, harmonized with the progress of the implementation groups and States from CAR/SAM Regions.
- Deliverable 3 – Communications Plan detailing the adequate means of dissemination (dashboards, etc.) of the KPIs.

2. Objectives and Scope

The main objective of these guidelines is to provide a comprehensive and detailed methodology to support and guide the CAR/SAM region states in the calculation and implementation of the GANP KPIs as part of the CAR/SAM Regional Air Navigation Plan Volume III.

To achieve the previous general objective, the following specific objectives are addressed:

- To understand the work performed up to date in the region on GANP KPIs in the context of the ICAO GREPECAS working groups and individually at state level.

- To define a specific approach for the CAR/SAM region considering the particularities of the region and the different starting points of the CAR/SAM region states to ensure a fast and efficient implementation by all states.
- To depict and justify the proposed list of GANP KPIs for the CAR/SAM region and explain the selection process.
- To present a scheme of the general process and a summarized overview of the action plan to develop and implement the GANP KPIs for the CAR/SAM Region.
- To detail the proposed methodology for calculating and monitoring each of the GANP KPIs, providing a step-by-step overview of the process, including data sources, calculation formula, stakeholders involved and including a description of the templates, models, tools and/or platforms to be used in the different steps of the process.
- To provide practical examples of the application of the methodology to selected KPIs.
- To finish with a list of conclusions and recommended next steps.

The proposed guidelines are addressed to all the states in the ICAO CAR and SAM regions:

- CAR states:
    - Antigua
    - Bahamas
    - Barbados
    - Belize
    - Costa Rica
    - Cuba
    - Curaçao
    - Dominica
    - Dominican Republic
    - El Salvador
    - Grenada
    - Guatemala
    - Haiti
    - Honduras
    - Jamaica
    - Mexico
    - Nicaragua
    - Saint Kitt and Nevis
    - Saint Lucia
    - Saint Vincent and the Grenadines
    - Trinidad and Tobago
    - United Sates (As FAA is provider of Air Navigation Services in several Caribbean airspaces)
    - COCESNA
- SAM states:
    - Argentina
    - Bolivia
    - Brazil
    - Chile
    - Colombia
    - Ecuador
    - Guyana
    - Panama
    - Paraguay
    - Peru
    - Suriname
    - Uruguay
    - Venezuela

Considering the previous objectives and scope, the contents of the guidelines are structured as follows:

- Firstly, a justification is presented on the need of defining and implementing regional GANP KPIs aligned with the needs of the CAR/SAM region. Also it is explained why there is a need of having a regional guidance material proposing a common approach for selecting, calculating and monitoring the regional KPIs.
- In addition, a summary of the context and the background of the work done so far regarding the development and implementation of GANP KPIs in the CAR/SAM region is outlined.
- Secondly, it is provided an overview of the particular approach for the CAR/SAM region and the proposed list of GANP KPIs and explain the applied selection process.
- Thirdly, an scheme of the general process and a summary of the proposed action plan is presented.
- Following, the main part of the guidelines is dedicated to explain in detail the methodology for calculating and monitoring each of the GANP KPIs, and including a practical example of the application of the methodology to a selected KPI.
- Finally, a set of conclusions and next steps is presented to efficiently implement the recommended methods of the present guidelines.

3. Justification for CAR/SAM Regional Guidelines on GANP KPIs

The GANP KPIs are core elements of any Air Navigation Plan, as part of the required Performance-based Approach, in order to assess Performance Objectives and Operational Improvements. GANP KPIs convert the planning objectives in quantifiable indicators, in order to allow the measurement of the existing needs and opportunities of the Air Navigation system in the different performance areas, the establishment of clear performance targets and the monitoring of the operational improvements and progress obtained by the effective implementation of the proposed enablers and solutions.

As described by the ICAO GANP, the Performance Framework and the KPIs are transversal elements of the planning and implementation functions that connect them into an iterative cycle. This Performance-based Approach was defined by the ICAO Doc. 9883 Manual on Global performance of the Air Navigation System and adopted by the GANP 6th Edition, representing a profound change in the Air Navigation planning and implementation approaches. The figure below presents the six steps proposed by the GANP and how the KPIs are driving the iterative planning and monitoring processes.

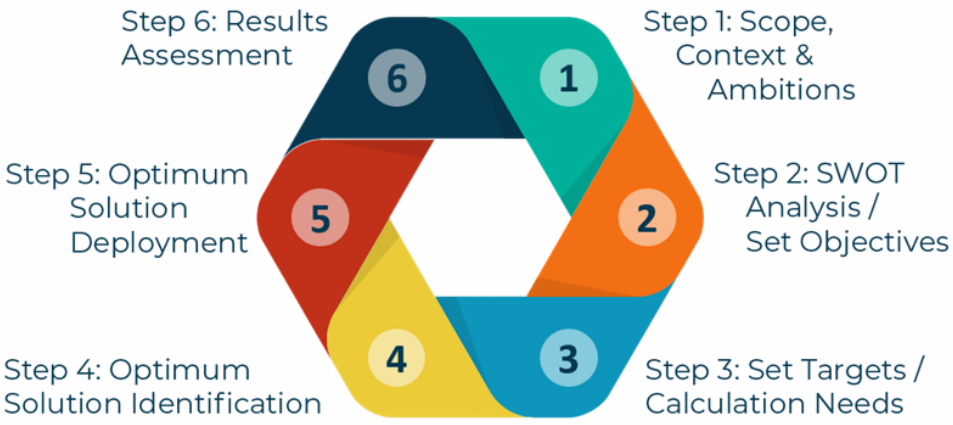


Figure 1 – Iterative six steps of the ICAO GANP Performance-based Approach

The objective of this six-step cyclical approach is to identify optimal solutions based on operational requirements and performance needs so that the expectations of the aviation community can be met

by improving air navigation system performance and optimizing allocation and use of available resources.

The KPIs are defined in Step 3 of the iterative cycle, considering the performance ambitions established in Step 1 and the objectives based on operational needs and opportunities identified in Step 2. Then, considering the performance targets in each KPI settled in Step 3, the enablers and solutions are selected in Step 4. At this stage KPIs are crucial since they can quantify the potential performance gains that the future implementation of the selected solutions, including ASBU elements, would bring to the air navigation system. In particular, ICAO GANP has establish a traceability link between the KPIs and the ASBU elements. Finally, once the solutions are deployed in Step 5, it is necessary to evaluate the impact generated by the implementation of each solution (and ASBU element) in the system by measuring the KPIs to continuously track performance and monitor if the performance gaps are being closed as expected. This Performance monitoring activity is conducted in Step 6. Once the cycle is completed, it is necessary to start again a new planning cycle, identifying new needs, potential new KPIs and a new set of solutions to be implemented.

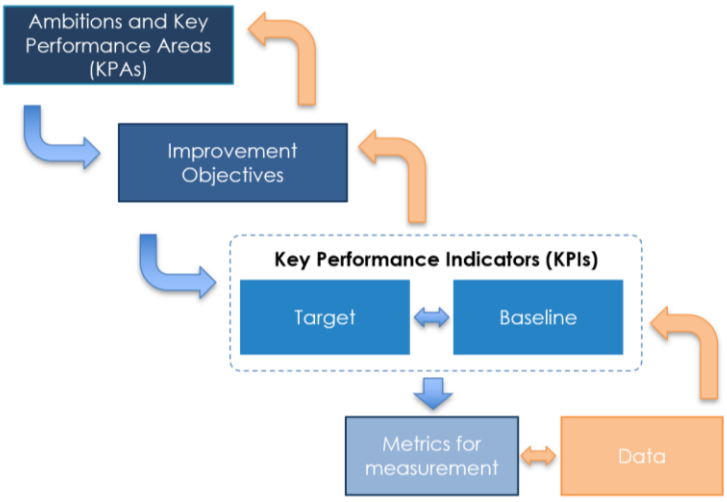


Figure 2 – Overview of the performance management process

In this sense, KPIs are the key elements of the Performance-based Approach supporting with quantifiable data the decision-making approach of selecting and planning the required enablers and solutions. This decision making approach is based on three principles: strong focus on desired or required results; informed decision making motivated by said desired or required results; and decision making based on facts and data.

The following table presents a practical example for two KPIs and how are they mapping to ASBU elements and other enablers.

					...up to Step 3	...steps 4 and 5	
Scope/ Applicability	**KPA & Focus Area**	**Performance Objective**	**KPI/ Variant**	**KPI Baseline**	**KPI Target**	**Operational Improvements (ASBU Elements/Enablers & Non ASBU)**	**Target Date**
1	2	3	4	5	6	7	8
FIR	Capacity (Capacity, throughput & utilisation)	En-route airspace capacity	**KPI 06** Variant 2: airspace occupancy count	35 movements /hr.	56 movements /hr.	Enhanced Airspace and FIR implementation ; FRTO B0/4; FRTO B1/1	Implemented
[location]	Predictability (Punctuality)	Increase the number (%) of scheduled flights adhering to the scheduled on-block time.	**KPI 14** Variant 2A: % of arrivals within ± 15 minutes of scheduled time of arrival	44% of flights 52% of flights	50% of flights 90% of flights	ACDM B0/1; ACDM B0/2	Implemented

Figure 3 – Example of KPIs to ASBU elements mapping

The future GANP 8th Edition, which was approved at the ICAO 42nd Assembly but has not yet been published, will increase the focus on the Performance-based Approach and the relevance of establishing and using KPIs in the planning and implementation processes. In particular the GANP portal will be updated covering all the essential elements of Doc. 9883 with many sections updated to reflect improvements in Data Management and more specific guidance for Key Performance Indicators (KPIs). In this sense, current guidelines are subject to be updated once the update of the ICAO GANP portal is effective.

The ICAO GANP propose to apply the Performance-based Approach following a multilayer structure of four levels, made up of global (strategic and technical), regional and national levels, providing a framework for alignment of regional, sub-regional and national plans. The four-layer structure facilitates decision making by providing a stable strategic direction for the evolution of the air navigation system and, at the same time, timely relevance in the technical content.

Figure 4 – ICAO GANP Performance-based Approach multilayer structure

The Regional level ensures regional consistency and provide common planning, R&D and implementation, where applicable. The regional ANPs apply the GANP methodology to develop the strategic direction, as well as performance and planning guidance for each of the ICAO regions. Regional ANPs are composed of 3 volumes: Static elements (Vol. I) and dynamic elements (Vol. II) and guidance for planning and implementation of ASBU elements (Vol. III). Regional Air Navigation Plans are coordinated by the Planning and Implementation Regional Groups (PIRGs).

In the case of CAR/SAM region, GREPECAS is the CAR/SAM Planning and Implementation Regional Group (PIRG), which is responsible for the development and maintenance of air navigation plans and

provides guidance for the planning and implementation of air navigation systems within specific areas, in accordance with the planning frameworks agreed at the global and regional levels. In September 2015, GREPECAS endorsed the Vol. I and Vol. II of the CAR/SAM Regional Air Navigation Plan. Since 2020, GREPECAS through its ePPRC Meetings has been preparing the work and activities to comply with the development of the Regional CAR/SAM Air Navigation Plan Vol. III. See additional information on the activities performed in the next section.

The existing version of the Regional CAR/SAM Air Navigation Plan Vol. III defines a first list of regional KPIs based on the ICAO GANP KPIs:

- KPI01 Departure Punctuality (Var 2A): % of departures within ± 15 minutes of scheduled time of departure. KPA Predictability.
- KPI02 Taxi out additional time: Actual taxi-out time compared to an unimpeded/reference taxi-out time. KPA Efficiency.
- KPI04 Filed flight plan en-route extension: Flight planned en-route distance compared to a reference ideal trajectory distance. KPA Efficiency.
- KPI05 Actual en-route extension: Actual en-route distance flown compared to a reference ideal distance. KPA Efficiency.
- KPI06 En-route airspace capacity: The maximum volume of traffic an airspace volume will safely accept under normal conditions in a given time period. KPA Capacity.
- KPI08 Additional time in terminal airspace: Actual terminal airspace transit time compared to an unimpeded time. Actual trajectories are generally longer in time and distance due to path stretching and/or holding patterns. In the example below the unimpeded trajectories are shown in red, and the actual trajectories in green and blue. KPA Efficiency.
- KPI09 Airport peak capacity: The highest number of operations an airport can accept in a one-hour time frame (also called declared capacity). Can be computed for arrivals, departures or arrivals + departures. KPA Capacity.
- KPI10 Airport peak throughput: The 95th percentile of the hourly number of operations recorded at an airport, in the “rolling” hours sorted from the least busy to the busiest hour. Can be computed for arrivals, departures or arrivals + departures. KPA Capacity.
- KPI13 Taxi-in additional time: Actual taxi-in time compared to an unimpeded/reference taxi-in time. KPA Efficiency.
- KPI14 Arrival punctuality: Percentage of flights arriving at the gate on-time (compared to schedule). KPA Predictability.
- KPI15 Flight time variability: Distribution of the flight (phase) duration around the average value. KPA Predictability.

The list of regional KPIs establishes a reference performance framework for the National KPIs, which should contain at least these regional KPIs and adding also those national ones that are specific to the national specific operational needs and opportunities. In this sense, contributing to the Regional Air Navigation Plan KPIs is a way to develop at the same time the National Air Navigation Plan KPIs. This could be an optimum approach for those states that are still a bit behind in the development of their National Air Navigation Plans, and thanks to the contribution to regional KPIs they can start also developing some of the national KPIs.

A common regional approach for defining and implementing regional KPIs is even more necessary in the CAR/SAM region considering the transversal challenges that the region will face in the short and mid-term regarding airport and airspace capacity, flight efficiency, operations predictability and

environmental sustainability, among others. In particular these challenges would be more evident considering the high increase of traffic expected for the region in the coming years and decades, in particular in specific states such as projected by the traffic forecasts, as for example the ones from ACI LAC. Special attention should be made to expected growth of the international traffic in the CAR/SAM region, which would require a coordinated regional planning approach in terms of airspace capacity, flight efficiency and operations predictability.

An example of a regional performance framework is the Single European Space (SES) Performance Scheme which was established in 2012, as a coordinated action to address the challenges of the fragmented and complex European air navigation system in terms of capacity, efficiency and environmental sustainability. The SES Performance Scheme is currently implemented based on regulation (EU) 2019/317 and establishes KPIs and their compliance targets in different reference periods (RPs), RP1 (2012-2014), RP2 (2015-2019), RP3 (2020-2024) the current one being RP4 (2025-2029). It is a regional performance management framework that uses advanced methodology and tools and establishes a common KPI management process for all European States. In addition to the operational performance areas proposed by ICAO, the European Performance Scheme sets KPIs and targets for cost efficiency and ANS fees and rates.

On the other hand, there are several additional reasons that made necessary to have a CAR/SAM regional guidelines to foster the implementation of GANP KPIs in the region:

- Firstly, there is no a clear CAR/SAM regional guidance with detailed instructions on the implementation of GANP KPIs and the application of the methodologies suggested by ICAO in the GANP, including case studies. Additionally, there are no formal regional agreements on the variants that will be used for some KPIs, according to the description of the GANP.
- Secondly, the pace of implementation of the GANP KPIs is different for the SAM and the CAR regions, being more advanced the situation in the SAM States, while most States of the CAR region are in the initial the initial or preparatory process for the formulation of KPI baselines. There is a need to achieve a synchronism between all CAR/SAM States for the calculation of the KPIs in same baseline years.
- Finally, there is insufficient communication that affects the participation of GREPECAS in the tasks of calculation and management of KPIs. These deficiencies were identified at the KPI Workshop from 28 to 31 October 2024.

4. Context and Background

In 2014, ICAO's Council approved a new model for Regional Air Navigation Plans (ANP) with three volumes.

Volume III was designed to contain dynamic and flexible elements, guidance for planning and implementing air navigation systems, and modernization aligned with initiatives such as ASBUs and related technology roadmaps in the GANP. Unlike Volumes I and II, amendments to Volume III do not require Council approval.

Initial plans aimed for GREPECAS to approve the CAR/SAM RANP Vol. III by mid-2015, but the process was delayed, partly awaiting the ICAO GANP 5th edition (2016) and later adjustments for the 6th edition.

In July 2019, the GREPECAS Program and Project Review Committee tasked ICAO's Secretariat to align the Vol. III with GANP 6th Edition and finalize it III for the CAR/SAM ANP by Q3 2020. A coordinated work plan between regional offices supported planning for upcoming years, including guidance development for Vol. III completion.

A virtual and first CAR/SAM Volume III Preparation Workshop was held in February 2022 to guide the States in preparing Vol. III and engage the required stakeholders in the related work. Best practices were shared from EANA (Argentina) and COCESNA (Central America) in ANS planning. Performance ambitions for the CAR/SAM region and related KPIs were prioritized, including new KPIs initially not included in Volume III or in the ICAO GANP. In the first level of priority the following KPA and KPIs were agreed:

- Capacity:
    - KPI06 En-route airspace capacity
    - KPI07 En-route ATFM delay (not included in Vol. III)
    - KPI09 Airport peak capacity
- ATM community participation:
    - KPI# Improve stakeholder participation, collaboration, and coordination (not included in the GANP)
- Safety:
    - KPI# Number of operational deviations per / number of operations (not included in the GANP)
- Aviation Security:
    - KPI# Number of events that interrupt or affect service delivery/number of total events (not included in the GANP)
    - KPI# Number of vulnerabilities identified and resolved (not included in the GANP)
    - KPI# Time of service interruption caused by cyberattacks/evaluated by impact (not included in the GANP)

As second level of priority were identified the following KPAs: Efficiency, Flexibility and Interoperability. In this case the related KPIs were not assigned yet.

In November 2022 the 20th meeting of GREPECAS (GREPECAS/20) was celebrated in which the initial version (version 0) of Volume III of the CAR/SAM ANP was approved, together with the Programme for its management, which allows the sustainable implementation of performance-based planning. Additionally it was approved that the States should implement work teams to develop data collection activities and management of GANP KPIs as a basis for populating the data of the Planning Tables of Vol. III, with the assistance of the Secretariat to report in GREPECAS/21.

The second CAR/SAM Volume III Preparation Workshop was held in February 2024 at Mexico City, were it was recommended to incorporate the following indicators for the Efficiency KPA:

- KPI17 Level-off during climb
- KPI19 Level-off during descent

Additionally, during this workshop, it was recommended to consider Safety as a number one priority KPA and in this sense to incorporate in the CAR/SAM ANP Vol. III the following KPIs:

- KPI20 Number of aircraft accidents
- KPI21 Number of runway incursions
- KPI22 Number of runway excursions
- KPI23 Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)

In September and October 2024 were performed at Mexico City two workshops on strategic planning for air navigation and airports and on GANP KPIs, respectively. Main conclusions of the second workshop were:

- Workshop participants highlighted that it is necessary to identify which of the GANP indicators should first be developed, within a progressive approach, from simple KPI to complex indicators and the selection of priorities based on some criteria defined in consensus.
- Besides, workshop participants comment the insufficient communication that promotes the participation of air navigation implementation groups in the tasks of calculation and management of KPIs, which does not allow strengthening the performance-based planning process. This also affects integrated work with industry, airlines and users.
- There is no Regional CAR/SAM Guidance with more specific directions for the application of these methodologies, including case studies. Therefore, there are no formal agreements on the variants that will be used for some KPIs, according to the description of the GANP. A harmonized reference year for the baseline needs to be defined, the KPIs promulgated in Vol. III refer to different years (2019, 2021, 2022, etc.).

The ninth meeting of the NACC Working Group (NACC/WG/9) was celebrated in September and October of 2024 at Mexico City. During this meeting the following recommendations were agreed:

- The NACC/WG should give priority to the measurement of the following KPIs:
    - Capacity:
        - KPI06 En-route airspace capacity
        - KPI09 Airport peak capacity
    - Efficiency:
        - KPI01 Departure punctuality
        - KPI05 Actual en-route extension
        - KPI08 Additional time in terminal airspace
    - Safety:
        - KPI23 Number of loss of separation (variant 3)
- The Meeting recognized the GANP KPIs can be difficult to measure for many of the States/ANSPs, this is mostly due to the data elements needed to calculate the indicators. The Meeting requested the NACC/WG ATFM and Airspace Optimization (AO) Task Force Rapporteurs, along with the Secretariat, to establish an ad hoc group to address the following:
    - provide recommendations and guidance to ensure each State/Territory can effectively store and analyze the required data.
    - promote the development of capabilities to use traffic counts as the most commonly available data.
    - provide guidance to analyze the GANP KPIs to ensure they can be tailored to States'/Territories' capabilities, yet flexible enough to adapt to changing needs, and provide possible alternatives for measurement.

The Joint GREPECAS–RASG-PA meeting and the 22nd GREPECAS meeting (GREPECAS/22) were held in November 2024 at Lima (Peru). The main conclusion related to the CAR/SAM ANP Vol. III was

- That the CAR/SAM States, in conjunction with ANSP and airports, with the participation of airlines and International Organizations, assisted by the Secretariat, populate the Tables of

Volume III of the RANP CAR/SAM with the data of performance indicators - KPIs, prioritizing and harmonizing the management of these indicators according to the progress of the Working Groups for the regional implementation of air navigation by GREPECAS/23.

- That under the framework of GREPECAS Programme for the Strengthening of the Regional Plan (RANP) and National Plans (NANP) of the CAR/SAM, Project A1, and to work jointly with the regional implementation groups, the industry and stakeholders, the AD-HOC Group is activated, which members are Bahamas, Brazil, Chile, Colombia, Cuba, Dominican Republic, Ecuador, Panama, Peru, Trinidad and Tobago, United States, IATA and IFATCA, for the development of Key Performance Indicators KPI of the GANP (GADHOC) in order to strengthen the implementation of Volume III of the RANP CAR SAM, which results are to be presented at GREPECAS/23 with the following tasks:
    - prepare a regional CAR/SAM guidelines and standardized training material on the methodology of performance indicators, data collection and management and calculations;
    - formulate an Action Plan for the progressive implementation of KPIs, identifying priorities and resources required, harmonized with the progress of the implementation groups;
    - implement a Communications Plan and adequate means of dissemination (dashboards, etc.) of the KPIs;
    - and formulate a regional and/or interregional initiative for KPIs benchmarking activities.

First meeting of the GADHOC group was held online on the 12th September 20205, where the terms of reference and action plan of the group were discussed. First outline of these regional guidelines were presented during the meeting.

Additionally, in July 2025 the Fourth Air Traffic Flow Management (ATFM) Workshop/Meeting on Data Management and Indicator Calculation was celebrated at Lima (Peru). The workshop focused on the work done by DECEA (Brazil), in coordination with the ICAO SAM Office, on the calculation of ATFM operational indicators at SAM region level. It was presented the status of the process, in particular how the different states in the SAM region were contributing to the calculation of their ATFM indicators with the provision of the data inputs, and how they were processed and integrated by DECEA at regional level. As one of the main outcomes of the workshop, it was identified that for several of the ATFM operational indicators already being calculated in the SAM region, most of the aspects of the process, such as the data input, the formula and methods of calculation and integration at regional level are the same or very similar to the ones required for the calculation of equivalent GANP KPIs. In this sense, it is recommended to take advantage of this work done so far by the states in the SAM region and consider it as starting point for the calculation the GANP KPIs for the CAR/SAM Regional Air Navigation Plan, Vol. III. Additionally, having common data inputs from the states for the calculation of both ATFM indicators and GANP KPIs ensures the coherency of the data used and the indicators results both for operational analysis and planning purposes.

Similar work on ATFM indicators is being also conducted in the NACC region with several initiatives, such as the CARPIs initiative led by the FAA (USA) and CADENA by CANSO. In both cases, and similarly to the ATFM indicators calculated in the SAM region, the work done by the states for compiling the required data inputs and for contributing in the process of calculation of the indicators could be also considered as a starting point for the calculation of the GANP KPIs for the CAR/SAM region.

5. CAR/SAM Regional ANP KPIs General Approach

Before entering in the description of the detailed methodology for the calculation of the selected KPIs, this section outlines the proposed general approach for the CAR/SAM Regional ANP KPIs, looking for an efficient implementation and taking into account the current situation and the particularities of the region.

a. Key aspects and assumptions of the proposed approach

The proposed approach for the CAR/SAM region is defined considering the following assumptions:

- As described in the previous section, the CAR/SAM region and in particular GREPECAS has been working for several years in the definition and selection of the GANP KPIs to be incorporated in the Regional ANP Vol III. Additionally, the calculation and implementation of the KPIs in the CAR/SAM region is already in progress, even though with different levels of deployment depending on the States, being the ones in the SAM region more advanced compared with the CAR ones. In this sense, the approach proposed by these guidelines is not to start from scratch but to review and to build up from the work already done in the region. And not only with regards to GANP KPIs but also other activities performed in the context of operational and ATFM indicators.
- Considering the potential long list of KPIs, and the different starting points and available dedicated resources of the States, the approach should follow the principle of “starting small”. In this sense, it is recommended to follow a phased implementation approach, with a first phase addressing a reduced number of KPIs and then adding the rest of them in following phase(s).
- As described in the first assumption, one of the principles of these guidelines is to reutilize the work done so far. And in particular, as mentioned in the previous section, the region has been working considerably in the development of ATFM indicators, both in the SAM region with the coordination of the ICAO SAM office and the leadership of Brazil, and in the CAR region with several initiatives as CADENA from CANSO and the CARPIs from the FAA. The inputs and the process of calculation of some of the GANP KPIs is the same or very similar to the ones followed in the calculation of some ATFM indicators, which are already being calculated in the CAR/SAM region, as mentioned in the previous section. This ensures the coherence between planning and operation indicators and allows to follow a unique process for the data collection and calculation of both types of indicators, and then apply separate processes for the application and use of the indicator outcome, GANP indicator for medium-long term planning and ATFM indicator for tactical and operational analysis.
- The proposed methodology of calculation and management of GANP indicators is based in simple tools and open processes. For the collection and registration of the data inputs required to calculate the indicators, structured data storage in simple relational databases, such as Excel tables are recommended. In an initial phase, the calculation of the indicators and they integration at regional level will be also performed using Excel. In a second phase it is envisaged to incorporate Power BI or similar platforms to perform the calculation and integration of the KPIs, and keeping the Excel tables as the way of collecting the data inputs from the States. All processes and tools will be used following an “open access” approach to facilitate the traceability of the data and to ensure a transparency during the entire process.
- As suggested at GREPECAS meetings, the proposed methodology should allow a level of flexibility in the different KPI calculation and management processes, in particular in the required data sources, the calculation formulas, the periodicity of calculation of the KPIs, etc. In this sense, variations in some of these elements could be initially accepted. This flexibility

would facilitate to address some potential difficulties that some States may have to comply completely with the methodology and process described by the ICAO GANP. This flexibility could be necessary mainly in the starting phase of the proposed methodology.

b. List of selected CAR/SAM KPIs

The proposed list of KPIs to be developed in the region is defined considering the KPIs already included in the current version of the CAR/SAM RANP Volume III (version 0.1) and adding those that have been identified as priorities by the CAR/SAM states in previous GREPECAS meetings and related workshops and activities. This list only include KPIs that are part of the current list of 23 KPIs proposed by the ICAO GANP 7th edition. In future editions of these guidelines the list of KPIs can be updated and extended to incorporate new KPIs, as applicable.

The following table presents the current 23 GANP KPIs grouped by basic and advanced KPIs, per KPA and per focus area within the KPA.

ICAO KPI Overview

KPA	Efficiency			Capacity	Predictability			Safety
Focus Area(s)	Additional flight time & distance	Vertical flight efficiency	Additional fuel burn	Capacity, throughput & utilization	Capacity shortfall & associated delay	Punctuality	Variability	Operational safety outcomes
Basic KPIs	KPI02 Taxi-out additional time KPI13 Taxi-in additional time			KPI09 Airport peak capacity KPI10 Airport peak throughput		KPI01 Departure punctuality KPI14 Arrival punctuality	KPI15 Flight time variability	KPI20 Number of aircraft accidents KPI21 Number of runway incursions KPI22 Number of runway excursions KPI23 Number of airprox/ TCAS alert/ loss of separation/ near midair collisions/ midair collisions (MAC)
Advanced KPIs	KPI04 Filed flight plan en-route extension KPI05 Actual en-route extension KPI08 Additional time in terminal airspace	KPI17 Level-off during climb KPI18 Level capping during cruise KPI19 Level-off during descent	KPI16 Additional fuel burn	KPI06 En-route airspace capacity KPI11 Airport throughput efficiency	KPI07 En-route ATFM delay KPI12 Airport/Terminal ATFM delay	KPI03 ATFM slot adherence		

49

Figure 5 – ICAO GANP KPIs

The list of CAR/SAM KPIs is structured in three groups, the first one composed by those KPIs to be built in the first short-term phase of implementation, as priority KPIs for the region and including those that are already being calculated by several States in the region; and then a second group of KPIs to be implemented in a mid-term phase, and finally a third group targeting a long-term phase of implementation.

Group 1 (short- term implementation):

- KPI01 Departure Punctuality (Variant 2A)
- KPI06 En-route airspace capacity
- KPI09 Airport peak capacity
- KPI10 Airport peak throughput
- KPI14 Arrival punctuality

Group 2 (mid-term implementation)

- KPI02 Taxi out additional time
- KPI05 Actual en-route extension
- KPI08 Additional time in terminal airspace

- KPI13 Taxi-in additional time
- KPI15 Flight time variability
- KPI23 Loss of separation (Variant 3)

Group 3 (long-term implementation):

- KPI04 Filed flight plan en-route extension
- KPI07 En-route ATFM delay
- KPI17 Level-off during climb
- KPI19 Level-off during descent

Please note that KPI20 Number of aircraft accidents, KPI21 Number of runway incursions and KPI22 Number of runway excursions are not part of the scope of the CAR/SAM RANP Volume III.

c. Scheme of the general process

The process of calculating the CAR/SAM Regional KPIs is structured in 9 steps, involving both the States at national level and the ICAO Regional Offices at regional level.

The following list identifies and describes briefly each of the steps of this general process.

1. Selection of the KPI:
    a. Justification: Explain the relevance of the KPI to the strategic objectives.
    b. Priority: Determine the urgency and impact of the KPI in the region.
    c. Link with ASBU elements: Establish the traceability between the KPI and the related ASBU elements.
    d. Selection criteria: Ensure that the KPI is measurable, achievable, and aligned with global policies.
2. Understanding the KPI:
    a. Definition: Write the exact and clear concept of the KPI.
    b. Contribution to Objectives and KPAs: Indicate how it contributes to the achievement of the objectives defined in the GANP.
    c. Formula: Present the precise mathematical equation or algorithm to calculate the KPI, including the KPI unit and the considered period of time, if applicable.
    d. Instances: Define the instances of calculation (Per airport, per airspace sector, per state, etc.).
    e. Metadata: Input data elements required for the calculation of the KPI.
    f. Frequencies: Determine the frequency of calculation at State level and consolidation at Regional level.
    g. Owner and Responsibilities: KPI owner is the responsible of its entire calculation and management process at State level. Additionally, it is needed to assign responsible staff for the different activities, collection of inputs, quality check, KPI calculation, etc.
    h. References and Best Practices: Identify the main references and practices applied internationally for calculating the KPI (others to ICAO GANP reference).
3. Identifying the data sources:
    a. Primary sources: List the databases, tools, processes and stakeholders involved.
    b. Alternative sources: In the case primary sources are not available, identify and characterize the available alternative ones and assess the potential impact in the KPI formula and/or metadata.

   c. Data source accessibility evaluation: Evaluate the consistency, validity, and accessibility of each source.
4. Input data collection and consolidation
   a. Collection and consolidation format: Use of tables in Excel or other standardized formats.
   b. Frequency of collection and consolidation: Define the update frequency (monthly, quarterly, yearly).
   c. Metadata quality check: Ensuring the quality of the input data received form the different data sources.
5. KPI calculation and provision of results
   a. Formula application: Use the data collected and the defined formula to generate results by country.
   b. KPI baselines calculation: Calculate the KPI value for the most recent available data, for a defined period of time, normally per year.
   c. Internal validation: Check the consistency and accuracy of the calculations.
   d. Documentation preparation: Record assumptions, variations, unavailable input data and observations.
   e. Provision of results to regional level: Sending KPI's State results and associated documentation for its integration at regional level.
6. Integration of KPIs at regional level
   a. Integration format: Use of Excel tables, Power Bi models or other standardized data bases.
   b. Consolidation and standardization: To group national results into a regional set. And adjust potential methodological or unit differences between States.
   c. Quality Control and Verification: Review of errors, outliers and temporal consistency and confirm consistency of integrated data before regional analysis.
   d. Comparison: Calculation of regional averages and establish KPI rankings among States.
7. Data visualization and monitoring:
   a. Presentation tools: Excel dynamic tables and graphs or more advanced formats as for example Power Bi models or other visualization dashboards.
   b. KPIs views: Baseline vs target, historical trends, regional maps, state monographic, multi-state comparison, etc.
   c. Access and transparency: Ensure that States Civil Aviation Authorities and other relevant stakeholders (ANSPs, Airport operators, Airlines) can consult the information.
8. Data analysis:
   a. Comparative analysis: Evaluate performance across countries and against regional averages and international benchmarks.
   b. Trend analysis: Identify short-, medium-, and long-term patterns.
   c. Gap analysis: Baseline results vs targets, identification of new targets.
9. Interpretation of results and recommendations
   a. Synthesis of findings: Explain the main conclusions of the analysis.
   b. Impact on regional objectives: Determine to what extent KPIs reflect progress or gaps.
   c. Traceability KPIs vs RANP Solutions: Identification of the effectiveness in terms of performance improvement of the implemented solutions and ASBU elements of the RANP and recommendations of new solutions.

d. Recommendations: Propose concrete actions for improvement and priority areas of attention, in the form of new performance objectives, KPIs and associated targets.

The figure below illustrates how these steps are sequenced and structured at national and regional levels. The processes at national level are responsibility of each CAR/SAM State, while the process to be performed at regional level could be done either by the ICAO SAM and NACC regional offices or a designated State or organization. The process to be done at both levels should be appropriately coordinated.

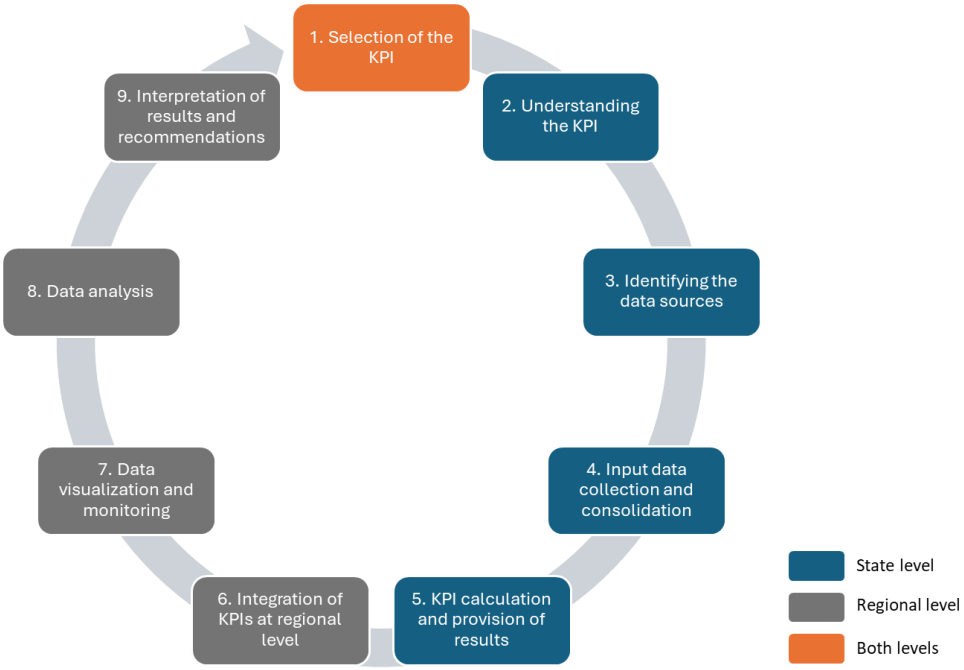


Figure 6 – Scheme of the general process for calculating the CAR/SAM RANP KPIs

Please note that the previous approach does not prevent that a State implements the entire process at national level, as part of their National Air Navigation Plan development and monitoring activities.

The following table summarizes the general process of calculation and its application to KPI01 as an example.

Step	**Sub-levels**	**Example for KPI 01 – Departure Punctuality**
1. Selection of the KPI	a. Justification b. Priority c. Link with ASBU elements d. Selection criteria	a. Departure punctuality is a key performance measure for passenger experience and operational efficiency. b. High priority in CAR/SAM due to recurrent congestion at main hubs (i.e. Mexico City, São Paulo, Bogotá, Lima). c. KPI01 is not linked to any ASBU element (as per ICAO GANP traceability tool (https://www4.icao.int/ganpportal/ASBU/PerformanceDashboard) d. Measurable using airline operational data, airport departure boards, and ANSP coordination.

Step	Sub-levels	Example for KPI 01 – Departure Punctuality
2. Understanding the KPI	a. Definition b. Contribution to Objectives and KPAs c. Formula d. Instances e. Metadata f. Frequencies g. Owner and Responsibilities h. References and Best Practices	a. Percentage of flights departing within ±15 minutes of their Scheduled Off-Block Time (SOBT) compared with their Actual Off-Block Time (AOBT). b. Contributes to GANP KPA: Predictability c. Formula: (Departures where |AOBT − SOBT| ≤ 15 min ÷ Total scheduled departures) × 100. d. Instances: by airport, runway, and consolidated at State and CAR/SAM regional level. e. Metadata: ▪ Flight Call sign (i.e. GLO1182) ▪ Aircraft Type (i.e. B738) ▪ Airport of departure (ADEP) (i.e. SBBR) ▪ Airport of destination (ADES) ▪ Flight Type, commercial, using for example a C, or non-commercial, indicating NC ▪ Scheduled Off-Block Time (SOBT) (i.e. 28/01/25 06:15:00) ▪ Actual Off-Block Time (AOBT) ▪ Runway in use (i.e. 17R) f. Frequencies: monthly calculation and quarterly consolidation at regional level. g. KPI owner and responsible staff from the National Civil Aviation Authority h. References: DECEA (Brazil), EUROCONTROL, ACI Europe
3. Identifying the data sources	a. Primary sources b. Alternative sources c. Data sources accessibility evaluation	a. Primary: Airport Operational Databases (AODB) b. Alternative: Airline OCCs and ATC systems. c. Accessibility: Higher in larger airports with A-CDM implemented, but weaker in smaller airports where access to SOBT/AOBT may require airline cooperation.
4. Input data collection and consolidation	a. Collection and consolidation format b. Frequency of collection and consolidation c. Metadata quality check	a. KPI01 metadata stored in Excel/CSV or centralized database. b. Weekly updates of data input and monthly consolidation of metadata. c. Quality check established for mapping, completeness, matching and accuracy evaluation.

Step	Sub-levels	Example for KPI 01 – Departure Punctuality
5. KPI calculation and provision of results	a. Formula application b. KPI baseline c. Internal validation d. Documentation preparation e. Provision of results to regional level	a. Example: Bogotá (BOG), July 2024 → SOBT flights = 12.000; flights within ±15 min SOBT-AOBT = 9.240 → KPI = 77% Departure Punctuality in july 2024 b. Example: KPI baseline for Brazil airports in 2024 = 80% c. Cross-check with airline punctuality reports and stakeholders peer reviews. d. Document cases with missing SOBT or AOBT, note assumptions. e. KPI01 State results are provided to ICAO Regional Office.
6. Integration of KPIs at regional level	a. Integration format b. Consolidation and standardization c. Quality Control and Verification	a. Regional consolidation via Excel/Power BI. b. Ensure KPI results are consolidated and standardized across States. c. Check KPI results consistency, remove duplicate records and verify with ICAO SAM Performance Dashboard.
7. Data visualization and monitoring	a. Presentation tools b. KPI views c. Access and transparency	a. Dashboards in Power BI with punctuality charts. b. Views: baseline vs. targets, monthly trends, punctuality maps, State rankings. c. Access for CAAs, ANSPs, airports, airlines, ICAO regional offices.
8. Data analysis	a. Comparative analysis b. Trend analysis c. Gap analysis	a. Benchmark airports and States (e.g., PTY vs. MEX). b. Seasonal trend: Example: delays increase in Caribbean during tourist peaks. c. Gap: Regional target 85%, actual average 77% → shortfall of 8%.
9. Interpretation of results and recommendations	a. Synthesis of findings b. Impact on regional objectives c. Traceability KPIs vs RANP Solutions d. Recommendations	a. CAR/SAM average = 77% punctuality; large hubs show greatest unpunctuality concentrations. b. Efficiency and predictability targets and objectives not fully achieved. c. Airports with A-CDM and ATFM show better punctuality. d. Recommendations: expand A-CDM, reinforce ATFM, improve SOBT-AOBT reporting, set 2030 target at 85% punctuality.

In section 6, the methodology to be applied in each of the previous steps will be detailed for the selected list of KPIs to be implemented in the short-term phase.

d. Summarized action plan

The Action Plan for the implementation of the GANP KPIs to be included in the CAR/SAM Regional Air Navigation Plan, Vol. III is structured in three main phases:

- First phase (Short-term deployment): Implementation of the first 5 KPIs (KPI01, KPI06, KPI09, KPI10, KPI14) by all states in the CAR/SAM region. From January 2026 until December 2026.
- Second phase (Mid-term deployment): Implementation of the next group of 6 KPIs (KPI02, KPI05, KPI08, KPI13, KPI15, KPI23) by all states in the CAR/SAM region. From June 2026 until June 2027. Considering that some states have already advanced in the implementation of the first phase, this second phase can be started earlier and in parallel with the first phase.
- Third Phase: (Long-term deployment): Implementation of the last group of 4 KPIs (KPI04, KPI07, KPI17, KPI19) by all states in the CAR/SAM region. From July 2027 until July 2028.

On-site support would be provided by ICAO regional offices to the CAR/SAM States during the three implementation phases. These on-site support will be designed in each case depending on the specific needs of each State.

See detailed description of the Action Plan in Deliverable 2.

6. Detailed methodology for calculating the CAR/SAM KPIs

The current version of these guidelines provides a detailed methodology and a practical example for the calculation of each of the indicators to be deployed in the initial deployment phase (KPI01, KPI06, KPI09, KPI10, KPI14).

Following editions of these guidelines will incorporate detailed information for the rest of the KPIs proposed to be implemented in the mid and long-term phases.

The proposed methodology addresses the steps to be performed at State level, which are the first 5 steps of the general process defined in the previous section.

a. KPI01 Departure Punctuality (Variant 2A)

i. Selection of the KPI

Firstly, it is necessary to understand why the KPI has been selected as part of the CAR/SAM RANP, evaluate its level of priority, its link with ICAO ASBU elements and the selection criteria applied.

- **Justification:**

It is clear that punctuality is a key business driver of the air transport sector, which ensures its competitiveness versus other transportation modes. And in particular departure punctuality is a key performance measure for passenger experience and operational efficiency. Increasing predictability of operations ensures a higher reliability to the flight schedules, which is crucial to provide the right flight status information to the passengers and to facilitate the capacity and resource allocation procedures to airport operators and ANSPs.

- **Priority:**

Considering the current situation of frequent delays and unpredictable situations in several main airport hubs in the CAR/SAM region, KPI01 is of high priority for the CAR/SAM Regional Air Navigation Plan. The urgency of establishing and monitoring the indicator may vary across the different States considering the current baseline regarding departure punctuality at their airports.

- **Link with ASBU elements:**

Links between KPI01 and ASBU elements are not yet provided by the ICAO GANP traceability tool https://www4.icao.int/ganpportal/ASBU/PerformanceDashboard. It is expected that in the short/mid-term KPI01 traceability will be established, mainly with ACDM ASBU elements.

Note. - The GANP 8th Edition was approved by the ICAO Assembly 42 (Montreal, 23 September – 3 October 2025). Among other insertions, the traceability for KPI01, KPI09 and KPI14 was defined. The publication of 8th edition in GANP Portal is expected by the first quarter of 2026.

- **Selection criteria:**

Finally, regarding the KPI selection criteria, it is necessary to ensure that the KPI is feasible to be measured by all States in the region. In this sense, considering the relative simple formula of the KPI and the potential easy access to the input data required, KPI01 is considered as a feasible KPI for most of the States in the region. Additionally, it has been identified by both regions, CAR and SAM, as a priority GANP KPI, and for operational ATFM purposes it is being already calculated, mainly by SAM region States.

ii. Understanding the KPI

The KPI01 Departure Punctuality, as described by the ICAO GANP portal, is an airspace user and passenger focused KPI: departure punctuality gives an overall indication of the service quality experienced by passengers, and the ability of the airlines to execute their schedule at a given departure location.

- **Definition:**

KPI01 Departure Punctuality is defined by the ICAO GANP as the percentage (%) of flights departing from the gate on-time (compared to schedule).

ICAO GANP offers four variants for calculating KPI01:

- Variant 1A – % of departures within ± 5 minutes of scheduled time of departure
- Variant 1B – % of departures delayed ≤ 5 minutes versus schedule
- Variant 2A – % of departures within ± 15 minutes of scheduled time of departure
- Variant 2B – % of departures delayed ≤ 15 minutes versus schedule

The proposed variant for the KPI01 as part of the CAR/SAM RANP is the variant 2A, which on one hand, compared with variants 1, allows a wider tolerance window, giving a realistic picture of operations since minor delays are inevitable, and is widely used in the aviation industry, being therefore more suitable for global benchmarking; and on the other hand, compared with variant 2B, it detects not only delayed flights but also early departures, which could also lead to operational and passenger connections issues. The objective is to measure the schedule adherence.

Therefore, the definition to be used for the KPI01 in the CAR/SAM RANP is: Percentage of flights departing from the gate within ±15 minutes of their Scheduled Off-Block Time (SOBT) compared with their Actual Off-Block Time (AOBT).

Depending on the availability of the required input data, if the SOBT data is not available it can be calculated using EOBT data form the flight plan, instead.

Additionally, in the case AOBT data is not available, it can be considered to use ATOT and taxi out times and estimate AOBT values.

- **Contribution to Objectives and KPAs:**

KPI01 Departure Punctuality is aligned with the following CAR/SAM performance objective, included in the Voume III: Increase the number (%) of flights adhering to the planned take-off time. This performance objective is part of the Predictability KPA.

- **Formula:**

$$KPI01 = \frac{Departures\ where\ |AOBT - SOBT| \leq 15\ min}{Total\ scheduled\ departures} \times 100$$

In the case SOBT data is not available, it can be calculated using EOBT data instead.

Additional variation in the formula, depending on data availability, could be to use ADT and SDT data instead of AOBT and SOBT data, respectively.

Initially, only scheduled commercial departures are considered. General aviation, military and other type of flights could be included only for specific analysis of KPI01, as required by each State. KPI01 does not take into account the cancelled departing flights, which could be measured and monitored as a separated metric.

The considered time period for calculating KPI01 could be from hourly to yearly results, including also daily and monthly periods.

- **Instances:**

The instances of calculation of KPI01 may depend on the available input data. The recommended instance is by airport infrastructure in each State. The list of airports to be include in the analysis should include those airports above 40.000 commercial operations/year.

Additionally, for airports with more than one departing runway, it is suggested to calculate KPI01 per each departing runway.

Finally, at State level it will be calculated the aggregated KPI for all airports included in each State scope. Consolidation of KPI01 results will be also done at Regional level in step 6 of the process.

- **Metadata:**

Metadata is normally defined as the data of the data, that is the contextual information that makes raw data meaningful, searchable, and usable. In this sense, for each KPI we need to identify and characterize the different data input that it is required for its calculation. In the context of these guidelines, the group of data inputs of the KPI is considered as the KPI metadata.

In the case of KPI01, for each registered flight in the considered time period, the following metadata is required:

- Flight Call sign, as per the Flight Plan (i.e. GLO1182)
- Aircraft Type (i.e. B738)
- Flight Type, commercial, using for example a C, or non-commercial, indicating NC
- Airport of departure (ADEP), in ICAO code (i.e. SBBR)
- Airport of destination (ADES), in ICAO code
- Scheduled Off-Block Time (SOBT), in date (day/month/year) and time (hour : minute : seconds) (i.e. 28/01/25 06:15:00)
- Actual Off-Block Time (AOBT), in in date (day/month/year) and time (hour : minute : seconds)
- Runway in use (RWY) (i.e. 17R)
- Departing gate (GATE)

See example for table for compiling the metadata required for KPI01 at the input data collection and consolidation section. Also see Excel template in Annex 1.

- **Frequencies:**

KPI01 is recommended to be calculated by each State at national level with a monthly frequency. The integration at regional level is recommended to be done with a quarterly frequency (every three months).

- **Owner and Responsibilities:**

Each KPI should have an owner nominated at State level, who will be responsible for the calculation and management of the KPI. Normally, it will be staff of the Planning Department at the Civil Aviation Authority or the State ANSP.

The owner of KPI01 at State level should nominate the staff responsible for receiving the data, consolidating it and performing the metadata quality checks.

The same responsible staff can be nominated for the three roles, or, depending on existing capabilities at the owner entity, the responsibilities could be assigned to different teams. The selected approach would be the same across all KPIs.

- **References and Best Practices:**

Departure punctuality is a key metric for the aviation sector, and not only for planning purposes. Some key references and best practices on departure punctuality indicators are:

- DECEA (Brazil) presents the SISCEAB Performance website, providing access to ATM performance indicators, including departure punctuality.

  https://performance.decea.mil.br/areas/previsibilidade/#graf_opc_ano

- EUROCONTROL, at its Aviation Intelligence Portal, provides a dashboard with insights into various performance areas and indicators, including departure punctuality.

  https://www.eurocontrol.int/Economics/DailyPunctuality-Airports.html

- The Airport Performance Network – Europe (APN – Europe) brings together ACI Europe members to discuss issues related to punctuality and airport performance management.

  https://www.aci-europe.org/industry-topics/industry-topics/29-airport-performance.html

As a summarized outcome of this step, the following KPI01 **Descriptive Table** is recommended to be completed by each State (see Excel template in Annex 1):

KPI01 – Descriptive Table	
Name	Departure Predictability (Variant 2A)
Definition	Percentage of flights departing from the gate within ±15 minutes of their Scheduled Off-Block Time (SOBT) compared with their Actual Off-Block Time (AOBT). Depending on the availability of the required input data, if the SOBT data is not available it can be calculated using EOBT data form the flight plan, instead.
Utility of the KPI	This is an airspace user and passenger focused KPI: departure punctuality gives an overall indication of the service quality experienced by passengers, and the ability of the airlines to execute their schedule at a given departure location.
Key Performance Area	Predictability

KPI01 – Descriptive Table	
RANP Performance Objectives	Increase the number (%) of flights adhering to the planned take-off time
Link to ASBU elements	None It is expected that links will be established in the future with ACDM elements
Formula	(Departures where |AOBT − SOBT| ≤ 15 min ÷ Total scheduled departures) × 100 Only commercial departures considered Considered time periods: hour, day, month and year
Unit	% of scheduled departures
Metadata	CALLSIGN, ACFT TYPE, FLT TYPE, ADEP, ADES, SOBT, AOBT, RUNWAY, GATE
Instances	Identify the instances of calculation for the KPI, for example: • Airports above a defined threshold of commercial ops/year • Departure runway • Gate
Frequencies	Monthly calculation at State level Quarterly consolidation at Regional level
Data Sources	Indicate the data source used per each required metadata element at each instance (for example): • AOBT: AODB • SOBT: AODB, Airline OCC • Allocated airport resources (runway, gate): AODB Additionally, if applicable, identify the responsible staff, at the data source, to provide the information and the responsible staff, at State level, to collect it.
Owner and responsibilities	Identify the owner of the KPI and the responsible staff, at Stale level, for the calculation and management of the KPI
Users	Identify the users of the KPI, such as airports operators, ANSPs, Airlines and others, at State level
Applied Variations	List the variations applied in the formula, metadata, data sources, frequency, or other elements of the calculation process
References	Links to reference material and to examples of calculation For example: DECEA, EUROCONTROL, ACI Europe
File	Link to the local Excel file with the input data and calculation formulas

Some of the fields of the KPI Descriptive Table should be filled once the next steps are completed, for example, metadata, data sources, owner, applied variations, etc.

As a main reference, to complement the understanding of KPI01, see the descriptive table provided by the ICAO GANP: https://www4.icao.int/ganpportal/ASBU/KPI

iii. Identifying the data sources

In order to identify the required data sources for KPI01, it is necessary to clearly understand the different metadata necessary as inputs. In the case of KPI01 main metadata elements are the off-block time stamps, both the actual (AOBT) and the schedule (SOBT). The definition of off-block time stamp

is the time the aircraft starts to move from its stand, with all doors closed, under its own power or pushback. Additionally, it would be required to obtain the assigned airport resources, runway and gate, to each departing flight.

- **Primary sources**

Primary sources of information for obtaining the required KPI01 metadata usually are:

- Airport Operational Databases (AODB), which normally registers flight schedule information from airlines, including SOBT, resource allocation as assigned gates and departure runways, and key turnaround milestones, as AOBT. For CDM airports, SOBT and AOBT are key milestones to be registered.
- Airline Operations Control Centers (OCC) provide flight schedules including the SOBT information. Additionally, Airline OCCs record the AOBT which is reported in airline movement (MVT) messages, as OUT field of the message. SOBT is also included in MVT messages.

It is also important to identify in each potential data source the responsible staff, which will be providing the information with the required frequency and formats.

When possible, it is recommended to use a unique data source for all airport instances, for example an existing database at the Civil Aviation Authority. If this not the case, it will be necessary to work with each airport operator and/or airline to establish separated data collection processes per each airport instance, and then build an integrated data base at State level (see next step).

- **Alternative sources**

In the case of AOBT, alternative sources of information could be:

- Some ANSPs record at their ATC departure clearance systems the start of pushback or movement from stand clearance, more likely to be available at CDM airports
- Surveillance systems, such as Surface Movement Radar, A-SMGCS or ADS-B, can identify the exact time an aircraft begins to move from the stand.
- Ground Handling systems: Pushback time stamps are recorded directly by ramp agents or automated systems (electronic dispatch, handheld devices) and then fed into AODB and/or airline OCC systems. Please, note that this source would not be providing the AOBT in the case pushback is not required.

Alternatively, if AOBT data is not available from any source, it could be considered to estimate it using ATOT data and taxi out times, in the case they are available. ATOT could be obtained from ADS-B data sources, and taxi times could be estimated using a reference or average taxi time, usually provided by the airport operators.

On the other hand, if SOBT is not available from the primary sources, then it can be introduced a variation in the KPI01 calculation formula and use EOBT instead of SOBT. In that case, EOBT can be obtained from Flight Plans (FPL) databases.

- **Data sources accessibility evaluation**

Once the primary, or alternative if necessary, sources are identified per each element of the KPI metadata, it is necessary to conduct and evaluation of its accessibility in different aspects:

- Collection frequency: Daily frequency is recommended, if not weekly, but not lower than monthly.
- Data format: It is recommended to have access to digital data sources, such as databases or Excel files. As last option paper based reports could be accepted.

- Collection method: Automated methods, as online interfaces, would be ideally preferred, but email communication could be acceptable at early stages.
- Data completeness should be total, in order to ensure the quality of the calculated KPI. Depending on the data source continuity completeness could be impacted.
- Data reliability is evaluated qualitatively, mainly depending if the source relies on manual processes or is generated by automated systems.
- Access benefit vs cost: Also a qualitative factor, that evaluates how difficult or costly could be to get access to the data source. For example, accessing some data from third parties might require complex approvals or agreement letters.

Additionally, commitment from the involved staff at each data source, which will be responsible for providing the data, needs to be assessed and confirmed.

To perform this assessment of the accessibility of the different data sources, the following table needs to be prepared, including the aspects to be evaluated for each source identified per each metadata element and at each calculation instance. See example below for KPI01:

Meta-data	Instance	Data source	Collection frequency	Data format	Collection method	Data completeness	Data reliability	Access Benefit vs Cost	Responsible focal point
AOBT	Airport i	AODB	Daily	Database	Online interface	Total	High	Low	Airport ops manager
		Airline OCC	Weekly	Excel	Email	Very high	High	Medium	Airline ops manager
	Airport ii	ATC system	Weekly	Excel	Email	High	Medium	High	TWR Supervisor
SOBT	Airport i	AODB	Daily	Database	Online interface	Total	High	Low	Airport ops manager
	Airport ii	Not available	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EOBT	Airport ii	ICAO FPL	Daily	Database	Online interface	Total	High	High	ICAO officer

This example shows that, depending on the airport, there could be more than one available data sources, but with different levels of accessibility. This exercise is crucial to ensure the continuity and success of the data collection process and further calculation of the KPI, and to identify the potential variations required due to data availability. As a result, the optimum data source per each metadata element is identified and the required coordination and collection agreements are established with the data source responsible.

See Excel template in Annex 1 for the previous table to evaluate the KPI data sources accessibility.

iv. Input data collection and consolidation

Once the data sources are identified and the required connection and coordination is established with all of them, the process of collecting and integration of the KPI01 input data should be activated.

- **Metadata collection and integration format:**

At this step, the designated KPI01 owner at State level starts receiving from the different sources the required metadata for calculating the KPI. As described in the previous step, each metadata may be received from different data sources using different formats, methods and frequencies. In this regards,

the consolidation of the input data per departing flight should be done using a common database or Excel table to ensure the appropriate management of the data for the KPI calculation.

For KPI01, it is recommended to consolidate the metadata in the following table, and initially using Excel as recommended format (See Annex 1 for Excel template). See example below:

CALLSIGN	ACFT TYPE	FLT TYPE	ADEP	ADES	SOBT	AOBT	RUNWAY	GATE
AEB9003	A320	NC	SBBR	SBFL	29/01/25 15:45:00	01/01/25 15:37:14	11L	N/A
ARG1219	B738	C	SBBR	SABE	13/01/25 01:21:00	13/01/25 01:05:00	11L	N/A
AZU2604	E295	C	SBBR	SBCF	04/01/25 09:00:00	04/01/25 08:56:50	11L	N/A
AZU2604	E295	C	SBBR	SBCF	06/01/25 09:00:00	06/01/25 08:57:16	11L	N/A

In the case any variation is introduced in the formula and/or input data, as for example using EOBT instead of SOBT, or using ATOT and taxi times instead of AOBT, the table will be adapted as necessary.

Additionally for each metadata element it will be registered information on the data source, focal point at data source, date of reception, and comments field indicating any missing information or issue on the received data. This information will be an input for the metadata quality check described below.

- **Frequency of collection and consolidation:**

As described in previous section, the frequency of collection of the KPI01 metadata elements could be different depending on the used data sources. Therefore, the consolidation frequency of the metadata for a same flight will be defined by the metadata element with lower frequency of collection. Considering the previous, in the worst case a monthly frequency should be established as the minimum one for the metadata consolidation process, and targeting to improve it to a daily or, at least, weekly frequency.

- **Metadata quality check:**

Considering that various sources could be used to build the complete set of metadata elements per each departing flight, it is crucial to conduct a quality check of the consolidated data per flight and per the full set of flights per consolidation period.

The following quality checks are proposed to be conducted for KPI01 metadata:

- Mapping: This quality process checks the format of the submitted data ensuring that follows the correct coding convention.
- Completeness: This area focuses on checking the number of operated flights and the amount of flights with null values in the metadata elements.
- Matching: To ensure that the consolidated metadata elements are correctly assigned to the corresponding departing flights. For example avoiding duplicate flights.
- Accuracy Validation: This quality area aims to evaluate the degree of conformance between the collected values and their true values. In the case of KPI01, it could be introduced a check process using various data sources to confirm that SOBT and AOBT data are coherent.

As a result of this process a metadata quality check report will be produced, identifying the required corrective actions to be implemented at collection and/or consolidation activities.

v. KPI calculation and provision of results

- **Formula application:**

For calculating KPI01, first it is necessary to have all the data inputs for all scheduled departing flights in the defined calculation period (daily weekly, monthly, quarterly, season, yearly punctuality). Once

all metadata is registered in the consolidation table (see previous section) for the complete set of flights, then the KPI formula can be applied.

Several options can be used to apply the formula using the same consolidation table in excel format. A common approach is to add a column, after the metadata columns, to evaluate if a departure flight is punctual or not, by checking if the absolute value of the difference between its AOBT and its SOBT is equal or less than 15 min. In the case the flight is punctual, the value "1" is registered in the new column. Finally, by calculating the sum of "1" in that column for all flights in a defined period of time and dividing it by the total number of scheduled flights in that same period, it is obtained the % of punctual departure flights, that is the value of KPI01, in the mentioned period of time.

Applying to excel table different filters or using dynamic tables, KPI01 can be calculated for specific an airport, or group of airports, or at State level and for different calculation periods, day, week, month, quarter, season or year. Additionally, if the data is available, within an specific airport the calculation can be also done for a specific departure runway or for a specific gate.

See Excel template in Annex 1 incorporating formula to calculate KPI01

- **KPI baselines calculation:**

KPI values are essential to evaluate system performance. For KPI01, this specifically means assessing the predictability of scheduled departures. To identify potential improvements in this area, the KPI must be quantified and its evolution monitored over time. This requires establishing a reference baseline, which serves as the foundation for future performance comparisons. Furthermore, baseline values at both State and Regional levels offer a clear picture of any existing performance gaps and provide the necessary insights for setting future KPI target values.

When complete annual datasets for KPI01 become available, a reference baseline can be calculated. The goal for all CAR/SAM States is to deliver KPI01 results for 2026, establishing a common regional baseline reference.

- **Internal validation:**

It is necessary to ensure that the KPI results obtained by the application of the formula are accurate and reliable before its submission to regional level. Different approaches can be followed:

  - Select representatives samples of data and recalculate the KPI manually and compare it with the excel formula outputs.
  - Check consistency over the time and validate that KPI results follow expected patterns (no sudden variations due to calculation errors).
  - Peer review: share methodology and sample results with internal and external stakeholders (airport operators, airlines, etc.).
  - Cross-check with other punctuality reports from airlines or commercial aviation data sources.

The validation results will determine any corrective actions needed in the KPI calculation process. If no issues are found, the KPI results are considered approved.

Additionally, the internal validation process may reveal anomalies, such as implausible delays, often caused by incorrect AOBT or SOBT timestamps. In such cases, corrective action should be taken directly at the data source level.

- **Documentation:**

Once the KPI is calculated it is necessary to document the key aspects of the process: what the KPI is, how it is defined, which data sources are used, how data is processed, the exact calculation steps, who is responsible, how it is reported, and how changes are tracked. Documenting the process of KPI calculation is essential to ensure transparency, repeatability, and auditability.

Key elements of the KPI documentation package are:

- KPI Descriptive Table
- Data sources evaluation table
- Metadata collection, consolidation and KPI calculation processes descriptions and Excel files
- Metadata consolidation quality check reports
- KPI calculation internal validation report

It is relevant to include in the different documents the required references to the potential variations applied to KPI01 calculation, that is assumptions, KPI formula and/or metadata adjustments, unavailable input data and other observations.

- **Provision of results to regional level**

After the KPI results are calculated and internally approved, the State compiles the standardized submission package formed by the KPI documentation described in the previous step. This package is then sent to the regional coordinating body (ICAO NACC and SAM Regional Offices) through the designated reporting channel, whether that is a secure email, an online portal, or another official submission system to be defined. States should confirm that the submission is received and track any feedback or requests for clarification. This step ensures official receipt, traceability, and accountability, forming the basis for subsequent regional consolidation and analysis of KPI results.

b. KPI06 En-route airspace capacity (Variant 1)

i. Selection of the KPI

Firstly, it is necessary to understand why the KPI has been selected as part of the CAR/SAM RANP, evaluate its level of priority, its link with ICAO ASBU elements and the selection criteria applied.

- **Justification:**

En-route airspace capacity is a key performance indicator as it assesses the extent to which traffic demand can be accommodated within the available sector capacity in a safe and efficient manner. The indicator supports the implementation of Air Traffic Flow Management (ATFM) by facilitating the identification of capacity bottlenecks and enabling the planning of appropriate measures, such as sector reconfiguration or flow management regulations. Furthermore, it contributes to the preservation of safety margins by preventing excessive controller workload, while at the same time enhancing operational efficiency through the reduction of delays, rerouting, and holding, which also could lead to a reduction of fuel consumption and emissions.

- **Priority:**

In the CAR/SAM region, monitoring KPI06 will provide relevant insights to ensure that growing traffic demand can be safely and efficiently accommodated within available sectors, helping States and ANSPs plan and manage airspace proactively. In particular, with traffic expected to increase significantly across the region, SAM States face opportunities to enhance capacity along major corridors linking São Paulo, Buenos Aires, Lima, Bogotá, and Santiago through sector redesign, ADS-B deployment, and improved cross-border coordination. On the other hand, in the CAR region, dense international flows crossing multiple FIRs within short distances—such as routes between Miami, Havana, Kingston, Santo Domingo, and San Juan—highlight the benefits of introducing coordinated ATFM measures. In this sense, monitoring KPI06 will enable CAR States to optimize sector use,

strengthen predictability, and minimize delays, contributing to a more resilient and harmonized regional air traffic system.

- **Link with ASBU elements:**

The ICAO GANP traceability tool https://www4.icao.int/ganpportal/ASBU/PerformanceDashboard identifies the following ASBU elements which implementation will generate a positive impact on KPI06:

Elements implementation planning in progress in CAR/SAM regions.

- FRTO (Improved operations through enhanced en-route trajectories) elements: FRTO-B0/4 Basic conflict detection & conformance monitoring (MTCD/MONA) equips ATC with planning tools that detect conflicts earlier and ensure adherence to clearances, reducing tactical vectoring and enabling denser, more orderly streams. FRTO-B1/2 Required Navigation Performance (RNP) routes create more predictable, performance-based routing structures (including in constrained airspace), which reduces controller workload and deconflicts flows, allowing more aircraft to use the same airspace safely. Both elements translate to higher sustainable sector demand handling for KPI06.
- NOPS (Network Operations) element: NOPS-B1/4 Dynamic Traffic Complexity Management gives the network and ANSPs the means to measure and actively manage complexity (not just volume), coordinating flow measures, configurations, and reroutes before sectors overload. By keeping controller task load within acceptable bounds and distributing demand across time/space, this element raises the effective capacity the network can safely absorb, improving KPI06 outcomes.

Elements implementation not yet planned

- CSEP (Cooperative Separation) elements: CSEP-B1/3 Performance-Based Longitudinal Separation Minima and CSEP-B1/4 Performance-Based Lateral Separation Minima reduce required in-trail and lateral spacing where performance allows, letting controllers safely accommodate more traffic per sector. CSEP-B2/1 Interval Management (IM) Procedure and CSEP-B3/1 IM with complex geometries shift part of spacing management to airborne tools, smoothing flows through merges/crossings and further increasing sector throughput. CSEP-B3/2 Remain-Well-Clear (RWC) for UAS/RPAS enables predictable integration of new entrants without eroding crewed traffic capacity, and CSEP-B4/1 Airborne separation (longer-term) envisages aircraft-managed separation to unlock additional capacity where supported by standards and equipage. Together these elements lift the practical ceiling of aircraft a controller/sector can handle while preserving safety margins, directly improving KPI06.
- OPFL (Improved access to optimum flight levels in oceanic and remote airspace) elements: OPFL-B3/1 Helicopter RNP 0.3 Terminal and En-route Operations standardizes precise rotorcraft operations so they can share or transition through en-route structures with less segregation, protecting fixed-wing capacity. OPFL-B3/2 Expansion of the upper limit of the RVSM band increases the number of usable flight levels, directly adding vertical capacity for long-haul flows. Both reduce level capping/constraints and open more vertical “lanes,” positively impacting KPI06 where applicable.

In summary, these specific ASBU elements, once they are available for implementation, will raise safe sector throughput by tightening separation where performance justifies it, improving controller tools and route predictability, managing network complexity, and adding usable flight levels, each a direct lever on KPI06.

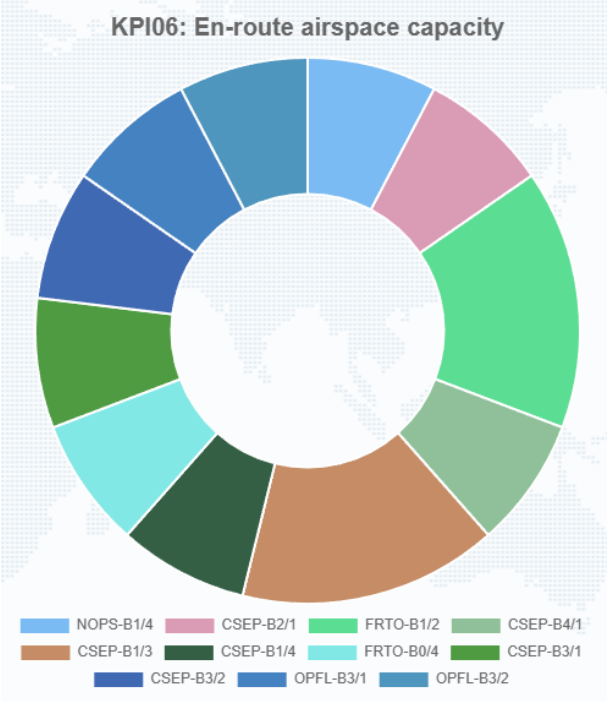


Figure 6 – KPI06 traceability with ASBU elements – ICAO GANP Portal

- **Selection criteria:**

Regarding the KPI selection criteria, it is essential to ensure that the chosen indicator can be measured by all States in the region. KPI06 is derived from the GESEA Capacity Manual formulas, which are based on measurement processes that, while requiring time and resources, remain feasible and affordable for most States. Furthermore, CAR region has identified KPI06 as a priority GANP indicator.

ii. Understanding the KPI

The KPI06 En-route airspace capacity, as described by the ICAO GANP portal, measures an upper bound on the allowable throughput or occupancy count of an en-route facility or sector.

KPI06 measures the nominal capability of an ANSP to deliver ATM services to IFR traffic in a given volume of en-route airspace, as seen at a given planning horizon. For each horizon a different type of capacity is defined by the ICAO GANP:

- Planned capacity: expected values one or more years ahead for planning and investment purposes
- Declared capacity: values used during the strategic and pre-tactical ATFM processes
- Expected capacity: values as finalized at the end of the pre-tactical process
- Actual capacity: values as actually used on the day of operation during tactical ATFM and ATC.

Planned capacities are primarily used for multi-year and investment planning. Declared, expected and actual capacities are used in traffic flow management as well as for measuring and monitoring service delivery and efficiency. Some ANSPs may prefer not to declare capacities, and only have these capacities established on a daily basis based on known/current operational factors. Establishing capacities at different planning horizons provides an important reference for understanding the total system performance under normal operating conditions and provides a basis to work from when determining the impact of operational factors limiting capacity. These factors include, but are not limited to, ATCO availability and workload.

These guidelines recommend using the declared capacity approach, consistent with the definitions and methodology contained in the *Manual de Cálculo de Capacidad de Pista y Sector ATC*, Version 2.0, developed by GESEA. This GESEA Capacity Manual constitutes the primary reference underpinning the KPI06 calculation methodology presented in the present guidelines.

- **Definition:**

KPI06 En-route airspace capacity is defined by the ICAO GANP as the maximum volume of traffic an airspace volume will safely accept under normal conditions in a given time period.

ICAO GANP offers two variants for calculating KPI06:

- Variant 1: airspace throughput (entry flow rate), at a specific time interval at which the throughput declaration is made.
- Variant 2: airspace occupancy count, at a specific time interval at which the average occupancy count declaration is made.

The proposed variant for the KPI06 as part of the CAR/SAM RANP is the variant 1, and for a time interval of 1 hour, which is in line with the definitions and approach of the GESEA Capacity Manual.

Therefore, the definition to be used for the KPI06 in the CAR/SAM RANP is the maximum flow of traffic an airspace volume will safely accept under normal conditions in one hour, measured in movements/hour.

This definition will be applied using the approach of the GESEA Capacity Manual for the Sector Hourly Capacity (CSH).

- **Contribution to Objectives and KPAs:**

KPI06 En-route airspace capacity is aligned with the following CAR/SAM performance objectives included in the Voume III:

- Improve what's needed to reduce longitudinal separation minima.
- Overcome capacity limitations attributable to route network design.
- Take advantage of increased navigation precision (airspace with PBN operations) to implement route networks and airspace structures with smaller lateral and vertical safety buffers.

These three performance objectives are part of the Capacity KPA.

- **Formula:**

The proposed KPI06 formula is the following one, described in the GESEA Capacity Manual:

$$KPI06 = Sector\ Hourly\ Capacity\ (CHS) = 3.600 \times \frac{0{,}683 \times Nref + 0{,}317 \times Npeak}{T}$$

Nref, calculated ATC sector capacity, is the optimal number of aircraft under simultaneous control in an ATC sector over a period of time, without the number of flights ever causing an overload of work for the ATCO, and is calculated as:

$$Nref = \frac{T \times \propto}{CT}$$

- T is the average time the aircraft remains in the sector (in seconds)
- α is the convergence factor, which is a factor for reducing the average time spent in the sector (T). The convergence factor is intended to minimize discrepant effects in very large ATC

sectors so that the Nref does not exceed 18 aircraft[1]. For each class of average time spent in the sector (T), a coefficient (α) was established as follows:

T (seconds)	α
0-899	1,00
900-999	0,98
1.000-1.099	0,92
1.100-1.199	0,87
1.200-1.299	0,82
1.300-1.399	0,78
1.400-1.499	0,74
1.500-1.599	0,70
1.600-1.699	0,66
1.700-1799	0,63
1.800-1.899	0,60
1.900-1.999	0,57
2.000-2.099	0,54
2.100-2.199	0,51
2.200-2.299	0,48
2.300-2.399	0,46
2.400-2.499	0,44
2.500-2.599	0,41

- CT is the ATCO workload defined as the average time (in seconds) used by the ATCO to process all the tasks required by a control position, within a given time interval, to maintain safe and orderly air traffic.

$$CT = (TCom + TTS) \times 1{,}30$$

  - TCom is the sum of the communication time between aircraft and the ATCO in a given period, divided by the number of aircraft that maintained contact during that same period.
  - TTS is the average time spent by the ATCO performing coordination tasks, filling in flight progress records (FPV), updating the radar screen, and any other visible activity inherent to air traffic service, except for the use of the communication channel with the aircraft. In certain cases, a percentage of the tasks performed by the assistant is added when it influences the ATCO's TTS.
  - The constant 1,30 is the cognitive factor (COGNF) and consists of adding 30% of the sum of TCom and TTS to the workload (CT). It refers to the ATCO's thinking operations during the time dedicated to planning, traffic organization, and radar surveillance functions.

Npeak is the simultaneous aircraft control capacity that a given ATC sector is able to maintain for a maximum of 19 (nineteen) minutes, continuous or not, within one hour, in order to meet a short-term increase in demand. During this period, the ATCO could experience a controlled workload. If the situation is seen to be prone to prolonging, ATFM measures should be taken. In the mathematical model, the Nref should be treated as an optimal capacity value to which a margin can be added to reach Npeak for a period of up to 19 minutes.

[1] Optimum number of aircraft according to ICAO Doc 9971 Appendix II-C

$$Npeak = \frac{T_{max} \times \alpha}{(TCom_{min} + TTS_{min}) \times 1{,}30}$$

$$T_{max} = T + \sigma_T$$

$$TCom_{min} = TCom - \sigma_{TCom}$$

$$TTS_{min} = TTS - \sigma_{TTS}$$

- One sigma (σ: standard deviation) is equivalent to 68,3% of the sample's representativeness. Considering that the probability of variation caused by using the σ for T_{max}, $TCom_{min}$, and TTS_{min} is the same, it will occur 31,7% of the time (one hour) – equivalent to approximately 19 (nineteen) minutes.

The proposed formulas are established on the basis that each ATC sector is operated by one executive ATCO. It is further recognized that, in some operational environments, the executive ATCO may be assisted by a planner ATCO or an assistant ATCO responsible for the execution of part of the secondary tasks.

Coming back to the KPI06 formula, CHS represents the ATC sector's capacity to flow air traffic. Thus, the greater the CHS of an ATC sector, the greater the air traffic flow in that sector. The CHS varies according to the number of aircraft that can be controlled simultaneously (sector complexity) and the time spent in the sector (T).

Therefore, to increase the sector's hourly capacity, its complexity must be reduced and the time spent by the aircraft in the sector.

- **Instances:**

The recommended instances of calculation of KPI06 are the individual ATC sectors of the State airspace.

Finally, at State level it will be calculated the aggregated KPI for all ATC sectors, and grouped by FIR and/or ACC, as applicable. Consolidation of KPI06 results will be also done at Regional level in step 6 of the process.

- **Metadata:**

Metadata is normally defined as the data of the data, that is the contextual information that makes raw data meaningful, searchable, and usable. In this sense, for each KPI we need to identify and characterize the different data input that it is required for its calculation. In the context of these guidelines, the group of data inputs of the KPI is considered as the KPI metadata.

In the case of KPI06, the metadata required per ATC sector are the different elements of the KPI calculation formula, together with the information from the flight samples needed to be measured and used in the calculation process:

- Sector identification (ATC SECTOR)
- Date of sample (DATE) (day/month/year) (i.e. 20/08/25)
- Aircraft identification (ACT ID) (i.e. XX-ZPC)
- Aircraft entry time in the sector (ENTRY TIME) (hour : minute : seconds) (i.e. 10:10:10)
- Aircraft exit time in the sector (EXIT TIME) (hour : minute : seconds) (i.e. 10:25:00)
- Planner ATCO or assistant support (PL ATCO SUPP), indicating if there is or not a planning ATCO or assistant supporting the activities of the executive ATCO (Y or N)
- Time of communication between ATCO and aircraft (TCOM) (in seconds)
- Time used by the ATCO for secondary tasks (TTS) (in seconds)

- Type of secondary task (TS TYPE) (1 = Coordination (other controls, assistant, supervisor), 2 = Interaction with communications system, 3 = Filling flight progress records (FPV) and arranging the dashboard, 4 = Processing flight plans (FPL), 5 = Interaction with radar screen)
- Traffic density at the start (TRAFFIC DENSITY START) and at the end (TRAFFIC DENSITY END) of the measurement of TTS, in number of aircraft in the sector
- Names of the executive ATCO (EX ATCO) and of the planner ATCO or assistant (PL ATCO), if any
- Cognitive factor (COGNF)(by default 1,30)

See example for table for compiling the metadata required for KPI06 at the input data collection and consolidation section. Also see Excel template in Annex 1.

- **Frequencies:**

Compared with other KPIs, KPI06 can be considered as a more "static" indicator, since it looks at the structural capacity of en-route sectors, which is mostly determined by airspace design, separation standards, sectorization, ATCO staffing models, and supporting technology, elements which are not subject to frequent changes. In this sense, KPI06, as sector declared capacity, remains valid until there is a significant change in any of the previous factors.

Therefore, KPI06 should be recalculated only when structural or technological changes occur, or when traffic demand shows a sustained deviation from earlier patterns. Although relevant changes do not occur, it would be recommended to update the calculations with an annual frequency. For regional reporting purposes, States should confirm KPI06 values quarterly, as for the rest of the CAR/SAM KPIs.

- **Owner and Responsibilities:**

Each KPI should have an owner nominated at State level, who will be responsible for the calculation and management of the KPI. Normally, it will be staff of the Planning Department at the Civil Aviation Authority or the State ANSP.

The owner of KPI06 at State level should nominate the staff responsible for measuring and obtaining the required data samples, collecting the data, consolidating it and performing the metadata quality checks.

The same responsible staff can be nominated for the different roles, or, depending on existing capabilities at the owner entity, the responsibilities could be assigned to different teams. The selected approach would be the same across all KPIs.

- **References and Best Practices:**

En route airspace is a key metric for the aviation sector, and not only for planning purposes. Some key references and best practices on en-route airspace capacity indicators are:

- As described in previous section, the formula and calculation methodology of KPI06 follows the approach and methods of the GESEA Capacity Manual (*Manual de Cálculo de Capacidad de Pista y Sector ATC*, Version 2.0, developed by GESEA).
- DECEA (Brazil) presents the SISCEAB Performance website, providing access to ATM performance indicators, including en-route airspace capacity.

  https://performance.decea.mil.br/areas/capacidade/#graf_opc_ano
- The EUROCONTROL CAPAN methodology calculates sector capacity by applying a controller workload model to traffic samples from peak periods, where each flight is assigned task times for activities such as conflict detection, coordination, and radio communication; the total workload is compared against the usable controller time available per hour (typically 70% of

60 minutes per controller), and declared capacity is obtained by dividing this usable time by the average workload per flight, with results validated through fast-time simulation and operational feedback to set a safe entry flow rate in flights per hour.

https://www.eurocontrol.int/methodology/capacity-analysis-methodology

- The FAA uses the dynamic density model approach in which sector capacity is tied to traffic complexity and controller workload metrics rather than simply aircraft count. Key parameters include dynamic density, which combines factors such as transit time through the sector, vertical level changes, route crossing points, and the volume of aircraft. FAA models estimate the amount of traffic that a sector can handle before the workload reaches operationally safe limits. The capacity is often based on empirical data, historical peak traffic flow, and simulation of controller tasks. Operators identify a "break point" where increasing traffic causes workload or delays to escalate non-linearly. This becomes the declared capacity in flights per hour that should not be exceeded for safe and efficient operations.

  https://archive.ll.mit.edu/mission/aviation/publications/publication-files/atc-reports/Welch_2015_ATC-426.pdf

As a summarized outcome of this step, the following KPI06 **Descriptive Table** is recommended to be completed by each State (see Excel template in Annex 1):

KPI06 – Descriptive Table	
Name	En-route airspace capacity (Variant 1)
Definition	Maximum flow of traffic an airspace volume will safely accept under normal conditions in one hour. This definition follows declared capacity approach of the GESEA Capacity Manual for the Sector Hourly Capacity (CSH).
Utility of the KPI	Declared, expected and actual capacities are used in traffic flow management as well as for measuring and monitoring service delivery and efficiency. Establishing capacities at different planning horizons provides an important reference for understanding the total system performance under normal operating conditions and provides a basis to work from when determining the impact of operational factors limiting capacity, such as ATCO availability and workload.
Key Performance Area	Capacity
RANP Performance Objectives	• Improve what's needed to reduce longitudinal separation minima. • Overcome capacity limitations attributable to route network design. • Take advantage of increased navigation precision (airspace with PBN operations) to implement route networks and airspace structures with smaller lateral and vertical safety buffers.
Link to ASBU elements	• CSEP (Cooperative Separation) elements: CSEP-B1/3, CSEP-B1/4, CSEP-B2/1, CSEP-B3/1, CSEP-B3/2, CSEP-B4/1 • FRTO (Improved operations through enhanced en-route trajectories) elements: FRTO-B0/4, FRTO-B1/2 • NOPS (Network Operations) element: NOPS-B1/4 • OPFL (Improved access to optimum flight levels in oceanic and remote airspace) elements: OPFL-B3/1, OPFL-B3/2

KPI06 – Descriptive Table	
Formula	$$KPI06 = 3.600 \times \frac{0{,}683 \times Nref + 0{,}317 \times Npeak}{T}$$ Nref is the optimal number of aircraft under simultaneous control in an ATC sector over a period of time, without the number of flights ever causing an overload of work for the ATCO (in number of aircraft). Npeak is the simultaneous aircraft control capacity that a given ATC sector is able to maintain for a maximum of 19 (nineteen) minutes, continuous or not, within one hour, in order to meet a short-term increase in demand (in number of aircraft). T is the average time the aircraft remains in the sector (in seconds).
Unit	Aircraft/hour
Metadata	ATC SECTOR, DATE, ACT ID, ENTRY TIME, EXIT TIME, PL ATCO SUPP, TCOM, TTS EX ATCO, TTS PL ATCO, TS TYPE, TRAFFIC DENSITY START, TRAFFIC DENSITY END, EX ATCO, PL ATCO, COGNF
Instances	Identify the instances of calculation for the KPI, for example: • Individual ATC Sectors • Grouped by ACC and/or FIR
Frequencies	KPI06 is considered a "static" indicator. In this sense, recalculation at State level is recommended in an annual basis and when an structural and operational change occurs at sector level. Reporting at Regional level will be done quarterly, providing new values or reconfirming previous ones as applicable.
Data Sources	Indicate the data source used per collect the information to characterize each ATC sector and select the related measurement time intervals. Confirm per ATC sector that the data measurement process in live operations will be the primary source to obtain the required KPI06 metadata, or indicate the alternative method, if any.
Owner and responsibilities	Identify the owner of the KPI and the responsible staff, at Stale level, for the calculation and management of the KPI
Users	Identify the users of the KPI, such as ANSPs, at State level
Applied Variations	List the variations applied in the formula, metadata, data sources, frequency, or other elements of the calculation process
References	Links to reference material and to examples of calculation For example: GESEA Capacity Manual, DECEA, EUROCONTROL, FAA
File	Link to the local Excel file with the input data and calculation formulas

Some of the fields of the KPI Descriptive Table should be filled once the next steps are completed, for example, metadata, data sources, owner, applied variations, etc.

As a main reference, to complement the understanding of KPI06, see the descriptive table provided by the ICAO GANP: https://www4.icao.int/ganpportal/ASBU/KPI

iii. Identifying the data sources

As explained in the previous sections, KPI06 is calculated for each ATC sector using a formula that relies on data collected from multiple samples of controlled flights within that sector. The specific

approach to data collection or measurement will vary depending on the type of metadata required, with some elements obtained directly from existing records and others needing to be measured through dedicated measurement or observation.

On one hand, the metadata used in the KPI06 formula will be mainly obtained from direct observation and measurement during live operation conditions at each ATC sector.

On the other hand, for characterizing the ATC sectors to be analyzed is necessary to have access to the following information:

Additionally, for selecting the optimum periods of measurement at an ATC sector is necessary to ensure that the following conditions apply to the ATC sector in the selected measurement periods:

- Ideal conditions for air traffic sequencing and coordination
- All personnel are considered to have the same training and operational performance
- All radio navigation equipment, visual aids, and communications equipment (VHF/telephony) are considered to be technically and operationally unrestricted.

Finally, for successful data measurement, it will be required to be analyzed all available information regarding the operation of the ATC sector (for example: the operational shift list, the internal operating manual, and shift books or records of the ATC unit, etc.). Factors that may disrupt routine operations must be taken into consideration to avoid collecting data when they cause a significant operational impact. These factors may include:

- Periods of high meteorological instability
- Military operations
- Events and holidays
- Radar maintenance
- Maintenance of air navigation aids (VOR, ILS, etc.) and communication equipment (VHF)
- Database updates
- Replacement of automated ATM systems
- Traffic volume statistics during the collection period (medium or high demand)
- Analysis of clusters of the most frequently used sectors in the ATC unit

- **Primary sources**

In the case of the information to characterize the ATC sector and selecting the optimum periods of measurement, it should be provided by the ANSP and in particular by the responsible or supervisor of the ATC sector or related ACC.

Regarding the metadata to be measured, mainly the time values for T, TCom and TTS, its measurement process should be conducted by designated staff from the Civil Aviation Authority or the ANSP. It is recommended 2-3 specialists per ATC sector.

This measurement process, which is described in detail in the next step, is mainly based in direct observation, registration of time stamps and measurement of time intervals. The tools normally used for the measurement process are templates, time chronometer, and access to audio register of the ATS communication frequencies (in particular for the TTS).

- **Alternative sources**

For ATC sector characterization, an alternative data source to the ANSP may be the Civil Aviation Authority department responsible for airspace design and planning.

If direct measurement in live operations cannot be carried out in a given sector, the required KPI06 metadata may instead be obtained from available statistical information on sector operations.

Ideally, when dedicated simulation platforms are available, such as EUROCONTROL's CAPAN model, they may be used as an alternative to the measurement-based methodology proposed in these guidelines.

- **Data sources accessibility evaluation**

Regarding the information to characterize the ATC sector and select the measurement time intervals, it is important to ensure its completeness and reliability.

Regarding the measurement process of the required metadata at each ATC sector, the relevant aspect is to ensure the representativeness of the data measured and the correctness of the measurement processes.

Additionally, commitment from the involved staff at each data source, which will be responsible for providing the data, and at the measurement processes needs to be assessed and confirmed.

iv. Input data collection and consolidation

Once the data sources and measurement methods are evaluated and confirmed, the process of collection of information and measurement of data should start.

- **Metadata collection and integration format:**

Firstly, it is necessary to identify the different instances of calculation of KPI06 at State level, that is individual ATC Sectors or groups of them. The measurement process is the same for grouped and individual sectors.

A list of sector groupings should be requested in advance from ATC units for measurement analysis and planning, where deemed necessary by the sector configuration. This will allow for analyzing the operational console configuration, preparing for data collection, and identifying the time intervals of medium and high traffic demand in each sector, which are the preferred time intervals to conduct the measurements. This step is not considered necessary for less complex sectors or where information is available from another source, as for example, from statistics.

Per each instance it will be identified the collection and measurements periods and time intervals, with medium and high traffic demands. Example:

- ATC instance: ACC ANYPORT (Sector 1)
- Measurement period: 03/11/2025 – 12/11/2025
- Measurement hourly intervals: 11:30 – 13:30 UTC and 21:30 – 23:30 UTC

The selected periods and time intervals, should be enough to allow conducting the measurement of a minimum of 35 samples of 1 hour of live operations each. This number of samples is required to be measured per each instance (individual ATC sector or group of sectors) to ensure the representativeness of the calculated KPI06. For each of the 35 samples the values of T, TTS and TCom will be measured.

For the measurement of T(average time the aircraft remains in the sector), it is necessary to record the time of the first and last communication (time of entry and exit from the sector in minutes) of the aircraft during periods of greatest traffic volume, separating by sector and/or group of sectors, in a continuous one-hour interval. Each continuous hour represents a sample.

To obtain the TCom (Time of communication between ATCO and aircraft), the same criteria for collecting T are followed, and the samples are added until they reach 35. A chronometer or other

available automated system is used to record the communication times in seconds between the pilot and the ATCO per each aircraft in the sample (one-hour period).

The collected data for entry and exit times and TCom will be registered in the table below (See Annex 1 for Excel template).

ATC SECTOR	DATE	SAMPLE	ACFT ID	ENTRY TIME	EXIT TIME	TCOM	EX ATCO
SECTOR 1	03/11/2025	1	XX-ZPC	10:00:30	10:10:15	10 secs	J. Perez
SECTOR 1	03/11/2025	1	XZ-JPC	10:01:40	10:12:00	15 secs	J. Perez
SECTOR 1	03/11/2025	1	ZY-BRK	10:01:55	10:09:50	8 secs	J. Perez
SECTOR 1	03/11/2025	1	VB-SBB	10:02:10	10:11:15	12 secs	J. Perez

T values per aircraft are calculated in seconds as EXIT TIME - ENTRY TIME. Additionally, per each sample (n) is counted the number of aircraft (N_n), which will be used in the later calculation of TTS.

In the case of the TTS (Time used by the ATCO for secondary tasks), at least 35 measurements during 180 seconds (3 minutes) each will be performed per each sector. These measurements will comply with the following criteria:

- A minimum of five and a maximum of ten measurements of each type of TTS from the same controller
- Collection must be performed when demand is equal to or greater than 50% (fifty percent) of the reference number or at identified times of medium/high demand
- To collect up to 10% (ten percent) of a sector's measurements, an ATCO in training (final phase) may be observed. Other trainees should not be observed
- Depending on the sector being analyzed, a collection time of 7 to 10 days is recommended
- In non-radar sectors, other types of TTS may be omitted or indicated
- All activities related to the provision of ATS services performed by the ATCO must be measured (in seconds), except for the time spent communicating with aircraft, separating the TTS by type

The types of secondary tasks are coded as following, as described in the metadata section above:

- 1 = Coordination (other controls, assistant, supervisor)
- 2 = Interaction with communications system
- 3 = Filling flight progress records (FPV) and arranging the dashboard
- 4 = Processing flight plans (FPL)
- 5 = Interaction with radar screen

In cases where, due to the sector design and work methodology used, the influence of the tasks of the planner ATCO (or assistant ATCO) significantly influences the workload of the executive ATCO on the main frequency, the planner ATCO's TTS measurements will be taken following the parameters mentioned in the previous point. In the calculation process, the planner ATCO's TTS values will be considered as a weighted 20% of the sector's total TTS.

The TTS measurements are recorded in the following table:

ATC SECTOR	DATE	PL ATCO SUPP	START	END	TS TYPE	TTS EX ATCO	TTS PL ATCO	TRAFFIC DENSITY START	TRAFFIC DENSITY END	EX ATCO	PL ATCO
S1	03/11/2025	Y	13:00:00	13:03:00	1	31 s	12 s	8	8	J. Perez	M. Ace
S1	03/11/2025	Y	13:05:00	13:08:00	1	29 s	15 s	8	7	J. Perez	M. Ace

ATC SECTOR	DATE	PL ATCO SUPP	START	END	TS TYPE	TTS EX ATCO	TTS PL ATCO	TRAFFIC DENSITY START	TRAFFIC DENSITY END	EX ATCO	PL ATCO
S1	03/11/2025	Y	13:07:00	13:10:00	3	37 s	25 s	7	5	J. Perez	M. Ace
S1	03/11/2025	N	13:08:00	13:11:00	5	30 s		4	4	J. Perez	N/A

Once all measurements of T, TCom and TTS are registered per a specific ATC sector, they need to be processed and consolidated.

For the measurements of T, it is necessary to calculate the average T per aircraft in each sample (T_n), that is to sum together all measurements per aircraft in one sample and divide the total by the number of aircraft in the sample (N_n). Then it is calculated the general average of T per aircraft in the ATC sector, considering the 35 samples:

$$T = \frac{T_1 + T_2 + \cdots + T_{35}}{35}$$

Additionally, the standard deviation of the measurements of T in each sector is also calculated:

$$\sigma_T = \sqrt{\frac{\sum_{n=1}^{35}(T_n - T)^2}{n-1}}$$

In the case of TCom, a similar process is followed. It is necessary to calculate the average TCom per aircraft in each sample, that is to sum together all measurements per aircraft in one sample and divide the total by the number of aircraft in the sample. Then it is calculated the general average of TCom per aircraft in the ATC sector, considering the 35 samples:

$$TCom = \frac{TCom_1 + TCom_2 + \cdots + TCom_{35}}{35}$$

And the standard deviation of the measurements of TCom in each sector is also calculated:

$$\sigma_{TCom} = \sqrt{\frac{\sum_{n=1}^{35}(TCom_n - TCom)^2}{n-1}}$$

Finally, the TTS measurements are also processed and integrated. Firstly, it is calculated the average of the measurements in each sector per type of ATCO, executive ATCO or planner/assistant ATCO, and then pondered (80% for executive ATCO and 20% for planner/assistant ATCO) to calculate the average of the measurements of TTS in the sector (TTS_M).

$$TTS_{Ex\ ATCO} = \frac{\sum_{M_{Ex\ ATCO}=1}^{M_{Ex\ ATCO}} TTS_{M_{Ex\ ATCO}}}{M_{Ex\ ATCO}}$$

$$TTS_{Pl\ ATCO} = \frac{\sum_{M_{Pl\ ATCO}=1}^{M_{Pl\ ATCO}} TTS_{M_{Pl\ ATCO}}}{M_{Pl\ ATCO}}$$

$$TTS_M = \frac{TTS_{Ex\ ATCO} \times 80 + TTS_{Pl\ ATCO} \times 20}{100}$$

Then, the TTS_M per hour is calculated, considering the TTS_M has been obtained for measurement periods of 180 seconds:

$$TTS_{M/h} = \frac{3.600 \times TTS_M}{180}$$

With this value, the TTS per aircraft in each sample (samples used for the T and TCom measurements) is calculated diving the $TTS_{M/h}$ by the number of aircraft in the sample (N_n):

$$TTS_n = \frac{TTS_{M/h}}{N_n}$$

Finally, the average TTS per aircraft in the sector and the associated standard deviation are calculated:

$$TTS = \frac{TTS_1 + TTS_2 + \cdots + TTS_{35}}{35}$$

$$\sigma_{TTS} = \sqrt{\frac{\sum_{n=1}^{35}(TTS_n - TTS)^2}{n-1}}$$

To finalize the measurement process, the measurement results of T, TCom and TTS and its related standard deviations are consolidated in the following table per ATC sector (see Excel template in Annex 1):

SAMPLES	T		TCOM		TTS	
1	T_1		$TCOM_1$		TTS_1	
2	T_2		$TCOM_2$		TTS_2	
3	T_3		$TCOM_3$		TTS_3	
…	…		…		…	
…	…		…		…	
34	T_{34}		$TCOM_{34}$		TTS_{34}	
35	T_{35}		$TCOM_{35}$		TTS_{35}	
SECTOR AVERAGE TIMES	**T**		**TCOM**		**TTS**	
SECTOR STANDARD DEVIATIONS	**σ_T**		**σ_{TCOM}**		**σ_{TTS}**	

Additionally, for each ATC sector it will be registered information on the specialists conducting each if the measurements, the ATCOs on duty, and an observations or comments field indicating any missing information or issue during the measurement process. This information will be an input for the metadata quality check described below.

- **Frequency of collection and consolidation:**

As described in previous sections, KPI06 is considered a “static” KPI which should be recalculated in an annual basis and when an structural and operational change occurs at sector level. Therefore, the measurement frequency of the KPI06 metadata elements will be also aligned with the KPI06 calculation frequency, that is annually and when a change occurs.

- **Metadata quality check:**

Considering that different measurements processes are used to build the complete set of metadata elements, it is crucial to conduct a quality check of the consolidated measurements per sector.

The following quality checks are proposed to be conducted for KPI06 metadata:

- Mapping: This quality process checks the format of the measured and recorded data ensuring that follows the correct coding convention.
- Completeness: This area focuses on checking the number of samples, the number of measurements in each sample and the amount of aircraft with null values in the metadata measurements.

- Matching: To ensure that the consolidated metadata measurements are correctly assigned to the corresponding aircraft in the Sector. For example avoiding duplicate aircraft.
- Accuracy Validation: This quality area aims to evaluate the degree of conformance between the measured values and their true values. In the case of KPI06, it could be introduced a check process using alternative data sources and cross-checks to confirm that measurements are coherent.

As a result of this process a metadata quality check report will be produced, identifying the required corrective actions to be implemented at measurement and/or consolidation activities.

v. KPI calculation and provision of results

- **Formula application:**

For calculating KPI06, once all the measurements of T, TCom and TTS per each ATC sector are registered in the consolidated table, as described in the previous section, then the KPI06 formulas can be applied.

First, the Nref is calculated:

$$Nref = \frac{T \times \propto}{(TCom + TTS) \times 1{,}30}$$

Where the value of α (convergence factor) is obtained from the table included in previous section describing KIP06 formula. The cognitive factor of 1,30 could be adapted to other values if it is justified considering that different conditions apply.

Secondly, the Npeak is calculated:

$$Npeak = \frac{(T + \sigma_T) \times \alpha}{((TCom - \sigma_{TCom}) + (TTS - \sigma_{TTS})) \times 1{,}30}$$

And finally, the KPI06 formula is applied:

$$KPI06 = 3.600 \times \frac{0{,}683 \times Nref + 0{,}317 \times Npeak}{T}$$

Several options can be used to apply the formula using the same consolidation table in excel format, adding the Nref and NPeak values and the KPI06 calculation formula in the same table.

See Excel template in Annex 1 incorporating formula to calculate KPI06.

- **KPI baselines calculation:**

KPI values are essential to evaluate system performance. For KPI06, this specifically means assessing the capacity of the en-route sectors at State airspace. To identify potential improvements in this area, the KPI must be quantified and its evolution monitored over time. This requires establishing a reference baseline, which serves as the foundation for future performance comparisons. Furthermore, baseline values at both State and Regional levels offer a clear picture of any existing performance gaps and provide the necessary insights for setting future KPI target values.

When complete measurements of KPI06 become available at all ATC sectors at State level, a reference baseline can be calculated. The goal for all CAR/SAM States is to deliver KPI06 results for 2026, establishing a common regional baseline reference.

- **Internal validation:**

It is necessary to ensure that the KPI results obtained by the application of the formula are accurate and reliable before its submission to regional level. Different approaches can be followed:

- Select representatives samples of data and recalculate the KPI manually and compare it with the excel formula outputs.
- Check consistency of ATC sectors results compare with adjacent sectors and validate that KPI results follow expected patterns (no sudden variations due to calculation errors).
- Peer review: share methodology and sample results with internal and external stakeholders (Other states ANSPs, airlines, etc.).
- Cross-check results with other available capacity assessment methodologies or tools, as for example, simulation platforms.

The validation results will determine any corrective actions needed in the KPI measurement and calculation process. If no issues are found, the KPI results are considered approved.

- **Documentation:**

Once the KPI is calculated is necessary to document the key aspects of the process: what the KPI is, how it is defined, which data sources are used, how data is measured and processed, the exact calculation steps, who is responsible, how it is reported, and how changes are tracked. Documenting the process of KPI calculation is essential to ensure transparency, repeatability, and auditability.

Key elements of the KPI documentation package are:

- KPI Descriptive Table
- Metadata measurement and consolidation and KPI calculation processes descriptions and Excel files
- Metadata measurement and consolidation quality check reports
- KPI calculation internal validation report

It is relevant to include in the different documents the required references to the potential variations applied to KPI06 calculation, that is assumptions, KPI formula and/or metadata measurement adjustments, unavailable input data and other observations.

- **Provision of results to regional level**

After the KPI results are calculated and internally approved, the State compiles the standardized submission package formed by the KPI documentation described in the previous step. This package is then sent to the regional coordinating body (ICAO NACC and SAM Regional Offices) through the designated reporting channel, whether that is a secure email, an online portal, or another official submission system to be defined. States should confirm that the submission is received and track any feedback or requests for clarification. This step ensures official receipt, traceability, and accountability, forming the basis for subsequent regional consolidation and analysis of KPI results.

c. KPI09 Airport peak capacity

T B D

i. Selection of the KPI

ii. Understanding the KPI

iii. Identifying the data sources

iv. KPI calculation and provision of results

d. KPI10 Airport peak throughput

T B D

i. Selection of the KPI

ii. Understanding the KPI

iii. Identifying the data sources

iv. Input data collection and consolidation

v. KPI calculation and provision of results

e. KPI14 Arrival Punctuality

T B D

i. Selection of the KPI

ii. Understanding the KPI

iii. Identifying the data sources

iv. Input data collection and consolidation

v. KPI calculation and provision of results

7. Conclusions and next steps

The conclusions of these Guidelines highlight their role as a foundation for the consistent implementation of GANP KPIs across the CAR/SAM Region. They provide a harmonized methodology while allowing for flexibility so that each State can adapt the calculation process to its own availability of data, institutional resources, and technical readiness. This adaptability ensures that all States can begin monitoring performance in a meaningful way while progressively strengthening their systems. The Guidelines also represent an opportunity to create in-house capabilities, enabling Civil Aviation Authorities, ANSPs, airport operators and other aviation stakeholders to build sustainable expertise and at the same time generate KPIs to support their own National Air Navigation Plans.

Another important conclusion is that the Guidelines emphasize a practical and progressive use of tools. Initial implementation relies on simple formats such as Excel templates, which are widely available and easy to use. As experience grows and more sophisticated needs arise, the framework foresees the evolution toward advanced platforms such as Power BI or similar analytical tools. This gradual approach lowers the barrier to entry while also preparing the region for more complex, real-time monitoring and benchmarking in the future.

The Guidelines are conceived as a living document, subject to periodic updates. These updates will incorporate lessons learned during implementation, refine methodologies, and provide detailed calculation approaches for subsequent groups of KPIs. This ensures that the Guidelines remain relevant, practical, and aligned with regional and global developments over time.

A further conclusion is the importance of building on synergies with work already undertaken in the region. In the SAM Region, extensive experience has been gained with ATFM indicators, which use similar data inputs and calculation approaches to several GANP KPIs. Aligning with this work will accelerate implementation and enhance methodological consistency. In the CAR Region, initiatives such as the FAA's CARPIs and the CANSO CADENA initiative already provide valuable operational data and collaborative platforms that can support KPI calculation. Leveraging these initiatives will help avoid duplication, maximize the use of existing data, and promote greater regional integration in performance monitoring.

a. Recommendations

1. **Start with achievable priorities:** States should begin with KPIs for which data is already collected or easily accessible, ensuring early engagement and quick wins.

2. **Integrate with national frameworks**: KPI methodologies should be embedded into National Air Navigation Plans so that results serve both regional and national objectives.
3. **Build in-house capacity:** Authorities and service providers should invest in training staff to calculate, validate, and analyze KPIs, ensuring knowledge remains sustainable at the local level.
4. **Ensure data quality and validation:** Even with limited resources, States should adopt minimum validation processes to guarantee that KPI results are credible and comparable.
5. **Adopt a progressive approach to tools:** Begin with Excel templates for calculation and reporting, but plan to evolve toward advanced solutions such as Power BI for deeper analysis and dashboards.
6. **Engage with regional synergies:** Take advantage of ongoing work such as SAM's ATFM indicators, FAA's CARPIs, and CANSO's CADENA indicators to align methodologies, reuse data inputs, and foster collaboration.
7. **Participate actively in updates:** States should provide feedback and lessons learned so that periodic revisions of the Guidelines reflect operational realities and collective experience.

In conclusion, the Guidelines provide not only a technical reference but also a strategic opportunity for the CAR/SAM Region. Their flexible design ensures that every State can participate according to its capabilities, while their progressive structure encourages the use of increasingly sophisticated tools over time. By implementing the recommendations and capitalizing on existing synergies, the CAR/SAM Region can accelerate the adoption of a harmonized, reliable, and future-oriented performance monitoring framework that supports both regional cooperation and national air navigation priorities.

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Annex 1 – Excel templates

APPENDIX C

KPIs ACTION PLAN

Executive summary

The present document compiles the Action Plan to implement the CAR/SAM regional guidelines supporting the CAR/SAM region states in the calculation of the GANP Key Performance Indicators (KPIs) for the CAR/SAM Regional Air Navigation Plan, Volume III.

This Action Plan has been developed as part of the assistance provided by the European Union Aviation Safety Agency (EASA), in collaboration with the ICAO NACC and SAM Regional Offices, and in the context of the GREPECAS Ad-hoc Group for the Development of Key Performance Indicators (GADHOC).

The plan aims to ensure that KPIs become an integral part of national and regional monitoring processes by providing a structured framework that builds institutional capacity, establishes clear reporting mechanisms, and aligns regional activities with global ICAO objectives. Its scope covers the entire cycle of implementation, from the introduction of initial baseline indicators to the full deployment of the complete KPI set by 2029. Recognizing that States within the region begin from different levels of readiness, the plan emphasizes dedicated support measures such as on-site missions, training workshops, and peer-to-peer exchanges. These actions are designed to foster coordination, strengthen technical skills, and ensure that no State is left behind in meeting regional and global performance targets.

Implementation is designed in three phases over the period 2026 to 2029. The first phase, scheduled for 2026, introduces five priority KPIs (KPI01 Departure punctuality (Variant 2A), KPI06 En-route airspace capacity (Variant 1), KPI09 Airport peak capacity, KPI10 Airport peak throughput, KPI14 Arrival punctuality). This phase establishes national KPI focal points, baseline values, and the quarterly reporting cycle that will form the backbone of monitoring in subsequent years. The second phase, spanning mid-2026 to mid-2027, adds six more indicators (KPI02 Taxi-out additional time, KPI05 Actual en-route extension, KPI08 Additional time in terminal airspace, KPI13 Taxi-in additional time, KPI15 Flight time variability, KPI23 Loss of separation (Variant 3)). During this stage, regional performance monitoring expands to 11 KPIs, and the first consolidated reports begin to provide comparative analysis across States. The third and final phase introduces four advanced indicators (KPI04 Filed flight plan en-route extension, KPI07 En-route ATFM delay, KPI17 Level-off during climb, KPI19 Level-off during descent) to complete the full set of 15 GANP KPIs. By March 2029, all States are expected to report consistently on the complete framework, enabling comprehensive performance-based oversight across the CAR/SAM Regions.

Governance of the Action Plan is entrusted to the GREPECAS Ad Hoc Group on KPIs (GADHOC), which provides regional oversight and alignment with ICAO objectives. The ICAO NACC and SAM Regional Offices are responsible for technical coordination, guidance, and the development of reporting tools such as templates and dashboards. EASA contributes expertise and training through the EU–LAC APP programme, while industry partners, notably IATA and CANSO, bring operational knowledge and data inputs. Ultimately, the CAR/SAM States are the primary implementers, designating national focal points, collecting data, and reporting results on a quarterly basis. This collaborative framework ensures strong regional leadership, technical guidance, and industry participation while fostering ownership at the State level.

On-site support plays a central role in the plan's strategy to address disparities in readiness. During the first phase, experts will help States establish KPI focal points and build reporting structures, with a focus on establishing baseline values for 2025. In the second phase, support will shift toward integrating additional indicators and harmonizing reporting practices. In the final phase, assistance will concentrate on ensuring full KPI coverage, strengthening sustainability, and sharing best practices across the region. By combining technical assistance, mentoring, and knowledge exchange, this support mechanism will raise overall capacity and ensure consistent implementation.

The Action Plan concludes with a clear set of expected outcomes. By mid-2029, every CAR/SAM State should be reporting on all 15 KPIs and operating reliable monitoring systems embedded within their institutional structures. Regular regional reports will provide transparency and accountability while supporting continuous improvement. Looking beyond 2028, the creation of a dedicated CAR/SAM KPI Portal is recommended to centralize reporting, automate feedback, and provide a knowledge-sharing platform for best practices. This digital infrastructure will institutionalize KPI monitoring and ensure its sustainability as a permanent regional function.

In summary, the Action Plan provides the CAR/SAM Region with a practical, phased, and collaborative approach to implementing GANP KPIs. Through a combination of structured reporting, technical support, and capacity-building, it will harmonize performance monitoring across States, enhance evidence-based decision-making, and embed a culture of continuous improvement. By the end of the implementation cycle, the region will not only meet ICAO's requirements but also establish a sustainable framework that strengthens air navigation performance well into the future.

Table of contents

List of acronyms

ANP	Air Navigation Plan
ANSP	Air Navigation Service Provider
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
CAA	Civil Aviation Authority
CAR	Caribbean Region
CANSO	Civil Air Navigation Services Organisation
EASA	European Union Aviation Safety Agency
EU–LAC APP	European Union–Latin America and Caribbean Air Transport Project
GANP	Global Air Navigation Plan
GADHOC	GREPECAS Ad Hoc Group on Key Performance Indicators
GREPECAS	CAR/SAM Regional Planning and Implementation Group
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
KPI	Key Performance Indicator
LAC	Latin America and Caribbean
NACC	North American, Central American and Caribbean Region
RANP	Regional Air Navigation Plan
SAM	South American Region

1. Introduction

The present document, Deliverable 2 – CAR/SAM Action Plan for the progressive implementation of GANP KPIs, is the second deliverable of the assistance provided by EASA, through the EU-LAC APP II programme, to support the ICAO NACC and SAM Regional Office in the development and implementation of the GANP KPIs for the CAR/SAM Regional Air Navigation Plan, Volume III.

This deliverable provides an action plan for the progressive implementation of the GANP KPIs, identifying the priorities and resources required, and harmonized with the progress of the implementation groups and States from CAR/SAM Regions.

This Action Plan have been promoted by the ICAO NACC Regional Office and have been developed in close coordination and collaboration with the ICAO SAM Regional Office, as response to the conclusions and actions agreed at the GREPECAS/22 meeting.

The target audience of this action plan are the Civil Aviation Authorities of the CAR/SAM States, particularly the departments in charge of the Air Transport Planning activities. Additionally, the action plan is recommended for the key stakeholders that should be involved in the process of data gathering or/and KPIs calculation, such as Air Navigation Services Providers, Airport Operators, Airlines and other required stakeholders, depending on each specific case.

This document is complemented by the other two deliverables, as part of the assistance provided by EASA:

- Deliverable 1 – CAR/SAM Regional guidance material on the methodology for implementation of GANP KPIs.
- Deliverable 3 – Communications Plan detailing the adequate means of dissemination (dashboards, etc.) of the KPIs.

2. Objectives and Scope

The main objective of this action plan is to guide the progressive implementation of the GANP KPIs for the CAR/SAM Regional Air Navigation Plan, Volume III, across all States of the CAR/SAM Region following a harmonized, structured, and efficient approach. The plan aims to build the necessary institutional, technical, and operational capacity within States so that KPIs become an integral part of national and regional air navigation monitoring processes.

The scope of the plan covers the full cycle of implementation, from the introduction of the first group of priority KPIs to the final deployment of the complete set by March 2029. It encompasses not only the technical adoption of KPIs but also the establishment of baseline values, the creation of national focal points, the design of reporting and monitoring mechanisms, and the production of consolidated regional reports. The implementation phased approach—short-term, mid-term, and long-term—allows States to gradually absorb the requirements while ensuring that early progress is captured and lessons learned are integrated into subsequent stages.

Equally important, the plan recognizes that not all States begin from the same level of readiness. For this reason, it incorporates dedicated support from the GREPECAS GADHOC group and the ICAO NACC and SAM regional offices, including on-site missions, training workshops, and peer-to-peer exchanges to address specific needs. The scope therefore extends beyond technical implementation, embracing capacity-building, coordination, and risk management to ensure that no State is left behind in meeting the regional and global objectives of performance-based air navigation.

Finally, the action plan establishes a systematic reporting framework to ensure accountability and transparency. States will report KPI results on a semiannual basis to the CAR/SAM Regional levels, which will consolidate and analyze the information to produce regional integrated reports at the end

of each implementation phase. These reports will serve both as a record of progress and as a tool for continuous improvement, allowing stakeholders to assess trends, identify challenges and take corrective action where needed.

Considering the previous objectives and scope, the contents of the action plan are structured as follows:

- Firstly, an overview of the Action Plan for the CAR/SAM region is presented.
- Secondly, the organizational structure for the implementation of the Action Plan is outlined.
- Thirdly, the main part of the Action Plan is dedicated to detail each implementation phase (Phase 1, Phase 2 and Phase 3), including the meetings and workshops, key milestones and expected deliverables in each phase.
- Following, the description of the proposed on-site support to the CAR/SAM States for the implementation of the Action Plan is included.
- Additionally, a Gantt chart compiling all activities of the Action Plan is presented.
- Finally, a set of milestones and next steps is presented to efficiently implement the recommended actions of the present Action Plan and the recommended way forward.

3. Overview of the Action Plan for the CAR/SAM RANP KPIs implementation

The Action Plan for the implementation of the GANP KPIs within the CAR/SAM Regional Air Navigation Plan (RANP), Volume III, provides a structured roadmap of three phases, each introducing a defined set of KPIs that will expand the region's monitoring capability in a gradual and manageable way.

The following phases are included in the CAR/SAM RANP KPIs Action Plan:

- Phase 1: Short-term phase (April 2026 – March 2027) focuses on five priority KPIs that establish a baseline and strengthen States' capacity to integrate performance-based monitoring into their systems. Group 1 KPIs to be implemented in phase1:
    - KPI01 Departure punctuality
    - KPI06 En-route airspace capacity
    - KPI09 Airport peak capacity
    - KPI10 Airport peak throughput
    - KPI14 Arrival punctuality
- Phase 2: Mid-term phase (January 2027 – March 2028) adds six additional KPIs, consolidating the first set while extending RANP performance areas and objectives coverage. Considering that some states have already advanced in the implementation of the first phase, this second phase can be started earlier and in parallel with the first phase. Group 2 KPIs to be implemented in phase 2:
    - KPI02 Taxi-out additional time
    - KPI05 Actual en-route extension
    - KPI08 Additional time in terminal airspace
    - KPI13 Taxi-in additional time
    - KPI15 Flight time variability

  - KPI23 Loss of separation (Variant 3)

- Phase 3: Long-term phase (January 2028 – March 2029) completes the implementation with four more advanced KPIs, ensuring that by February 2029, all States in the CAR/SAM Region report on a full set of 15 KPIs. Group 3 KPIs to be implemented in phase 3:
  - KPI04 Filed flight plan en-route extension
  - KPI07 En-route ATFM delay
  - KPI17 Level-off during climb
  - KPI19 Level-off during descent

The implementation of the GANP KPIs in the CAR/SAM Region will be led by the GREPECAS Ad-hoc Group for the Development of Key Performance Indicators (GADHOC), which will provide governance and oversight, with technical coordination and support from the ICAO NACC and SAM Regional Offices. The process will be further strengthened by the contribution of EASA through the EU–LAC APP programme, offering capacity-building and cooperative expertise, as well as by regional teams of industry partners such as IATA and CANSO, who will provide operational knowledge and data inputs. Ultimately, the CAR/SAM States will serve as the main implementers, responsible for designating KPI focal points, collecting data, calculating and integrating KPIs into their national monitoring frameworks, and reporting them to the regional levels. This collaborative structure ensures leadership, technical guidance, industry alignment, and active State participation to achieve the objectives of the Action Plan.

4. Organizational Structure for the Implementation of the Action Plan

The implementation of the GANP KPIs within the CAR/SAM Regional Air Navigation Plan (RANP), Volume III, will be coordinated through a collaborative structure that ensures strategic oversight, technical support, and operational delivery. The GREPECAS Ad-hoc Group on KPIs (GADHOC) will act as the leading body responsible for guiding and monitoring the execution of this Action Plan. Under GREPECAS, the GADHOC group will provide the overall governance framework, ensure alignment with regional priorities, and report progress to the GREPECAS plenary as part of its mandate to oversee performance-based implementation in the CAR/SAM Region.

The ICAO NACC and SAM Regional Offices will provide direct technical and operational support to States throughout the three phases of implementation. Their role will include developing and distributing KPI guidance materials, organizing workshops and training sessions, facilitating reporting mechanisms, maintaining the regional KPI dashboard, and coordinating the publication of integrated regional reports. They will also manage on-site assistance missions, ensuring that specific national challenges are addressed in a timely and effective manner.

The implementation process will also benefit from the active support of international and regional partners. The European Union Aviation Safety Agency (EASA), through the EU–LAC APP programme, will contribute technical cooperation, training, and knowledge transfer to support States in strengthening their capacity for KPI reporting and monitoring. This collaboration will complement ICAO's efforts and promote best practices by drawing on experiences from other regions. In addition, regional delegations of industry partners such as the International Air Transport Association (IATA) and the Civil Air Navigation Services Organisation (CANSO) will provide operational expertise, data inputs, and alignment with global industry standards, helping to ensure that KPIs reflect both regulatory and operational perspectives.

Finally, the CAR/SAM States will serve as the primary implementers of the Action Plan. Each State will be responsible for designating national KPI focal points, establishing data collection systems, calculating and integrating KPIs into their national performance monitoring frameworks, and ensuring

quarterly reporting to regional levels. States are also expected to participate actively in workshops, progress meetings, and reporting reviews, as well as to provide feedback on challenges and lessons learned.

5. Phase 1: Short-term Deployment (April 2026 – March 2027)

The first phase of the Action Plan marks the launch of KPI implementation across the CAR/SAM Region and establishes the foundation for subsequent phases. During this stage, States will implement the first five priority KPIs (KPI01, KPI06, KPI09, KPI10, KPI14), selected for their relevance and feasibility as entry points to performance-based monitoring. The main objective of Phase 1 is to build national capacity, establish baseline values for 2025, and develop a consistent regional reporting framework that can be expanded in later phases. By the end of this phase, all CAR/SAM States should have functional processes in place for collecting, reporting, and validating these KPIs.

Implementation will begin in April 2026, following the distribution of official regional guidelines and templates by GREPECAS ADHOC (GADHOC) Group in December 2025. CAR/SAM States will designate national KPI focal points who will be responsible for coordinating implementation at the national level and ensuring compliance with KPI reporting requirements. To support this process, ICAO regional offices will organize several kick-off and training activities, ensuring that all States are familiar with the methodology, tools, and reporting expectations. In addition, ICAO will provide tailored on-site support missions to States requiring specific technical assistance. EASA, through the EU–LAC APP programme, will assist with training and capacity-building initiatives, while IATA and CANSO regional teams will contribute with industry data and operational expertise to strengthen the KPI calculation processes.

A key feature of Phase 1 is the establishment of a biannual reporting cycle, ensuring consistent monitoring and corrective action where needed. States will submit KPI data to ICAO regional offices in September 2026, and February 2027. GADHOC and ICAO Regional Offcies will validate the submissions and consolidate them into a regional dashboard. A critical milestone for this phase is the provision of baseline values for 2025, to be submitted by all States as part of the June 2026 reporting cycle. These baseline values will serve as the reference point for measuring progress in later phases.

a. Key meetings and Workshops (Phase 1)

The following meetings and workshops will be conducted in Phase 1:

- **April 2026**: Regional Kick-off Meeting, organized by ICAO Regional Offices under GADHOC guidance, with participation from all CAR/SAM States, EASA, IATA, and CANSO.
- **May 2026:** Familiarization Training Workshops (virtual and in-person) on methodology, data reporting, and use of the ICAO KPI dashboard. Supported by ICAO Regional Offices and EASA, with input from industry stakeholders.
- **September 2026, February 2027:** Biannual Progress and Reporting Meetings held in conjunction with State KPI submissions, providing feedback and guidance. Coordinated by ICAO Regional Offices, with GADHOC oversight.
- **October 2026:** Mid-term Regional Review Workshop to assess data quality, identify challenges, and share lessons learned. Organized by ICAO Regional Offices under GADHOC guidance, with participation from all CAR/SAM States, EASA, IATA, and CANSO.
- **March 2027:** Final Reporting and Progress Meeting, including presentation of the first CAR/SAM Regional Integrated KPI Report (Phase 1). Organized by ICAO Regional Offices under GADHOC guidance, with participation from all CAR/SAM States, EASA, IATA, and CANSO.

b. Milestones (Phase 1)

The following Milestones are defined for Action Plan Phase 1:

- **April 2026:** Designation of national KPI focal points by all States.
- **June 2026:** First quarterly KPI submission.
- **September 2026:** Submission of 2025 baseline values by all States.
- **October 2026:** Mid-term review completed.
- **March 2027:** Publication of Regional Integrated KPI Report (Phase 1).

c. Deliverables (Phase 1)

As a result of Phase 1, the following key deliverables are expected to be obtained:

- Established national KPI focal points in every State.
- Biannual KPI submissions throughout 2026.
- A regional baseline dataset for Group 1 KPIs.
- CAR/SAM Regional Integrated KPI Report consolidating Phase 1 results.

6. Phase 2: Mid-term Deployment (January 2027 – March 2028)

The second phase of the Action Plan expands KPI implementation by introducing a new set of six indicators (KPI02, KPI05, KPI08, KPI13, KPI15, KPI23). This stage builds on the foundations laid in Phase 1, consolidating the reporting mechanisms already established while progressively broadening the scope of monitoring. The main objectives of Phase 2 are to ensure that States transition smoothly from the initial set of KPIs to a more comprehensive performance framework, to harmonize reporting practices across the region, and to strengthen regional benchmarking capabilities.

Phase 2 officially begins in January 2027, but some States that have advanced quickly in Phase 1 may begin working in the Group 2 KPIs and reporting them earlier. GADHOC will issue the Phase 2 guidance package in March 2027, accompanied by technical briefing sessions to clarify methodology and data requirements. By September 2027, States will conduct readiness assessments to evaluate their ability to integrate the new KPIs into their national systems. Throughout this period, ICAO regional offices will continue to provide technical support, on-site missions, and opportunities for peer-to-peer learning between early adopters and those requiring additional assistance. EASA/EU–LAC APP will support capacity-building, particularly for States requiring additional assistance, while IATA and CANSO regional delegations will contribute with operational expertise and facilitate peer-to-peer exchanges between States and industry stakeholders.

The biannual reporting cycle continues as the backbone of monitoring during Phase 2. States will submit KPI results covering both Phase 1 and Phase 2 indicators in September 2027, and in February 2027. GADHOC and ICAO Regional Offices will validate submissions, update the regional dashboard, and provide targeted feedback to each State. A mid-point evaluation will be carried out in March 2028, allowing ICAO Regional Offices and States to assess progress, identify common difficulties, and agree on corrective measures. The KPIs baseline values for 2026 will be submitted by all States as part of the 2027 reporting cycle. At the conclusion of this phase, ICAO will issue the Regional Integrated KPI Report (Phases 1 and 2), consolidating results for 11 KPIs across the CAR/SAM Region.

By completing Phase 2, the CAR/SAM Region will have significantly broadened its performance monitoring framework, moving from five to eleven KPIs. This stage will reinforce harmonization,

enable deeper regional comparisons, and provide valuable insights for refining strategies ahead of the final implementation phase.

a. Key meetings and Workshops (Phase 2)

The following meetings and workshops will be conducted in Phase 2:

- **March 2027:** Technical briefing webinar on Phase 2 guidelines and data requirements.
- **April 2027:** Phase 2 Readiness Meeting for States to share readiness assessments and identify data gaps.
- **September 2027, February 2028:** Quarterly Progress and Reporting Meetings to review submissions, provide feedback, and discuss challenges.
- **October 2027:** Regional Progress Meeting and ICAO Interim Evaluation of implementation progress.
- **February 2028:** Regional Consolidation Workshop to validate results and discuss lessons learned, followed by the publication of the Regional Integrated KPI Report (Phases 1 and 2).

b. Milestones (Phase 2)

The following Milestones are defined for Action Plan Phase 2:

- **April 2027:** GADHOC issues Phase 2 regional guidelines.
- **June 2027:** States submit Phase 2 readiness self-assessments.
- **September 2027:** First consolidated reporting cycle including Groups1 and 2 KPIs.
- **October 2027:** ICAO interim evaluation completed and submission of 2026 baseline values by all States.
- **March 2028:** Publication of Regional Integrated KPI Report (Phases 1 and 2).

c. Deliverables (Phase 2)

As a result of Phase 2, the following key deliverables are expected to be obtained:

- Successful integration of six additional KPIs across all States.
- Biannual KPI submissions covering Groups 1 and 2 KPIs.
- Regional dashboard updated with consolidated KPI data.
- CAR/SAM Regional Integrated KPI Report (Phases 1 and 2) presenting harmonized results for 11 KPIs.

7. Phase 3: Long-term Deployment (January 2028 – March 2029)

The third and final phase of the Action Plan completes the regional implementation of the GANP KPI framework by introducing the last set of four indicators (KPI04, KPI07, KPI17, KPI19). This stage focuses on consolidating all previous efforts, achieving full KPI coverage across the CAR/SAM States, and embedding a culture of continuous monitoring and performance-based decision-making. The main objectives of Phase 3 are to ensure that every State reports on the complete set of 15 KPIs, to validate

the reliability of data collection and analysis processes, and to publish a final regional report that captures the results of the entire implementation cycle.

Implementation will begin in January 2028, following the release of the Phase 3 guidance package and technical documentation by GADHOC in April 2028. A Technical Kick-off Workshop will be organized in June 2028 to provide States with practical training on advanced KPI methodologies and integration into existing monitoring frameworks. ICAO Regional Offices will continue to provide tailored technical support, both through on-site missions and virtual assistance, with a strong focus on ensuring that States with limited capacity are able to achieve compliance. Additionally, EASA and CANSO and IATA regional delegation will continue supporting the CAR/SAM States in the process.

The biannual reporting cycle remains in force throughout Phase 3, covering the full set of 15 KPIs. States will submit data in September 2028, and February 2029. GADHOC and ICAO Regional Offices will validate these submissions, update the regional dashboard, and provide feedback bulletins. A Regional Best Practices Workshop will be held in October 2028 to showcase experiences, share solutions to common challenges, and promote peer learning across States. A critical milestone will be reached in December 2028, when all CAR/SAM States are expected to achieve full KPI coverage, reporting consistently on the entire framework. The phase will conclude with a Closing Workshop in March 2029, during which ICAO Regional Offices will publish the Final Regional Integrated KPI Report, summarizing results and outlining recommendations for ongoing performance monitoring.

By completing Phase 3, the CAR/SAM Region will achieve full implementation of all 15 selected GANP KPIs. This milestone will not only fulfill the objectives of the Action Plan but also establish a sustainable performance-monitoring culture, enabling the region to continuously evaluate progress, share best practices, and make informed decisions to enhance air navigation in alignment with ICAO GANP global vision.

a. Key meetings and Workshops (Phase 3)

The following meetings and workshops will be conducted in Phase 3:

- **April 2028:** Distribution of Phase 3 guidelines and technical documentation.
- **June 2028:** Phase 3 Technical Kick-off Workshop to launch implementation.
- **September 2028, February 2029:** Quarterly Progress and Reporting Meetings tied to KPI submissions.
- **October 2028:** Regional Best Practices Workshop for peer learning and validation of preliminary results.
- **March 2029:** Final Reporting and Closing Workshop, presentation of the Final Regional Integrated KPI Report.

b. Milestones (Phase 3)

The following Milestones are defined for Action Plan Phase 3:

- **April 2028:** GADHOC issues Phase 3 guidelines.
- **June 2028:** Technical Kick-off Workshop held.
- **September 2028:** First quarterly submission including Phase 3 KPIs.
- **October 2028:** Regional Best Practices Workshop.
- **October 2028:** Submission of 2027 baseline values by all States.

- **December 2028:** All States achieve full KPI coverage (15 KPIs).
- **March 2029:** Publication of the Final Regional Integrated KPI Report.

c. Deliverables (Phase 3)

As a result of Phase 3, the following key deliverables are expected to be obtained:

- Implementation of the final seven KPIs in all CAR/SAM States.
- Quarterly submissions covering the full KPI framework.
- A regional best practices repository to support ongoing learning.
- The Final Regional Integrated KPI Report (March 2029) consolidating results from all phases and providing recommendations for sustainability.

8. On-site Support for KPI Implementation

Recognizing the varying levels of readiness among CAR/SAM States, the Action Plan foresees dedicated on-site support missions to assist States with limited capacity or those requiring targeted guidance. This support is aimed at ensuring that no State is left behind and that all States are able to implement the KPI guidelines effectively, establish reliable data collection processes, and succeed in calculating and reporting the KPIs in line with the regional plan.

On-site support will be coordinated under the oversight of the GREPECAS Ad-hoc Group on KPIs (GADHOC) and managed operationally by the ICAO NACC and SAM Regional Offices, in close collaboration with partners such as EASA through the EU–LAC APP programme, IATA, and CANSO. Support will be tailored to each State's needs and may include technical missions, hands-on workshops, mentoring, or virtual follow-up sessions.

a. On-site Support by Implementation Phase

- **Phase 1 (2026 - 2027 – Foundational Implementation):**

During Phase 1, on-site missions will concentrate on helping States establish the foundations of KPI monitoring. ICAO and EASA experts will work directly with national authorities to designate KPI focal points, review and strengthen national data collection systems, and ensure that reporting templates are properly understood. Special emphasis will be placed on assisting States in producing their 2025 baseline values, which are critical for establishing reference points for future performance assessments. These visits will also facilitate dialogue among national stakeholders, such as civil aviation authorities, air navigation service providers, and airports, to ensure that responsibilities for data provision and validation are well coordinated.

- **Phase 2 (2027–2028 – Expansion and Harmonization):**

In Phase 2, the focus of on-site support will evolve to reflect the broader scope of the KPIs being introduced. Missions will assist States in integrating the second group of indicators, identifying reliable data sources, and consolidating calculation methodologies. In this stage, capacity-building will be strengthened through collaborative activities, with ICAO and EASA supporting national teams and industry partners like IATA and CANSO contributing their expertise on traffic management, flight efficiency, and operational performance. For States that encounter difficulties in aligning Phase 1 and Phase 2 data, additional mentoring and technical coaching will be offered to ensure consistent reporting across the expanded KPI framework.

- **Phase 3 (2028 – 2029 – Full Coverage and Consolidation):**

Finally, in Phase 3, on-site support will concentrate on ensuring that States achieve full KPI coverage and can sustain the monitoring framework beyond 2028. Technical experts will help refine national methodologies, validate data quality, and integrate the complete set of 15 KPIs into national performance monitoring systems. Special missions will share best practices and lessons learned across the region, with contributions from industry and international partners enriching the practical aspects of KPI application. For States that continue to face challenges, additional visits or virtual follow-up sessions will be arranged to ensure that the milestone of full KPI coverage, expected by December 2028, is achieved.

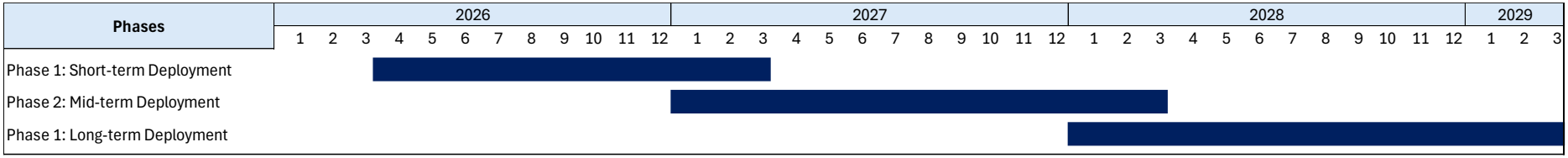
b. Expected Outcomes of the On-site Support

Through this phased approach, on-site support will ensure that disparities in readiness are progressively reduced, that capacity is strengthened at both technical and institutional levels, and that the whole region advances in a harmonized and coordinated manner. By the conclusion of Phase 3, every State in the CAR/SAM Region should not only be capable of reporting on all 15 GANP KPIs but also have the internal structures in place to continue monitoring performance sustainably into the future.

- States with initially low levels of readiness will reach the same level of compliance as their regional peers by the end of each phase.
- Technical capacity within Civil Aviation Authorities (CAAs) and Air Navigation Service Providers (ANSPs) will be strengthened to ensure sustainable KPI monitoring.
- Regional harmonization will be achieved, with reduced disparities between advanced and less advanced States in terms of reporting quality and timeliness.

Through this structured programme of on-site support, coordinated among ICAO regional offices, EASA, IATA, and CANSO, the Action Plan guarantees that all CAR/SAM States will receive the assistance they need to succeed in implementing the KPI guidelines and to fully contribute to the regional performance monitoring framework.

9. Action Plan Gantt Chart



10.Conclusions and next steps

The implementation of the GANP KPIs within the CAR/SAM Regional Air Navigation Plan, Volume III, represents a decisive step towards harmonizing performance monitoring and strengthening evidence-based decision-making in the region. Through a structured three-phase approach, supported by clear milestones, biannual reporting cycles, and regional integrated reports, the Action Plan provides States with a practical and achievable roadmap to progressively adopt and apply the full set of 15 GANP KPIs by December 2028. The collaborative framework, led by the GREPECAS Ad-hoc Group on KPIs (GADHOC), ensures that implementation is guided by regional oversight, reinforced by ICAO's technical coordination, enriched by the support of EASA through the EU–LAC APP programme, complemented by the operational expertise of IATA and CANSO, and ultimately delivered by CAR/SAM States themselves.

One of the central conclusions of this plan is the recognition that States within the region begin from different levels of maturity in performance monitoring. For this reason, the plan integrates a strong programme of capacity-building, on-site support, and peer-to-peer collaboration to guarantee that no State is left behind. Quarterly reporting and the production of regional integrated reports will not only ensure transparency and accountability but also provide a valuable feedback mechanism, allowing the region to adjust its strategies and continuously improve data quality and consistency.

a. Recommendations

- Sustain regional biannual KPI reporting as the backbone of regional monitoring, ensuring reliable and timely data for decision-making.
- Strengthen national ownership by empowering KPI focal points in each State and embedding reporting responsibilities institutionally
- Maximize the role of support partners (EASA, IATA, CANSO) to leverage international best practices, industry data, and complementary resources.
- Ensure equitable progress by prioritizing on-site assistance to States with lower levels of readiness, especially during the baseline establishment in Phase 1 and the full coverage milestone in Phase 3.
- Promote knowledge-sharing and transparency through workshops, best-practice exchanges, and regional dashboards that allow States to benchmark their performance.

b. Way Forward

To ensure the long-term sustainability of KPI monitoring beyond 2028, the Action Plan recommends the creation of a CAR/SAM RANP KPI Portal to serve as the single channel for States to report their KPI data to ICAO regional offices. This portal will incorporate:

- Standardized online reporting templates to simplify biannual submissions from States.
- A regional dashboard (developed using tools such as Power BI or similar platforms) to present integrated KPI results at the regional level, enable trend analysis, and allow for transparent benchmarking among States.
- Automated feedback mechanisms, providing States with validation alerts, performance summaries, and tailored recommendations immediately after data submission.

- A knowledge-sharing section with training resources, best-practice case studies, and guidance material contributed by ICAO, EASA, IATA, CANSO, and States.
- A documentary repository, serving as a centralized library for all key references, including:
    - Regional guidelines for KPI calculation and implementation.
    - The CAR/SAM RANP Volumes I, II, and III.
    - Regional Integrated KPI Reports.
    - Other relevant ICAO and partner documentation supporting performance monitoring.
- Secure access protocols, ensuring data protection while enabling authorized stakeholders to monitor progress in real time.

This digital infrastructure will institutionalize KPI monitoring as an ongoing regional process, reduce administrative burdens, and embed performance monitoring as a permanent function within the CAR/SAM RANP framework. By adopting this portal, the region will not only meet its 2028 targets but also establish a sustainable platform to support continuous improvement, cooperation, and accountability in the years that follow.

APPENDIX D

KPIS COMMUNICATION PLAN

Executive summary

The present document compiles the Communication Plan to implement the CAR/SAM regional guidelines supporting the CAR/SAM region states in the calculation of the GANP Key Performance Indicators (KPIs) for the CAR/SAM Regional Air Navigation Plan, Volume III.

This Communication Plan has been developed as part of the assistance provided by the European Union Aviation Safety Agency (EASA), in collaboration with the ICAO NACC and SAM Regional Offices, and in the context of the GREPECAS Ad-hoc Group for the Development of Key Performance Indicators (GADHOC).

The Communication Plan is designed to ensure that States and stakeholders are equipped with the information, tools, and guidance necessary to effectively adopt and apply the GANP KPIs. It positions communication as a critical enabler of performance monitoring by ensuring that guidance is not only distributed but also understood, applied, and reinforced throughout the three implementation phases.

The plan recognizes that successful KPI implementation depends not only on technical guidance and reporting requirements but also on clear and consistent communication with the relevant audiences. Its primary objective is to guarantee that States are informed about regional guidance materials, reporting cycles, and methodological expectations, while also promoting engagement, transparency, and accountability. By combining formal ICAO communication channels with innovative digital tools, the plan creates an environment where States can both receive and contribute to the flow of information, making the process participatory and collaborative.

The target audience of the plan is twofold. On one hand, it focuses on the direct implementers—national KPI focal points, Civil Aviation Authorities, Air Navigation Service Providers, and relevant ministries—who are responsible for producing reports and applying guidance. On the other, it addresses secondary stakeholders such as ICAO regional offices, EASA, IATA, and CANSO, who play a supporting role by providing expertise, data, training, and coordination. By tailoring communication to each audience, the plan ensures that every stakeholder receives relevant and actionable information in a timely manner.

At the core of the plan is a mix of communication channels and tools designed to balance the formal with the interactive. ICAO circulars and State letters remain the official channels for transmitting requirements and deadlines, while guidance materials provide detailed methodological instructions. At the same time, modern platforms such as the CAR/SAM KPI Portal and the Interactive KPI Guidelines Website add new dimensions by offering real-time dashboards, automated validation tools, training modules, and case studies. These platforms will not only support the quarterly reporting cycles but also act as knowledge-sharing hubs, ensuring that lessons learned and best practices are widely disseminated.

The Communication Plan is aligned with the phased implementation of KPIs. During Phase 1, emphasis is placed on launching the portal and website, conducting workshops, and issuing the first integrated reports. In Phase 2, communication activities expand with technical briefings, readiness assessments, and interim evaluations that accompany the introduction of additional KPIs. Phase 3 consolidates the

process with advanced training, best practices workshops, and the publication of the final integrated report. By linking communication directly to implementation milestones, the plan ensures that States are consistently supported at each stage of the journey.

Roles and responsibilities are clearly distributed across the network of stakeholders. GREPECAS, through its Ad Hoc Group on KPIs (GADHOC), provides strategic oversight, while ICAO regional offices manage operational communication, maintain the digital platforms, and lead workshops. EASA contributes training and cooperative expertise, while IATA and CANSO enrich communication with industry data and practical perspectives. The States themselves remain responsible for cascading information internally and ensuring timely reporting. This multi-actor framework ensures that communication is both top-down, from ICAO to States, and bottom-up, with States providing feedback and lessons learned.

Continuous monitoring and feedback mechanisms form an integral part of the plan, ensuring that communication is not static but adaptive. Portal usage statistics, participation records, reporting reviews, and annual surveys of focal points will allow ICAO and partners to assess whether States are receiving and applying information effectively. This approach transforms communication into a two-way process, where guidance is continuously refined in response to user needs and regional realities.

In conclusion, the Communication Plan elevates communication from a supportive activity to a strategic pillar of KPI implementation in the CAR/SAM Region. By combining formal ICAO mechanisms with digital innovation, it guarantees that States are well-informed, engaged, and supported throughout the implementation cycle. It also provides the foundation for sustainable communication beyond 2028, as the KPI Portal and interactive website will continue to serve as permanent regional tools for reporting, monitoring, and training. Through this plan, the CAR/SAM Region establishes a transparent, participatory, and forward-looking communication framework that strengthens performance monitoring and ensures alignment with ICAO’s global vision.

Table of contents

List of acronyms

ANP	Air Navigation Plan
ANSP	Air Navigation Service Provider
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
CAA	Civil Aviation Authority
CAR	Caribbean Region
CANSO	Civil Air Navigation Services Organisation
EASA	European Union Aviation Safety Agency
EU–LAC APP	European Union–Latin America and Caribbean Air Transport Project
GANP	Global Air Navigation Plan
GADHOC	GREPECAS Ad Hoc Group on Key Performance Indicators
GREPECAS	CAR/SAM Regional Planning and Implementation Group
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
KPI	Key Performance Indicator
LAC	Latin America and Caribbean
NACC	North American, Central American and Caribbean Region
RANP	Regional Air Navigation Plan
SAM	South American Region

1. Introduction

The present document, Deliverable 3 – CAR/SAM Communication Plan for the implementation of GANP KPIs, is the third deliverable of the assistance provided by EASA, through the EU-LAC APP II programme, to support the ICAO NACC Regional Office in the development and implementation of the GANP KPIs for the CAR/SAM Regional Air Navigation Plan, Volume III.

This deliverable provides a communication plan for detailing the adequate means of dissemination (dashboards, etc.) of the CAR/SMA RANP KPIs and its related implementation guidelines.

This Communication Plan has been promoted by the ICAO NACC Regional Office, and has been developed in close coordination and collaboration with the ICAO SAM Regional Office, as response to the conclusions and actions agreed at the GREPECAS/22 meeting.

The target audience of this communication plan are the Civil Aviation Authorities of the CAR/SAM States, and in particular the departments in charge of the Air Transport Planning activities. Additionally, the action plan is recommended for the key stakeholders that should be involved in the process of data gathering or/and KPIs calculation, such as Air Navigation Services Providers, Airport Operators, Airlines and other required stakeholders, depending on each specific case.

This document is complemented by the other two deliverables, as part of the assistance provided by EASA:

- Deliverable 1 – CAR/SAM Regional guidance material on the methodology for implementation of GANP KPIs.
- Deliverable 2 – CAR/SAM Action Plan for the progressive implementation of GANP KPIs.

2. Objectives and Scope

The Communication Plan is designed to ensure that all CAR/SAM States are informed about the regional guidance material for the implementation of GANP KPIs and receive clear, timely, and user-friendly information to successfully implement the GANP KPIs in line with the Action Plan.

Communication will not only deliver regional guidelines but also foster engagement, capacity-building, and transparency across the region. By using a combination of formal ICAO channels and innovative digital tools, the plan will help States to internalize KPI methodologies, meet reporting requirements, and benefit from regional benchmarking. Its primary aim is to guarantee that the guidance provided by ICAO and supporting partners translates into effective national action.

For the Communication Plan to succeed, it is not enough to define KPIs and reporting cycles, States must clearly understand what is expected of them, how to calculate the indicators, and how to report results in a consistent way. The communication plan provides this foundation by ensuring that guidance is not only transmitted but also understood, applied, and reinforced throughout the three implementation phases. It positions communication as both an enabler of compliance and a catalyst for engagement among States and partners.

Key objectives of the CAR/SAM Communication Plan include:

- Disseminating the Regional Guidance Material, including guidelines for KPI calculation, reporting templates, and methodological notes, as the foundation for implementation.
- Ensuring States understand and apply the guidance consistently through training, interactive platforms, and direct feedback.
- Providing continuous feedback mechanisms on the CAR/SAM Regional KPIs between ICAO, States, and partners.

- Promoting engagement and transparency through modern communication platforms (KPI Portal, Regional Dashboard, interactive guidelines).
- Ensuring States are consistently informed of milestones, reporting deadlines, and integrated results throughout the three phases of implementation.

By pursuing these objectives, the communication plan ensures that KPI implementation becomes a shared regional effort rather than a series of isolated national initiatives.

Considering the previous objectives and scope, the contents of the action plan are structured as follows:

- Firstly, the target audience of the Communication Plan for the CAR/SAM region is presented.
- Secondly, the communication channels and tools of the Communication Plan are outlined.
- Thirdly, the proposed digital tools to support communication and implementation, such as the CAR/SAM KPI Portal and the iterative KPI Guidelines website, are detailed.
- Fourthly, the main part of the Communication Plan is dedicated to detail the specific communication action in each implementation phase (Phase 1, Phase 2 and Phase 3).
- Following, the description of the proposed communication roles and responsibilities is included.
- Additionally, the communication monitoring and feedback activities are presented.
- Finally, a set of conclusions and next steps is presented to efficiently implement the recommended actions of the present Communication Plan.

3. Communication Plan target audience

The success of the Action Plan depends on delivering the right information to the right people. Each communication activity must be tailored so that national implementers receive practical instructions, while regional and industry partners are provided with contextual information that allows them to support States effectively.

- Primary audience (direct implementers):
    - National KPI focal points in each State.
    - Civil Aviation Authorities (CAAs), Air Navigation Service Providers (ANSPs), and Ministries of Transport.

  These actors are directly responsible for applying the guidance and producing reports.
- Secondary Audience (supporters and stakeholders):
    - ICAO NACC and SAM Regional Offices technical divisions, ensuring global alignment with GANP.
    - EASA through the EU–LAC APP programme, providing cooperative expertise and training.
    - IATA and CANSO, offering operational perspectives and data.
    - Other regional aviation organizations supporting capacity-building.

By clearly defining audiences, the plan makes it possible to tailor the tone, format, and depth of communication. This ensures that every stakeholder, whether policymaker, implementer, or technical partner, receives relevant and actionable information.

4. Communication channels and tools

A robust communication framework must balance formal ICAO mechanisms with modern, interactive platforms. This balance guarantees harmonization and consistency while also enhancing accessibility and user engagement. The CAR/SAM Region will therefore rely on a mix of circulars, digital portals, online tools, and interactive training resources:

- **ICAO Circulars and State Letters:** The formal and official means of communicating requirements, milestones, and updates.
- **Regional Guidance Material:** Detailed documentation on KPI calculation and reporting methods, distributed as PDFs and interactive modules.
- **Interactive KPI Guidelines Website:** A dynamic platform with tutorials, FAQs, and case studies to complement static guidance.
- **CAR/SAM KPI Portal:** The central hub for quarterly reporting, validation, and access to the Regional Dashboard. It will also serve as a documentary repository containing guidance, RANP Volumes I–III, regional reports, and workshop materials.
- **Email Distribution Lists:** Fast and direct communication to remind, update, and clarify.
- **Workshops and Webinars:** ICAO-led events with contributions from EASA, IATA, and CANSO to reinforce application of the guidance.
- **Quarterly Progress and Reporting Meetings:** Structured opportunities for ICAO and States to review submissions, challenges, and improvements.
- **Regional Integrated KPI Reports:** Periodic publications summarizing results and lessons learned.

Together, these channels ensure that communication is harmonized, interactive, and adaptable. This multi-layered approach reflects the diversity of stakeholders in the CAR/SAM Region and recognizes that effective communication is a key enabler of performance monitoring.

The central innovation of this plan is the introduction of dedicated digital tools — the CAR/SAM KPI Portal and the Interactive KPI Guidelines Website — which transform communication into a dynamic, transparent, and sustainable process. The following section describes them in detail .

5. Digital tools to support communication and implementation

The success of the Communication Plan relies not only on written guidance and periodic meetings but also on digital tools that make KPI reporting and knowledge-sharing accessible, transparent, and user-friendly. To achieve this, two complementary platforms will be developed and maintained by ICAO Regional Offices with the support of partners: the CAR/SAM KPI Portal and the Interactive KPI Guidelines Website. Together, these platforms will become the central pillars of communication, training, and reporting throughout the implementation phases and beyond 2028.

a. CAR/SAM KPI Portal

The CAR/SAM KPI Portal will serve as the official digital platform for all States to submit, validate, and consult KPI data. Designed as a secure, interactive environment, the portal will ensure consistency in reporting while providing States and stakeholders with real-time access to integrated regional results. Its structure an main components are:

- **User Dashboard (State interface):** Personalized workspace for national KPI focal points, including reporting deadlines, submission status, and automated reminders.

- **KPIs Reporting Module:** Online forms and templates aligned with Regional Guidance Material to allow structured quarterly submissions. Includes automatic validation checks to identify inconsistencies or missing data before submission.
- **KPIs Regional Dashboard:** A dynamic interface developed with Power BI or equivalent, offering real-time visualization of regional KPI results, comparisons among States, and trend analysis over time. This dashboard will be available to authorized stakeholders and updated quarterly.
- **Documentary Repository:** Digital library with:
    - Regional Guidance Material for KPI calculation and implementation.
    - CAR/SAM RANP Volumes I, II, and III.
    - Regional Integrated KPI Reports.
    - ICAO circulars, training materials, and case studies.
- **Feedback Module:** Enables ICAO to provide tailored comments on submissions and share performance summaries directly with each State.
- **Helpdesk Section:** Provides States with access to FAQs, user manuals, and a helpdesk service operated by ICAO Regional Offices.

By combining reporting, results visualization, and documentation, the portal will institutionalize KPI monitoring as a permanent function of the CAR/SAM RANP.

The CAR/SAM KPI Portal will function as the official platform for KPI reporting, validation, and monitoring. Given its role in managing quarterly submissions and sensitive State data, access will be strictly role-based. National KPI focal points will have rights to submit and review their own data, while ICAO Regional Offices will manage validation, oversight, and dashboard publication. GADHOC Group members will be able to consult validated regional data, while partners such as EASA, IATA, and CANSO will have limited access to aggregated results and reports. Only ICAO and the submitting State will see raw data, ensuring confidentiality while promoting transparency through aggregated dashboards and regional reports.

b. Interactive KPI Guidelines Website

Complementing the portal, the Interactive KPI Guidelines Website will act as a knowledge-sharing and training hub. Unlike the portal, which is focused on reporting and monitoring, the website will focus on learning, familiarization, and capacity-building. Its structure and main components are:

- **Guideline Modules:** Interactive presentations of the Regional Guidance Material, including step-by-step explanations of KPI definitions, formulas, and calculation examples.
- **Tutorial Videos and Webinars:** On-demand access to recorded training sessions, walkthroughs of the reporting process, and presentations from workshops.
- **Case Studies and Best Practices:** Practical examples contributed by ICAO, EASA, IATA, CANSO, and States, illustrating successful KPI application.
- **Interactive Tools:** Calculators, quizzes, and self-assessment checklists to help focal points test their understanding of methodologies.
- **FAQ and Troubleshooting Section:** Continuously updated with clarifications on recurring questions raised by States.

- **Community Forum:** Moderated discussion space where focal points can exchange experiences, challenges, and solutions under ICAO supervision.

The website will be public and widely accessible, ensuring transparency and inclusivity. It will also be regularly updated to reflect lessons learned from each implementation phase.

The Interactive KPI Guidelines Website is intended as a knowledge-sharing and training tool rather than a reporting channel. Most of its content — including guidance modules, tutorials, case studies, FAQs, and interactive tools — will be openly accessible to all States and stakeholders. Certain features, such as community forums or advanced training modules, may require user registration for moderation purposes, but overall the website will remain public-facing. This open model ensures that guidance is widely available, promoting inclusivity and capacity-building across the region.

c. Integration between platforms

The portal and the interactive website will be complementary and interconnected:

- The portal will be the formal channel for quarterly submissions, regional dashboards, and access to authoritative documents.
- The website will serve as a training and familiarization tool, making it easier for States to apply the guidance when using the portal.
- Cross-links will allow users to move seamlessly between the two, ensuring coherence and reinforcing both platforms as parts of the same digital ecosystem.

d. Sustainability beyond 2028

Once the three implementation phases of the Action Plan are completed, the CAR/SAM KPI Portal and the Interactive Guidelines Website will remain active as permanent tools for monitoring, reporting, and training. They will serve not only the KPI framework but also future regional initiatives requiring structured reporting and capacity-building. Their creation therefore represents both a short-term enabler of this Action Plan and a long-term investment in the region's digital infrastructure for air navigation planning and performance monitoring.

6. Communication activities aligned with the Implementation Phases

Communication must evolve alongside the phased implementation of KPIs. Each phase requires targeted messages, clear materials, and specific events to guide States through the process. By linking communication activities directly to phases, the plan ensures coherence and continuity.

- **Phase 1 (April 2026 – March 2027 – Foundations):** Distribution of guidance, launch of portal and website, Kick-off Meeting, workshops, biannual meetings, and publication of the first integrated report.
- **Phase 2 (January 2027 – March 2028 – Expansion):** Updated guidance, webinars, readiness meeting, consolidated reporting cycles, interim evaluation, and publication of the Regional Integrated KPI Report (Phases 1 & 2).
- **Phase 3 (January 2028 – March 2029 – Consolidation):** Final guidance, technical Kick-off Workshop, biannual submissions, Best Practices Workshop, and Final Regional Integrated KPI Report.

These activities ensure that States always have access to the right tools and information at the right moment. Communication is not a one-time action but a continuous cycle that accompanies the entire implementation journey. By aligning communication directly with implementation milestones, States are continuously supported and reminded of their obligations.

7. Communication roles and responsibilities

Effective communication requires clarity about who is responsible for producing, transmitting, and applying information. The plan assigns responsibilities across all key actors to ensure accountability and collaboration:

- **GADHOC:** Provides strategic oversight and ensures communications remain aligned with GREPECAS objectives.
- **ICAO NACC and SAM Regional Offices:** Act as the operational backbone, managing communications, maintaining the portal, distributing guidance, and leading workshops.
- **EASA/EU–LAC APP:** Supports the development of training content and provides technical cooperation disseminated through the portal and workshops.
- **IATA and CANSO:** Contribute operational case studies and data that enrich the communication of KPIs.
- **CAR/SAM States:** Responsible for cascading guidance within their administrations, coordinating national data collection, and ensuring timely submissions.

By sharing responsibilities across this network, communication is ensured to be both top-down (from ICAO to States) and bottom-up (from States back to ICAO through feedback and reporting).

8. Communication monitoring and feedback

To be effective, communication must be continuously assessed and improved. Monitoring ensures that States are not only receiving information but also applying it effectively in their KPI reporting. Feedback mechanisms close the loop and allow communication tools to evolve based on user needs.

Monitoring will be achieved through:

- Portal analytics (usage rates, dashboard access, downloads from the repository).
- Participation records (attendance at meetings, webinars, and workshops).
- Quarterly reporting reviews (direct ICAO feedback on submissions).
- Annual surveys of national focal points to gauge clarity, accessibility, and effectiveness of guidance.

This continuous evaluation ensures that communication remains relevant, practical, and adapted to the realities of States. In doing so, it transforms communication from a one-way channel into an interactive process of learning and improvement.

9. Conclusions and next steps

The Communication Plan is not a supporting element but a core pillar of the Action Plan. It guarantees that the Regional Guidance Material, reporting templates, and integrated results are transmitted in a way that empowers States to act consistently and confidently. By combining traditional ICAO communication mechanisms with innovative digital tools like the KPI Portal, the Regional Dashboard,

and the interactive guidelines website, the region establishes a sustainable and transparent framework for collaboration.

To consolidate this approach, several recommendations are put forward:

- Place the Regional Guidance Material at the center of all communications and ensure it is updated regularly.
- Promote the KPI Portal as the default channel for reporting, accessing guidance, and consulting integrated results.
- Use the Interactive Guidelines Website to foster continuous learning and capacity-building.
- Ensure that communication remains two-way, with States providing feedback to ICAO on their needs and challenges.
- Maximize the participation of partners such as EASA, IATA, and CANSO in communication efforts to bring both technical and operational perspectives.
- Use monitoring and feedback results to continually refine communication strategies and adapt them to evolving regional needs.

In conclusion, this plan transforms communication from a simple transmission of information into a dynamic enabler of regional performance monitoring. By keeping States informed, engaged, and supported, it ensures that the CAR/SAM Region moves together toward the successful implementation of the GANP KPIs and sustains that progress well beyond 2028.