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Second CAR/SAM Planning and Implementation Regional Group (GREPECAS) Data Analysis Working Group (DAWG/02) Meeting
On-line, 5 – 6 October 2022

Participants List: refer to **Appendix A**)

1. Reference:

1.1 State Letter Ref.: NT-N1-15.7 — E.OSG-NACC94350 dated 8 September 2022 with the Invitation to the Second GREPECAS Data Analysis Working Group (DAWG/02) Meeting (DAWG/02).

2. Objectives:

a) Review the progress made since the DAWG/01 meeting and plan the next stage of tasks and activities defined in the DAWG work programme approved by GREPECAS that will be presented at the GREPECAS Programmes and Projects Committee (PPRC) Fifth Virtual Meeting (ePPRC/05) in April 2023.
b) Obtain public, non-confidential data related or not to the air navigation Key Performance Indicator (KPIs), through the Aviation Authorities in the Caribbean and South American (CAR/SAM) Regions.
c) Statistical analysis of exploratory, descriptive and predictive data sets and showing the perspectives obtained through graphical visualizations.
d) Data analysis processes (data processing, handling, transformation and cleaning).
e) Prepare information elements from the data analysis for the annual report.

3. Introduction

3.1 The DAWG members of the CAR/SAM States and Territories participated, and simultaneous interpretation in Spanish and English was provided.

4. Agenda

a) Review of the progress made by the DAWG
b) Memorandum of Understanding (MoU) (Refer to **Appendix B**)
c) Key Performance Indicators (KPIs) (Refer to **Appendices C and D**)
d) Data and Information Access Control Procedure and Policies (Draft version 1.0) (refer to **Appendix E**)
e) Identification of data sources and assignment of tasks to the DAWG Points of Contact (PoCs) Review and update of the DAWG Work Programme
f) Other business

4.1 <u>Topics considered for the DAWG/03 Meeting:</u>

a) Collection of the data identified as necessary to develop and implement the Dashboard of the air navigation KPIs
b) Identification of the analyses and their graphs to be represented in the GREPECAS Dashboard

c) Preparation of an outline of the annual monitoring report on the status of the KPIs of the Global Air Navigation Plan (GANP) to GREPECAS

5. Follow-up general aspects

5.1 Group Progress

5.1.1 The progress made by the DAWG was reported: MoU and KPIs, , as well as the initial version of the document on Procedures and Policies for the Control of Access to Data and Information to define the versions to be presented at the next GREPECAS meetings, as well as the request to the States for their Agreement and completion of the KPIs.

5.1.2 The progress made by the DAWG is as follows :

a) MoU
b) KPIs to define the versions to be presented in the next GREPECAS meetings, and the request to the States for their agreement and completion in the case of the KPIs.
c) Discussion and review of the initial version 1.0 (draft) on Procedures and Policies for Control of Access to Data and Information.
d) DAWG Action List and Deadlines
e) Colombia mentioned that it has a new Analysis Department

5.2 Establishment of GREPECAS/Dashboard management and access control procedures

a) Review with the Information Technologies (IT) Area of the ICAO Regional NACC/SAM Offices access control procedures.
b) Define the harmonization of the work of GRP and CAR/SAM Air Navigation Plan (ANP)-Vol. III regarding the data and the participation of the States.
c) Regarding the ANP-Vol project. III, this would be done in stages, so as not to duplicate and/or overload data providers, so the DAWG will be involved in the validation and analysis of KPI data.
d) Identify Points of Contact (PoCs) of the States, Territories, International Organizations, and others involved, for data collection and other pertinent coordination.

5.3 Coordination of the data necessary to develop and implement the Dashboard of the KPIs

a) Coordinate with the ICAO Air Navigation Services (ANS) (CAR/SAM) Regional Officers, what was requested by GREPECAS for ANP Vol. III in addition to what was expressed in the DAWG Terms of Reference (ToRs) and work programme, previously approved.

6. Final recommendations

6.1 Comments were made on the contact with the IT team of the Regional Offices to start discussions on the access to a site where the data that will be the source of the dashboard be stored.

6.2 The idea of addressing the proposed GANP indicators for Vol. III of the CAR/SAM as an additional task of the Group, in addition to those already identified was explained.

6.3 In this sense, a list of indicators will be developed with their respective variables in order to understand which data will be required from the States. This topic will be the first to deal with.

6.4 This is the link to access the form:

https://forms.office.com/r/FCPwW8uYRh

6.5 It was recommended to review and follow what is indicated in the ICAO Second Edition **"Cybersecurity Action Plan": https://bit.ly/40bwIRC**

7. Chart of agreed action Items

7.1 Three phases or steps were proposed to move forward with the Group's most immediate tasks (refer to **Appendix E**):

a) Share information
b) Know what is available and what is needed by each CAR/SAM State in relation to the KPIs required by GREPECAS
c) Receive information and data from the States
d) Request specific information and data
e) Determine the appropriate analyses
f) Find out from GREPECAS its requirements
g) Argentina could create a repository through ICAO for the information and data.

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APPENDIX A / APÉNDICE A

Second GREPECAS Data Analysis Working Group Meeting
Segunda Reunión del Grupo de Trabajo de Análisis de Datos del GREPECAS
(DAWG/02)
On-line, 5 -6 October 2022 / En línea, 5 – 6 de octubre de 2022

LIST OF PARTICIPANTS / LISTA DE PARTICIPANTES

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1. Claus Hinrichs
2. Moira Callegare
3. Mariana Claudia Etchevest

BRAZIL/BRASIL
4. Adriano Duarte da Silva
5. Ricardo David
6. José Mauricio da Conceição Rocha
7. Rafael Domingos Rodrigues

COLOMBIA
8. Harlen Mejia Oliveros

CUBA
9. Maidy Plana

DOMINICAN REPUBLIC/REPUBLICA DOMINICANA
10. Carlos Eduardo Santana Checo
11. Roosevelt Pena Mendez

GUATEMALA
12. Mario Roberto Grajeda García

UNITED STATES/ESTADOS UNIDOS
13. Norma Campos
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ICAO/OACI
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17. Jorge Armoa
18. Sereya Schotborgh

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APPENDIX B / APÉNDICE B

Memorandum of Understanding Template
Plantilla de Memorando de Entendimiento

Prepared for:
Preparado para:

PartnerA.FirstName] [PartnerA.LastName]
[PartnerA.Company]
Nombre Socio/a A] [Apellido Socio/a A]
[Socio/a A. Empresa]

Created by:
Creado por:

[PartnerB.FirstName] [PartnerB.LastName]
[PartnerB.Company]
Nombre Socio/a B] [Apellido Socio/a B]
[Socio/a B. Empresa]

This Memorandum of Understanding (MoU) is an agreement between two or more parties who want to share information and data. This MoU is drafted for future sharing, as well as possible partnerships and joint activities. This MoU does not bind Parties to any legal obligations.. The MoU initiates the sharing relationship by describing the intentions of each party.
Este Memorándum de entendimiento (MoU) es un acuerdo que dos o más partes celebran que desean compartir información y datos. Se redacta este MoU para futuras comparticiones, así como para posibles asociaciones y actividades conjuntas. Este MoU no vincula a las Partes con ninguna obligación legal. El MoU inicia la relación de compartición al describir las intenciones de cada parte.

This MoU is entered on the *(number)* day of *month)* n *(year)* (herein referred to as the "Effective Date") into by and between:
Este MoU se registra el (número) día de (mes) en (año) (en adelante, la "Fecha de entrada en vigencia") por y entre:

[Partner A. First Name] [Partner A. Last Name] of [Partner A. Company] of [Partner A. Street Address] [Partner A. City] [Partner A. State] [Partner A. Postal Code] (herein referred to as "Partner A") and
[Nombre Socio/a A] [Apellido Socio/a A] de [Compañía Socio/a A.] de [Dirección Socio/a A] [Ciudad Socio/a A] [Estado Socio/a A] [Código Postal Socio/a A] (aquí referido como "Socio/a A.") y

[Partner B. First Name] [Partner B. Last Name] of [Partner B. Company] of [Partner B. Street Address] [Partner B. City] [Partner B. State] [Partner B. Postal Code] (herein referred to as "Partner B").
[Socio/a B. Nombre] [Socio/a B. Apellido] de [Socio/a B Compañía] de [Socio/a B. Dirección] [Socio/a B. Ciudad] [Socio/a B. Estado] [Socio/a B. Código Postal] (aquí referido como "Socio/a B.").

Parties may be referenced individually as "Party" and collectively as "Parties".
Las partes pueden ser referenciadas individualmente como "Parte" y colectivamente como "Partes".

Recitals:
Considerandos:

WHEREAS, Partner A is in the business of *(Enter specific activities here. Include information on the business' industry, specialized expertise, organizational mission, and other details relevant to the potential partnership).*

***POR CUANTO**, el/la Socio/a A está en el negocio de (Ingrese actividades específicas aquí. Incluya información sobre la industria del negocio, experiencia especializada, misión organizacional y otros detalles relevantes para la asociación potencial).*

WHEREAS, Partner B is in the business of *(Enter specific, relevant activities here).*
POR CUANTO, el/la Socio/a B está en el negocio de (Ingrese actividades específicas y relevantes aquí).

WHEREAS, Partner A wishes to (Enter Partner A's intent for the partnership. For example: "to engage with a strategic partner for specialized activities" or "to engage with a partner for better safety development and better decision-making of decisions").
POR CUANTO, el/la Socio/a A desea (Ingrese la intención del/de la Socio/a A para la asociación. Por ejemplo: "comprometerse con un/a socio/a estratégico/a con respecto a actividades especializadas" o "comprometerse con un/a socio para lograr un mejor desarrollo de la seguridad operacional y una mejor toma de decisiones").

WHEREAS, Partner B desires to *(Enter Partner B's intention for the partnership).*
POR CUANTO, el/la Socio/a B desea (Ingrese la intención del/de la Socio/a B para la asociación).

WHEREAS, Parties collectively desire to enter into this MOU to memorialize the terms and conditions of their anticipated collaboration.
POR CUANTO, las Partes colectivamente desean celebrar este MoU para conmemorar los términos y condiciones de su colaboración anticipada.

NOW, THEREFORE, the Parties agree to the following terms and conditions:
AHORA, POR LO TANTO, las Partes acuerdan los siguientes términos y condiciones:

A. Purpose
A. propósito

The purpose of this MoU is to establish a good-faith foundation between the Parties for future collaborative efforts that are mutually beneficial. The Parties agree to work together in a cooperative and coordinated manner to achieve each Party's individual desires and the collective desires of the partnership.
El propósito de este MoU es establecer una base de buena fe entre las Partes para futuros esfuerzos de colaboración que sean mutuamente beneficiosos. Las Partes acuerdan trabajar juntas de manera cooperativa y coordinada para lograr los deseos individuales de cada Parte y los deseos colectivos de la asociación.

This MoU is designed to detail the specific elements of the working relationship between the Parties to vet the success of the potential collaboration. This MoU does not obligate the Parties to provide funds or payment. This MoU does not bind Parties to any legal obligations.

Este MoU está diseñado para detallar los elementos específicos de la relación de trabajo entre las Partes para evaluar el éxito de la posible colaboración. Este MoU no obliga a las Partes a proporcionar fondos o pagos. Este MoU no vincula a las Partes con ninguna obligación legal.

By their nature, MoU is not legally binding.

Instead, these documents serve as a paper trail for parties interested in doing activities together. Each party must dedicate time and effort to draft and understand the terms of their collaborative interests. Because MoU do not hold up to legal challenges, it is not necessary to list long-winded provisions such as governing law, severability, or binding in the MoU.
Por su naturaleza, el MoU no es legalmente vinculante.

En cambio, estos documentos sirven como prueba documental para las partes interesadas en hacer actividades juntas. Cada parte debe dedicar tiempo y esfuerzo para redactar y comprender los términos de sus intereses de colaboración. Debido a que el MoU no resiste los desafíos legales, no es necesario que enumere disposiciones prolijas, como la ley aplicable, la separabilidad o la vinculación en el MoU.

B. Roles and responsibilities
B. Funciones y responsabilidades

To achieve Parties' mutual desires, each Party agrees to the following roles and responsibilities:
Para lograr los deseos mutuos de las Partes, cada Parte acepta los siguientes roles y responsabilidades:

- Roles and responsibilities of Partner A will include (Enter Partner A's responsibilities here. Please be as specific as possible and list information directly related to Partner A's activities and wishes as stated in the recitals. Include details such as requirements for reports, dates of activities, deadlines, and other pertinent information that should be taken into account).
- Las funciones y responsabilidades del/de la Socio A incluirán (Ingrese las responsabilidades del/de la Socio/a A aquí. Sea lo más específico/a posible y enumere la información directamente relacionada con las actividades y los deseos del/de la Socio/a A como se indica en los considerandos. Incluya detalles como requisitos de informes, fechas de actividades, fechas límite, y otra información pertinente que deba tenerse en cuenta).

- Partner B Roles and Responsibilities shall include *(Enter Partner B's responsibilities).*

- Parties agree to uphold their roles and responsibilities in a committed, good-faith manner.

- Las funciones y responsabilidades del/de la Socio/a B incluirán (Ingrese las responsabilidades del/de la Socio B).

- Las partes acuerdan cumplir con sus roles y responsabilidades de manera comprometida y de buena fe.

C. Resources
C. Recursos

To further the relationship between the Parties, the Parties agree to provide the following resources.
Para promover la relación entre las Partes, las Partes acuerdan proporcionar los siguientes recursos.

Part A will provide (Enter resources here. This would include provision of data and information, provision of support, dedication of specialized staff, application of technology, or related resources. As always, please be specific and include a description of the resources and of specialized skills and other pertinent information that should be noted).
La Parte A proporcionará (Ingrese los recursos aquí. Esto incluiría el suministro de datos e información la prestación de apoyo, la dedicación de personal especializado, la aplicación de tecnología o recursos relacionados. Como siempre, sea específico/a e incluya la descripción los recursos y de habilidades especializadas y otra información pertinente que deba ser señalada).

Party B shall provide *(Enter resources here):*
La Parte B deberá proporcionar (Ingrese los recursos aquí):

-
-

– …

Parties agree to provide the resources above at a minimum. The Parties may agree to provide additional resources in future agreements.
Las Partes acuerdan proporcionar los recursos anteriores como mínimo. Las Partes pueden acordar proporcionar recursos adicionales en futuros acuerdos.

D. Confidentiality
D. Confidencialidad

Parties agree that they each use confidential, sensitive information to achieve their individual goals. Due to the nature of the Parties' activities and intent to establish a working relationship together, confidential information may be shared between the Parties.
Las Partes acuerdan que cada una de ellas utiliza información confidencial y sensible para lograr sus objetivos individuales. Debido a la naturaleza de las actividades de las Partes y la intención de establecer una relación de trabajo en conjunto, las Partes pueden compartir información confidencial.

The Parties agree to keep all confidential information and organizational secrets in the strictest confidence during the relationship. The Parties may not share any disclosed confidential information with unauthorized third parties. The Parties may, enter at their discretion, into a Confidentiality Agreement to ensure that confidential information and trade secrets are kept confidential.
Las Partes acuerdan mantener toda la información confidencial y los secretos organizacionales en la más estricta confidencialidad durante la relación. Las Partes no pueden compartir ninguna información confidencial divulgada con terceros no autorizados. Las Partes pueden, a su discreción, celebrar un Acuerdo de Confidencialidad para garantizar que la información confidencial y los secretos comerciales se mantengan confidenciales.

The MoU is not legally binding.

However, the inclusion of a confidentiality provision in your MoU explains that Parties intend to keep confidential information and organizational secrets private during the relationship between them. Specify that the Parties may choose to keep confidential information confidential by entering into an additional specific confidentiality agreement, which is more legally binding than this MOU.
El MoU no es legalmente vinculante.

Sin embargo, la inclusión de una disposición de confidencialidad en su MoU explica que las Partes tienen la intención de mantener la información confidencial y los secretos organizacionales privados durante la relación entre ellas. Especifique que las Partes pueden optar por mantener la confidencialidad de la información confidencial mediante la celebración de un acuerdo adicional específico de confidencialidad, que es más vinculante legalmente que este MoU.

E. Entire agreement
E. Acuerdo completo

The Parties agree that this MoU represents the most current agreement between the Parties and supersedes all other prior written or oral agreements. If the Parties wish to update the terms or adjust the provisions of this MoU, the Parties shall do so by drafting and signing a new MoU or partnership agreement.
Las Partes acuerdan que este MoU representa el acuerdo más actual entre las Partes y reemplaza todos los demás acuerdos escritos u orales previos. Si las Partes desean actualizar los términos o ajustar las disposiciones de este MoU, deberán hacerlo mediante la redacción y firma de un nuevo MoU o contrato de asociación.

F. Term and termination
F. Plazo y rescisión

This agreement shall be effective from the Effective Date of this MoU until *(MoU end date)*. Both Parties may terminate this MoU by means of signing a termination addendum.
The undersigned Parties acknowledge and agree to this MoU:
Este acuerdo entrará en vigencia a partir de la Fecha de entrada en vigencia de este MoU hasta (fecha de finalización del MoU). Ambas Partes pueden rescindir este MoU mediante la firma de un anexo de rescisión.
Las Partes abajo firmantes reconocen y aceptan este MoU:

[Sender. Company]	[Client. Company]
Signature	**Signature**
MM/DD/YYYY	MM/DD/YYYY
[Sender. First Name] [Sender. Last Name]	[Client. First Name] [Client. Last Name]
[Remitente. Empresa]	[Cliente. Empresa]
Firma	**Firma**
MM/DD/YYYY	MM/DD/YYYY
[Remitente. Nombre] [Remitente. Apellido]	[Cliente. Nombre] [Cliente. Apellido]

APÉNDICE C / APPENDIX C

Key Performance Indicators (KPI)
Indicadores Clave de Rendimiento (KPI)

	Action Item Acción	General Description Descripción general	Deadline Fecha Límite
1	Review of Draft MoU Revisión de borrador MoU	Improve the Document with the review of the DAWG, to generate a new version Mejorar el Documento con la revisión del DAWG, para generar una nueva versión	17-05-23
2	Review of Draft KPIs Revisión de borrador KPI	Define the KPIs that apply to the definition of categories or blocks of States Definir los KPI que apliquen a la definición de categorías o bloques de Estados	1º. semestre 2023 1st.semester 2023
3	Review of Draft Policy and Procedures Revisión de Borrador de Política y Procedimientos	Improve the Document with the review of the DAWG, to generate a new version Mejorar el Documento con la revisión del DAWG, para generar una nueva versión	
4	ToRs improvement Mejora de los ToR	Improve the Document with the ICAO review, to generate a new version Mejorar el Documento con la revisión de la OACI, para generar una nueva versión	
5	Survey to States Encuesta a los Estados	Request a list of possible Providers for each State, according to the identified variables. Hold an intermediate meeting in the first semester 2023 Solicitar una relación de los posibles Proveedores por cada Estado, de acuerdo con las variables identificadas. Realizar una reunión intermedia en primer semestre de 2023	
6	Prepare the State Letter to the for their participation in the work of the DAWG Preparar la Comunicación a los Estados para su participación en los trabajos del DAWG	Inform about the role of the States with respect to the work of the DAWG Informar el papel que tienen los Estados en el trabajo del DAWG	17-05-23
7	Definition of initial tasks of the DAWG Definición de tareas iniciales del DAWG	Identify the most immediate tasks of the DAWG, as a Table with estimated deadlines Identificar las tareas más inmediatas del DAWG, a manera de Tabla con fechas límite estimadas	
8	It will be sought to establish the Points of Contact (PoC) in the States and International Organizations Se buscará establecer los Puntos de contacto (PoC) en los Estados y Organizaciones Internacionales	Identify data sources for analysis and presentation to GREPECAS through a dashboard to be integrated Identificar las fuentes de datos para su análisis y presentación al GREPECAS por medio de un cuadro de mando a ser integrado	

		KPI ID																		
Variable	**Description**	**Potential Supplier**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
STA	Scheduled Time Arrival	Concesionary														x					
AOBT	Actual off-block time	Aircraft movement registry/ OOOI data: gate “out” (Actual off-block time, AOBT), wheels “off,” wheels “on,” and gate “in” (Actual in-block time, AIBT) actual times.	x	x													x				
ALDT	Actual landing time	Aircraft movement registry								x		x	x		x						
ATOT	Actual Take-off time	Aircraft movement registry		x	x							x	x								
SIBT	Scheduled in-block time	Questionnaire														x					
AIBT	Actual in-block time	Airports (airport operations), airlines, (OOOI data), Automatic dependent surveillance - broadcast (ADS-B) data providers and/or Air Navigation Service Providers (ANSPs)													x	x	x				
CTOT	Calculated Take-off time	Airports, Air traffic flow management (ATFM) service			x				x					x							
ETOT	Estimated Take-off time	ATFM							x				x	x							
ELDT	Estimated landing time	Airports											x								
STD	Scheduled Time of departure	Concesionary	x																		
SOBT	Scheduled Off-block time	Concesionary	x																		
Wheels on		Aircraft movement registry / OOOI data: gate “out” (AOBT), wheels “off,” wheels “on,” and gate “in” (AIBT) actual times.															x				
Wheels off		Aircraft movement registry / OOOI data: gate “out” (AOBT), wheels “off,” wheels “on,” and gate “in” (AIBT) actual times.															x				
Arrival airport		For variant 1: ANSPs; For variant 2: Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs				x														x	
Landing runway ID		Airlines (OOOI data), airports, ADS-B data providers and/or ANSPs								x											
Departure airport		For variant 1: ANSPs; For variant 2: Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs				x	x													x	
Maximum cruise Flight Level		For variant 1: ANSPs; For variant 2: Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs																			x
Departure Gate ID (Optional)		Airports (airport operations, Airport Collaborative Decision Making, A-CDM), airlines (OOOI data), ADS-B data providers and/or ANSPs		x																	

Variable	Description	Potential Supplier	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Take-off runway ID (optional)		Airports (airport operations, A-CDM), airlines (OOOI data), ADS-B data providers and/or ANSPs		x																	
ADR	Airport Departure Rates	Runway capacity measurement									x										
AAR	Airport Acceptance Rates	Runway capacity measurement									x										
Arrival airport ARP coordinates		Airlines																			x
Departure airport ARP coordinates		Airlines																	x		
Declared total capacity of the airport		Airports											x								
Entry point in the 'Reference area' (Point O)		ATM System				x	x														
Exit point from the 'Reference area' (Point D)		ATM System				x	x														
Entry points in the 'Measured areas' (Points N)		ATM System				x	x														
Delay code associated with the flow restriction		ATFM							x					x							
Exit points from the 'Measured areas' (Points X)		ATM System				x	x														
Planned distance for each NX portion of the flight		ATM System				x															
Scheduling parameters for slot controlled airports		Runway capacity measurement									x										
ID of the flow restriction generating the ATFM delay		ATFM							x					x							
Airspace volume associated with the flow restriction		ATFM							x												
4D data points (latitude, longitude, altitude and time)		Airlines																	x		x
For each time interval: Declared landing capacity of the airport		Airports											x								
Airport or terminal airspace volume associated with the flow restriction		ATFM												x							
Terminal airspace entry time, computed from surveillance data (radar, ADS-B…)		Airlines (OOOI data), airports, ADS-B data providers and/or ANSPs								x											

Variable	Description	Potential Supplier	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Distance flown for each NX portion of the actual flight trajectory, derived from surveillance data (radar, ADS-B…)		ATM System					x														
Terminal airspace entry segment, computed from surveillance data (radar, ADS-B…)		Airlines (OOOI data), airports, ADS-B data providers and/or ANSPs								x											
The various capacities are determined by the ANSP, and are dependent on traffic pattern, sector configuration, ATCO and system capability, etc.		ANSPs						x													

VOL III	KPI	Name	V1	V2	V3	V4	V5	V6	V7	Supplier
x	KPI 01	Departure Punctuality	STD/SOBT	AOBT						Concensionary
x	KPI 04	Filed flight plan en-route extension	Departure airport (Point A)	Destination airport (Point B)	Entry point in the 'Reference area' (Point O)	Exit point from the 'Reference area' (Point D)	Entry points in the 'Measured areas' (Points N)	Exit points from the 'Measured areas' (Points X)	Planned distance for each NX portion of the flight	ATM System
x	KPI 05	Actual en-route extension	Departure airport (Point A)	Destination airport (Point B)	Entry point in the 'Reference area' (Point O)	Exit point from the 'Reference area' (Point D)	Entry points in the 'Measured areas' (Points N)	Exit points from the 'Measured areas' (Points X)	Distance flown for each NX portion of the actual flight trajectory, derived from surveillance data (radar, ADS-B…)	ATM System
x	KPI 09	Airport peak capacity	Scheduling parameters for slot controlled airports	Airport Acceptance Rates (AAR), Airport Departure Rates (ADR)						Runway capacity measurement
x	KPI 10	Airport peak throughput	ALDT	ATOT						Aircraft movement registry
x	KPI 14	Arrival Punctuality	STA	SIBT	AIBT					Concensionary
x	KPI 15	Flight time variability	AOBT	Wheels off	Wheels on	AIBT				Aircraft movement registry / OOOI data: gate "out" (AOBT), wheels "off," wheels "on," and gate "in" (AIBT) actual times.
x	KPI17	Level-off during climb	4D data points (latitude, longitude, altitude and time)	Departure airport ARP coordinates						Airlines
x	KPI19	Level-off during descent	4D data points (latitude, longitude, altitude and time)	Arrival airport ARP coordinates						Airlines
	KPI 02	Taxi out additional time	AOBT	ATOT	Departure Gate ID (Optional)	Take-off runway ID (optional)				Airports (airport operations, A-CDM), airlines (OOOI data), ADS-B data providers and/or ANSPs
	KPI 03	ATFM slot adherence	CTOT	ATOT						Airports, ATFM service
	KPI 06	En-route airspace capacity	The various capacities are determined by the ANSP, and are dependent on traffic pattern, sector configuration, ATCO and system capability, etc.							ANSPs
	KPI 07	En-route ATFM delay	ETOT	CTOT	ID of the flow restriction generating the ATFM delay	Airspace volume associated with the flow restriction	Delay code associated with the flow restriction			ATFM
	KPI 08	Additional time in terminal airspace	For each arriving flight:Terminal airspace entry time, computed from surveillance data (radar, ADS-B…)	ALDT	In addition, for the advanced KPI variants: Terminal airspace entry segment, computed from surveillance data (radar, ADS-B…)	Landing runway ID				Airlines (OOOI data), airports, ADS-B data providers and/or ANSPs
	KPI 11	Airport throughput efficiency	ALDT	ATOT	ELDT	ETOT	For each time interval: Declared landing capacity of the airport	Declared total capacity of the airport		Airports
	KPI 12	Airport/Terminal ATFM delay	ETOT	CTOT	ID of the flow restriction generating the ATFM delay	Airport or terminal airspace volume associated with the flow restriction	Delay code associated with the flow restriction			ATFM

VOL III	KPI	Name	V1	V2	V3	V4	V5	V6	V7	Supplier
	KPI 13	Taxi in additional time	ALDT	AIBT						Airports (airport operations), airlines (OOOI data), ADS-B data providers and/or ANSPs
	KPI 16	Additional fuel burn	Indicator values to be converted to estimated additional fuel burn: KPI02 Taxi-Out Additional Time (min/flight) KPI13 Taxi-In Additional Time (min/flight) KPI05 Actual en-Route Extension (%) & average en-route distance flown (km/flight) KPI08 Additional time in terminal airspace (min/flight) KPI17 Level-off during climb KPI18 Level capping during cruise & average cruise (ToC-ToD) distance flown (km/flight) KPI19 Level-off during descent							Performance analysts
	KPI18	Level capping during cruise	For each flight trajectory: Maximum cruise Flight Level	Departure airport	Arrival airport					For variant 1: ANSPs; For variant 2: Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs

ICAO GANP PORTAL

KPI OVERVIEW

KPI01	Departure punctuality
Definition	Percentage of flights departing from the gate on-time (compared to schedule).
Mesurement Units	% of scheduled flights
Operations Measured	IFR departures of scheduled airlines
Variants	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
Objects Characterized	The KPI is typically computed for traffic flows, individual airports, or clusters of airports (selection/grouping based on size and/or geography).
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.
Parameters	On-time threshold (maximum positive or negative deviation from scheduled departure time) which defines whether a flight is counted as on-time or not. Recommended values: 5 minutes and 15 minutes.
Data Requirement	For each departing scheduled flight: • Scheduled time of departure (STD) or Scheduled off-block time (SOBT) • Actual off-block time (AOBT)
Data Feed Providers	Schedule database(s), airports, airlines and/or ANSPs
Formula / Algorithm	At the level of individual flights: 1. Exclude non-scheduled departures 2. Categorize each scheduled departure as on-time or not At aggregated level: 3. Compute the KPI: number of on-time departures divided by total number of scheduled departures

References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • China / Europe benchmarking study (CAUC - EUROCONTROL, 2017)

KPI02	Taxi-out additional time
Definition	Actual taxi-out time compared to an unimpeded/reference taxi-out time.
Mesurement Units	Minutes/flight
Operations Measured	The duration of the taxi-out phase of departing flights
Variants	Variant 1 – basic (computed without departure gate and runway data) Variant 2 – advanced (computed with departure gate and runway data)
Objects Characterized	The KPI is typically computed for individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI is intended to give an indication of the efficiency of the departure phase operations on the surface of an aerodrome. This may include the average queuing that is taking place in front of the departure runways, non-optimal taxi routing and intermediate aircraft stops during taxi-out. The KPI is also typically used to estimate excess taxi-out fuel consumption and associated emissions (for the Environment KPA). The KPI is designed to filter out the effect of physical airport layout while focusing on the responsibility of ATM to optimize the outbound traffic flow from gate to take-off.
Parameters	Unimpeded/reference taxi-out time: • Recommended approach for the basic variant of the KPI: a single value at airport level, e.g. the 20th percentile of actual taxi times recorded at an airport, sorted from the shortest to the longest. • Recommended approach for the advanced variant of the KPI: a separate value for each gate/runway combination, e.g. the average actual taxi-out time recorded during periods of non-congestion (needs to be periodically reassessed).
Data Requirement	For each departing flight: • Actual off-block time (AOBT) • Actual take-off time (ATOT) In addition, for the advanced KPI variant: • Departure gate ID • Take-off runway ID
Data Feed Providers	Airports (airport operations, A-CDM), airlines (OOOI data), ADS-B data providers and/or ANSPs

Formula / Algorithm	At the level of individual flights: 1. Select departing flights, exclude helicopters 2. Compute actual taxi-out duration: ATOT minus AOBT 3. Compute additional taxi-out time: actual taxi-out duration minus unimpeded taxi-out time At aggregated level: 4. Compute the KPI: sum of additional taxi-out times divided by number of IFR departures
References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • Singapore / US / Europe benchmarking study (CAAS - FAA - EUROCONTROL, 2017) • China / Europe benchmarking study (CAUC - EUROCONTROL, 2017) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Single European Sky Performance Scheme • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI03	ATFM slot adherence
Definition	Percentage of flights taking off within their assigned ATFM slot (Calculated Take-Off Time Compliance).
Mesurement Units	% of flights subject to flow restrictions
Operations Measured	The take-off of IFR flights subject to flow restrictions.
Variants	Variants are possible depending on the size of the ATFM slot window.
Objects Characterized	The KPI is typically computed for individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI gives an indication of the capability of an airport to contribute to ATFM effectiveness by delivering outbound traffic in a predictable manner to the departure runway, in compliance with assigned ATFM slots.
Parameters	Size of the ATFM slot window. Variant 1: the period between 5 minutes before and 10 minutes after the CTOT. Variant 2: the period between 5 minutes before and 5 minutes after the CTOT.
Data Requirement	For each departing IFR flight subject to an ATFM regulation: • Calculated Take-Off Time (CTOT) • Actual take-off time (ATOT)
Data Feed Providers	Airports, ATFM service

Formula / Algorithm	At the level of individual flights: 1. Exclude flights not subject to an ATFM regulation 2. Categorize each departing flight as compliant with its ATFM slot window or not At aggregated level: 3. Compute the KPI: number of compliant departures divided by total number of departing flights subject to an ATFM regulation
References & Examples of Use	• PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Slot Tolerance Window (STW) compliance (Single European Sky Performance Scheme) • EDCT Window compliance (US) • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI04	Filed flight plan en-route extension
Definition	Flight planned en-route distance compared to a reference ideal trajectory distance.
Mesurement Units	% excess distance
Operations Measured	The planned en-route distance, as selected during the preparation of flight plans.
Variants	Variant 1, using a 40 NM cylinder around the departure and destination airport as the start/end of en-route airspace. Variant 2, using a 40 NM cylinder around the departure airport and a 100 NM cylinder around the destination airport as the start/end of en-route airspace.
Objects Characterized	The KPI can be computed for any volume of en-route airspace; this implies that it can be computed at State level (covering the FIRs of a State).
Utility of the KPI	This KPI measures the en-route horizontal flight (in)efficiency contained in a set of filed flight plans crossing an airspace volume. Its value is influenced by route network design, route & airspace availability, airspace user choice (e.g. to ensure safety, to minimize cost and to take into account wind and weather) and airspace user constraints (e.g. overflight permits, aircraft limitations). A significant gap between this KPI and the Actual en-Route Extension KPI indicates that many flights are not flown along the planned route, which should trigger an analysis of why this is happening.
Parameters	A '*Measured area'* is defined for which the KPI is computed. For example, a State. A '*Reference area*' is defined as a (sub)regional boundary considered, containing all '*Measured areas'*, for example States within the same ICAO Region. Departure terminal area proxy: a cylinder with 40 NM radius around the departure airport. Destination terminal area proxy: a cylinder with 40 NM radius around the destination airport (variant 1). For variant 2 the radius is 100 NM.

Data Requirement

For each flight plan:

- Departure airport (Point A)
- Destination airport (Point B)
- Entry point in the '*Reference area'* (Point O)
- Exit point from the '*Reference area'* (Point D)
- Entry points in the '*Measured areas'* (Points N)
- Exit points from the '*Measured areas'* (Points X)
- Planned distance for each NX portion of the flight

Data Feed Providers

ANSPs

Formula / Algorithm

For the horizontal trajectory of each flight, different parts (trajectory portions) are considered (see Figure 1 for the example of a flight departing outside the '*Reference Area*' and overflying a measured State; Figure 2 for the example of a domestic flight within a measured State):

1. The part of the flight which is within the reference area (segment OD). If airports A and/or B are located within the reference area, the points O and/or D are placed on the airport reference point (ARP).
2. The part of the flight for which the State level indicator is computed (between points N and X). If points A and/or B (the airports) are located within the measured State, the points N and/or X are placed on the 40 NM circle (variant 1) around the airport reference point as shown in Figure 2, to exclude terminal route efficiency from the indicator.

Between points N and X, three quantities can be computed: the planned distance (length of flight plan trajectory), the local direct distance (great circle distance between N and X, not required for this indicator), and the contribution of the trajectory between N and X to the completion of the great circle distance between O and D. This contribution is called the "achieved distance". The formula for computing this is based on four great circle distances interconnecting the points O, N, X and D: achieved distance = [(OX-ON)+(DN-DX)]/2.

When a given flight traverses multiple States, the sum of the planned distance in each State equals the total planned distance from O to D. Likewise the sum of all achieved distances equals the direct distance from O to D.

The extra distance for a portion NX of a given flight is the difference between the actual/flight planned distance and the achieved distance. The total extra distance observed within a measured area (e.g. a State) over a given time period is the sum of the planned distances across all traversing flights, minus the sum of the achieved distances across all traversing flights.

The KPI is computed as the total extra distance divided by total achieved distance, expressed as a percentage.

References & Examples of Use

- ICAO EUR Doc 030 EUR Region Performance Framework Document (July 2013)
- Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016)
- PRC Performance Review Report (EUROCONTROL 2017)
- European ANS Performance Data Portal
- Single European Sky Performance Scheme
- CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

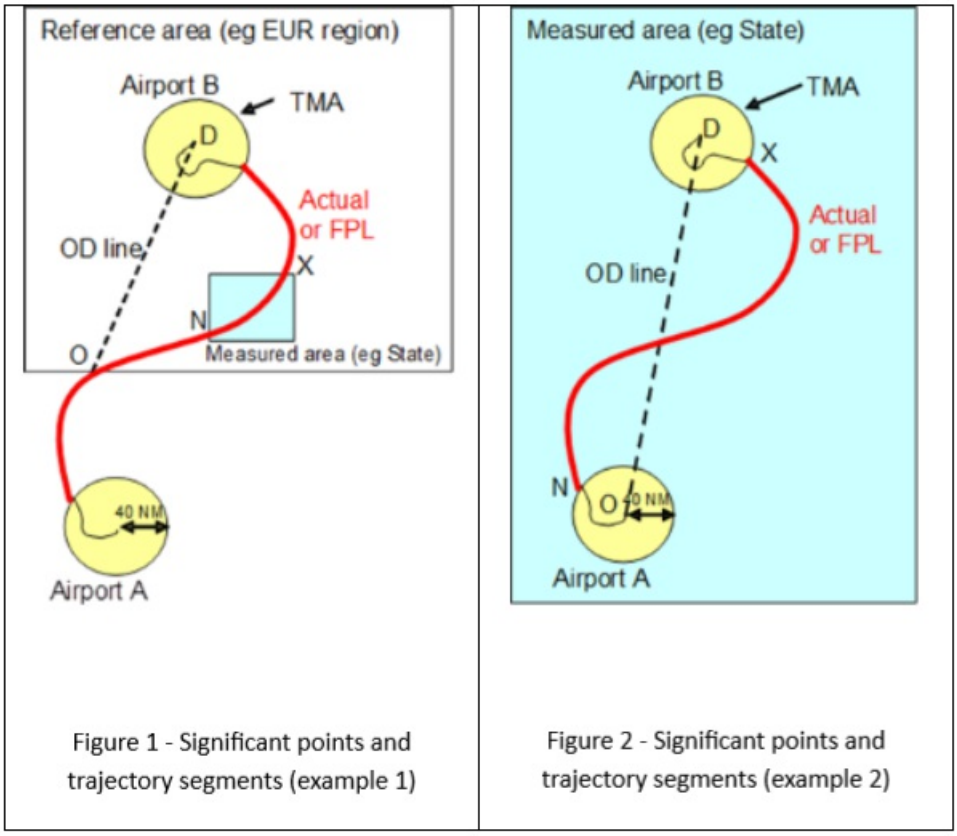

Figure 1 - Significant points and trajectory segments (example 1)

Figure 2 - Significant points and trajectory segments (example 2)

Significant points and trajectory segments (examples 1 and 2)

KPI05	Actual en-route extension
Definition	Actual en-route distance flown compared to a reference ideal distance.
Mesurement Units	% excess distance
Operations Measured	The actual distance flown by flights in en-route airspace.
Variants	Variant 1, using a 40 NM cylinder around the departure and destination airport as the start/end of en-route airspace. Variant 2, using a 40 NM cylinder around the departure airport and a 100 NM cylinder around the destination airport as the start/end of en-route airspace.
Objects Characterized	The KPI can be computed for a traffic flow or a volume of en-route airspace; this implies that it can be computed at State level (covering the FIRs of a State).
Utility of the KPI	This KPI measures the en-route horizontal flight (in)efficiency as actually flown, of a set of IFR flights crossing an airspace volume. Its value is influenced by route network design, route & airspace availability, airspace user choice (e.g. to ensure safety, to minimize cost and to take into account wind and weather) and airspace user constraints (e.g. overflight permits, aircraft limitations), and tactical ATC interventions modifying the trajectory (e.g. reroutings and ‘direct to’ clearances). The KPI is also typically used to estimate the excess fuel consumption and associated emissions (for the Environment KPA) attributed to horizontal flight inefficiency.

Parameters	Identical to the parameters of the ‘Filed Flight Plan en-Route Extension’ KPI.
Data Requirement	For each actual flight trajectory: • Departure airport (Point A) • Destination airport (Point B) • Entry point in the ‘Reference Area’ (Point O) • Exit point from the ‘Reference Area’ (Point D) • Entry points in the ‘Measured Areas’ (Points N) • Exit points from the ‘Measured Areas’ (Point X) • Distance flown for each NX portion of the actual flight trajectory, derived from surveillance data (radar, ADS-B…).
Data Feed Providers	ANSPs, ADS-B data providers
Formula / Algorithm	Identical to the formula/algorithm of the ‘Filed Flight Plan en-Route Extension’ KPI.
References & Examples of Use	• ICAO EUR Doc 030 EUR Region Performance Framework Document (July 2013) • Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Single European Sky Performance Scheme • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI06	En-route airspace capacity
Definition	The maximum volume of traffic an airspace volume will safely accept under normal conditions in a given time period.
Mesurement Units	Variant 1: Movements/hr Variant 2: Number of aircraft (occupancy count)
Operations Measured	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 to be considered: • 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 finalised at the end of the pre-tactical process • Actual capacity: values as actually used on the day of operation during tactical ATFM and ATC.
Variants	Variant 1: airspace throughput (entry flow rate) Variant 2: airspace occupancy count
Objects Characterized	The KPI is typically used at the level of individual sectors (sector capacity) or en-route facilities (ACC capacity).

Utility of the KPI	The KPI measures an upper bound on the allowable throughput or occupancy count of an en-route facility or sector. 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.
Parameters	Variant 1: time interval at which the throughput declaration is made. Variant 2: time interval at which the average occupancy count declaration is made.
Data Requirement	The various capacities are determined by the ANSP, and are dependent on traffic pattern, sector configuration, ATCO and system capability, etc.
Data Feed Providers	ANSPs
Formula / Algorithm	At the level of an individual en-route facility: 1. Select highest value from the set of established capacities (the maximum configuration capacity). 2. Compute the KPI: for variant 1, convert the value to an hourly movement rate, if the declaration is at smaller time intervals.
References & Examples of Use	• Brazil / Europe benchmarking study (DECEA - EUROCONTROL, 2017) • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI07	En-route ATFM delay
Definition	ATFM delay attributed to flow restrictions in a given en-route airspace volume
Mesurement Units	Minutes/flight
Operations Measured	The management of (temporary) capacity shortfalls in en-route airspace due to high demand and/or capacity reductions for a variety of reasons, resulting in the allocation of ATFM delay
Variants	None
Objects Characterized	The KPI can be computed for any volume of en-route airspace which participates in the ATFM process.

Utility of the KPI	This KPI is a time aggregation of the ATFM delay generated by flow restrictions which are established to protect a given volume of en-route airspace against demand/capacity imbalances. These flow restrictions (also called ATFM regulations) normally have a delay cause associated with them. This allows the KPI to be disaggregated by cause, which allows better diagnosis of the reasons for demand/capacity imbalances. Typically, the KPI is used to check whether ANSPs provide the capacity needed to cope with demand.
Parameters	None
Data Requirement	For each IFR flight: - Estimated Take-off Time (ETOT) computed from the last filed flight plan - Calculated Take-off Time (CTOT) - ID of the flow restriction generating the ATFM delay - Airspace volume associated with the flow restriction - Delay code associated with the flow restriction
Data Feed Providers	ATFM
Formula / Algorithm	At the level of individual flights: 1. Select the flights crossing the volume of en-route airspace 2. Select the subset of flights which are affected by the flow restrictions in this airspace 3. Compute ATFM delay: CTOT minus ETOT At aggregated level: 4. Compute the KPI: sum of ATFM delays divided by number of IFR flights crossing the airspace
References & Examples of Use	• ICAO EUR Doc 030 EUR Region Performance Framework Document (July 2013) • Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Single European Sky Performance Scheme • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI08	Additional time in terminal airspace
Definition	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. See Figure 1: Terminal trajectories.
Mesurement Units	Minutes/flight
Operations Measured	The terminal airspace transit time during the arrival flight phase.

Variants	Variants are possible depending on the chosen size of terminal airspace (40 NM or 100 NM cylinder) and the richness of the data feed: basic (without arrival runway ID) or advanced (with arrival runway ID) Variants with 100 NM cylinder are useful if airports have holding patterns outside the 40 NM cylinder. The use of generic cylinders abstracts local specifics in terms of approach airspace design (e.g. TMA) and ensures comparability across different airports. See table 1: Cylinder variants
Objects Characterized	The KPI is typically computed for individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI is intended to give an indication of the average queuing that is taking place in terminal airspace. This queuing is the result of sequencing and metering. The KPI captures the extent to which arriving flights are subjected to speed reductions, path extensions and holding patterns to absorb the queuing time. The KPI is also typically used to estimate excess fuel consumption and associated emissions (for the Environment KPA) attributable to horizontal flight inefficiency in terminal airspace. The KPI is designed to filter out the operational variability of terminal airspace transit time (e.g. due to wind, aircraft speed and length of the approach procedure, such as the difference between a straight-in approach and a downwind arrival) while focusing on the responsibility of ATM to optimize the inbound traffic flow from terminal airspace entry to landing.
Parameters	Destination terminal area proxy (also called Arrival Sequencing and Metering Area – ASMA): a cylinder with 40 NM radius around the destination airport. For variants A100 and B100 the radius is 100 NM. For the advanced variants only: list of terminal airspace entry segments (used to group flights entering the cylinder from ± the same direction). Unimpeded terminal airspace transit time: • Recommended approach for the basic variants of the KPI: a single value at airport level = the 20th percentile of actual terminal airspace transit times recorded at an airport, sorted from the shortest to the longest. • Recommended approach for the advanced variants of the KPI: a separate value for each entry segment/landing runway combination = the average terminal airspace transit time recorded during periods of non-congestion (needs to be periodically reassessed).
Data Requirement	For each arriving flight: • Terminal airspace entry time, computed from surveillance data (radar, ADS-B…) • Actual landing time (ALDT) In addition, for the advanced KPI variants: • Terminal airspace entry segment, computed from surveillance data (radar, ADS-B…) • Landing runway ID
Data Feed Providers	Airlines (OOOI data), airports, ADS-B data providers and/or ANSPs

Formula / Algorithm

At the level of individual flights:

1. Select arrivals, exclude helicopters

2. Compute actual terminal airspace transit time: ALDT minus terminal airspace entry time

3. Compute additional terminal airspace transit time: actual terminal airspace transit time minus unimpeded terminal airspace transit time

At aggregated level:

4. Compute the KPI: sum of additional terminal airspace transit times divided by number of IFR arrivals

References & Examples of Use

- Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016)
- Singapore / US / Europe benchmarking study (CAAS - FAA - EUROCONTROL, 2017)
- PRC Performance Review Report (EUROCONTROL 2017)
- European ANS Performance Data Portal
- Single European Sky Performance Scheme
- CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

	40 NM cylinder	100 NM cylinder
Advanced data feed	Variant A40	Variant A100
Basic data feed	Variant B40	Variant B100

Table 1: Cylinder variants

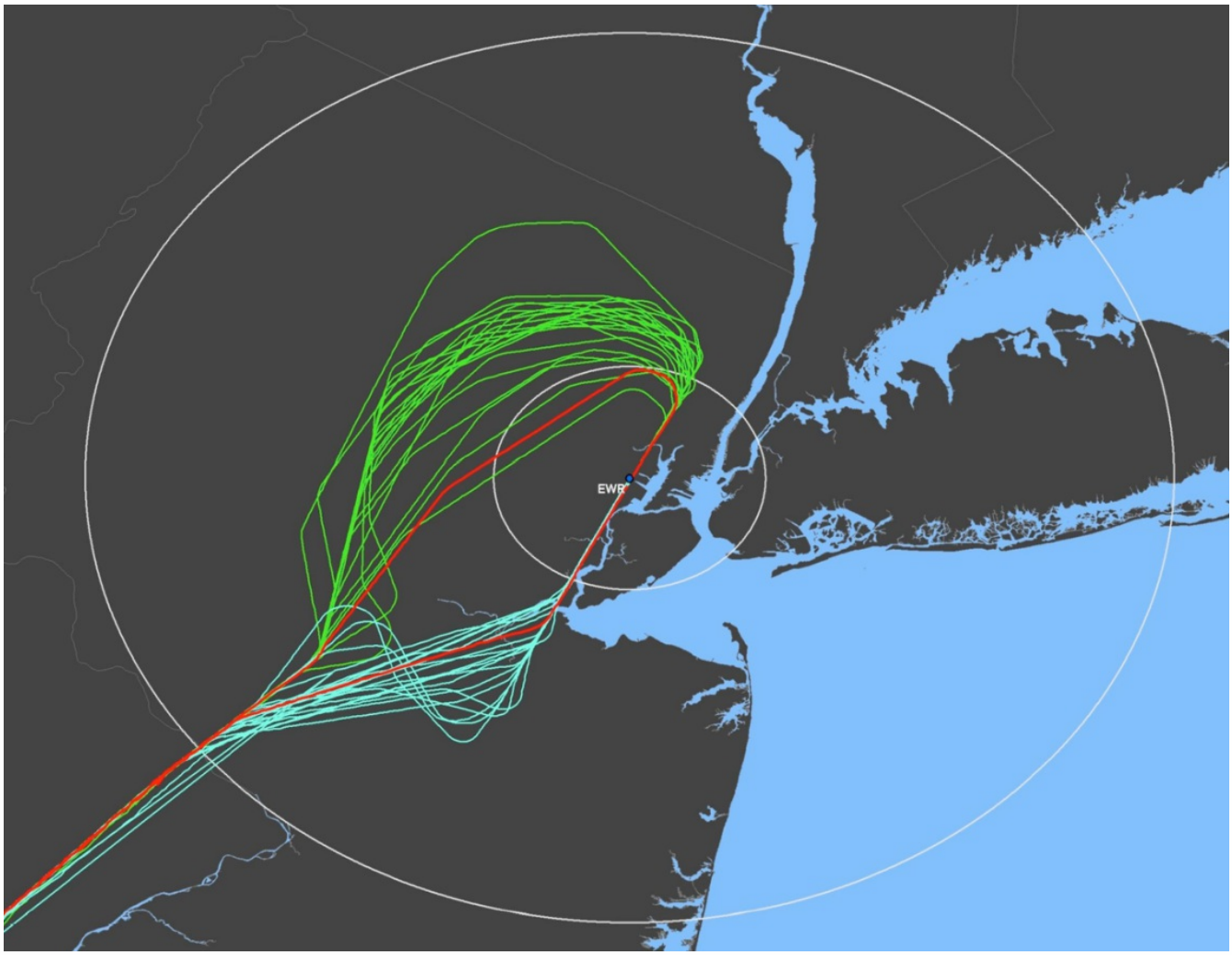

Figure 1: Terminal trajectories

KPI09	Airport peak capacity
Definition	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.
Mesurement Units	Number of departures / hour, Number of landings / hour, Number of (departures+landings) / hour
Operations Measured	The capacity declaration of an airport.
Variants	Variant A: Airport peak arrival capacity Variant D: Airport peak departure capacity Variant AD: Airport peak movement capacity (departures + arrivals)
Objects Characterized	The KPI is computed for individual airports.

Utility of the KPI	This KPI indicates the highest number of operations that an airport will accept, using the most favorable runway configuration under optimum operational conditions. The runways may or may not be the most constraining factor for airport capacity: at some airports the most constraining factor may be the terminal airspace, the taxiways, the number of gates, passenger handling capacity etc. The KPI is typically used for scheduling and ATFM purposes, and to develop capacity investment plans.
Parameters	None
Data Requirement	Scheduling parameters for slot controlled airports Airport Acceptance Rates (AAR), Airport Departure Rates (ADR)
Data Feed Providers	Airports
Formula / Algorithm	At the level of an individual airport: 1. Select highest value from the set of declared capacities. 2. Compute the KPI: convert the value to an hourly rate, if the declaration is at smaller time intervals.
References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • Brazil / Europe benchmarking study (DECEA - EUROCONTROL, 2017) • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI10	Airport peak throughput
Definition	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.
Mesurement Units	Number of departures / hour, Number of landings / hour, Number of (departures+landings) / hour
Operations Measured	The actual number of operations at an airport.
Variants	Variant 1: IFR operations only Variant 2: IFR + VFR operations (relevant for airports with a high percentage of VFR traffic) To be combined with: Variant A: Airport peak arrival throughput Variant D: Airport peak departure throughput Variant AD: Airport peak movement throughput (departures + arrivals)
Objects Characterized	The KPI is computed for individual airports.
Utility of the KPI	This KPI gives an indication of “busy-hour” actual movement rates at an airport, as recorded during a given time period. For congested airports, this throughput is an indication of the effectively realized capacity; for uncongested airports it is a measure of demand.

Parameters	Time interval for “rolling” hours. Recommended value: 15 minutes. The percentile chosen to exclude outliers. Recommended value: 95th percentile.
Data Requirement	For each flight: • Actual landing time (ALDT) • Actual take-off time (ATOT).
Data Feed Providers	Airports
Formula / Algorithm	At the level of individual flights: 1. Select flights, exclude helicopters At the level of individual “rolling” hours: 2. Convert the set of flights to hourly landing rates and departure rates by “rolling” hour 3. Sort the “rolling” hours from the least busy to the busiest hour 4. Compute the KPI: it equals the rate value of the 95th percentile of the “rolling” hours
References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • Singapore / US / Europe benchmarking study (CAAS - FAA - EUROCONTROL, 2017) • China / Europe benchmarking study (CAUC - EUROCONTROL, 2017) • Brazil / Europe benchmarking study (DECEA - EUROCONTROL, 2017)

KPI11	Airport throughput efficiency
Definition	Airport throughput (accommodated demand) compared to capacity or demand, whichever is lower. Can be computed for arrivals, departures or arrivals+departures.
Mesurement Units	Average Over/Under Delivery or % of accommodated operations.
Operations Measured	The number of unaccommodated operations at an airport.
Variants	Variant A: IFR arrivals Variant D: IFR departures Variant AD: IFR Operations (arrivals + departures)
Objects Characterized	The KPI is computed for individual airports.
Utility of the KPI	This KPI assesses how effectively capacity is managed by the ANSP. It is a measure of accommodated demand, compared to the available capacity of the airport, irrespective of the delay incurred by arriving traffic. Seen in another way, it captures the “missed” slots. At congested airports, the KPI relates the throughput to the declared capacity. At uncongested airports (or airports without declared capacity) the KPI relates the throughput to the unconstrained demand based on flight plans.
Parameters	Time interval at which to perform the most granular calculations. Recommended value: 15 minutes.

Data Requirement	For each arriving and/or departing flight: • Actual landing time (ALDT) and take-off time (ATOT) • Estimated landing time (ELDT) and take-off time (ETOT) (from flight plan) For each time interval: • Declared landing capacity of the airport • Declared departure capacity of the airport • Declared total capacity of the airport
Data Feed Providers	Airports
Formula / Algorithm	Example for arrivals: For each time interval: 1. Compute the throughput: count the number of actual landings based on ALDT 2. Compute the demand: count the number of estimated landings based on ELDT 3a. if demand >= capacity: efficiency = throughput / capacity 3b. if demand < capacity: efficiency = throughput / demand At aggregated level (longer time periods): 4. Compute the KPI: sum(efficiency*demand) / sum(demand) *Note: See Table 1: Example for arrivals. The average percentage weighted by actual arrivals is 96.1%. The average under-delivery of arrivals is -1.8. The same process can be used for departures or combined operations.*
References & Examples of Use	• Singapore / US / Europe benchmarking study (CAAS - FAA - EUROCONTROL, 2017) • Brazil / Europe benchmarking study (DECEA - EUROCONTROL, 2017) • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

Hour	15	16	17	18	19	20	21	22	23
Data									
Demand	41	58	59	70	67	59	63	72	66
Capacity	35	35	35	35	35	35	40	45	45
Throughput	30	38	36	36	36	32	35	37	44
Performance Score									
Throughput / Min (Demand, Capacity)	85.7%	108%	103%	103%	103%	91.4%	87.5%	82.2%	97.8%
Throughput minus Min (Demand, Capacity)	-5	3	1	1	1	-3	-5	-8	-1

Table 1: Example for arrivals

KPI12	Airport/Terminal ATFM delay
Definition	ATFM delay attributed to arrival flow restrictions at a given airport and/or associated terminal airspace volume.
Mesurement Units	Minutes/flight
Operations Measured	The management of (temporary) capacity shortfalls at and around destination airports due to high demand and/or capacity reductions for a variety of reasons, resulting in the allocation of ATFM delay.
Variants	None
Objects Characterized	The KPI is typically computed for individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI is a time aggregation of the ATFM delay generated by flow restrictions which are established to protect a destination airport or its terminal area against demand/capacity imbalances. If a terminal area covers multiple airports, each individual flight delay is attributed to the corresponding destination airport. These flow restrictions (also called ATFM regulations) normally have a delay cause associated with them. This allows the KPI to be disaggregated by cause, which allows better diagnosis of the reasons for demand/capacity imbalances. Typically, the KPI is used as a proxy to check whether airports and ANSPs provide the capacity needed to cope with demand.
Parameters	None

Data Requirement	For each IFR flight: • Estimated Take-off Time (ETOT) computed from the last filed flight plan • Calculated Take-off Time (CTOT) • ID of the flow restriction generating the ATFM delay • Airport or terminal airspace volume associated with the flow restriction • Delay code associated with the flow restriction
Data Feed Providers	ATFM
Formula / Algorithm	At the level of individual flights: 1. Select the flights arriving at this airport 2. Select the subset of flights which are affected by the flow restrictions at this airport or its terminal airspace 3. Compute ATFM delay: CTOT minus ETOT At aggregated level: 4. Compute the KPI: sum of ATFM delays divided by number of arrivals at the airport
References & Examples of Use	• ICAO EUR Doc 030 EUR Region Performance Framework Document (July 2013) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Single European Sky Performance Scheme • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI13	Taxi-in additional time
Definition	Actual taxi-in time compared to an unimpeded/reference taxi-in time
Mesurement Units	Minutes/flight
Operations Measured	The duration of the taxi-in phase of arriving flights
Variants	Variant 1 – basic (computed without landing runway and arrival gate data) Variant 2 – advanced (computed with landing runway and arrival gate data)
Objects Characterized	The KPI is typically computed for individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI is intended to give an indication of the various taxi-in inefficiencies that occur after landing. Its value may be influenced by unavailability of the arrival gate and effects such as non-optimal taxi routing and intermediate aircraft stops during taxi-in. The KPI is also typically used to estimate excess taxi-in fuel consumption and associated emissions (for the Environment KPA). The KPI is designed to filter out the effect of physical airport layout while focusing on the responsibility of the airport to provide parking space and ATM to optimize the inbound traffic flow from landing to in-blocks.

Parameters	Unimpeded/reference taxi-in time: • Recommended approach for the basic variant of the KPI: a single value at airport level, e.g. the 20th percentile of actual taxi times recorded at an airport, sorted from the shortest to the longest • Recommended approach for the advanced variant of the KPI: a separate value for each runway/gate combination, e.g. the average actual taxi-in time recorded during periods of non-congestion (needs to be periodically reassessed)
Data Requirement	For each arriving flight: • Actual landing time (ALDT) • Actual in-block time (AIBT) In addition, for the advanced KPI variant: • Landing runway ID • Arrival gate ID
Data Feed Providers	Airports (airport operations), airlines (OOOI data), ADS-B data providers and/or ANSPs
Formula / Algorithm	At the level of individual flights: 1. Select arriving flights, exclude helicopters 2. Compute actual taxi-in duration: AIBT minus ALDT 3. Compute additional taxi-in time: actual taxi-in duration minus unimpeded taxi-in time At aggregated level: 4. Compute the KPI: sum of additional taxi-in times divided by number of IFR arrivals
References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • China / Europe benchmarking study (CAUC - EUROCONTROL, 2017) • PRC Performance Review Report (EUROCONTROL 2017) • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI14	Arrival punctuality
Definition	Percentage of flights arriving at the gate on-time (compared to schedule)
Mesurement Units	% of scheduled flights
Operations Measured	IFR arrivals of scheduled airlines
Variants	Variant 1A – % of arrivals within ± 5 minutes of scheduled time of arrival Variant 1B – % of arrivals delayed ≤ 5 minutes versus schedule Variant 2A – % of arrivals within ± 15 minutes of scheduled time of arrival Variant 2B – % of arrivals delayed ≤ 15 minutes versus schedule

Objects Characterized	The KPI is typically computed for traffic flows, individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This is an airspace user and passenger focused KPI: arrival 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 destination.
Parameters	On-time threshold (maximum positive or negative deviation from scheduled arrival time) which defines whether a flight is counted as on-time or not. Recommended values: 5 minutes and 15 minutes.
Data Requirement	For each arriving scheduled flight: • Scheduled time of arrival (STA) or Scheduled in-block time (SIBT) • Actual in-block time (AIBT)
Data Feed Providers	Schedule database(s), airports, airlines and/or ANSPs
Formula / Algorithm	At the level of individual flights: 1. Exclude non-scheduled arrivals 2. Categorize each scheduled arrival as on-time or not At aggregated level: 3. Compute the KPI: number of on-time arrivals divided by total number of scheduled arrivals
References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • China / Europe benchmarking study (CAUC - EUROCONTROL, 2017) • PRC Performance Review Report (EUROCONTROL 2017)

KPI15	Flight time variability
Definition	Distribution of the flight (phase) duration around the average value.
Mesurement Units	Minutes/flight
Operations Measured	Scheduled flights with the same flight ID on a given airport-pair (flight XYZ123 from A to B): the gate-to-gate duration, and at more detailed level the duration of the individual flight phases (taxi-out, airborne, taxi-in)
Variants	Different parameter values possible (see 'Parameters').
Objects Characterized	The KPI is typically computed for the scheduled traffic flows interconnecting a given cluster of airports (two or more; selection/grouping based on size and/or geography).

Utility of the KPI	The “variability” of operations determines the level of predictability for airspace users and hence has an impact on airline scheduling. It focuses on the variance (distribution widths) associated with the individual phases of flight as experienced by airspace users. The higher the variability, the wider the distribution of actual travel times and the more costly time buffer is required in airline schedules to maintain a satisfactory level of punctuality. In addition, reducing the variability of actual block times can potentially reduce the amount of excess fuel that needs to be carried for each flight in order to allow for uncertainties.
Parameters	Minimum monthly flight frequency filter: flights with a frequency less than 20 times per month are not included in the indicator. Outlier filter: Variant 1: Only 70% of the (remaining) flights are considered in the indicator, i.e. the 15th percentile (percentile 1) is used to determine the shortest duration, the 85th percentile (percentile 2) is used to determine the longest duration Variant 2: Only 60% of the (remaining) flights are considered in the indicator, i.e. the 20th percentile (percentile 1) is used to determine the shortest duration, the 80th percentile (percentile 2) is used to determine the longest duration
Data Requirement	For each flight: OOOI data: gate “out” (AOBT), wheels “off,” wheels “on,” and gate “in” (AIBT) actual times.
Data Feed Providers	Airlines
Formula / Algorithm	At the level of flights with the same flight ID, at monthly or longer (e.g. annual) time aggregation level: 1. Exclude flight IDs not meeting the minimum monthly frequency requirement 2. Sort flights in ascending order of flight (phase) duration 3. Identify shortest (percentile 1) and longest (percentile 2) duration 4. Compute variability: (longest – shortest) / 2 At the more aggregated level: 5. Compute the KPI: weighted average of the individual flight ID variabilities
References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • PRC Performance Review Report (EUROCONTROL 2017) • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI16	Additional fuel burn
Definition	Additional flight time/distance and vertical flight inefficiency converted to estimated additional fuel burn attributable to ATM
Mesurement Units	kg fuel/flight

Operations Measured	Actual IFR flights
Variants	Variant 1 – simple approach: calculation based on the average value other KPIs for groups of flights and corresponding average fuel burn values Variant 2 – advanced approach: calculation based on values computed for individual flights
Objects Characterized	This KPI is a conversion of the additional flight time/distance and vertical flight inefficiency KPIs to a corresponding (estimated) additional fuel consumption; hence it describes a performance characteristic of the same objects as the additional flight time/distance and vertical flight inefficiency KPIs: en-route airspace, terminal airspace and airports. Typically the KPI is published at the level of a State or (sub)region.
Utility of the KPI	This KPI is designed to provide a simple method for estimating ATM-related fuel efficiency at aggregated level, without the need to model fuel burn at the level of individual flights. By adding the average additional fuel burn value of the individual flight phases, a gate-to-gate value is produced which is representative for an “average flight”. The KPI is often further converted into additional CO2 emission (for the environment KPA) and/or the monetary value of fuel savings (for the cost effectiveness KPA). The KPI is sometimes called the “benefit pool”: it gives an indication of the ATM-induced flight inefficiency that is theoretically actionable by ATM. In practice the actionable “benefit pool” is smaller: real optimum performance is achieved at a residual non-zero value of the KPI.
Parameters	Average fuel flow (kg/min) during taxi Average fuel flow (kg/min) during arrival in terminal airspace Average fuel flow (kg/km) in en-route airspace Average additional fuel flow (kg/FL/km) during cruise due to flying lower
Data Requirement	Indicator values to be converted to estimated additional fuel burn: KPI02 Taxi-Out Additional Time (min/flight) KPI13 Taxi-In Additional Time (min/flight) KPI05 Actual en-Route Extension (%) & average en-route distance flown (km/flight) KPI08 Additional time in terminal airspace (min/flight) KPI17 Level-off during climb KPI18 Level capping during cruise & average cruise (ToC-ToD) distance flown (km/flight) KPI19 Level-off during descent
Data Feed Providers	Performance analysts

Formula / Algorithm	At aggregated level: Compute the KPI: (KPI02 Taxi-Out Additional Time x Average fuel flow during taxi) + (KPI13 Taxi-In Additional Time x Average fuel flow during taxi) + (KPI05 Actual en-Route Extension (%) x Average en-route distance flown x Average fuel flow in en-route airspace) + (KPI08 Additional time in terminal airspace x Average fuel flow during arrival in terminal airspace) + (KPI17 Level-off distance during climb x Average additional fuel flow during climb) + (KPI18 Average number of FL too low x Average distance during cruise x Average additional fuel flow per FL too low during cruise) + (KPI19 Level-off distance during descent x Average additional fuel flow during descent).
References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016)

KPI17	Level-off during climb
Definition	Distance and time flown in level flight before Top of Climb.
Mesurement Units	NM/flight and minutes/flight
Operations Measured	Actual IFR flights
Variants	Variant 1: Average distance flown in level flight before Top of Climb Variant 2: Average time flown in level flight before Top of Climb
Objects Characterized	The KPI is typically computed for traffic flows, individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI is intended to give an indication of the amount of level flight during the climb phase. Ideally, there should be no level flight during climbs because level flight results in a higher fuel burn and possibly more noise. Aircraft should reach their cruising altitudes as soon as possible since the fuel consumption is lower at higher altitudes.
Parameters	• Analysis radius: the radius around the analysed airport within which the climb trajectory is analysed (e.g. 200NM). • Vertical speed limit: maximum vertical speed used to detect the start and end of a level segment (e.g. 300 feet/minute). • Level band limit: altitude band within which data points have to stay to be included in a level segment (e.g. 200 feet). • Minimum level time: minimum time duration for a level segment to be considered in the results (e.g. 20 seconds). • Exclusion box percentage: percentage of the Top of Climb altitude which is used to define the lower altitude of the exclusion box (e.g. 90%). E.g. level segments occurring above the lower altitude limit of the exclusion box and longer than the exclusion box time are excluded from the results. • Exclusion box time: a level segment in the exclusion box and longer than the exclusion box time is excluded (e.g. 5 minutes). • Minimum altitude: the altitude where the level segment detection during the climb starts. The trajectory below this altitude is not analysed (e.g. 3000 feet).

Data Requirement	For each flight trajectory: • 4D data points (latitude, longitude, altitude and time) • Departure airport ARP coordinates
Data Feed Providers	Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs.
Formula / Algorithm	Level segments in the climb trajectory within the analysis radius are detected using the vertical speed limit and level band limit. The methodology considers a data point as the start of a level segment when the following conditions are met: • the altitude difference with the next data point is less than or equal to the level band limit; and • the vertical speed towards the next data point is less than or equal to the vertical speed limit. The level segment ends when the altitude difference between the altitude of the beginning of the level segment and the altitude of a data point is more than the level band limit or when the vertical speed between two consecutive data points is more than the vertical speed limit.
References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal

KPI18	Level capping during cruise
Definition	Flight Level difference between maximum Flight Levels on a measured airport pair and maximum Flight Levels on similar unconstrained airport pairs.
Mesurement Units	Flight Levels/flight
Operations Measured	The cruise phase of IFR flights.
Variants	Variant 1: based on the maximum cruise Flight Level in the last filed flight plans Variant 2: based on the maximum cruise Flight Level of actual trajectories (surveillance data)
Objects Characterized	The KPI is typically computed for traffic flows on individual airport pairs or groups of airport pairs (weighted average).
Utility of the KPI	This KPI is intended to give an indication of the amount of vertical flight inefficiency related to maximum Flight Levels during the cruise phase (level capping). It measures the average Flight Level difference between the maximum Flight Levels of respectively flights on the analysed airport pair and flights on similar unconstrained airport pairs. The KPI is purely based on statistical processing of vertical flight profiles; it does not require any data on operational level capping constraints.

Parameters	• Great Circle Distance (GCD) interval: the width of the ranges of great circle distances (e.g. 10NM). If 10 NM is used, reference distributions are built for airport pairs with a great circle distance in the following ranges: [0NM, 10NM), [10NM, 20NM), [20NM, 30NM)… • Number of reference flights: minimum number of flights in every GCD interval (e.g. 1000 flights). • Percentile interval: the interval between the calculated percentiles of the distributions (e.g. 1 percent). • Excluded flights percentage: percentage of flights excluded from the higher and lower end of the distributions to account for outliers (e.g. 10%).
Data Requirement	For each flight trajectory: • Maximum cruise Flight Level • Departure airport • Arrival airport
Data Feed Providers	For variant 1: ANSPs; For variant 2: Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs
Formula / Algorithm	Reference distributions of the maximum Flight Levels of reference flights are built for every GCD interval. Reference flights are flights on airport pairs which have a great circle distance similar to the great circle distance of the analysed airport pair and which have no flight level capping constraints. The reference distributions are then converted into percentiles for every percentile interval. Distributions and percentiles for the analysed airport pair are calculated in the same way. For each percentile interval, the Flight Level value of the airport pair is subtracted from the Flight Level value of the reference. When the airport pair value is higher than the reference value, the result of the subtraction is negative. This might appear as if the flights are more efficient than the reference flights. Nevertheless, the focus is put on finding the inefficiencies, so negative values are set to 0. The result of the percentile interval is then multiplied by the number of flights corresponding to the percentile interval (e.g. if the width of the percentile interval is 1%, the number of flights corresponding to the percentile interval is 1% of the total number of flights on the airport pair). Summing up over all percentile intervals gives the total vertical flight inefficiency (number of Flight Levels summed over all flights). The vertical flight inefficiency per flight value is then calculated by dividing the total vertical flight inefficiency by the number of flights on the considered airport pair. The number of flights for this calculation step is 80% of the total number of flights on the airport pair if the excluded flights percentage is 10% (lowest 10% and highest 10% of the flights are not used). This methodology is done for groups of aircraft types having similar performance to avoid comparing e.g. jet aircraft and turboprop aircraft which have significantly different nominal cruising altitudes.
References & Examples of Use	• PRC Performance Review Report (EUROCONTROL 2017)

KPI19	Level-off during descent
Definition	Distance and time flown in level flight after Top of Descent.
Mesurement Units	NM/flight and minutes/flight

Operations Measured	Actual IFR flights.
Variants	Variant 1: Average distance flown in level flight after Top of Descent Variant 2: Average time flown in level flight after Top of Descent
Objects Characterized	The KPI is typically computed for traffic flows, individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI is intended to give an indication of the amount of level flight during the descent phase. Ideally, there should be no level flight during descents because level flight results in a higher fuel burn and possibly more noise. Ideally, aircraft should be able to descend from Top of Descent until touchdown.
Parameters	• Analysis radius: the radius around the analysed airport within which the descent trajectory is analysed (e.g. 200NM). • Vertical speed limit: maximum vertical speed used to detect the start and end of a level segment (e.g. 300 feet/minute). • Level band limit: altitude band within which data points have to stay to be included in a level segment (e.g. 200 feet). • Minimum level time: minimum time duration for a level segment to be considered in the results (e.g. 20 seconds). • Exclusion box percentage: percentage of the Top of Descent altitude which is used to define the lower altitude of the exclusion box (e.g. 90%). E.g. level segments occurring above the lower altitude limit of the exclusion box and longer than the exclusion box time are excluded from the results. • Exclusion box time: a level segment in the exclusion box and longer than the exclusion box time is excluded (e.g. 5 minutes). • Minimum altitude: the altitude where the level segment detection during the descent ends. The trajectory below this altitude is not analysed (e.g. 1800 feet).
Data Requirement	For each flight trajectory: • 4D data points (latitude, longitude, altitude and time) • Arrival airport ARP coordinates
Data Feed Providers	Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs.
Formula / Algorithm	Level segments in the descent trajectory within the analysis radius are detected using the vertical speed limit and level band limit. The methodology considers a data point as the start of a level segment when the following conditions are met: • the altitude difference with the next data point is less than or equal to the level band limit; and • the vertical speed towards the next data point is less than or equal to the vertical speed limit. The level segment ends when the altitude difference between the altitude of the beginning of the level segment and the altitude of a data point is more than the level band limit or when the vertical speed between two consecutive data points is more than the vertical speed limit.

References & Examples of Use	• Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal

APPENDIX E / APÉNDICE E

Data Access Procedure. DAWG 02 – GREPECAS – PPRC
Procedimiento de Acceso a Datos. DAWG 02 – GREPECAS – CRPP.

A Data Access Policy is an **established control put in place to ensure that data protection requirements are followed**, for accessing controlled data
Una política de acceso a datos es un control establecido que se implementa para garantizar que se cumplan los requisitos de protección de datos, para acceder a datos controlados

Policy Statement: Access to data will be as broad as possible, **consistent with the classification of the data, role(s) and responsibilities of the user, and level of training**. Data will be classified according to its sensitivity to unauthorized exposure as per the standards defined in this document.
Declaración de política: El acceso a los datos será lo más amplio posible, de acuerdo con la clasificación de los datos, las funciones y responsabilidades del usuario y el nivel de capacitación. Los datos se clasificarán según su sensibilidad a la exposición no autorizada según los estándares definidos en este documento.

Additionally, the purpose of this policy is **to ensure there is a process and tools in place to track/control/prevent/correct secure access to critical assets (e.g., information, resources, and systems) according** to the formal determination of which persons, computers, and applications have a need and right to access.
Además, el propósito de esta política es garantizar que exista un proceso y herramientas para rastrear/controlar/prevenir/corregir el acceso seguro a activos críticos (por ejemplo, información, recursos y sistemas) de acuerdo con la determinación formal de qué personas, las computadoras y las aplicaciones tienen la necesidad y el derecho de acceder.

A data security policy **specifies details about how customer data, employee PII, intellectual property and other sensitive information is to be handled**. Sometimes it is referred to as a "customer data security policy," but the broader term "data security policy" is more accurate.
Una política de seguridad de datos especifica detalles sobre cómo se manejarán los datos de los clientes, la PII de los empleados, la propiedad intelectual y otra información confidencial. A veces se denomina "política de seguridad de datos del cliente", pero el término más amplio "política de seguridad de datos" es más preciso.

When managing data access, follow these guidelines:

1. Authorize access to data only as necessary. By restricting access to data, you help minimize the risk of data exposure or misuse.
2. Review access regularly. Routinely review access to ensure that those who still have it still need it.
3. Do not share passwords.

Al administrar el acceso a los datos, siga estas pautas:

1. Autorizar el acceso a los datos solo cuando sea necesario. Al restringir el acceso a los datos, ayuda a minimizar el riesgo de exposición o mal uso de los datos.

2. Revise el acceso periódicamente. Revise de forma rutinaria el acceso para asegurarse de que aquellos que todavía lo tienen todavía lo necesiten.

3. No compartas contraseñas

A Data Access Policy is **an established control put in place to ensure that data protection requirements are followed**. ... The GDC requires that users obtain authorization from the National Center for Biotechnology Information (NCBI) Database of Genotypes and Phenotypes (dbGaP) for accessing controlled data.

Una política de acceso a datos es un control establecido que se implementa para garantizar que se cumplan los requisitos de protección de datos. ... El GDC requiere que los usuarios obtengan autorización de la base de datos

de genotipos y fenotipos (dbGaP) del Centro Nacional de Información Biotecnológica (NCBI) para acceder a datos controlados

The Data Use Policy is **a compulsory legal disclosure of how a website operator collects, retains and shares personally identifiable information**. In other words, it's often a list of ways your personal data is not private and under their control.

La Política de uso de datos es una divulgación legal obligatoria de cómo un operador de sitio web recopila, retiene y comparte información de identificación personal. En otras palabras, a menudo es una lista de formas en que sus datos personales no son privados y no están bajo su control.

Access controls are necessary to ensure only authorized users can obtain access to an Institution's information and systems. ... Access **controls manage the admittance of users to system and network resources by granting users access only to the specific resources they require to complete their job related duties**.

Los controles de acceso son necesarios para garantizar que solo los usuarios autorizados puedan obtener acceso a la información y los sistemas de una Institución. ... Los controles de acceso administran la admisión de usuarios a los recursos del sistema y de la red otorgando a los usuarios acceso solo a los recursos específicos que necesitan para completar sus tareas relacionadas con el trabajo.

Identity and access management (IAM) is **a framework of business processes, policies and technologies that facilitates the management of electronic or digital identities**. With an IAM framework in place, information technology (IT) managers can control user access to critical information within their organizations.

La gestión de identidades y accesos (IAM) es un marco de procesos comerciales, políticas y tecnologías que facilita la gestión de identidades electrónicas o digitales. Con un marco IAM implementado, los administradores de tecnología de la información (TI) pueden controlar el acceso de los usuarios a información crítica dentro de sus organizaciones.

Unified access management (UAM) refers to an identity management solution. It is used by enterprises to manage digital identities and provide secure access to users across multiple devices and applications, both cloud and on-premise.

La gestión de acceso unificado (UAM) hace referencia a una solución de gestión de identidades. Las empresas lo utilizan para administrar identidades digitales y proporcionar acceso seguro a los usuarios a través de múltiples dispositivos y aplicaciones, tanto en la nube como en las instalaciones.

A data classification policy **maps out a variety of components in an organization**. It then considers every type of data belonging to the organization and subsequently classifies the data according to storage and permission rights. These data may perhaps be categorized as sensitive, public, confidential, or personal.4

Una política de clasificación de datos mapea una variedad de componentes en una organización. A continuación, considera todos los tipos de datos que pertenecen a la organización y, posteriormente, clasifica los datos según los derechos de almacenamiento y permiso. Es posible que estos datos se clasifiquen como confidenciales, públicos, confidenciales o personales.4

Security policy types can be divided into three types based on the scope and purpose of the policy:

- Organizational. These policies are a master blueprint of the entire organization's security program.
- System-specific. ...
- Issue-specific.

Los tipos de políticas de seguridad se pueden dividir en tres tipos según el alcance y el propósito de la política:
• Organizacional. Estas políticas son un modelo maestro del programa de seguridad de toda la organización.
• Específico del sistema. ...
• Tema específico.

It relies on five major elements: **confidentiality, integrity, availability, authenticity, and non-repudiation**.
When we discuss data and information, we must consider the CIA triad. The CIA triad refers to an information security model made up of the three main components: **confidentiality, integrity and availability**. Each component represents a fundamental objective of information security.
Se basa en cinco elementos principales: confidencialidad, integridad, disponibilidad, autenticidad y no repudio.
Cuando discutimos datos e información, debemos considerar la tríada de la CIA. La tríada CIA hace referencia a un modelo de seguridad de la información compuesto por los tres componentes principales: confidencialidad, integridad y disponibilidad. Cada componente representa un objetivo fundamental de la seguridad de la información
There are two ways to access stored data: **random access and sequential access**. The sequential method requires information to be moved within the disk using a seek operation until the data is located. Each segment of data has to be read one after another until the requested data is found.

What Types Of Access Control Systems Are There?
- Discretionary access control (DAC) ...
- Mandatory access control (MAC) ...
- Role based access control (RBAC) ...
- Role based access control (RBAC)

¿Qué tipos de sistemas de control de acceso existen?
• Control de acceso discrecional (DAC)...
• Control de acceso obligatorio (MAC)...
• Control de acceso basado en roles (RBAC)...
• Control de acceso basado en roles (RBAC)

Data access control is **a technique used to regulate employees access to files in an organization**. It involves leveraging the principle of least privilege (POLP), i.e., managing employees' access rights based on their roles in the organization, and defining and limiting what data they have access to.
El control de acceso a datos es una técnica utilizada para regular el acceso de los empleados a los archivos de una organización. Implica aprovechar el principio de privilegio mínimo (POLP), es decir, administrar los derechos de acceso de los empleados en función de sus roles en la organización, y definir y limitar a qué datos tienen acceso.

Two fundamental types of data access exist:
- sequential access (as in magnetic tape, for example)
- random access (as in indexed media)

Existen dos tipos fundamentales de acceso a datos:
• acceso secuencial (como en cinta magnética, por ejemplo)
• acceso aleatorio (como en los medios indexados)

Data access methods are **used to process queries and access data**. ... The database objects that contain the data to be queried. The executable instructions or operations to retrieve and transform the data into usable information.

Los métodos de acceso a datos se utilizan para procesar consultas y acceder a datos. ... Los objetos de la base de datos que contienen los datos a consultar. Las instrucciones u operaciones ejecutables para recuperar y transformar los datos en información utilizable.

Data Policies **enable a developer to enforce data consistency by setting mandatory and read-only field attributes**. Unlike UI Policies, Data Policies execute server-side. ... Data Policy logic executes regardless of how a record changes. Developers cannot apply scripts to Data Policies.
Las políticas de datos permiten a un desarrollador imponer la coherencia de los datos al establecer atributos de campo obligatorios y de solo lectura. A diferencia de las políticas de interfaz de usuario, las políticas de datos se ejecutan en el lado del servidor. ... La lógica de la política de datos se ejecuta independientemente de cómo cambie un registro. Los desarrolladores no pueden aplicar scripts a las políticas de datos.

Data privacy or information privacy is **a branch of data security concerned with the proper handling of data – consent, notice, and regulatory obligations**. More specifically, practical data privacy concerns often revolve around: Whether or how data is shared with third parties.
La privacidad de los datos o la privacidad de la información es una rama de la seguridad de los datos relacionada con el manejo adecuado de los datos: consentimiento, notificación y obligaciones reglamentarias. Más específicamente, las preocupaciones prácticas sobre la privacidad de los datos a menudo giran en torno a: Si los datos se comparten con terceros o cómo se comparten.

Here are the seven main categories of access control.

- Directive. Directive access control is deployed to encourage compliance with security policies.
- Deterrent.
- Preventative.
- Detective.
- Corrective.
- Compensating.
- Recovery.
- Comporium Access Control Solutions

Aquí están las siete categorías principales de control de acceso.

• Directiva. El control de acceso directivo se implementa para fomentar el cumplimiento de las políticas de seguridad. ...

• Elemento disuasorio. ...

• Preventivo. ...

• Detective. ...

• Correctivo. ...

• Compensación. ...

• Recuperación. ...

• Soluciones de control de acceso de Comporium

A user account policy is **a document which outlines the requirements for requesting and maintaining an account on computer systems or networks**, typically within an organization. ... Some sites have users read and sign an account policy as part of the account request process.

Una política de cuenta de usuario es un documento que describe los requisitos para solicitar y mantener una cuenta en sistemas informáticos o redes, normalmente dentro de una organización. ... Algunos sitios hacen que los usuarios lean y firmen una política de cuenta como parte del proceso de solicitud de cuenta

Access control procedures are **the methods and mechanisms used by Information Owners to approve permission for Users to access data, information and systems**. AUTHENTICATION. Authentication is the process of identifying an Information User by the User presenting credentials.
Los procedimientos de control de acceso son los métodos y mecanismos utilizados por los propietarios de la información para aprobar el permiso para que los usuarios accedan a datos, información y sistemas. AUTENTICACIÓN. La autenticación es el proceso de identificación de un Usuario de la Información por parte del Usuario que presenta sus credenciales

There are three basic types of access methods used to manipulate the permanent and temporary database **objects -- Create, Scan, and Probe**. Temporary objects are created by the optimizer in order to process a query. In general, these temporary objects are internal objects and cannot be accessed by a user.
A user account policy is **a document which outlines the requirements for requesting and maintaining an account on computer systems or networks**, typically within an organization. Some sites have users read and sign an account policy as part of the account request process.
Existen tres tipos básicos de métodos de acceso que se utilizan para manipular los objetos de la base de datos permanentes y temporales: Crear, Escanear y Sondear. El optimizador crea objetos temporales para procesar una consulta. En general, estos objetos temporales son objetos internos y un usuario no puede acceder a ellos.
Una política de cuenta de usuario es un documento que describe los requisitos para solicitar y mantener una cuenta en sistemas informáticos o redes, normalmente dentro de una organización. Algunos sitios hacen que los usuarios lean y firmen una política de cuenta como parte del proceso de solicitud de cuenta.

It includes how new users are authorised and granted appropriate privileges, as well as how these are reviewed and revoked when necessary and includes appropriate controls to prevent users obtaining unauthorised privileges or access. Scope.
Incluye cómo se autorizan y otorgan los privilegios apropiados a los nuevos usuarios, así como también cómo se revisan y revocan cuando es necesario, e incluye los controles apropiados para evitar que los usuarios obtengan acceso o privilegios no autorizados. Alcance.