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UNITING AVIATION

GANP 2019/ASBUs

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Agenda

- Background information
- GANP 2019
 - Global Strategic level
 - Global Technical level
 - BBB and ASBU framework





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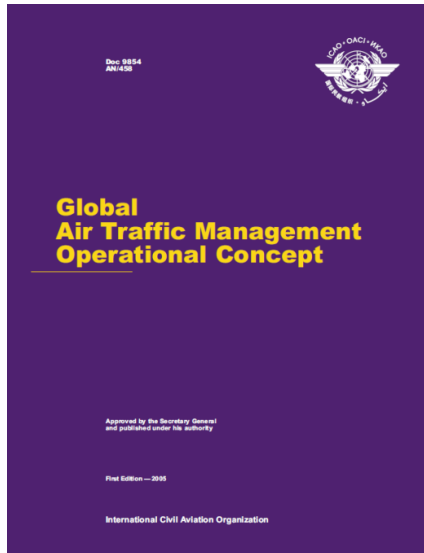
Global Air Navigation Planning

BACKGROUND INFORMATION





The future ATM system

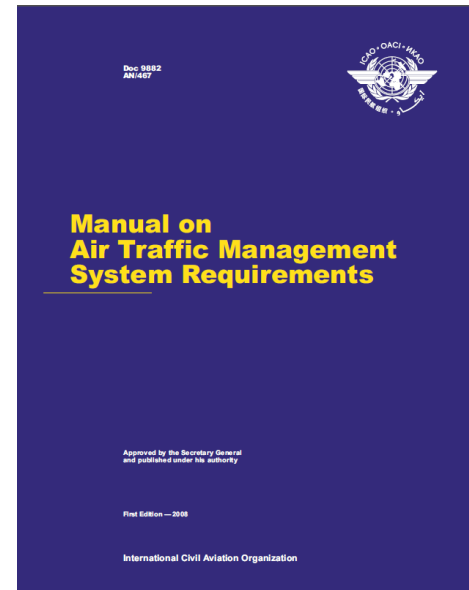


To achieve an **interoperable** global air traffic management system, **for all users during all phases of flight**, that **meets agreed levels of safety**, provides for **optimum economic operations**, is **environmentally sustainable** and **meets national security requirements**



ATM System Requirements

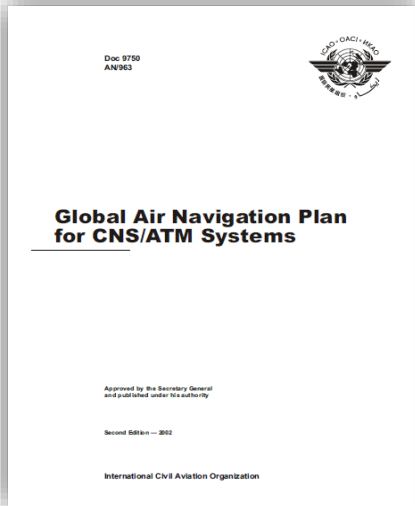
- Key Performance Areas
- Information management and services
- System design and engineering
- System components



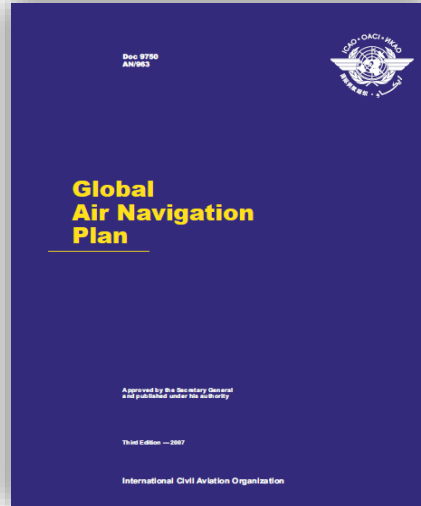


Global Air Navigation Planning: an evolution

2002



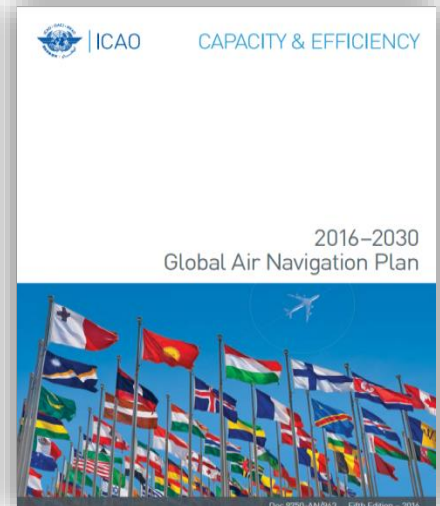
2007



2013



2016





GANP 2013

“Increase the capacity and improve the efficiency of the global civil aviation system”



- Through the **GANP**, offer a long-term vision to assist all aviation stakeholders, and ensure continuity and harmonization among modernization programmes
- Through the **Aviation System Block Upgrades (ASBUs)**, provide a consensus-driven modernization framework for integrated planning based on performance

GANP 2016

- **Objectives**
 - **International and overarching framework** of a global investment plan: make it more usable towards implementation
 - Keep it **stable** while making the necessary updates/additions
 - Adjust the **periodicity** to the Assembly and ICAO editing cycles
- **A Planning Document for Implementation**
 - GANP should serve as a comprehensive planning tool to **support the development and implementation** of a harmonized global air navigation system





Main Goals of the 2019 GANP

- **Useful for all Stakeholders**
- **Evolution of the global air navigation system**
 - Promote investment in **innovation** through research and development activities
 - Align **Regional Research and Development Programmes**
- **Support implementation**
 - **ASBU framework**
 - Alignment global, regional and national planning
 - **Performance-based** decision making method
 - Optimize **allocation and use of resources** for air navigation
- **ICAO provisions and future standards**





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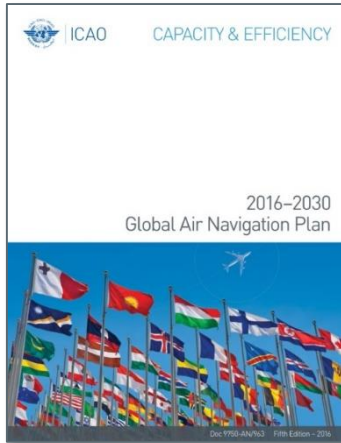
Global Air Navigation Planning

GANP 2019



DRAFT GANP 2019

MULTILAYER STRUCTURE





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Global Air Navigation Planning

GLOBAL STRATEGIC LEVEL





GLOBAL STRATEGIC LEVEL

- Background
- Vision
- Performance Ambitions
- Conceptual roadmap
- Implementation

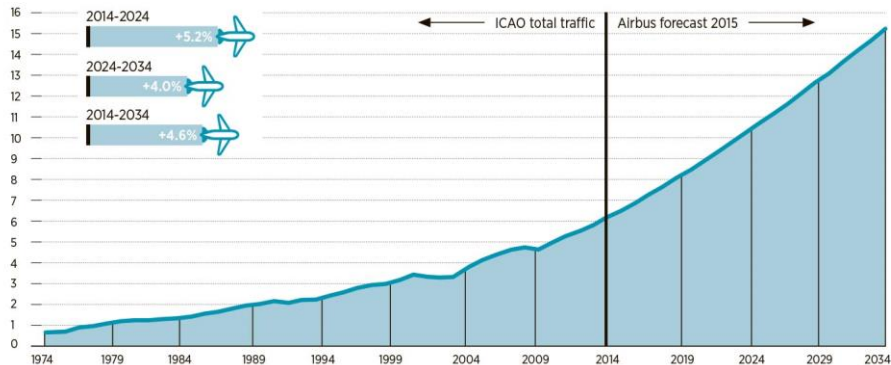


A NEW ERA IN AVIATION

Demand, including new entrants

GLOBAL AIR TRAFFIC (TRILLION REVENUE PASSENGER KILOMETRES)

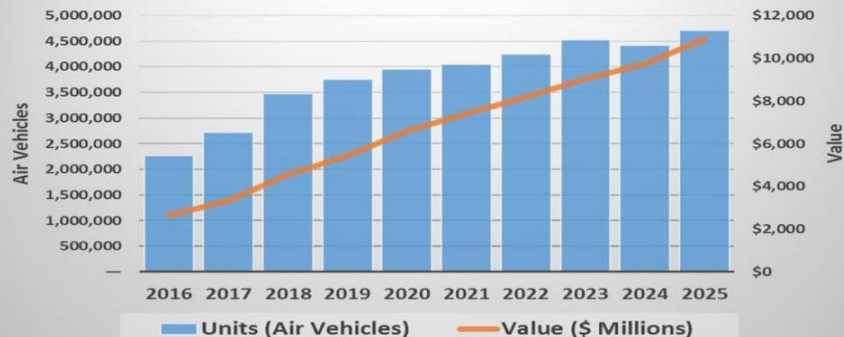
Traffic is expected to double in the next 15 years



Source: International Civil Aviation Organization (ICAO)/Airbus 2015



World Civil UAS Production Forecast



An exciting future full of opportunities

- **Upper atmosphere**
 - Balloons, RPAS, space activities
 - Single homogenous region
- **Low density areas**
 - Different type of aircraft
 - Different missions
- **High density areas**
 - Traffic will continue to increase
 - Same or enhanced level of performance expected



Manned vs. unmanned traffic



- + 362,000 aircraft
- 23,000 airliners
- Growth of 750 /year



- + 4,000,000 drones
- Expected 400k commercial
- Growth of 150,000 /year

A NEW ERA IN AVIATION

- Technology and information
 - Autonomous systems
 - Artificial intelligence





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A NEW ERA IN AVIATION

- Technology and information
 - Full connectivity

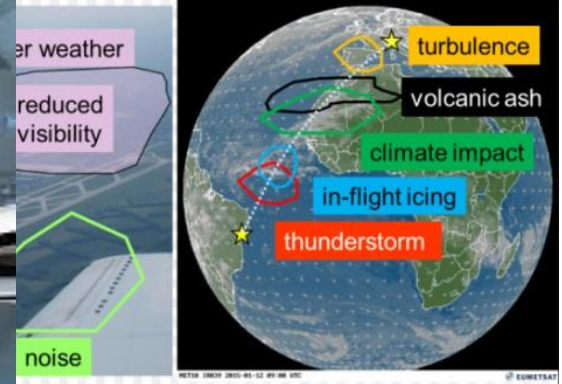
**“ANYTHING THAT CAN BE
CONNECTED, WILL BE CONNECTED”**



A NEW ERA IN AVIATION

- Humans

ITO 17008KT 4SM HZ OVC015 M01/M
11007KT 8SM -RA OVC008 02/02 A2
FR 042045Z AUTO 11007KT 8SM -RA
CQT 042047Z AUTO VRB03KT 10SM
FEW027 BKN048 17/09 A2994 RMK A
META
107 BKN077 /CGN0 11/0 A2994 RM
14KT 10SM RA S T007 B N03
CORG 042045Z AUTO 08010G14KT 1
AOO 042056Z AUTO 34031G39KT 1
14031G39KT 1 1/4SM HZ CLR M18/M2
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A3002 RMK AO2 TSNO 56021 T11831216 PK WND 34039/2052 SLPT



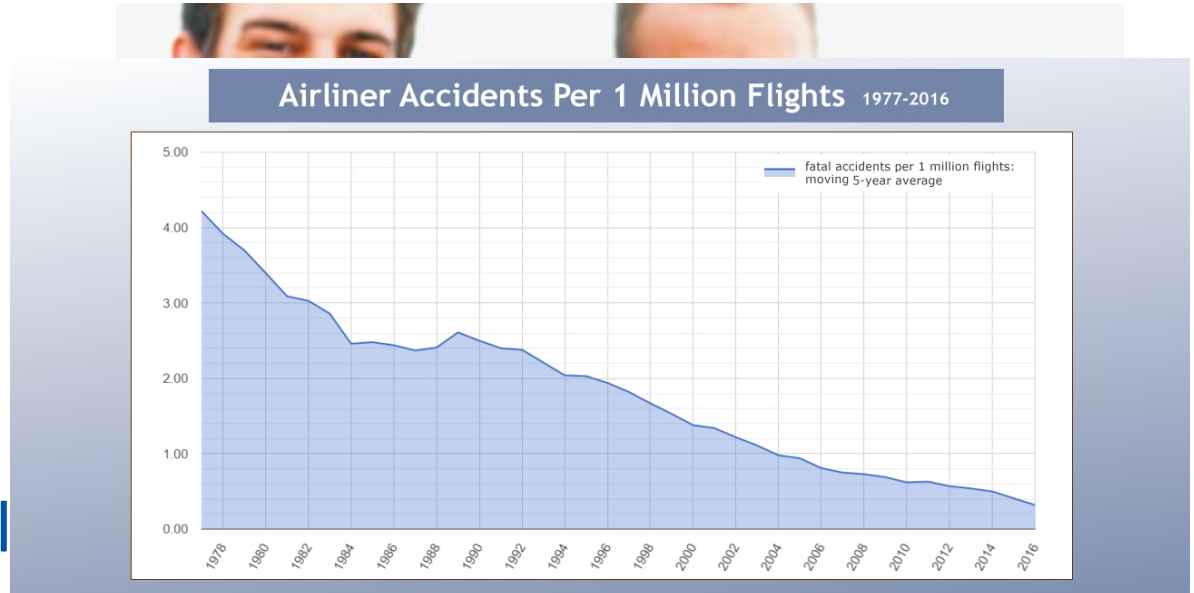
A NEW ERA IN AVIATION

- Business Models



SOCIAL WELLBEING ALL PEOPLES OF THE WORLD

- More quiet
- Cleaner
- Safer
- More resilient
- More profitable



Statistics are based on all worldwide fatal accidents involving civil aircraft with a minimum capacity of 14 passengers, from the ASN Safety Database <https://aviation-safety.net>



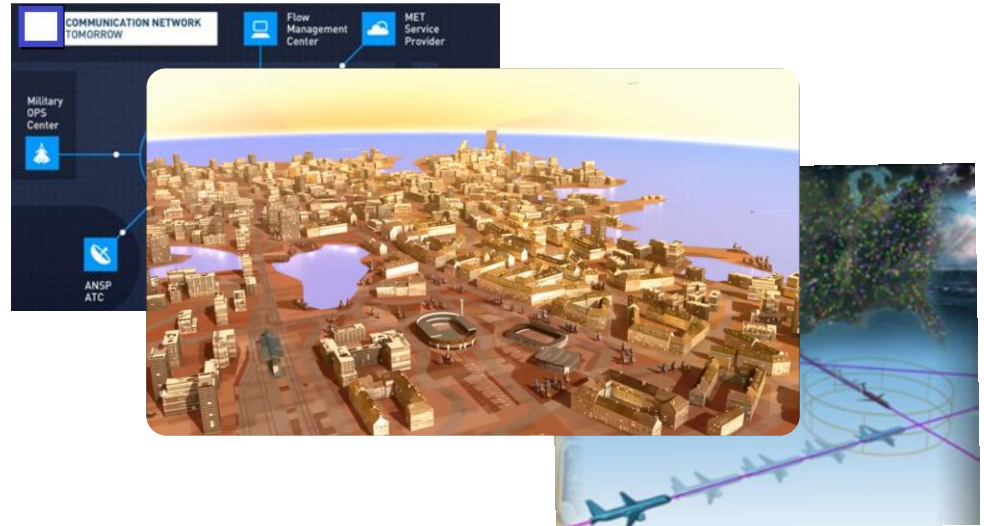
A high-performing Air Navigation System

Global interoperability	Ensure global interoperability
Access and equity	Access and equity to all airspace users
Capacity	Capacity to accommodate forecast demand
Efficiency	Increase efficiency of air operations
Flexibility and predictability	Enable flexibility to meet arrival times
Sustainability	Secure air navigation system sustainability
Resilience	Resilience to cope with system disruptions

In a time of change...

- Transformational change is needed

- Information Management
 - Digital data MET, AI, FICE,...
 - Information exchange over IP
- Management by trajectory
 - Time based management
 - Synchronization
 - Automation





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Global Air Navigation Planning

GLOBAL TECHNICAL LEVEL





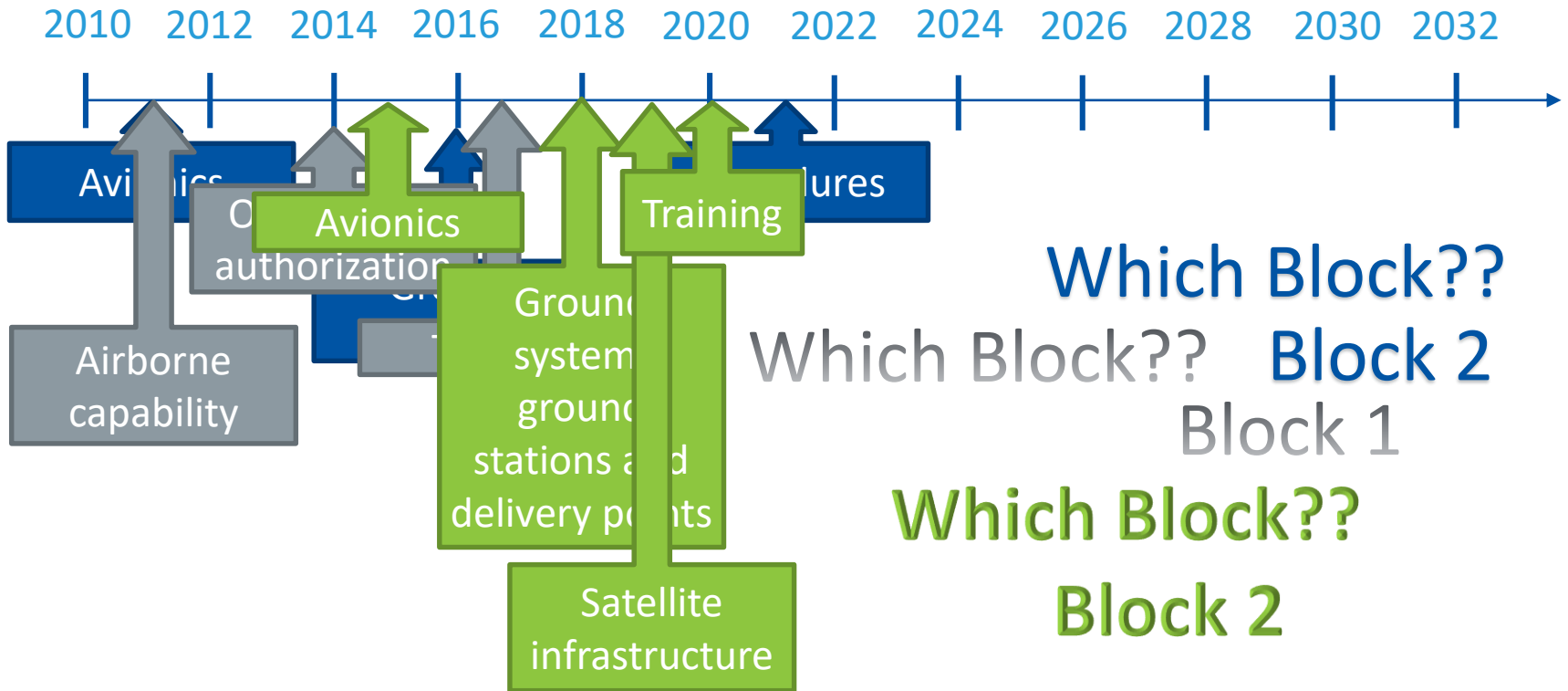
GLOBAL TECHNICAL LEVEL

- Performance-based decision making method
- ASBUs key concepts
- Digital ASBU framework
 - ASBUs within the portal
- ASBUs Performance
 - Catalogue of performance objectives
 - List of KPIs
- ASBUs vs. BBBs



ASBU Framework key concepts

- **ASBU Element:** a specific change in operations designed to improve the performance of the air navigation system under specified operational conditions.
- **ASBU Enabler:** component (standards, procedures, training, technology, etc) required to implement an element.
- **ASBU Thread:** key feature area of the air navigation system that needs improvement in order to achieve the vision outlined in the Global ATM Operational Concept.
- **ASBU Block:** a six year timeframe whose starting date defines a deadline for an element to be available for implementation.
- **ASBU Module:** a group of elements from a thread that, according to the enablers' roadmap, will be available for implementation within the defined deadline established by the ASBU Block.



Which Block??

Which Block?? **Block 2**

Block 1

Which Block??

Block 2



Digital ASBU framework

- ASBU Element
 - The main concept of the updated ASBU framework.
 - The ASBU elements were defined in previous versions of the GANP in an inconsistent manner. With the digitalization of the framework, they have become the core concept and they have been defined in a harmonized manner.
 - An ASBU element is a specific change in operations designed to improve the performance of the air navigation system under specified operational conditions.

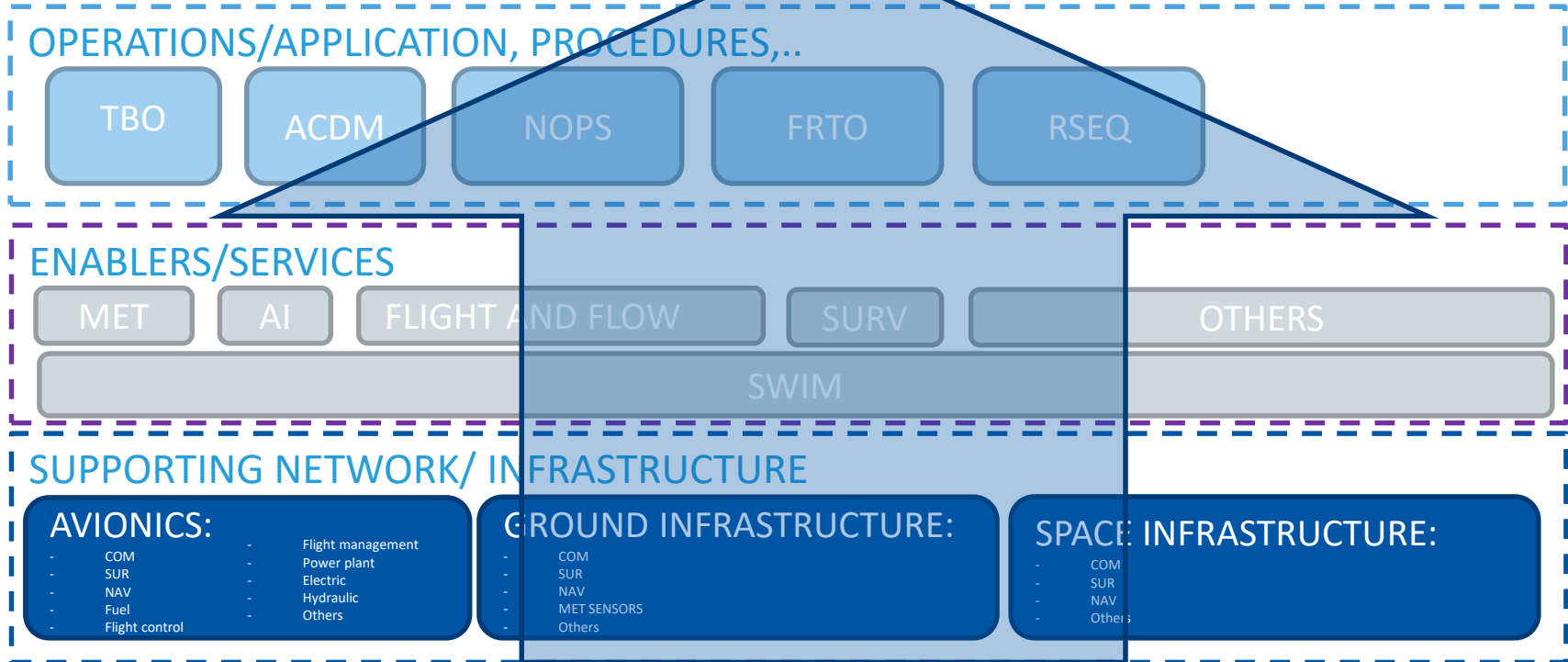


Digital ASBU framework

- ASBU Thread
 - Another key concept in the updated framework.
 - The ASBU threads already existed in previous versions of the GANP and they were key feature areas of the air navigation system where improvements are needed in order to achieve the vision outlined in the Global ATM Operational Concept.
 - The ASBU threads are been categorized in 3 groups:
 - Operational threads: ACDM, APTA, NOPS...
 - Information threads: SWIM, AMET, DAIM, FICE,...
 - Technology threads: COMS, COMI, NAVS, ASUR (previous roadmaps)



ASBU STRUCTURE





Digital ASBU framework

- ASBU Thread
 - This updated version of the GANP presents the following major changes regarding the threads:
 - The CCO and the CDO threads have been merged into the APTA thread, which has expanded its scope to cover terminal and approach operations.
 - Some elements in the OPFL thread have been moved to FRTO, so FRTO will from now on cover horizontal and vertical en-route flight efficiency. However, in order to respect stability, elements in Block 0 and one element in Block 1 have been left in OPFL.
 - The RPAS thread is TBD, however, the lower airspace operations improvements have been reflected as elements in other threads.



Digital ASBU framework

- ASBU Thread
 - (Continuation):
 - Higher airspace operations improvements have also been reflected as elements in other threads.
 - There is a new thread for global tracking: GADS.
 - The roadmaps have become technology threads in order to show the dependencies on them of the other ASBU elements.
 - The TBO thread has been updated based on the TBO concept and as an integrating concept, its elements are the elements from the operational threads. The communication elements in the previous versions of the TBO thread are now in the COMS (communication services) thread.



Digital ASBU framework

- ASBU Enabler
 - Another key concept in the updated framework.
 - The ASBU enablers are a new concept in the updated ASBU framework.
 - They are the components (standards, procedures, training, technology, etc) required to implement an element.
 - Their goal is to identify the stakeholders involved in the implementation of an ASBU element as well as all the necessary requirements, in order to ensure an effective implementation. Some of the enablers can be elements in other threads, for instance: avionics or ground systems in the technology threads.



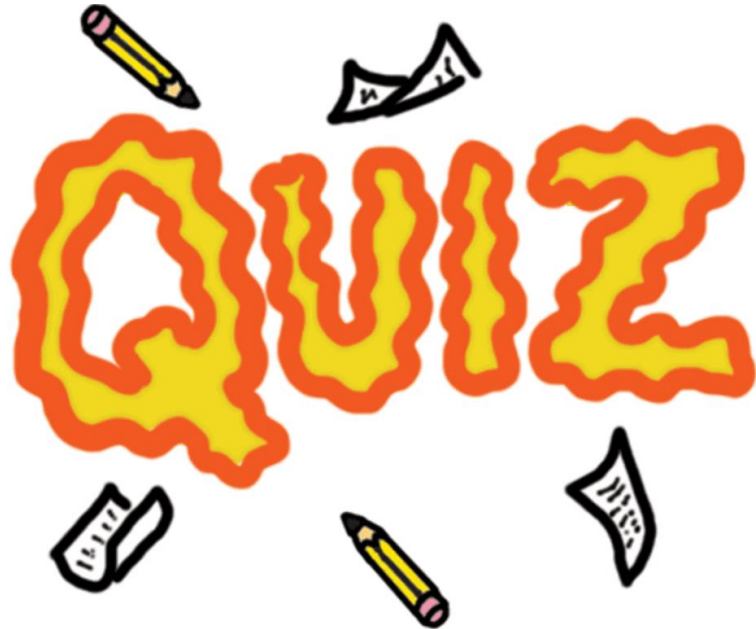
Digital ASBU framework

- ASBU Block
 - Another key concept in the updated framework.
 - The ASBU blocks already existed in previous versions of the GANP and they introduced the “time” dimension to the framework.
 - An ASBU Block is a date that defines a deadline for an element to be available for implementation. This implies, that the element and all the enablers associated to it, need to be available for implementation by the ASBU block year.
 - ASBU Blocks years: 2013, 2019, 2025, 2031....



Digital ASBU framework

- ASBU Module
 - The last key concept in the updated framework.
 - The ASBU modules already existed in previous versions of the GANP and they are the crossing point between the threads and the blocks. Therefore, an ASBU module is the group of elements from a thread that, according to the enablers' roadmap, will be available for implementation within the defined deadline established by the ASBU Block.
 - As such, if in the digital ASBU framework we select in the filter one ASBU thread and one Block, we will obtain the elements that constitute the module.





GANP 2019: ASBU Framework

- Template:
 - PART 1:
 - Concept of operations in different Blocks
 - PART 2:
 - List of operational improvements in that ASBU thread

WAKE		Wake Turbulence Separation	
CONCEPT OF OPERATIONS OF THE THREAD BY BLOCK			
PART 1	BBB	Wake turbulence separation applied to IFR flights is provided based on three aircraft wake turbulence categories (heavy, medium and light) as described in PANS-ATM. The wake turbulence separation does not apply to VFR flights neither to IFR flights executing visual approach when the aircraft has reported having the preceding aircraft in sight although the ATC unit concerned will issue a caution of possible wake turbulence when appropriate.	
	Block 0	Wake turbulence separation applied to IFR flights is provided based on 6 (or more) categories of aircraft wake turbulence categories. In airports with parallel runways with runway centre lines spaced less than 760m (2500 ft) apart, under certain wind conditions, wake turbulence separation can be reduced on dependent parallel approaches or wake turbulence independent departures. Independent segregated parallel operations can be realised.	
	Block 1	Wake turbulence separation applied to IFR flights is provided based on leader/follower static pair-wise wake separations. In airports with parallel runways with runway centre lines spaced less than 760m (2500 ft) apart, under monitored wind conditions, wake turbulence separation can be reduced on dependent parallel approaches or wake turbulence independent departures. Independent segregated parallel operations can be realised, based on static pair-wise wake separations.	
PART 2	Block	Element ID	Title
	Block 0	WAKE-B0/1	Wake turbulence separation minima based on six or more aircraft categories
	Block 0	WAKE-B0/2	Dependent parallel approaches and wake independent departures
	Block 0	WAKE-B0/3	Independent segregated parallel operations
	Block 1	WAKE-B1/1	Wake turbulence separation minima based on leader/follower static pair-wise
	Block 1	WAKE-B1/2	Dependent parallel approaches (with decision support)
	Block 1	WAKE-B1/3	Independent segregated parallel operations (with decision support)

GANP 2019: ASBU Framework

- Template:
 - PART 3:
 - For each element listed in PART 2: description, dependencies, scope,...
 - PART 4:
 - Enablers for each element

WAKE-B0/1		Dependent parallel approaches and wake independent departures				
Main purpose		To optimise the wake turbulence separation applied to instrument landing operations on parallel runways with centre lines spaced less than 760m (2500ft).				
New capabilities		Simultaneous use of parallel runways through the definition of new landing and go around procedures.				
Description		This element defines a dependent paired approach procedure to parallel runways, with centre lines spaced less than 760m (2500ft) apart, threshold staggered, and/or glide path height differences, under ILS Category I minimums, or the minimums depicted for an RNAV or LPV approach. It covers airports exploiting ICAO 3 Category or Revised Wake Vortex Separation 6 or more Categories.				
Dependencies and relations	Dependency type		ASBU Element			
	Evolution	Relation	ID	Title		
			Wake-B0/1	Wake turbulence separation minima based on 6 or more aircraft categories		
Operations	Flight phases					
	Taxi-out	Departure	En-route	Arrival	Taxi-in	Turn-around
				x		
Planning layers	ATM planning		Strategical	Pre-tactical		Post operations
				Tactical		
	x		x		x	
Enablers						
Category	Type	Description/Examples			Stakeholder(s)	
Regulatory Provisions						
Operational Procedures	For ATC	Procedure for dependent approaches to parallel runways with runway centre lines spaced less than 760m (2500ft) apart (may include the use of forecast and actual winds).			ANSP	
		Final approach procedures to staggered runway thresholds and/or require a change in glide slope angle for one runway to assure a level of vertical separation supporting wake avoidance.				
	For operations	Specific go around procedures.				
For Charting		Charting for ILS or PBN approaches.			ANSP	
Airborne System capabilities						
Ground system infrastructure	Navigation	ILS /MLS (on both runways) GBAS / SBAS for LPV.			ANSP / Airport	
	Surveillance	ATM Surveillance capability SSR Radar or ADS-B.			ANSP / Airport	
Training		ATCO and Pilot training on the new procedures, additional wake categories and new separation minima.			ANSP, Aircraft Operators	
Operational Approval		Local hazard identification and risk assessment.			CAA, ANSP	
Other					, Aircraft Operators	



GANP 2019: ASBU Framework

- Template:
 - PART 5:
 - Applicability
 - Performance impact
 - PART 6:
 - Performance objectives

	WAKE- BB/Z	Dependent parallel approaches and wake independent departures			
	Deployment applicability				
	Operational conditions	Aerodromes with demand that exceed peak or daily capacity resulting in delay with parallel runways having centrelines spaced less than 760 m (2500 feet) apart.			
	Main intended benefits				
	Type	Operational description	Benefiting stakeholder(s)		
PART 5	Direct benefits	Reduce separation minima on approach	Airspace user, ANSP, airport operator		
		Reduce delay	Airspace user, ANSP (& Network), airport operator		
		Increase/improve resilience	Airspace user, ANSP, airport operator		
		Increase peak capacity	Airspace user, ANSP, airport operator		
	Indirect benefits	Efficiency (temporal efficiency, i.e. delay)	Airspace user, ANSP		
Predictability		Airspace user, ANSP			
	Fuel savings	Airspace user			
	Intended performance impact on specific KPAs and KPIs				
	KPA	Focus Areas	KPI	KPI impact	Most specific performance objective(s)
PART 6	Capacity	Capacity, throughput & utilization	KPI 06: En-route airspace capacity		Note: there are no specific objective in the catalogue - Increase capacity declaration - Improved categorisation of aircraft - Increase airport departure rate - Increase airport arrival capacity utilization when demand exceeds capacity
			KPI 09: Airport peak arrival capacity	++	
			KPI 10: Airport peak arrival throughput	++	
			KPI 11: Airport arrival capacity utilization		
		Capacity shortfall & associated delay	KPI 07: En-route ATFM delay		
			KPI 12: Airport/terminal ATFM delay		
	Efficiency	Additional flight time & distance	KPI 02: Taxi-out additional time		
			KPI 04: Filed flight plan en-route extension		
			KPI 05: Actual en-route extension		
				KPI 08: Additional time in terminal airspace	+
			KPI 13: Taxi-in additional time		
Vertical flight efficiency		KPI 17: Level-off during climb*			
		KPI 18: Level capping during cruise*			
		KPI 19: Level-off during descent*			
Additional fuel burn		KPI 16: Additional Fuel burn	++		
		Punctuality	KPI 01: Departure Punctuality		
			KPI 14: Arrival punctuality		
Predictability		KPI 03: ATFM slot adherence			
		Variability	KPI 15: Flight time variability	++	
	Other objectives from the catalogue that do not contribute to the KPIs above				



ASBUs Performance

- Performance assessment
 - In the previous editions of the ASBU framework, the performance assessment was only done qualitatively, at a key performance area level (capacity, efficiency, predictability...) and by module.
 - In the digital edition of the ASBU framework, the performance assessment is done with more detail:
 - At a level of performance objective within each KPA
 - Qualitatively, however, the performance objectives are linked to key performance indicators (in order to facilitate the implementation of a quantitative approach)
 - By element, operational improvement by operational improvement.



ASBUs Performance

- Catalogue of performance objectives
 - New in the digital ASBU framework!
 - The catalogue of performance objectives was developed to fulfil the gap between the KPAs list and the list of potential KPIs, already available in previous editions of the GANP.
 - The catalogue serves to qualitatively identify the benefits expected from the implementation of each operational improvement outlined in the ASBU framework.



ASBUs Performance

- List of Key Potential Indicators
 - Already available in previous editions of the GANP.
 - Three new KPIs have been added to the list of 16 KPIs.
 - The KPI list is now available in the GANP Portal, together with the catalogue of performance objectives and the definition of the ASBUs.



The frameworks: BBBs vs ASBUs

- Aviation System Block Upgrade (ASBU) Framework
 - Group of operational improvements to advance air navigation capabilities and improve the performance of their air navigation system in a cost effective way
 - Evolution global air navigation system
 - ASBU threads, elements, blocks and modules



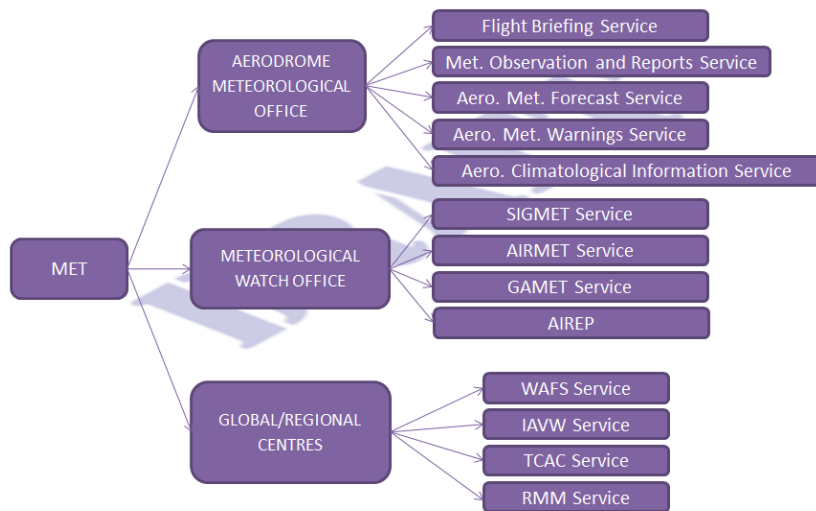
The frameworks: BBBs vs ASBUs

- Basic Building Block (BBBs) Framework
 - Backbone of any robust air navigation system
 - Nothing new: Basic services according to ICAO SARPs
 - Aerodrome operations, CNS, air traffic management, meteorology, search and rescue, and aeronautical information



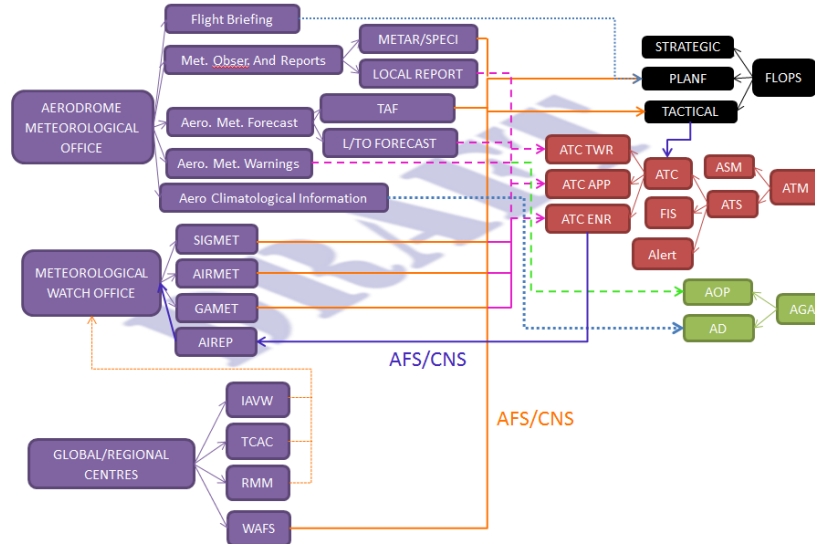
The frameworks: BBBs vs ASBUs

MET BASIC MODULES AND ELEMENTS



The frameworks: BBBs vs ASBUs

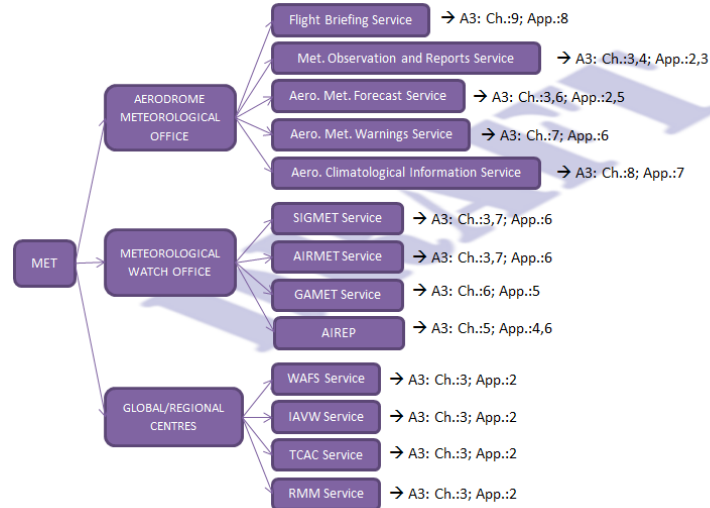
MET SUPPORT & END USERS



The frameworks: BBBs vs ASBUs

MET BASIC ELEMENTS/REFERENCES

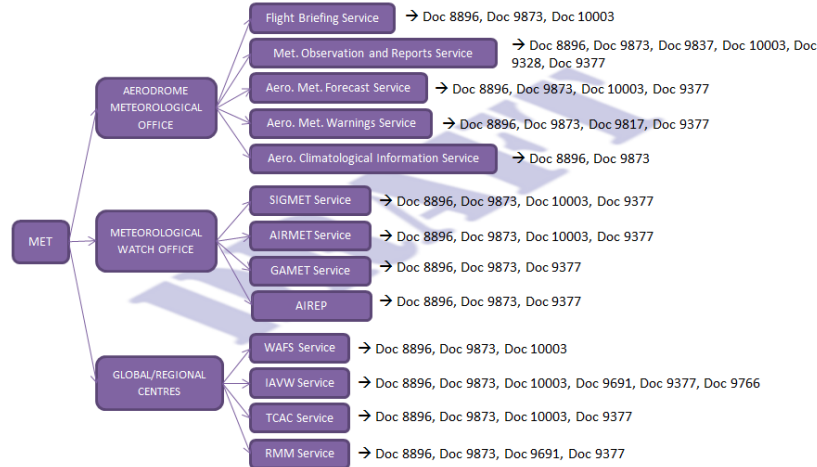
ICAO SARPs





The frameworks: BBBs vs ASBUs

MET BASIC ELEMENTS/REFERENCES GUIDANCE MATERIAL





State impact

- BBBs: Compliance with ICAO SARPs
- ASBUs:
 - More comprehensive framework
 - More useful
 - Oriented to support implementation



THANK YOU!