



Aplicación de Metodología de 6 pasos en la DGAC – Chile

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Metodología de los 6 pasos



Es un enfoque de procesos de gestión, basados en el **desempeño**



Nota: Paso 1 y Paso 2, fueron consensuados previamente para la región SAM, en talleres realizado durante 2021.

Paso 2

Análisis FODA y establecer Objetivos

Paso 2



- La realidad de la región CAR/SAM, no siempre podrá ser la realidad de un Estado en particular.
- ¿Podemos realizar un FODA nacional?
 - Sí, en primera instancia podemos analizar los Servicios de Navegación Aérea de la DGAC-Chile.
- ¿Cómo o con qué medir?
 - Con la herramienta web del GANP Portal de la OACI
 - En específico el **módulo AN-SPA** (Air Navigation - System Performance Assessment)

Módulo AN-SPA del GANP Portal



- ¿Porqué utilizar AN-SPA?
 - Es herramienta de Evaluación del Rendimiento del Sistema de Navegación Aérea
 - El objetivo de esta herramienta es promover un enfoque basado en el rendimiento para una modernización del sistema de navegación aérea.
 - Es una guía en la aplicación de un **proceso de gestión del rendimiento de seis pasos**
 - Permite visualizar la **selección de mejoras operativas relevantes dentro del marco de la ASBU**

<https://www4.icao.int/ganpportal/ANSPA/Reports>



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Welcome to the **Air Navigation Performance Assessment (AN-SPA)** tool. The goal of this tool is to promote a performance-based approach for a cost-effective modernization of the air navigation system. This tool guides the aviation community in the application of a six-step performance management process and in the selection of relevant operational improvements within the ASBU framework.

Collaborative decision-making is key for a cost-effective modernization of the air navigation system and therefore all relevant aviation stakeholders should be involved.

PREVIOUS REPORTS

START A NEW REPORT

ID	Geographical Scope	Time Horizon	ICAO Region	Key Performance Areas	Actions
679	En-Route	Short term	CARSAM	Capacity	VIEW DELETE

Resultados del AN-SPA



- Se realizaron 52 encuestas a los **proveedores internos** de la DGAC, en específico los **Servicios de Tránsito Aéreo**.
- De estas encuestas el Portal entrega resultados específicos
 - <https://www4.icao.int/ganpportal/ANSPA/Report/692>
 - Muestra una lista propuesta de objetivos de rendimiento de la OACI, basada en las respuestas dadas a las preguntas.
 - Cada resultadó se tabuló y se generó data, que sirvió para conocer el **estado de situación actual**, que ha permitido hasta la fecha la confección de las

Tabulación de los resultados



- Se utiliza planilla de cálculos de Google
- A cada registro se le asignan los KPI asociados y elementos ASBU, que el GANP Portal entrega como resultados

ID	Geographical Scope	Time Horizon	ICAO Region	Key Performance Areas KPA	Focus Area	Performance Objective	Key Performance Indicator KPI				Remarks			
							KPI02	KPI08	KPI13		SURF-B1/4	SURF-B1/5		
692	Aerodrome	Short term	CARSAM	Efficiency			KPI02	KPI08	KPI13		SURF-B1/4	SURF-B1/5		
692				Efficiency	Avoid slow taxi-out	Avoid slow taxi-out due to taxiway congestion	KPI02	KPI08	KPI13		SURF-B1/4	SURF-B1/5		
692				Efficiency	Avoid slow taxi-out	Avoid slow taxi-out due to weather conditions	KPI02	KPI08	KPI13		SURF-B1/4	SURF-B1/5		
692				Efficiency	Avoid slow taxi-out	Avoid slow taxi-out due to ATC and/or pilot	KPI02	KPI08	KPI13		SURF-B1/4	SURF-B1/5		
692				Efficiency	Avoid longer taxi-out routes	Avoid longer taxi-out routes due to unavailability of taxiways	KPI02	KPI08	KPI13		SURF-B1/4	SURF-B1/5		

Lista propuesta de objetivos de rendimiento KPI Elementos ASBU

Consideraciones



- Los registros tabulados, se procesaron para entregar la información requerida.
- Esta información se utilizará como la línea base para las mejoras de gestión, basados en el desempeño.
- La información será: un estado de situación actual para los Servicios de Navegación Aérea de Chile.
- Esto permitió, conocer cuales son los indicadores en los que Chile debe enfocarse, basado en la guía del GANP Portal.

Tabla 6



Tabla 6

N°	KPA	Focus Area	Threat/Weakness	Amount
1	Capacity	Improve airport capacity utilization (throughput efficiency)	Increase airport departure capacity utilization	16
2	Capacity	Improve airport capacity utilization (throughput efficiency)	Introduce integrated arrival and departure sequencing for a single runway or dependent runways of the same airport	15
3	Capacity	Avoid long taxi times after roll-out	Avoid need to backtrack after landing - Construct parallel taxiway	7
4	Capacity	Avoid long taxi times after roll-out	Construct more RWY exits	7
5	Capacity	Avoid long taxi times after roll-out	Extend roll-out till next RWY exit	7
6	Capacity	Increase demand if capacity constraints are not the issue	Accept traffic growth if airport is not congested	7
7	Capacity	Make better use of RWY during low visibility conditions	Reduce approach minima (ceiling & visibility)	7
8	Capacity	Relax scheduling constraints if these are capping the demand unnecessarily	Discontinue slot coordination if not needed any more	7
9	Capacity	Shorten roll-out	Apply stronger braking	7
10	Capacity	Shorten roll-out	Land with lower ground speed - Use headwind	7

KPA	Amount
Efficiency	194
Capacity	147
Predictability	24
Safety	16
Capacity Efficiency Predictability	8
Total	389

Conteo de las veces que el GANP Portal indicó los elementos del catálogo de objetivos de rendimiento (KPA, Focus Area, Threat/Weakness)

Tabla 7



Tabla 7

N°	KPA	Focus Area	Performance Objective	REMARKS	
				KPI	ASBU Elements
4	Capacity	Improve airport capacity utilization (throughput efficiency)	Increase airport departure capacity utilization	KPI's that may be used: KPI10 - Airport peak throughput And/Or KPI11 - Airport throughput efficiency And/Or KPI17 - Level-off during climb And/Or KPI19 - Level-off during descent	APTA-B0/1 = PBN Approaches (with basic capabilities) Maturity Level: 4 of 4 = Ready for implementation APTA-B0/3 = SBAS/GBAS CAT I precision approach procedures Maturity Level: 4 of 4 = Ready for implementation APTA-B0/6 = PBN Helicopter Point in Space (PinS) Operations Maturity Level: 4 of 4 = Ready for implementation APTA-B0/7 = Performance based aerodrome operating minima – Advanced aircraft Maturity Level: 4 of 4 = Ready for implementation APTA-B0/8 = Performance based aerodrome operating minima – Basic aircraft Maturity Level: 4 of 4 = Ready for implementation APTA-B1/1 = PBN Approaches (with advanced capabilities) Maturity Level: 3 of 4 = Standardization APTA-B1/3 = Performance based aerodrome operating minima – Advanced aircraft with SVGS Maturity Level: 3 of 4 = Standardization
5	Capacity	Improve airport capacity utilization (throughput efficiency)	Introduce integrated arrival and departure sequencing for a single runway or dependent runways of the same airport	KPI's that may be used: KPI10 - Airport peak throughput And/Or KPI11 - Airport throughput efficiency And/Or KPI17 - Level-off during climb And/Or KPI19 - Level-off during descent	APTA-B0/1 = PBN Approaches (with basic capabilities) Maturity Level: 4 of 4 = Ready for implementation APTA-B0/3 = SBAS/GBAS CAT I precision approach procedures Maturity Level: 4 of 4 = Ready for implementation APTA-B0/6 = PBN Helicopter Point in Space (PinS) Operations Maturity Level: 4 of 4 = Ready for implementation APTA-B0/7 = Performance based aerodrome operating minima – Advanced aircraft Maturity Level: 4 of 4 = Ready for implementation APTA-B0/8 = Performance based aerodrome operating minima – Basic aircraft Maturity Level: 4 of 4 = Ready for implementation APTA-B1/1 = PBN Approaches (with advanced capabilities) Maturity Level: 3 of 4 = Standardization APTA-B1/3 = Performance based aerodrome operating minima – Advanced aircraft with SVGS Maturity Level: 3 of 4 = Standardization

La columna **REMARK** se dividió en **KPI** y **ASBU Elements** que están Asociados al **Focus Area** y **Performance Objective**

Paso 3

Cuantificar objetivos, establecer metas y calcular requerimientos

Tabla 8



Tabla 8

N°	KPA	Performance Objective	KPI	Definition	ASBU Elements
4	Capacity	Increase airport departure capacity utilization	KPI's that may be used: KPI10 - Airport peak throughput And/Or KPI11 - Airport throughput efficiency And/Or KPI17 - Level-off during climb And/Or KPI19 - Level-off during descent	KPI10 - 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. KPI11 - Definition: Airport throughput (accommodated demand) compared to capacity or demand, whichever is lower. Can be computed for arrivals, departures or arrivals+departures. KPI17 - Definition: Distance and time flown in level flight before Top of Climb. KPI19 - Definition: Distance and time flown in level flight after Top of Descent.	APTA-B0/1 = PBN Approaches (with basic capabilities) Maturity Level: 4 of 4 = Ready for implementation APTA-B0/3 = SBAS/GBAS CAT I precision approach procedures Maturity Level: 4 of 4 = Ready for implementation APTA-B0/6 = PBN Helicopter Point in Space (PinS) Operations Maturity Level: 4 of 4 = Ready for implementation APTA-B0/7 = Performance based aerodrome operating minima – Advanced aircraft Maturity Level: 4 of 4 = Ready for implementation APTA-B0/8 = Performance based aerodrome operating minima – Basic aircraft Maturity Level: 4 of 4 = Ready for implementation APTA-B1/1 = PBN Approaches (with advanced capabilities) Maturity Level: 3 of 4 = Standardization APTA-B1/3 = Performance based aerodrome operating minima – Advanced aircraft with SVGS Maturity Level: 3 of 4 = Standardization
5	Capacity	Introduce integrated arrival and departure sequencing for a single runway or dependent runways of the same airport	KPI's that may be used: KPI10 - Airport peak throughput And/Or KPI11 - Airport throughput efficiency And/Or KPI17 - Level-off during climb And/Or KPI19 - Level-off during descent	KPI10 - 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. KPI11 - Definition: Airport throughput (accommodated demand) compared to capacity or demand, whichever is lower. Can be computed for arrivals, departures or arrivals+departures. KPI17 - Definition: Distance and time flown in level flight before Top of Climb. KPI19 - Definition: Distance and time flown in level flight after Top of Descent.	APTA-B0/1 = PBN Approaches (with basic capabilities) Maturity Level: 4 of 4 = Ready for implementation APTA-B0/3 = SBAS/GBAS CAT I precision approach procedures Maturity Level: 4 of 4 = Ready for implementation APTA-B0/6 = PBN Helicopter Point in Space (PinS) Operations Maturity Level: 4 of 4 = Ready for implementation APTA-B0/7 = Performance based aerodrome operating minima – Advanced aircraft Maturity Level: 4 of 4 = Ready for implementation APTA-B0/8 = Performance based aerodrome operating minima – Basic aircraft Maturity Level: 4 of 4 = Ready for implementation APTA-B1/1 = PBN Approaches (with advanced capabilities) Maturity Level: 3 of 4 = Standardization APTA-B1/3 = Performance based aerodrome operating minima – Advanced aircraft with SVGS Maturity Level: 3 of 4 = Standardization

- Para cada elemento del **Performance Objective**, tiene asociado el o los **KPI** que pueden ayudar a medir el desempeño de ese elemento, a su vez el se muestra un listado de los diferentes **ASBU Elements** que ayudarán a mejorar el elemento del **Performance Objective**.
- Para el caso de Chile, decidimos mostrar los ASBU Elements que están en un **Nivel de maduración 3** (Estandarización) y **Nivel de maduración 4** (Listo para la implementación)

KPI- Metas propuestas de medición



- En base a toda la información recopilada del GANP Portal, se pudo conocer cual son los KPI que Chile debiese medir (12).
- Sin embargo, hay que considerar que cada KPI tiene datos asociados y métricas/algoritmos que deben ser utilizados.
- Estos datos los podemos encontrar en los Elementos ASBU

N°	KPI	%
1	KPI17 - Level-off during climb	19.8%
2	KPI19 - Level-off during descent	19.8%
3	KPI10 - Airport peak throughput	15.5%
4	KPI11 - Airport throughput efficiency	14.1%
5	KPI05 - Actual en-route extension	6.7%
6	KPI18 - Level capping during cruise	6.5%
7	KPI08 - Additional time in terminal airspace	5.7%
8	KPI13 - Taxi-in additional time	5.2%
9	KPI02 - Taxi-out additional time	4.3%
10	KPI01 - Departure punctuality	0.9%
11	KPI14 - Arrival punctuality	0.9%
12	KPI04 - Filed flight plan en-route extension	0.7%

Relación KPI y elementos ASBU



N°	KPI	%	List of ASBU elements needs
1	KPI17 - Level-off during climb	19.8%	<p>APTA-B0/2 = PBN SID and STAR procedures (with basic capabilities) Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B1/2 = PBN SID and STAR procedures (with advanced capabilities) Maturity Level: 3 of 4 = Standardization</p> <p>APTA-B1/5 = COO (Advanced) Maturity Level: 3 of 4 = Standardization</p> <p>NOPS-B0/1 = Initial integration of collaborative airspace management with air traffic flow management Maturity Level: 4 of 4 = Ready for implementation</p> <p>NOPS-B1/5 = Full integration of airspace management with air traffic flow management Maturity Level: 3 of 4 = Standardization</p> <p>FRTO-B0/2 = Airspace planning and Flexible Use of Airspace (FUA) Maturity Level: 4 of 4 = Ready for implementation</p> <p>FRTO-B1/3 = Advanced Flexible Use of Airspace (FUA) and management of real time airspace data Maturity Level: 3 of 4 = Standardization</p> <p>APTA-B0/5 = COO (Basic) Maturity Level: 4 of 4 = Ready for implementation</p>
2	KPI19 - Level-off during descent	19.8%	<p>NOPS-B0/1 = Initial integration of collaborative airspace management with air traffic flow management Maturity Level: 4 of 4 = Ready for implementation</p> <p>NOPS-B1/5 = Full integration of airspace management with air traffic flow management Maturity Level: 3 of 4 = Standardization</p> <p>FRTO-B0/2 = Airspace planning and Flexible Use of Airspace (FUA) Maturity Level: 4 of 4 = Ready for implementation</p> <p>FRTO-B1/3 = Advanced Flexible Use of Airspace (FUA) and management of real time airspace data Maturity Level: 3 of 4 = Standardization</p> <p>OPFL-B0/1 = In Trail Procedure (ITP) Maturity Level: 4 of 4 = Ready for implementation</p> <p>OPFL-B1/1 = Climb and Descend Procedure (CDP) Maturity Level: 3 of 4 = Standardization</p> <p>NOPS-B1/10 = Collaborative Trajectory Options Program (CTOP) Maturity Level: 3 of 4 = Standardization</p>
4	KPI11 - Airport throughput efficiency	14.1%	<p>APTA-B0/2 = PBN SID and STAR procedures (with basic capabilities) Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B1/2 = PBN SID and STAR procedures (with advanced capabilities) Maturity Level: 3 of 4 = Standardization</p> <p>RSEQ-B0/1 = Arrival Management Maturity Level: 4 of 4 = Ready for implementation</p> <p>RSEQ-B2/1 = Integration of arrival and departure management Maturity Level: 2 of 4 = Validation</p> <p>RSEQ-B3/2 = Extended arrival management supporting overlapping operations into multiple airports Maturity Level: 2 of 4 = Validation</p> <p>RSEQ-B3/3 = Increased utilization of runway capacity by improved real-time runway scheduling Maturity Level: 1 of 4 = Concept</p>
5	KPI05 - Actual en-route extension	6.7%	<p>NOPS-B0/1 = Initial integration of collaborative airspace management with air traffic flow management Maturity Level: 4 of 4 = Ready for implementation</p> <p>NOPS-B1/5 = Full integration of airspace management with air traffic flow management Maturity Level: 3 of 4 = Standardization</p> <p>FRTO-B0/2 = Airspace planning and Flexible Use of Airspace (FUA) Maturity Level: 4 of 4 = Ready for implementation</p> <p>FRTO-B1/3 = Advanced Flexible Use of Airspace (FUA) and management of real time airspace data Maturity Level: 3 of 4 = Standardization</p>
6	KPI18 - Level capping during cruise	6.5%	<p>NOPS-B0/1 = Initial integration of collaborative airspace management with air traffic flow management Maturity Level: 4 of 4 = Ready for implementation</p> <p>NOPS-B1/5 = Full integration of airspace management with air traffic flow management Maturity Level: 3 of 4 = Standardization</p> <p>FRTO-B0/2 = Airspace planning and Flexible Use of Airspace (FUA) Maturity Level: 4 of 4 = Ready for implementation</p> <p>FRTO-B1/3 = Advanced Flexible Use of Airspace (FUA) and management of real time airspace data Maturity Level: 3 of 4 = Standardization</p> <p>OPFL-B0/1 = In Trail Procedure (ITP) Maturity Level: 4 of 4 = Ready for implementation</p> <p>OPFL-B1/1 = Climb and Descend Procedure (CDP) Maturity Level: 3 of 4 = Standardization</p> <p>NOPS-B1/10 = Collaborative Trajectory Options Program (CTOP) Maturity Level: 3 of 4 = Standardization</p>

N°	KPI	%	List of ASBU elements needs
7	KPI08 - Additional time in terminal airspace	5.7%	<p>RSEQ-B0/1 = Arrival Management Maturity Level: 4 of 4 = Ready for implementation</p> <p>RSEQ-B1/1 = Extended arrival metering Maturity Level: 3 of 4 = Standardization</p> <p>RSEQ-B3/2 = Extended arrival management supporting overlapping operations into multiple airports Maturity Level: 2 of 4 = Validation</p>
8	KPI13 - Taxi-in additional time	5.2%	<p>SURF-B0/1 = Basic ATCO tools to manage traffic during ground operations Maturity Level: 4 of 4 = Ready for implementation</p> <p>SURF-B1/1 = Advanced features using visual aids to support traffic management during ground operations Maturity Level: 3 of 4 = Standardization</p> <p>SURF-B1/4 = Routing service to support ATCO surface operations management Maturity Level: 3 of 4 = Standardization</p> <p>SURF-B1/5 = Enhanced vision systems for taxi operations Maturity Level: 3 of 4 = Standardization</p> <p>SURF-B2/1 = Enhanced surface guidance for pilots and vehicle drivers Maturity Level: 2 of 4 = Validation</p> <p>SURF-B3/1 = Optimization of surface traffic management in complex situations Maturity Level: 1 of 4 = Concept</p>
9	KPI02 - Taxi-out additional time	4.3%	<p>SURF-B0/1 = Basic ATCO tools to manage traffic during ground operations Maturity Level: 4 of 4 = Ready for implementation</p> <p>RSEQ-B0/2 = Departure Management Maturity Level: 4 of 4 = Ready for implementation</p> <p>SURF-B1/1 = Advanced features using visual aids to support traffic management during ground operations Maturity Level: 3 of 4 = Standardization</p> <p>SURF-B1/4 = Routing service to support ATCO surface operations management Maturity Level: 3 of 4 = Standardization</p> <p>SURF-B1/5 = Enhanced vision systems for taxi operations Maturity Level: 3 of 4 = Standardization</p> <p>RSEQ-B3/1 = Departure management in terminal airspace from multiple airports Maturity Level: 2 of 4 = Validation</p> <p>SURF-B2/1 = Enhanced surface guidance for pilots and vehicle drivers Maturity Level: 2 of 4 = Validation</p> <p>SURF-B3/1 = Optimization of surface traffic management in complex situations Maturity Level: 1 of 4 = Concept</p>
10	KPI01 - Departure punctuality	0.9%	
11	KPI14 - Arrival punctuality	0.9%	
12	KPI04 - Filed flight plan en-route extension	0.7%	<p>NOPS-B0/1 = Initial integration of collaborative airspace management with air traffic flow management Maturity Level: 4 of 4 = Ready for implementation</p> <p>NOPS-B1/5 = Full integration of airspace management with air traffic flow management Maturity Level: 3 of 4 = Standardization</p> <p>FRTO-B0/1 = Direct routing (DCT) Maturity Level: 4 of 4 = Ready for implementation</p> <p>FRTO-B0/2 = Airspace planning and Flexible Use of Airspace (FUA) Maturity Level: 4 of 4 = Ready for implementation</p> <p>FRTO-B1/1 = Free Route Airspace (FRA) Maturity Level: 3 of 4 = Standardization</p> <p>FRTO-B1/3 = Advanced Flexible Use of Airspace (FUA) and management of real time airspace data Maturity Level: 3 of 4 = Standardization</p> <p>FRTO-B2/3 = Large Scale Cross Border Free Route Airspace (FRA) Maturity Level: 2 of 4 = Validation</p> <p>NOPS-B1/10 = Collaborative Trajectory Options Program (CTOP) Maturity Level: 3 of 4 = Standardization</p>

Relación KPI y elementos ASBU

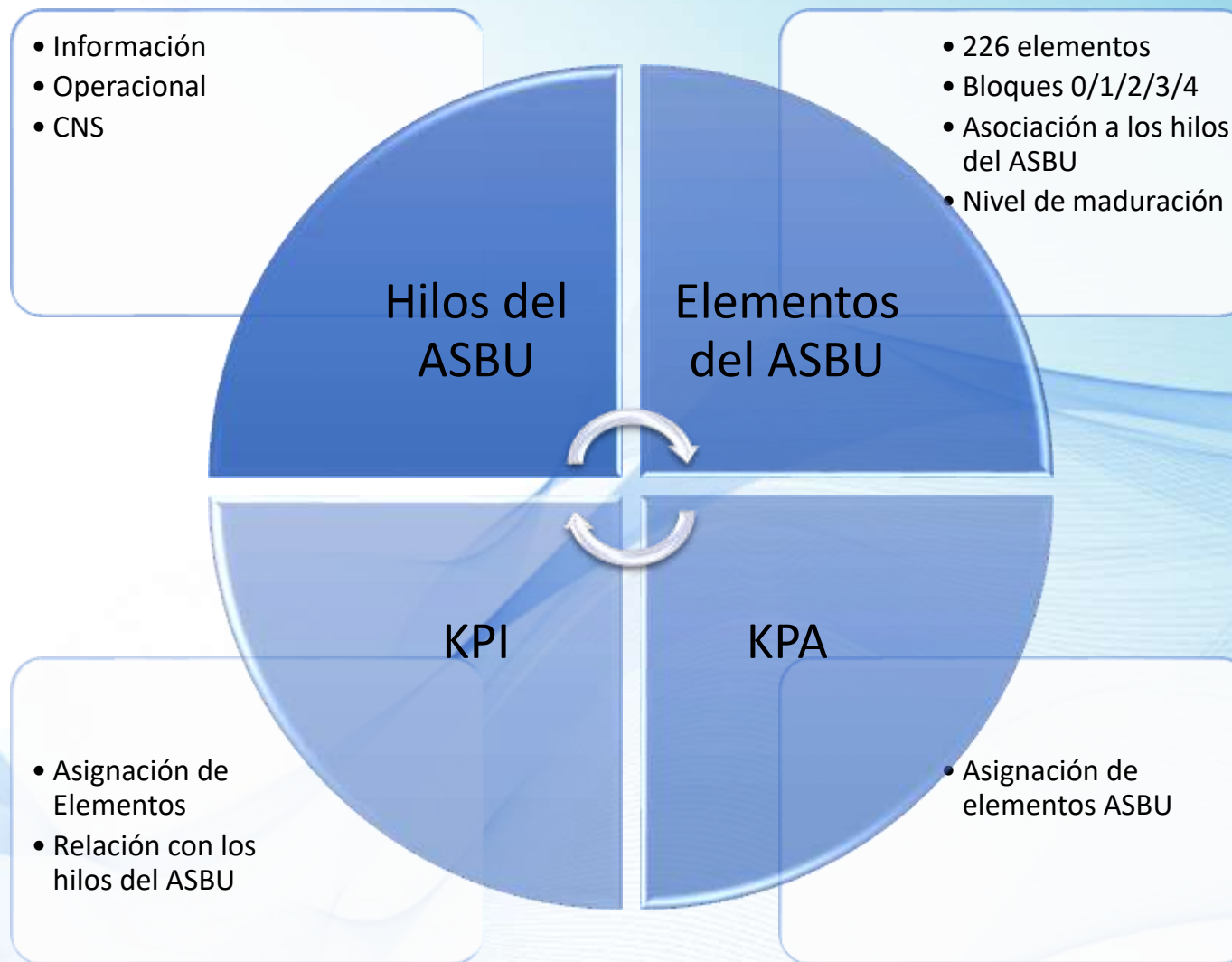


N°	KPI	%	List of ASBU elements needs
3	KPI10 - Airport peak throughput	15.5%	<p>WAKE-B2/1 = Wake turbulence separation minima based on 7 aircraft groups Maturity Level: 3 of 4 = Standardization</p> <p>APTA-B0/1 = PBN Approaches (with basic capabilities) Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B0/2 = PBN SID and STAR procedures (with basic capabilities) Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B0/3 = SBAS/GBAS CAT I precision approach procedures Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B0/6 = PBN Helicopter Point in Space (PinS) Operations Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B0/7 = Performance based aerodrome operating minima – Advanced aircraft Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B1/1 = PBN Approaches (with advanced capabilities) Maturity Level: 3 of 4 = Standardization</p> <p>APTA-B1/2 = PBN SID and STAR procedures (with advanced capabilities) Maturity Level: 3 of 4 = Standardization</p> <p>APTA-B2/2 = Simultaneous operations to parallel runways Maturity Level: 3 of 4 = Standardization</p> <p>APTA-B2/3 = PBN Helicopter Steep Approach Operations Maturity Level: 3 of 4 = Standardization</p> <p>APTA-B1/3 = Performance based aerodrome operating minima – Advanced aircraft with SVGS Maturity Level: 3 of 4 = Standardization</p> <p>WAKE-B2/2 = Dependent parallel approaches Maturity Level: 3 of 4 = Standardization</p> <p>WAKE-B2/3 = Independent segregated parallel operations Maturity Level: 3 of 4 = Standardization</p> <p>WAKE-B2/4 = Wake turbulence separation minima based on leader/follower static pairs-wise Maturity Level: 2 of 4 = Validation</p> <p>WAKE-B2/5 = Enhanced dependent parallel approaches Maturity Level: 2 of 4 = Validation</p> <p>WAKE-B2/6 = Enhanced independent segregated parallel operations Maturity Level: 2 of 4 = Validation</p> <p>RSEQ-B0/1 = Arrival Management Maturity Level: 4 of 4 = Ready for implementation</p> <p>RSEQ-B0/2 = Departure Management Maturity Level: 4 of 4 = Ready for implementation</p> <p>CSEP-B2/1 = Interval Management (IM) Procedure Maturity Level: 3 of 4 = Standardization</p> <p>CSEP-B4/1 = Airborne separation Maturity Level: 2 of 4 = Validation</p> <p>RSEQ-B2/2 = Arrival management in terminal airspace with multiple airports Maturity Level: 2 of 4 = Validation</p> <p>RSEQ-B3/1 = Departure management in terminal airspace from multiple airports Maturity Level: 2 of 4 = Validation</p> <p>RSEQ-B3/2 = Extended arrival management supporting overlapping operations into multiple airports Maturity Level: 2 of 4 = Validation</p> <p>WAKE-B2/7 = Time based wake separation minima for arrival based on leader/follower static pair-wise Maturity Level: 1 of 4 = Concept</p> <p>WAKE-B3/1 = Time based dependent parallel approaches Maturity Level: 1 of 4 = Concept</p> <p>WAKE-B3/2 = Time based independent segregated parallel operations Maturity Level: 1 of 4 = Concept</p> <p>RSEQ-B0/3 = Point merge Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B0/8 = Performance based aerodrome operating minima – Basic aircraft Maturity Level: 4 of 4 = Ready for implementation</p> <p>APTA-B2/1 = GBAS CAT IV/III precision approach procedures Maturity Level: 2 of 4 = Validation</p> <p>WAKE-B2/8 = Time based wake separation minima for departure based on leader/follower static pair-wise Maturity Level: 1 of 4 = Concept</p> <p>CSEP-B3/1 = Interval Management (IM) Procedure with complex geometries Maturity Level: 1 of 4 = Concept</p> <p>CSEP-B3/2 = Remain Well Clear (RWC) functionality for UAS/ RPAS Maturity Level: 2 of 4 = Validation</p>



Relaciones KPA, ASBU, KPI

¿Cómo relacionamos todo?



Hilos del ABSU



N°	ASBU THREADS		
1	AMET	Meteorological information	Information
2	DAIM	Digital Aeronautical Information Management	Information
3	FICE	Flight and Flow Information for a Collaborative Environment (FF-ICE)	Information
4	SWIM	System Wide Information Management	Information
5	ACAS	Airborne Collision Avoidance System (ACAS)	Operational
6	ACDM	Airport Collaborative Decision Making	Operational
7	APTA	Improve arrival and departure operations	Operational
8	CSEP	Cooperative Separation	Operational
9	FRTO	Improved operations through enhanced en-route trajectories	Operational
10	GADS	Global Aeronautical Distress and Safety System (GADSS)	Operational
11	NOPS	Network Operations	Operational
12	OPFL	Improved access to optimum flight levels in oceanic and remote airspace	Operational
13	RATS	Improved traffic flow through runway sequencing	Operational
14	RSEQ	Improved traffic flow through runway sequencing	Operational
15	SNET	Surface operations	Operational
16	SURF	Surface operations	Operational
17	TBO	Trajectory-based operations	Operational
18	WAKE	Wake Turbulence Separation	Operational
19	ASUR	Surveillance systems	CNS
20	COMI	Communication infrastructure	CNS
21	COMS	ATS Communication service	CNS
22	NAVS	Navigation systems	CNS

Elementos del ASBU

Level 1 of 4 = Concept
 Level 2 of 4 = Validation
 Level 3 of 4 = Standardization
 Level 4 of 4 = Ready for implementation



ASBU THREADS		ELEMENTS		Maturity Level

Information	AMET	AMET-B0/1	Meteorological observations products	4 of 4 = Ready for implementation
Information	AMET	AMET-B0/2	Meteorological forecast and warning products	4 of 4 = Ready for implementation
Information	AMET	AMET-B0/3	Climatological and historical meteorological products	4 of 4 = Ready for implementation
Information	AMET	AMET-B0/4	Dissemination of meteorological products	4 of 4 = Ready for implementation
Information	AMET	AMET-B1/1	Meteorological observations information	3 of 4 = Standardization
Information	AMET	AMET-B1/2	Meteorological forecast and warning information	3 of 4 = Standardization
Information	AMET	AMET-B1/3	Climatological and historical meteorological information	3 of 4 = Standardization
Information	AMET	AMET-B1/4	Dissemination of meteorological information	3 of 4 = Standardization
Information	AMET	AMET-B2/1	Meteorological observations information	2 of 4 = Validation
Information	AMET	AMET-B2/2	Meteorological forecast and warning information	2 of 4 = Validation
Information	AMET	AMET-B2/3	Climatological and historical meteorological information	2 of 4 = Validation
Information	AMET	AMET-B2/4	Meteorological information service in SWIM	2 of 4 = Validation
Information	AMET	AMET-B3/1	Meteorological observations information	1 of 4 = Concept
Information	AMET	AMET-B3/2	Meteorological forecast and warning information	1 of 4 = Concept
Information	AMET	AMET-B3/3	Climatological and historical meteorological information	----
Information	AMET	AMET-B3/4	Meteorological information service in SWIM	1 of 4 = Concept
Information	AMET	AMET-B4/1	Meteorological observations information	----
Information	AMET	AMET-B4/2	Meteorological forecast and warning information	----
Information	AMET	AMET-B4/3	Climatological and historical meteorological information	----
Information	AMET	AMET-B4/4	Meteorological information service in SWIM	----
Information	DAIM	DAIM-B1/1	Provision of quality-assured aeronautical data and information	3 of 4 = Standardization
Information	DAIM	DAIM-B1/2	Provision of digital Aeronautical Information Publication (AIP) data sets	4 of 4 = Ready for implementation
Information	DAIM	DAIM-B1/3	Provision of digital terrain data sets	4 of 4 = Ready for implementation

KPA y relaciones ASBU



KPA	ASBU Element 1	ASBU Element 2	ASBU Element 3	ASBU Element 4	ASBU Element 5	ASBU Element 6	ASBU Element 7
Efficiency	▼	▼	▼	▼	▼	▼	▼
Capacity	NOPS-B0/2 ▼	NOPS-B0/2 ▼	NOPS-B0/4 ▼	NOPS-B1/1 ▼	NOPS-B1/2 ▼	NOPS-B1/6 ▼	NOPS-B1/7 ▼
Predictability	▼	▼	▼	▼	▼	▼	▼
Safety	RATS-B1/1 ▼	SURF-B0/1 ▼	SURF-B0/2 ▼	SURF-B0/3 ▼	SURF-B1/1 ▼	SURF-B1/2 ▼	SURF-B1/3 ▼
Security	▼	▼	▼	▼	▼	▼	▼
Environment	▼	▼	▼	▼	▼	▼	▼
Cost effectiveness	RATS-B1/1 ▼	FRTO-B1/6 ▼	▼	▼	▼	▼	▼
Interoperability	SWIM-B2/5 ▼	▼	▼	▼	▼	▼	▼
Access and equity	FRTO-B0/2 ▼	FRTO-B1/3 ▼	NOPS-B2/3 ▼	▼	▼	▼	▼
Participation by the ATM community	▼	▼	▼	▼	▼	▼	▼
Flexibility	RATS-B1/1 ▼	FRTO-B0/3 ▼	NOPS-B3/1 ▼	RSEQ-B3/4 ▼	▼	▼	▼

KPI y relaciones ASBU



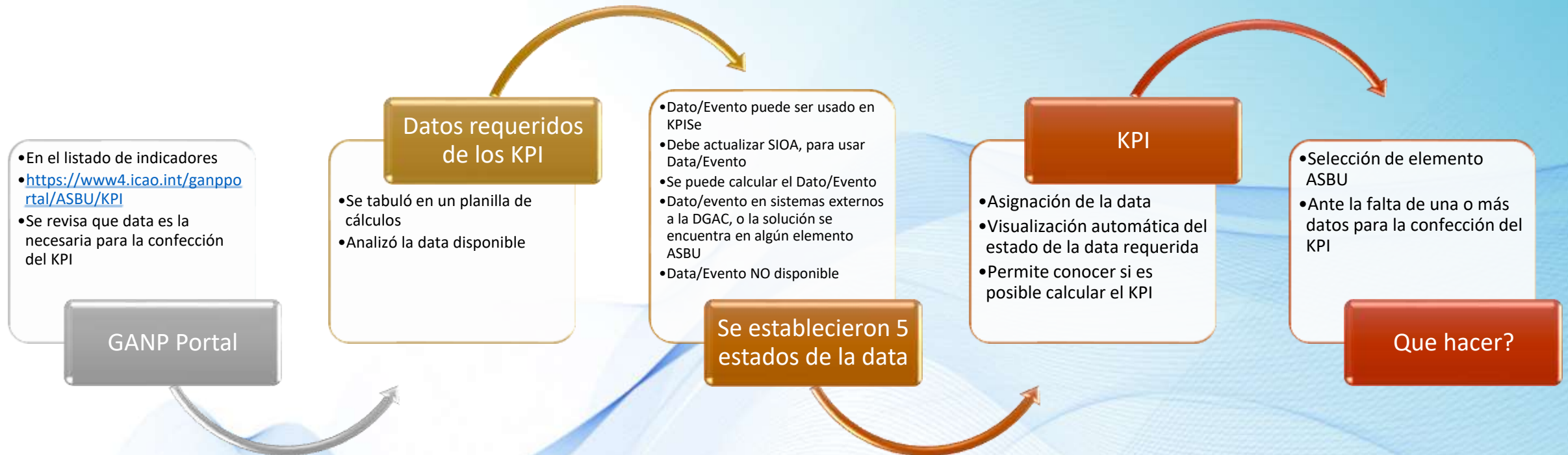
ASBU THREAD S	KPI ID	ASBU Element 1	ASBU Element 2	ASBU Element 3	ASBU Element 4	ASBU Element 5	ASBU Element 6	ASBU Element 7	ASBU Element 8
	KPI01								
Efficiency	KPI02	SURF-B0/1	RSEQ-B0/2	SURF-B1/1	SURF-B1/4	SURF-B1/5	RSEQ-B3/1	SURF-B2/1	SURF-B3/1
	KPI03								
Capacity	KPI04	NOPS-B0/1	NOPS-B1/5	FRTO-B0/1	FRTO-B0/2	FRTO-B1/1	FRTO-B1/3	FRTO-B2/3	NOPS-B1/10
Capacity	KPI05	NOPS-B0/1	NOPS-B1/5	FRTO-B0/2	FRTO-B1/3				
Capacity	KPI06	NOPS-B1/4	CSEP-B2/1	FRTO-B1/2	CSEP-B4/1	CSEP-B1/3	CSEP-B1/4	FRTO-B0/4	CSEP-B3/1
Capacity	KPI07	NOPS-B1/10	NOPS-B0/5						
Efficiency	KPI08	RSEQ-B0/1	RSEQ-B1/1	RSEQ-B3/2					
	KPI09								
Capacity	KPI10	WAKE-B2/1	APTA-B0/1	APTA-B0/2	APTA-B0/3	APTA-B0/6	APTA-B0/7	APTA-B1/1	
Capacity	KPI11	APTA-B0/2	APTA-B1/2	RSEQ-B0/1	RSEQ-B2/1	RSEQ-B3/2	RSEQ-B3/3		
Efficiency	KPI12								
Efficiency	KPI13	SURF-B0/1	SURF-B1/1	SURF-B1/4	SURF-B1/5	SURF-B2/1	SURF-B3/1		
	KPI14								
	KPI15								
	KPI16								
Efficiency	KPI17	APTA-B0/2	APTA-B1/2	APTA-B1/5	NOPS-B0/1	NOPS-B1/5	FRTO-B0/2	FRTO-B1/3	APTA-B0/5
Capacity	KPI18	NOPS-B0/1	NOPS-B1/5	FRTO-B0/2	FRTO-B1/3	OPFL-B0/1	OPFL-B1/1	NOPS-B1/10	
Efficiency	KPI19		NOPS-B0/1	NOPS-B1/5	FRTO-B0/2	FRTO-B1/3	OPFL-B0/1	OPFL-B1/1	NOPS-B1/10

Relación KPI y elementos ASBU



Análisis de la data requerida para los KPI's

Tabulación y asignación de data requerida



GANP Portal



Data Requirement

For each departing scheduled flight:

- Scheduled time of departure (STD) or Scheduled off-block time (SOBT)
- Actual off-block time (AOBT)

	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: <ul style="list-style-type: none">• Scheduled time of departure (STD) or Scheduled off-block time (SOBT)• Actual off-block time (AOBT)

Datos requeridos de los KPI



N°	Dato/Evento requerido	Descripción del Dato/Evento	¿Existe el dato en los Sistemas DGAC?	Fuente de Información o Sistema(s) en el que se encuentra	Forma ideal de Obtener la data (1)	Forma ideal de Obtener la data (2)	Si NO existe en sistema, ¿se puede calcular?	Si no se puede calcular, existe alguna solución ASBU	Si no se puede calcular, existe alguna solución NO ASBU	Es necesario el dato? (Depende de análisis AN-SPA)	Prioridad + alta para elaborar el KPI	Observación
11	SOBT	Scheduled Off-Block Time / Hora programada de fuera calzos	SI	FPL		Conexión a Base de Datos	NO	SI	SI	SI	10	aclarar si la hora SOBT es la que hora del FPL en el casillero hora de salida.
14	AOBT	Time / Hora real de	NO	FPVE, AODB		Conexión a Base de Datos	NO	---	SI	SI	10	La hora más proxima utilizada hasta el día de hoy, es la hora de autoización de rodaje Se requiere actualizar las FPVE para incorporar el evento AOBT
23	STD (Opcional)	Scheduled Time of Departure / Hora programada de salida	NO			---	NO	---		SI	10	Scheduled time of departure (STD) / Hora programada de salida: no existe en el Doc. 9971. Este evento es supercedido por el SOBT

- Cada columna pudiese ser completada, y dependiendo lo que se haya seleccionado, un código de colores aparecerá en la celda del dato/evento requerido.
- Permite visualmente conocer el estado de la data que requiere el o los KPI para su confección.

5 Estados de la data



Dato/Evento requerido	¿Existe el dato en los Sistemas DGAC?	Si NO existe en sistema, ¿se puede calcular?	Si no se puede calcular, existe alguna solución ASBU	Si no se puede calcular, existe alguna solución NO ASBU	Tiempo propuesto para obtención de la data
Dato/Evento puede ser usado en KPI	SI	----	----	----	CORTO PLAZO (1 AÑO)
Se debe actualizar SIOA, para usar Data/Evento	NO	----	----	SI	CORTO PLAZO (1,5 AÑO)
Se puede calcular el Dato/Evento	NO	SI	----	----	CORTO PLAZO (1 AÑO)
Dato/evento en sistemas externos a la DGAC, o la solución se encuentra en algún elemento ASBU	NO	----	SI	SI	MEDIANO PLAZO (2-2,5 AÑOS)
Data/Evento NO disponible	NO	----	----	----	LARGO PLAZO (4 AÑOS O MÁS)

KPI - elementos para ser calculados



- A cada KPI se le asigna el dato/evento necesario.
- Con la asignación, se obtiene la descripción y el estado de la data.
- De esta forma es posible conocer la factibilidad de poder confeccionar el KPI

ID	Nombre	Eventos/datos requeridos	ELDT	ALDT	EIBT	AIBT	ACGT	ASBT	ARDT	TSAT	ASRT	ASAT	SOBT	TOBT	EOBT	AOBT	TTOT	CTOT	ATOT	ETOT	STD (Opcional)
			Puede ser usado en KPI	Puede ser usado en KPI	Puede ser usado en KPI	Dato en estat. ext. o se debe implementar sol. A SBU	Dato en estat. ext. o se debe implementar sol. A SBU	Dato en estat. ext. o se debe implementar sol. A SBU	Dato en estat. ext. o se debe implementar sol. A SBU	Dato en estat. ext. o se debe implementar sol. A SBU	Puede ser usado en KPI	Puede ser usado en KPI	Puede ser usado en KPI	Dato en estat. ext. o se debe implementar sol. A SBU	Puede ser usado en KPI	Se debe actualizar SIOA, para usar data	Dato en estat. ext. o se debe implementar sol. A SBU	Se debe actualizar SIOA, para usar data	Puede ser usado en KPI	Se puede calcular el dato	Data NO disponible
KPI 01	Departure punctuality	SOBT: (Puede ser usado en KPI) AOBT: (Se debe actualizar SIOA, para usar data) STD (Opcional): (Data NO disponible)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KPI 02	Taxi-out additional time	AOBT: (Se debe actualizar SIOA, para usar data) ATOT: (Puede ser usado en KPI) PRKG/RWY/PRKG: (Se puede calcular el dato) DGI: (Puede ser usado en KPI) TRI: (Puede ser usado en KPI)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KPI 03	ATFM slot adherence	CTOT: (Se debe actualizar SIOA, para usar data) ATOT: (Puede ser usado en KPI)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

¿Qué hacer cuando la data no está disponible?



- Si la data no esté disponible, se debe pensar en:
 - Cada KPI tiene elementos ASBU que pueden permitir la existencia del dato requerido.
 - Considerar que dependiendo del elemento ASBU que sea seleccionado, este a su vez tiene dependencia tecnológica de otros elementos.
 - Por lo general los elementos ASBU en Nivel de maduración 4, ya se encuentran disponibles para su implementación.

Ejemplos de KPI con data faltante



ID	Nombre	Eventos/datos requeridos	ALDT	AIBT	PRKG/RWY/PRKG	PRKG	RWY	LRI	STA	SIBT
			Puede ser usado en KPI	Dato en sist. ext. o se debe implementar sol. ASBU	Se puede calcular el dato	Puede ser usado en KPI	Puede ser usado en KPI	Puede ser usado en KPI	Data NO disponible	Data NO disponible
KPI 13	Taxi-in additional time	ALDT: (Puede ser usado en KPI) AIBT: (Dato en sist. ext. o se debe implementar sol. ASBU) PRKG/RWY/PRKG: (Se puede calcular el dato) PRKG: (Puede ser usado en KPI) RWY: (Puede ser usado en KPI) LRI: (Puede ser usado en KPI)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KPI 14	Arrival punctuality	AIBT: (Dato en sist. ext. o se debe implementar sol. ASBU) STA: (Data NO disponible) SIBT: (Data NO disponible)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

RESUME	DEFINITION	ASBU Elements
KPI13 - Taxi-in additional time	Actual taxi-in time compared to an unimpeded/reference taxi-in time	<p>SURF-B0/1 = Basic ATCO tools to manage traffic during ground operations Maturity Level: 4 of 4 = Ready for implementation</p> <p>SURF-B1/1 = Advanced features using visual aids to support traffic management during ground operations Maturity Level: 3 of 4 = Standardization</p> <p>SURF-B1/4 = Routing service to support ATCO surface operations management Maturity Level: 3 of 4 = Standardization</p> <p>SURF-B1/5 = Enhanced vision systems for taxi operations Maturity Level: 3 of 4 = Standardization</p> <p>SURF-B2/1 = Enhanced surface guidance for pilots and vehicle drivers Maturity Level: 2 of 4 = Validation</p> <p>SURF-B3/1 = Optimization of surface traffic management in complex situations Maturity Level: 1 of 4 = Concept</p>
KPI14 - Arrival punctuality	Percentage of flights arriving at the gate on-time (compared to schedule)	

Resumen



Tabla 8

Performance Objective	KPI	Definición	ASBU Element
Airport peak throughput	KPI10 - Airport peak throughput	...	...
	KPI11 - Airport throughput efficiency	...	...
	KPI12 - Level-off during climb	...	...
	KPI13 - Level-off during descent	...	...
Actual en-route extension	KPI05 - Actual en-route extension	...	...
	KPI14 - Arrival punctuality	...	...
	KPI15 - Departure punctuality	...	...
	KPI16 - Filed flight plan en-route extension	...	...

Cuantificar objetivos

Para cada elemento del Performance Objective, tiene asociado el o los KPI que pueden ayudar a medir el desempeño de ese elemento, a su vez se muestra un listado de los diferentes ASBU Elements que ayudarán a mejorar el elemento del Performance Objective.

- Para el caso de Chile, decidimos mostrar los ASBU Elements que están en un Nivel de maduración 3 (Estandarización) y Nivel de maduración 4 (Listo para la implementación)

Paso 3 resumen

KPI - elementos para ser calculados

- A cada KPI se le asigna el dato/evento...
- Con la asignación, se obtiene la...
- De esta forma es posible con...

ID	Nombre	Descripción	Unit	Unit	Unit	Unit
KPI01
KPI02
KPI03

Calcular requerimientos

KPI- Metas propuestas de medición

Para toda la información del GANP Portal, se...

N°	KPI	%
1	KPI17 - Level-off during climb	19.8%
2	KPI19 - Level-off during descent	19.8%
3	KPI10 - Airport peak throughput	15.5%
4	KPI11 - Airport throughput efficiency	14.1%
5	KPI05 - Actual en-route extension	6.7%
6	KPI18 - Level capping during cruise	6.5%
7	KPI08 - Additional time in terminal airspace	5.7%
8	KPI13 - Taxi-in additional time	5.2%
9	KPI02 - Taxi-out additional time	4.3%
10	KPI01 - Departure punctuality	0.9%
11	KPI14 - Arrival punctuality	0.9%
12	KPI04 - Filed flight plan en-route extension	0.7%

Establecer metas

¿Qué sigue?



Construcción
indicadores de
desempeño (KPI)

- Los KPI, metodología BI
- Metodología que tiene pasos claramente definidos
 - Análisis y requerimientos (hasta el paso 3)
 - Establecer un modelo de datos
 - Desarrollar el modelo de datos
 - Producción
 - Formación y documentación

Identificación de
una Solución
Optima.

- Para solucionar/mejorar/mitigar riesgos (Tabla 6 -Tabla 8)
- Mediante KPI, permita medir y establecer metas en periodo de tiempo.
- Soluciones optimas serían los elementos ASBU

¿Consultas?

Questions?