Organización de Aviación Civil Internacional
Oficina para Norteamérica, Centroamérica y Caribe

NOTA DE ESTUDIO

NACC/WG/RAP/02 — NE/04REV
28/03/23

Segunda reunión de relatores del Grupo de Trabajo de Norteamérica, Centroamérica y Caribe (NACC/WG/RAP/02)

Oficina Regional NACC de la OACI, Ciudad de México, México, 07 a 10 de febrero de 2023

Cuestión 2 del Orden del Día: **Plan Mundial de Navegación Aérea (GANP), Séptima Edición**

INDICADORES CLAVE DE RENDIMIENTO (KPI)

(Presentada por la Secretaría)

RESUMEN EJECUTIVO	
Esta nota de estudio proporciona una evaluación de los Indicadores Clave de Rendimiento (KPI) bajo el nuevo Plan Mundial de Navegación Aérea (GANP), Séptima Edición que fue aprobado en octubre de 2022 en la 41° Asamblea de la OACI. La nota presenta un análisis, recomendaciones y acciones sugeridas que ayudarán a establecer los mecanismos de medición regionales y nacionales de los Estados CAR.	
Acción:	Las acciones sugeridas se describen en el numeral 5.
Objetivos Estratégicos:	• Objetivo estratégico 1 – Seguridad Operacional • Objetivo estratégico 2 – Capacidad y eficiencia de la navegación aérea • Objetivo estratégico 4 – Desarrollo económico del transporte aéreo • Objetivo estratégico 5 – Protección del medio ambiente
Referencias:	• Plan Mundial de Navegación Aérea, Séptima Edición: https://www4.icao.int/ganpportal/

1. Introducción

1.1 Los KPI son medios cuantitativos para medir el desempeño actual/pasado, el desempeño futuro esperado y el progreso real en el logro de los objetivos de desempeño. Para los Servicios de Navegación Aérea, brindan información para ser revisada por los Estados sobre el desempeño del servicio y apoyan la toma de decisiones para mejoras operacionales.

1.2 Los KPI son fundamentos clave que brindan información sobre las acciones realizadas, los sistemas implementados, etc. Una acción permite la medición objetiva del desempeño a lo largo del tiempo para un objetivo específico.

1.3 Con la nueva versión del Plan mundial de navegación aérea (GANP), se definieron 23 KPI diferentes, los cuales se enumeran en el **Apéndice A** (en inglés únicamente) de esta nota de estudio y también se pueden encontrar en este enlace: https://www4.icao.int/ Ganpportal/ASBU/KPI.

2. Catálogo de objetivos de desempeño

2.1 El Área clave de desempeño (KPA) es una forma de categorizar temas de desempeño relacionados con ambiciones y expectativas de alto nivel.

2.2 Las ambiciones de rendimiento, a nivel mundial, se cumplirán persiguiendo objetivos de rendimiento más específicos. A nivel regional, el Volumen III de los Planes de Navegación Aérea regionales proporciona objetivos de rendimiento regionales de acuerdo con los requisitos regionales específicos. Estos objetivos son "SMART" (específicos, medibles, alcanzables, relevantes y oportunos, por sus definiciones en inglés) y, aunque se expresan en términos cualitativos, pueden incluir una tendencia deseada o requerida para un indicador de desempeño sin expresar aún el objetivo de desempeño en términos numéricos (esto es hecho como parte de una configuración de objetivos de rendimiento).

2.3 Los objetivos de rendimiento regionales ayudan a la comunidad de la aviación a identificar mejoras relevantes y oportunas (mejoras operacionales) para el sistema de navegación aérea de una región determinada. Además, a nivel nacional, los Estados pueden establecer objetivos de rendimiento para sus diferentes entornos operativos utilizando la lista de KPI, teniendo en cuenta los requisitos de rendimiento regionales.

2.4 Según el GANP, Séptima Edición, los objetivos de performance son:

- Eficiencia
- Capacidad
- Previsibilidad
- Seguridad Operacional
- Seguridad
- Medio ambiente
- Rentabilidad
- Interoperabilidad
- Acceso y equidad
- Participación de la comunidad de Gestión del Tránsito Aéreo (ATM)
- Flexibilidad

Nota: Consulte https://www4.icao.int/ganpportal/ASBU/PerformanceObjective para más detalles.

2.5 Luego de la evaluación de los elementos ASBU "Listos para implementación" existen 17 KPI relacionados con estos elementos, los cuales son de interés regional y que nosotros como Grupo de Trabajo NACC debemos analizar. Consulte el **Apéndice B** (en inglés únicamente) de eta nota de estudio para obtener una lista completa.

2.6 Notas importantes sobre los KPI:

a. Los módulos Gestión de la información de todo el sistema (SWIM), Gestión de la información aeronáutica digital (DAIM), Información meteorológica mejorada (AMET), Información de vuelo y flujo para el entorno cooperativo (FICE) son habilitadores de información y no tienen KPI relacionados.

b. Todos los módulos del subproceso de tecnología también son habilitadores de información, Infraestructura de Comunicaciones (COMI), Servicio de

comunicación ATS (COMS), Vigilancia Alternativa (ASUR) y Sistemas de Navegación (NAVS). Tampoco tienen KPI relacionados.

c. Todos los KPI están relacionados con la aviación operativa y los servicios aeroportuarios, respaldados por información y tecnología.

2.7 En resumen, los módulos de información y tecnología ASBU juegan un papel importante en la provisión de información para brindar servicios de navegación aérea, pero los valores de desempeño se miden a través de los servicios aeronáuticos que ya están en operación.

3. Información necesaria para establecer KPIs

3.1 Para obtener los resultados de los diferentes KPI es necesario obtener datos preestablecidos que alimentan el algoritmo para el cálculo de los KPI. La información necesaria se muestra en el siguiente enlace: https://www4.icao.int/ganpportal/ASBU/KPI.

3.2 Un resumen de los 17 KPI disponibles para los elementos ASBU "Listos para la implementación" que muestra los requisitos de datos y los proveedores de datos se encuentra en el **Apéndice C** (en inglés únicamente) de esta nota de estudio.

3.3 La recopilación de datos implica hacer las siguientes preguntas:

- ¿Qué tipo de datos son?
- ¿Cuál es la fuente de los datos?
- ¿Cuál es la precisión de los datos?
- ¿Cuál es la periodicidad con la que se obtienen los datos?
- ¿Cuáles son las características de formato de los datos?
- ¿Cuál es el proceso de validación de los datos?
- ¿Quiénes son los proveedores de los datos?
- ¿Cuál es la metadata de los datos (tipo de dato, fecha, hora, sistema que lo obtuvo, quién lo obtuvo, etc.)? Una definición clara y precisa de los datos.

3.4 Es necesario que nosotros como Grupo de Trabajo regional establezcamos requisitos regionales para obtener esta información en términos de los KPI que están disponibles y que podemos evaluar. Hay dos aspectos importantes a tener en cuenta a la hora de realizar esta actividad:

a) Establecer el estado de implementación regional a través de los BBB: https://www4.icao.int/ganpportal/BBB y los elementos ASBU en su estado de madurez "Listo para implementación".

b) Hacer un análisis regional para obtener la información que cada Estado pueda brindar. Algunos Estados pueden proporcionar todos los datos; en ese sentido, como NACC/WG, debemos proporcionar información sobre el requisito mínimo que esos datos integrarán.

3.5 Cada Estado, de acuerdo con la información disponible, puede definir los KPI que aplican a sus operaciones y que alimentarán sus objetivos de mejora continua. Sin embargo, a nivel regional, los KPI que definamos deben ser aquellos para los que se disponga de la mayor parte de los datos para cada uno de los Estados.

3.6 Para obtener resultados que definan verdaderamente el estado de la performance regional es necesario que todos los Estados brinden información, la misma información, que mida los KPIs con base en requerimientos iguales, solo así obtendremos datos que midan válidamente la performance de la navegación aérea regional.

4. Recomendaciones

4.1 **Recomendación 1**: Evaluar la información proporcionada en esta nota de estudio y establecer un plan de acción para desarrollar un análisis de brechas en la implementación regional de los KPI.

4.2 **Recomendación 2**: Cada Grupo de Tarea NACC/WG debe integrar dentro de su plan de acción del Grupo de Tarea sus contribuciones para establecer los KPI regionales.

4.3 **Recomendación 3**: Es necesario que como Grupo Regional establezcamos los requisitos mínimos que cada Estado debe cumplir para obtener los datos que alimentarán los KPI.

5. Acciones sugeridas

5.1 Se invita a la Reunión a:

a) analizar la información proporcionada en esta nota de estudio;
b) que cada Grupo de Tarea del NACC/WG de acuerdo con su propia evaluación, proporcione su contribución al establecimiento de los KPI regionales;
c) establecer conjuntamente el programa piloto (borrador) como un proyecto regional del NACC/WG para establecer KPI regionales; y
d) cualquier otra acción necesaria.

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APÉNDICE A
INDICADORES CLAVE DE RENDIMIENTO (KPI)

1. KPI01: Departure punctuality
2. KPI02: Taxi-out additional time
3. KPI03: ATFM slot adherence
4. KPI04: Filed flight plan en-route extension
5. KPI05: Actual en-route extension
6. KPI06: En-route airspace capacity
7. KPI07: En-route ATFM delay
8. KPI08: Additional time in terminal airspace
9. KPI09: Airport peak capacity
10. KPI10: Airport peak throughput
11. KPI11: Airport throughput efficiency
12. KPI12: Airport/Terminal ATFM delay
13. KPI13: Taxi-in additional time
14. KPI14: Arrival punctuality
15. KPI15: Flight time variability
16. KPI16: Additional fuel burn
17. KPI17: Level-off during climb
18. KPI18: Level capping during cruise
19. KPI19: Level-off during descent
20. KPI20: Number of aircraft accidents
21. KPI21: Number of runway incursions
22. KPI22: Number of runway excursions
23. KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)

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- APÉNDICE B -

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION
KEY PERFORMANCE INDICATOR (KPI)

ACAS (Airborne Collision Avoidance System)

BLOQUE	Element	KPA	Focus Area	Performance Objective Suuported	KPI
B1	ACAS-B1/1 ACAS Improvements Operational	Safety		Improve mid-air collision avoidance (safety net)	**KPI20:** Number of aircraft accidents **KPI23:** Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions

APTA (Airport Accessibility)

BLOQUE	Element	KPA	Focus Area	Performance Objective Suuported	KPI
B0	APTA-B0/1 PBN Approaches (with basic capabilities) Operational	Capacity	Capacity, throughput & utilization	Equip additional RWY ends with instrument approaches	**KPI10:** Airport peak throughput
		Capacity	Capacity, throughput & utilization	Reduce approach minima (ceiling & visibility)	**KPI10:** Airport peak throughput
B0	APTA-B0/2 PBN SID and STAR procedures (with basic capabilities) Operational	Capacity	Capacity, throughput & utilization	Increase airport arrival rate	**KPI11**: Airport throughput efficiency
		Capacity	Capacity, throughput & utilization	Mitigate local airspace capacity constraints if this is the problem	KPI10: Airport peak throughput
		Capacity	Capacity, throughput & utilization	Mitigate noise constraints if this is the problem	KPI10: Airport peak throughput
		Efficiency	Vertical flight efficiency	Reduce permanent (airspace and approach procedure design) and	KPI19: Level-off during descent
		Efficiency	Vertical flight efficiency	Reduce permanent (airspace and departure procedure design) and semi-permanent (ATFCM measures) altitude constraints (level capping) along the climb portion of traffic flows, in terminal and en-route airspace	KPI17: Level-off during climb
B0	APTA-B0/3 SBAS/GBAS CAT I precision approach procedures Operational	Capacity	Capacity, throughput & utilization	Equip additional RWY ends with instrument approaches	KPI10: Airport peak throughput
		Capacity	Capacity, throughput & utilization	Reduce approach minima (ceiling & visibility)	KPI10: Airport peak throughput
B0	APTA-B0/4 CDO (Basic) Operational	Efficiency	Vertical flight efficiency	Avoid efficiency penalties attributable to non-optimum ToD (descent starts before or after the optimum ToD)	KPI19: Level-off during descent
		Efficiency	Vertical flight efficiency	Avoid tactical lengthening of arrival path (eg vectoring, holding, trombone extension) because this leads to level flight	KPI19: Level-off during descent
		Efficiency	Vertical flight efficiency	Reduce descent inefficiency attributable to altitude constraints imposed by ATM	KPI19: Level-off during descent
B0	APTA-B0/5 CCO (Basic) Operational	Efficiency	Vertical flight efficiency	Reduce permanent (airspace and departure procedure design) and semi-permanent (ATFCM measures) altitude constraints (level capping) along the climb portion of traffic flows, in terminal and en-route airspace	KPI17: Level-off during climb
B0	APTA-B0/6 PBN Helicopter Point in Space (PinS) Operations Operational	Capacity	Capacity, throughput & utilization	Mitigate local airspace capacity constraints if this is the problem	KPI10: Airport peak throughput
		Capacity	Capacity, throughput & utilization	Reduce approach minima (ceiling & visibility)	KPI10: Airport peak throughput

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION
KEY PERFORMANCE INDICATOR (KPI)

B0	APTA-B0/7 Performance based aerodrome operating minima – Advanced aircraft Operational	Capacity	Capacity, throughput & utilization	Reduce approach minima (ceiling & visibility)	KPI10: Airport peak throughput
B0	APTA-B0/8 Performance based aerodrome operating minima – Basic aircraft	Capacity	Capacity, throughput & utilization	Equip additional RWY ends with instrument approaches	KPI10: Airport peak throughput
		Capacity	Capacity, throughput & utilization	Reduce approach minima (ceiling & visibility)	KPI10: Airport peak throughput
	CSEP (Cooperative Separation)				
BLOQUE	**Element**	**KPA**	**Focus Area**	**Performance Objective Suuported**	**KPI**
B1	CSEP-B1/1 Basic airborne situational awareness during flight operations (AIRB) Operational	Safety		Improve mid-air collision avoidance (safety net)	KPI20: Number of aircraft accidents KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)
		Safety		Improve separation provision (at a planning horizon > 2 minutes)	KPI20: Number of aircraft accidents KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)
B1	CSEP-B1/2 Visual Separation on Approach (VSA) Operational	Safety		Improve separation provision (at a planning horizon > 2 minutes)	KPI20: Number of aircraft accidents KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)
	FRTO (Improved operations through enhanced en-route trajectories)				
BLOQUE	**Element**	**KPA**	**Focus Area**	**Performance Objective Suuported**	**KPI**
B0	FRTO-B0/1 Direct routing (DCT) Operational	Efficiency	Flight time & distance	Overcome route selection inefficiencies associated with route network design	KPI04: Filed flight plan en-route extension
B0	FRTO-B0/2 Airspace planning and Flexible Use of Airspace (FUA) Operational	Access and equity		Improve airspace reservation management	++
		Efficiency	Flight time & distance	Facilitate direct routing of portions of the flight (if this does not cause network problems)	KPI05: Actual en-route extension
		Efficiency	Flight time & distance	Overcome route selection inefficiencies associated with route & airspace availability as known at the flight planning stage	KPI04: Filed flight plan en-route extension
		Efficiency	Flight time & distance	Reduce need for tactical ATFM rerouting to circumnavigate airspace closed at short notice	KPI05: Actual en-route extension
		Efficiency	Flight time & distance	Reduce need to avoid airspace because of lack of confirmation that it will be open	KPI04: Filed flight plan en-route extension

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION
KEY PERFORMANCE INDICATOR (KPI)

		Efficiency	Vertical flight efficiency	Reduce altitude restrictions during climb to avoid Special Use Airspace	KPI17: Level-off during climb
		Efficiency	Vertical flight efficiency	Reduce altitude restrictions during cruise to avoid Special Use Airspace	KPI18: Level capping during cruise
		Efficiency	Vertical flight efficiency	Reduce altitude restrictions during descent to avoid Special Use Airspace	KPI19: Level-off during descent
B0	FRTO-B0/3 Pre-validated and coordinated ATS routes to support flight and flow Operational	Capacity	Capacity shortfall & associated delay	Establish/update/publish the catalogue of strategic ATFM measures designed to respond to a variety of possible/typical/recurring events degrading the airspace system (e.g. predefined action plans)	No KPI
		Flexibility		Improve flexibility of the Air Navigation System	No KPI
B0	FRTO-B0/4 Basic conflict detection and conformance monitoring Operational	Capacity	Capacity, throughput & utilization	Reduce ATCO workload (en-route)	KPI06: En-route airspace capacity
		Safety		Avoid vertical & lateral navigation errors during flight (cases of non-conformance with clearance)	KPI20: Number of aircraft accidents
		Safety		Improve early detection of conflicting ATC Clearances (CATC) (en-route / departure / approach)	KPI20: Number of aircraft accidents KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)
		Safety		Improve separation provision (at a planning horizon > 2 minutes)	KPI20: Number of aircraft accidents KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)
	NOPS (Network Operations)				
BLOQUE	**Element**	**KPA**	**Focus Area**	**Performance Objective Suuported**	**KPI**
B0	NOPS-B0/1 Initial integration of collaborative airspace management with air traffic flow management Operational	Efficiency	Flight time & distance	Facilitate tactical decisions leading to a shorter actual route than in the FPL	KPI05: Actual en-route extension
		Efficiency	Flight time & distance	Overcome route selection inefficiencies associated with route & airspace availability as known at the flight planning stage	KPI04: Filed flight plan en-route extension
		Efficiency	Flight time & distance	Reduce need for tactical ATFM rerouting to circumnavigate airspace closed at short notice	KPI05: Actual en-route extension
		Efficiency	Vertical flight efficiency	Reduce altitude restrictions during climb introduced to avoid airspace above	KPI17: Level-off during climb
		Efficiency	Vertical flight efficiency	Reduce altitude restrictions during cruise introduced to avoid airspace above	KPI18: Level capping during cruise
		Efficiency	Vertical flight efficiency	Reduce altitude restrictions during descent to avoid Special Use Airspace	KPI19: Level-off during descent
B0	NOPS-B0/5 Dynamic ATFM slot allocation	Capacity	Capacity shortfall & associated delay	Implement TMIs to delay take-off times	KPI07: En-route ATFM delay

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION
KEY PERFORMANCE INDICATOR (KPI)

OPFL (Improved access to optimum flight levels in oceanic and remote airspace)

BLOQUE	Element	KPA	Focus Area	Performance Objective Suuported	KPI
B0	OPFL-B0/1 In Trail Procedure (ITP) Operational	Efficiency	Vertical flight efficiency	Increase acceptance of pilot requests for higher cruise level	KPI18: Level capping during cruise
		Efficiency	Vertical flight efficiency	Reduce level restrictions during cruise issued by ATCOs for conflict	KPI18: Level capping during cruise
B2	OPFL-B2/1 Separation minima using ATS surveillance systems where VHF voice communications are not available Operational	Efficiency	Flight time & distance	Improve route selection after the flight planning stage	KPI05: Actual en-route extension
		Efficiency	Flight time & distance	Improve route selection at the flight planning stage	KPI04: Filed flight plan en-route extension
		Efficiency	Fuel burn	Reduce fuel burn impact of impeded conditions	KPI16: Additional fuel burn
		Efficiency	Vertical flight efficiency	Reduce vertical flight inefficiency during the cruise phase	KPI18: Level capping during cruise

RSEQ (Improved traffic flow through runway sequencing)

BLOQUE	Element	KPA	Focus Area	Performance Objective Suuported	KPI
B0	RSEQ-B0/1 Arrival Management Operational	Capacity	Capacity, throughput & utilization	Apply arrival balancing	KPI10: Airport peak throughput
		Capacity	Capacity, throughput & utilization	Apply smart sequencing to harmonise final approach speeds (arrival)	KPI10: Airport peak throughput
		Capacity	Capacity, throughput & utilization	Apply smart sequencing to optimise wake vortex separations	KPI10: Airport peak throughput
		Capacity	Capacity, throughput & utilization	Improve arrival sequencing and metering to fill all arrival slots	KPI11: Airport throughput efficiency
		Efficiency	Flight time & distance	Apply TTA and en-route speed reduction if traffic is already airborne	KPI08: Additional time in terminal airspace
		Efficiency	Flight time & distance	Reduce need to fine-tune traffic spacing in terminal airspace (arrival)	KPI08: Additional time in terminal airspace
B0	RSEQ-B0/2 Departure Management Operational	Capacity	Capacity, throughput & utilization	Maintain or improve departure rate of the RWY	KPI10: Airport peak throughput
		Efficiency	Flight time & distance	Avoid additional holding time after line up caused by departure metering not factored in during pushback planning	KPI02: Taxi-out additional time
		Efficiency	Flight time & distance	Improve the delivery of departing traffic into the overhead stream	KPI02: Taxi-out additional time
B0	Point merge Operational	Capacity	Capacity, throughput & utilization	Apply merging & synchronisation of arrival flows	KPI10: Airport peak throughput

SNET (Ground-based Safety Nets)

BLOQUE	Element	KPA	Focus Area	Performance Objective Suuported	KPI
B0	SNET-B0/1 Short Term Conflict Alert (STCA) Operational	Safety		Improve mid-air collision avoidance (safety net)	KPI20: Number of aircraft accidents KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION
KEY PERFORMANCE INDICATOR (KPI)

B0	SNET-B0/2 Minimum Safe Altitude Warning (MSAW) Operational	Safety		Avoid controlled flight into terrain (CFIT) and obstacle collision risk	KPI20: Number of aircraft accidents
B0	SNET-B0/3 Area Proximity Warning (APW) Operational	Safety		Avoid unauthorized penetration of segregated airspace	KPI20: Number of aircraft accidents
B0	SNET-B0/4 Approach Path Monitoring (APM) Operational	Safety		Avoid controlled flight into terrain (CFIT) and obstacle collision risk	KPI20: Number of aircraft accidents
B1	SNET-B1/1 Enhanced STCA with aircraft parameters Operational	Safety		Improve mid-air collision avoidance (safety net)	KPI20: Number of aircraft accidents KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)
B1	SNET-B1/2 Enhanced STCA in complex TMAs Operational	Safety		Improve mid-air collision avoidance (safety net)	KPI20: Number of aircraft accidents KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)

SURF (Surface operations)

BLOQUE	Element	KPA	Focus Area	Performance Objective Suuported	KPI
B0	SURF-B0/1 Basic ATCO tools to manage traffic during ground operations Operational	Efficiency	Flight time & distance	Avoid taxi-in additional time resulting from adverse conditions	KPI13: Taxi-in additional time
		Efficiency	Flight time & distance	Avoid taxi-out additional time resulting from adverse conditions	KPI02: Taxi-out additional time
		Safety		Avoid incorrect entries of aircraft or vehicles onto the runway protected area (without or contrary to ATC clearance or due to incorrect ATC clearance)	KPI20: Number of aircraft accidents KPI21: Number of runway incursions
		Safety		Avoid incorrect runway crossings by aircraft or vehicles (without or contrary to ATC clearance or due to incorrect ATC clearance)	KPI20: Number of aircraft accidents KPI21: Number of runway incursions
		Safety		Avoid incorrect taxiing (cases of non-conformance with clearance)	KPI20: Number of aircraft accidents
B0	SURF-B0/2 Comprehensive situational awareness of surface operations Operational	Safety		Improve collision avoidance during taxi operations (safety net)	KPI20: Number of aircraft accidents
		Safety		Avoid incorrect entries of aircraft or vehicles onto the runway protected area (without or contrary to ATC clearance or due to incorrect ATC clearance)	KPI20: Number of aircraft accidents KPI21: Number of runway incursions
		Safety		Avoid incorrect presence of vacating aircraft or vehicles onto the runway protected area	KPI20: Number of aircraft accidents KPI21: Number of runway incursions

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION
KEY PERFORMANCE INDICATOR (KPI)

		Safety		Avoid incorrect runway crossings by aircraft or vehicles (without or contrary to ATC clearance or due to incorrect ATC clearance)	KPI20: Number of aircraft accidents KPI21: Number of runway incursions
B0	SURF-B0/3 Initial ATCO alerting service for surface operations Operational	Safety		Improve runway collision avoidance (safety net)	KPI20: Number of aircraft accidents
B1	SURF-B1/2 Comprehensive pilot situational awareness on the airport surface Operational	Safety		Improve collision avoidance during taxi operations (safety net)	KPI20: Number of aircraft accidents
		Safety		Avoid incorrect entries of aircraft or vehicles onto the runway protected area (without or contrary to ATC clearance or due to incorrect ATC clearance)	KPI20: Number of aircraft accidents KPI21: Number of runway incursions
		Safety		Avoid incorrect presence of vacating aircraft or vehicles onto the runway protected area	KPI20: Number of aircraft accidents KPI21: Number of runway incursions
		Safety		Avoid incorrect runway crossings by aircraft or vehicles (without or contrary to ATC clearance or due to incorrect ATC clearance)	KPI20: Number of aircraft accidents KPI21: Number of runway incursions

- APÉNDICE C -

ASBU ELEMENTS
ELEMENTS READY FOR IMPLEMENTATION
KPIs

No	KPI	Data Requirement	Data Feed Providers
1	KPI02: Taxi-out additional time	For each departing scheduled flight: Scheduled time of departure (STD) or Scheduled off-block time (SOBT) Actual off-block time (AOBT)	Schedule database(s), airports, airlines and/or ANSPs
2	KPI04: Filed flight plan en-route extension	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	ANSPs
3	KPI05: Actual en-route extension	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…).	ANSPs, ADS-B data providers
4	KPI06: 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
5	KPI07: En-route ATFM delay	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	ATFM Providers
6	KPI08: Additional time in terminal airspace	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	Airlines (OOOI data), airports, ADS-B data providers and/or ANSPs
7	KPI10: Airport peak throughput	For each flight: Actual landing time (ALDT) Actual take-off time (ATOT).	Airports

ASBU ELEMENTS
ELEMENTS READY FOR IMPLEMENTATION
KPIs

No	KPI	Data Requirement	Data Feed Providers
8	KPI11: Airport throughput efficiency	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	Airports
9	KPI13: Taxi-in additional time	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	Airports (airport operations), airlines (OOOI data), ADS-B data providers and/or ANSPs. Note: OOOI Data refers to times of the actual aircraft movements of Gate Out, Wheels Off, Wheels On, and Gate In.
10	KPI16: 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
11	KPI17: Level-off during climb	For each flight trajectory: 4D data points (latitude, longitude, altitude and time) Departure airport ARP coordinates	Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs.
12	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
13	KPI19: Level-off during descent	For each flight trajectory: 4D data points (latitude, longitude, altitude and time) Arrival airport ARP coordinates	Trajectory data providers (reporting archived actual trajectories based on ADS-B and/or other surveillance data sources) and/or ANSPs.
14	KPI20: Number of aircraft accidents	For each reported occurrence: Date of occurrence Occurrence Category State of occurrence	ICAO ADREP database; iSTARS Application "ADREP et al." Note: ADREP: Accident Data Report. https://www.icao.int/safety/airnavigation/AIG/Pages/Reporting.aspx

ASBU ELEMENTS
ELEMENTS READY FOR IMPLEMENTATION
KPIs

No	KPI	Data Requirement	Data Feed Providers
15	KPI21: Number of runway incursions	For each reported occurrence: Date of occurrence Airport of occurrence	Airports and airlines
16	KPI22: Number of runway excursions	For each reported occurrence: Date of occurrence Airport of occurrence	Airports and airlines
17	KPI23: Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)	For each reported occurrence: Date of occurrence FIR of occurrence	ANSPs and airlines