



ASBU framework

• What is ASBU framework? Today's Challenges, Tomorrow's Needs, Why ASBU methodology and ASBU explanation



- Air traffic growth expands two-fold every
 - 15 years



- Growth can be a double-edged sword.
 - Challenge is how to achieve both safety and operational improvements
- The 37th session of ICAO General Assembly advised to redouble efforts with focus on ensuring interoperability of systems while at the same time maintaining or enhancing aviation safety.



ICAO DAKAR UNITING AVIATION

New National/Regional Plans - interoperability challenges



National ATM modernization Regional and Many programmes are being developed worldwide

- They are following ICAO's Global Air Navigation Plan and Operational Concept, but nevertheless they are different in their own way
- thus resulting in interoperability challenges



- Global framework is needed to ensure that Safety is maintained and enhanced
 - ATM improvement programs are harmonized
 - Barriers to future efficiency and environmental gains are removed, at reasonable cost

Harmonize the Global Agenda

- Initial NextGen/SESAR Symposium (2008)
- Convened Standards Organization Roundtable (2009)
- Established working agreements with Standards Organizations on shared work programmes (2010)



What is the Basis for Block Upgrades?

• Foundation of blocks originates from existing, near term implementation plans and extracted from (examples):







- Aligned with ICAO ATM Operational Concept
- Block upgrades will allow structured approach to meet regiona and local needs, while considering associated business cases
- They reflect recognition that all modules are **not** required in al airspaces



What is the difference between Past/current and ASBU methodology?

- Past/current methodology
 - Scope covers only ground equipment for ANSPs
 - Planning based on short and medium term
 - Implementation process is through GPIs
- ASBU methodology
 - Scope extends to airspace users and regulators
 - Planning based on short, medium and long terms
 - Implementation process is through Blocks and corresponding modules

What are the advantages of ASBU methodology?

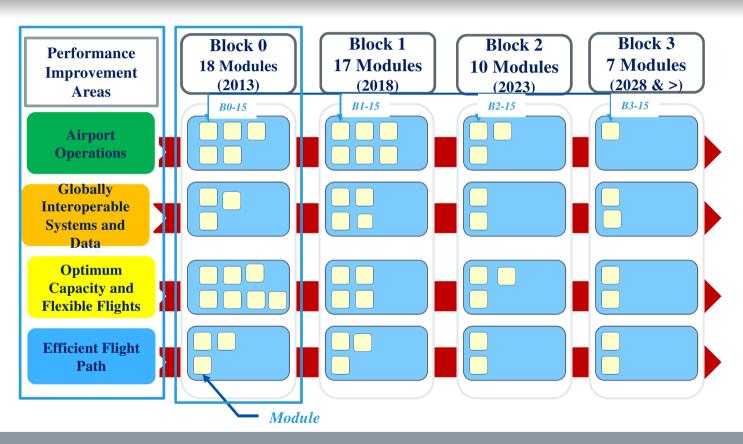
- Takes into account all related issues such as air/ground Systems, air/ground procedures, air/ground regulatory requirements and business case formulation
- One stop planning at the same time flexible and scalable
- Modules provide a series of measurable, operational performance improvements, which could be introduced as needed

Aviation System Block Upgrades – Definition

- What is an 'Aviation System Block Upgrade' (ASBU)?
- Each Module is defined as follows:
 - ➤ Intended Operational Improvement/Metric to determine success
 - > Necessary *Procedures*/Air and Ground
 - > Necessary Technology/Air and Ground
 - **▶** Positive *Business Case* per Upgrade
 - > Regulatory Approval Plan/Air and Ground
 - > Well understood by a Global Demonstration Trial
 - All synchronized to allow initial implementation
 - Won't matter when or where implemented



ICAO DAKAR UNITING AVIATION Understanding the Relationships





Threads Between Modules... and Across Blocks

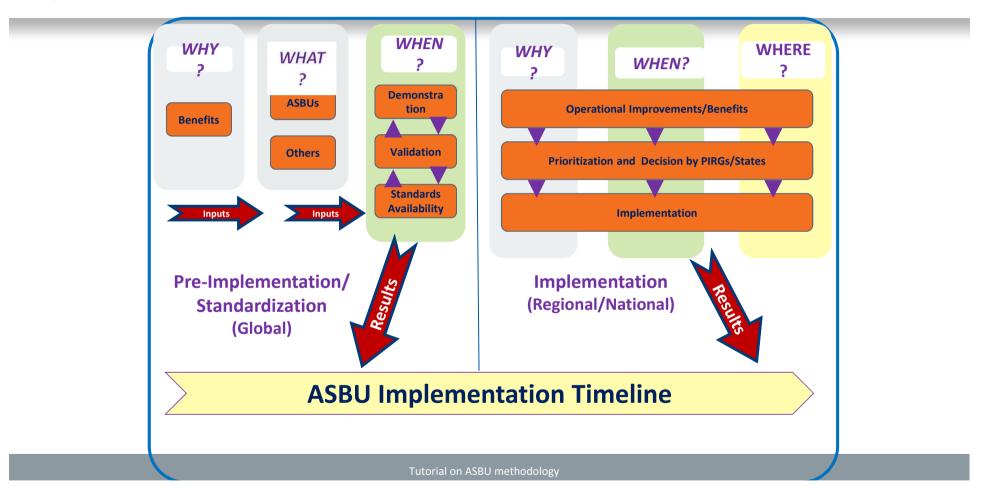


2013 2019 2025 2031>



- Timing/sizing of the block upgrades are in response to
 - need for Mature standards,
 - Integrated air and ground solutions and
 - Establishment of positive business cases
- Block "0" optimizes current onboard equipage and provides baseline
- Modules lacking specific maturity are purposefully placed in later blocks
- Block upgrades respond to issue of non-homogeneous areas







Categorization of 15 Block 0 Modules

- **Essential (E):** These are the ASBU modules that provide <u>substantial contribution</u> towards global interoperability, <u>safety</u> or <u>regularity</u>.
- Desirable (D): These are the ASBU modules that, because of their <u>strong business and/or safety</u> <u>case</u>, are <u>recommended</u> for implementation almost everywhere.



Categorization of Block 0 Modules

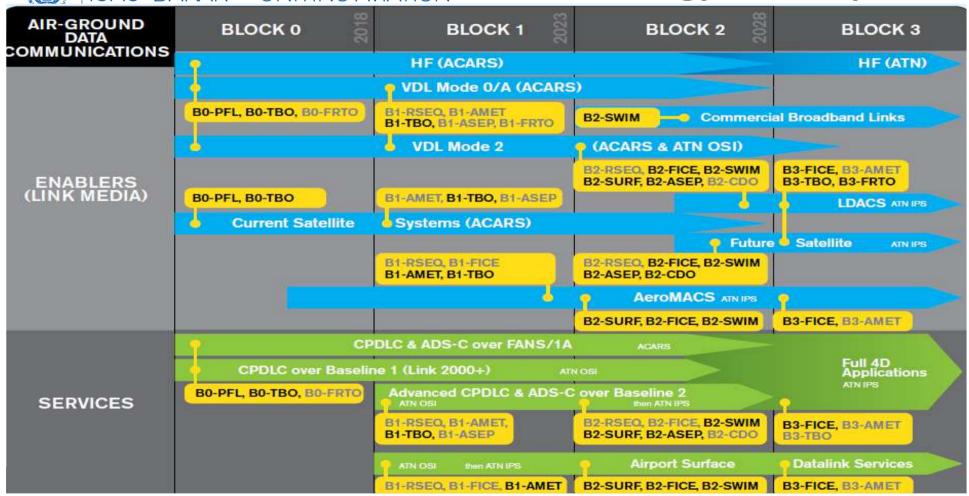
- Specific (S): These are the ASBU modules that are recommended for implementation to address a particular operational environment or mitigate identified risks.
- Optional (O): These are the ASBU modules that address particular operational requirements and provide additional benefits that may not be common everywhere.

ICAO DAKAR UNITING AVIATION Prioritization of Block 0 Modules

Criteria for priority allocation

- Priority 1 = Immediate Implementation
- Priority 2 = Recommended **Implementation**

Technology Roadmap



BLOCK 3	B3-TBO, B3-FICE, B3-AMET	Information Management (see Roadmap)		Future Digital Voice System?
BLOCK 2 2028	B2-FICE	Inform	(Hz) CONGESTION RELIEF	Fut
BLOCK 1 2023	E, BO-DAIM IPV4 IPV6 VOICE Over IP (for G/G accord and links to A/G tockwars)	B1-FICE	VHF (25 KHz) VHF (8.33 KHz)	HF Current Satellite Systems
BLOCK 0 2018	BO-FICE, BO-DAIM IPV4 IPV6 IPV6 IPV8 VOICE Over IP (see	BO-FICE AMHS AIDC		
GROUND-GROUND COMMUNICATIONS	ENABLERS (LINK MEDIA)	SERVICES	AIR-GROUND VOICE COMMUNICATIONS	ENABLERS (LINK MEDIA)

	BLOCK 3	PSR	MultiStatic PSR	SSR/Mode-S	WAM	ADS-B In/Out (ICAO Ver. 2)	Future ADS-B In/Out System	ADS-B Out via Satellite	ADS-C		Ground-based Surveillance		Surveillance Data Fusion	SMR		MLAT	ADS-B In/Out (ICAO Ver. 2)	Future ADS-B In/Out System	Cameras	CS Level 1 and 2	SMGCS Level 3 and 4
	X 2 2 2 2 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2				-	ADS-B In/	Future ADS	ADS-E			Ground-ba		Surveille				ADS-B In/	Future AD		SMG	SMS
	BLOCK 2					_								•	B2-SURF	•	•	EQ. BH-RATS			B2-SURF
TION	BLOCK 1	-	B1-SNET	•		•	B1-TB0	•	•			B1-SNET	i de la companya de l	Ġ	B1-SURF, B1-RSEQ, B1-RATS	9	-	B1-WAKE, B1-SURF, B1-RSEO, B1-RATS	P		B1-SURF, B1-RSEO, B1-RATS
ICAO DAKAR UNITING AVIATION	BLOCK 0	-	BO-ASUR, BO-SNET			•		Во-тво	•	B0-ASUR	•	BO-ASUR, BO-SNET	.	-	Bo-SURF	•			B1-RATS		BO-SURF
ICAO DAK	SURVEILLANCE	GROUND-BASED				ENABLERS				CAPABILITIES				SURFACE		NABI EDE					CAPABILITIES

UNITING AVIATION	
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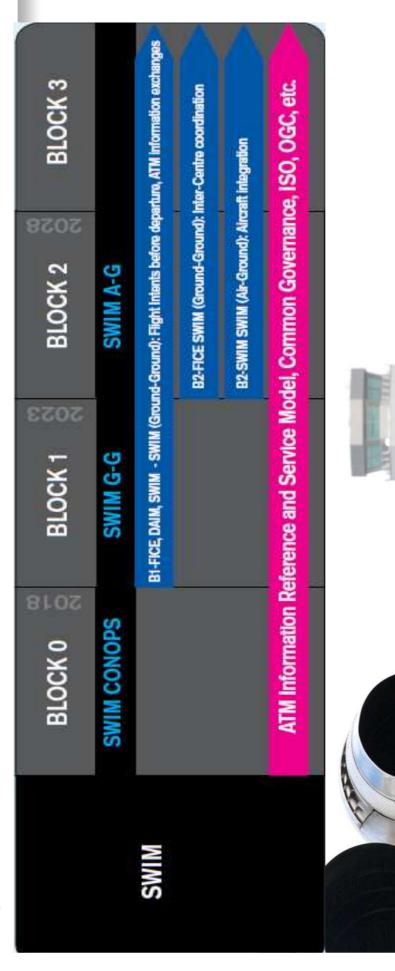
Walle .				
SURVEILLANCE	BLOCK 0	BLOCK 1	BLOCK 2 2028	BLOCK 3
AIR-AIR	B0-ASEP, B0-ITP	B1-SURF, B1-ASEP, B1-SNET B2-SURF, B2-ASEP, B2-ACAS	32-SURF, B2-ASEP, B2-ACAS	
000	-	9		ADS-B In/Out (ICAO Ver. 2)
ENABLERS			ADS-81	ADS-B In/Out (ICAO Ver. 3)
	0		In-Trall F	In-Trail Procedures (ITP)
	Во-птр			
		Airborne Situational Awareness during Flight Operations (AIRB)	reness during Filght Op	verations (AIRB)
	-	Visual 9	Visual Separation on Approach (VSA)	Approach (VSA)
	B0-ASEP			
		Airborne Spacing A	Airborne Spacing Application (ASPA) Interval Management	ral Management
CAPABILITIES		B1-ASEP		
			Basic Surface Situation Awareness (SURF)	areness (SURF)
		Surface Situation Awan	Surface Situation Awareness with Indications and Alerts (SURF-IA)	I Alerts (SURF-IA)
		B1-SURF		
			B2-ASEP	ASEP
				S-SEP

ATION BLOCK 0 S BLOCK 1 S BLOCK 2 S BLOCK 3	ILS/MLS Retain to support precision approach and mitigate GNSS outage DME Optimize existing network to support PBN operations VOR/NDB Retionalize based on need and equipage	Core GNSS Constellations Single frequency (GPS/GLONASS) E-BASED) SBAS GBAS Cat II 7111 Core GNSS Constellations Audit-Frequency//Multi-Constellation (GPS/GLONASS/Beridou/Gailled) Audit-Freq GBAS/SBAS GBAS Cat II 7111 Multi-Freq GBAS/SBAS	LITIES PBN Operations PBN-CDO, B0-FRTO B1-FRTO, B1-FBO B2-CDO B3-FRTO B3	APPROACH) CATIVILII Landing GRAS Catililii GRAS Catililii GRAS Catililii GRAS Catililii GRAS Catililii B1-APTA
NAVIGATION	ENABLERS	ENABLERS	CAPABILITIES	CAPABILITIES
	(CONVENTIONAL)	(SATELLITE-BASED)	(PBN - see roadmap)	(PRECISION APPROACH)

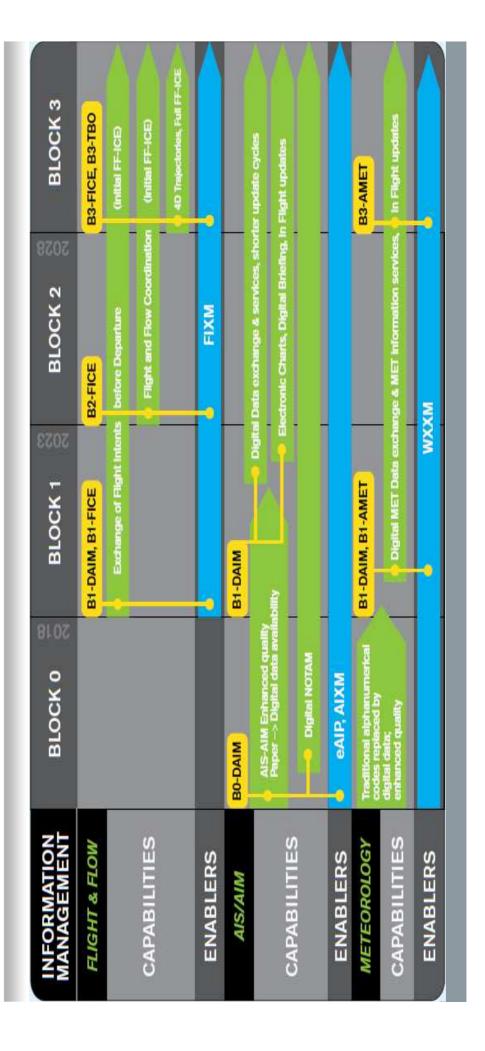
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	BLOCK 3					- 24	
	2028				LNAV	irements	
	BLOCK 2		d RNP telicopter only)	RNP Helicopter only)	LPV, BARO VNAV: LNAV/VNAV, Basic GNSS: LNAV)	Migration path based on Region/State requirements	
	7023		Advanced RNP RNP 0.3 (Hefitoptor only)	Advanced RNP RNP 0.3 (Helicopter only)	LNAV/VN	ased on R	
ATION	BLOCK 1		RNP 2	4 11	V, BARO VNAV:	Aigration path be	
VG AVI,	8102	P 10) P 2	N=	NP 1		2	
ICAO DAKAR UNITING AVIATION	BLOCK 0	RNAV 10 (RNP 10) RNP 4 RNP 2	RNAV 5 RNAV 2 RNAV 1	W 1 Basic RNP 1	RNP APCH (SBAS: RNP AR APCH (whe		
KAR		RNI	NA NA	RNAV 1	RNS RNS		
AO DA	7	ceanic note ental	ıte sıntal	irspace: eparture	ach		
ONCI-	PBN	Enroute Oceanic and Remote Continental	Enroute Continental	Terminal Airspace: Arrival & Departure	Approach		
O. T. T.		'n		Ter			



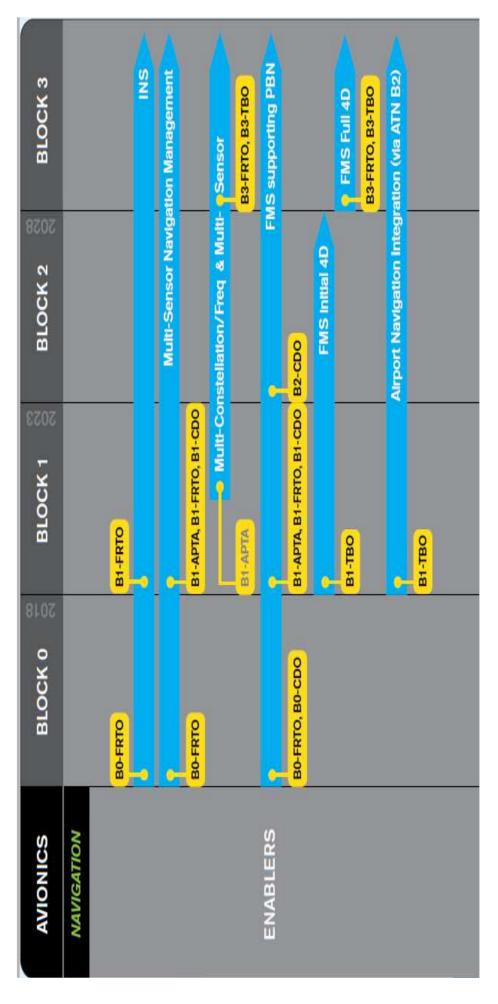




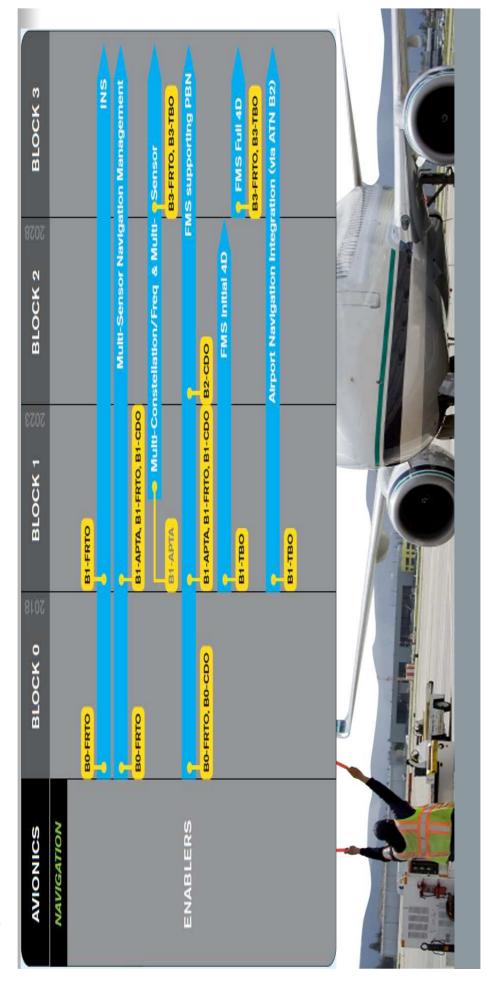




BLOCK 2 S BLOCK 3			A	egration (via ATN B2)	B2-SURF, B2-ASEP, B2-CDO B3-TBO	Aircraft access to o SWIM	B3-FICE, B3-AMET		82-75, B2-ASEP, B2-ACAS	Traffic Computer	ADS-B In/Out (ICAO Ver. 2)	ADS-B In/Out (ICAO Ver. 3)	2-ASEP	The same of the sa
BLOCK 1 SS BLO	m, Nav Integration (via ACARS)	B1-RSEQ	Nav Integratic	FANS 3/C with CNS integration (via ATN B2)	B1-RSEQ, B1-TBO B2-SURF, B2	9 Aircraf	B2-SWIM		B1-SURF, B1-ASEP, B1-SNET 82-75, B2-A				B1-ASEP B2-SURF, B2-ASEP	Strivelliance Integration (via ATN R9)
BLOCK 0 2018	FANS 1/A with Comm	1	FANS 2/B with Comm,						B0-ASEP, B0-ITP					
AVIONICS	COMMUNICATIONS			ENABLERS				SURVEILLANCE			FNARIEDS			

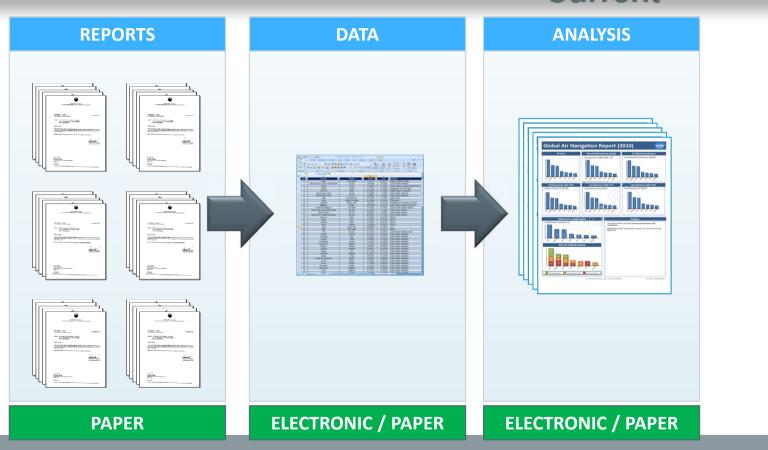


	BLOCK 3		A	ò			1	A		A		A		A	-	A
	BLOCK 2 28 BI		-a . a	B2-ACAS		Future ACAS			B2-WAKE				B2-SURF	SVS	B2-SURF, B2-ASEP, B2-CDO B3-AMET	SB
NOIL	BLOCK 1			B2				•	82 82		B1-SURF, B1-TB0	EVS	B1-SURF B2		B1-SURF, B1-ASEP B2	Electronic Flight Bags
ILAO DAKAR HINITING AVIAT	BLOCK 0		TAWS	B0-ACAS	ACAS 7.1			Weather Radar		Airport Moving Map	-				B0-ASEP, B0-ITP	
ILAN DAK	AVIONICS	AIRBORNE SAFETY NETS	ENABLERS		CABABILITIES		ONBOARD SYSTEMS						DISPLAYS			



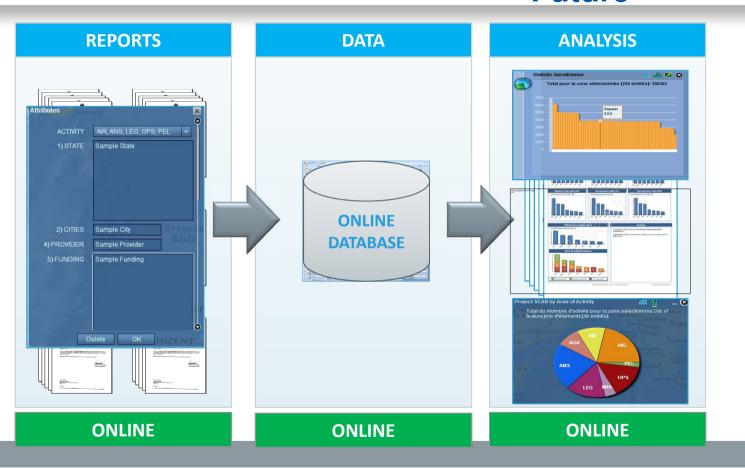


Air Navigation Reporting Current



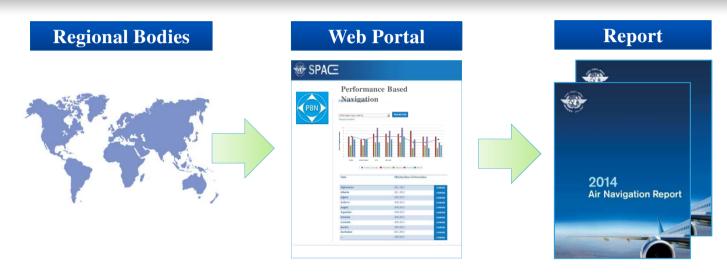


Air Navigation Reporting Future





Measuring Against the Global Plans *Reporting Mechanism and Tools*



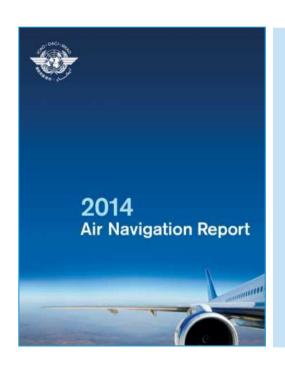
- **Visualize** the status of implementation through dynamic and interactive charts
- Provide feedback on the data (qualification of the data)
- Perform self-assessments, generate ad-hoc reports and export data
- Provide a venue for data collection towards the Annual Reports

Annual Global Air Navigation Report Purpose

- Transparency and sharing of information are fundamental to a safe and efficient global air transportation system.
- Consistent with this principle and much like the existing annual Safety Report, the proposed annual Global Air Navigation Report will assist PIRGs and States in understanding which areas require special attention to effectively improve air navigation performance worldwide. First Report in April 2014
- Help propagate information on implementation success stories.
- Provide an opportunity for the civil aviation community to evaluate progress across different ICAO regions.
- Facilitate more effective interregional harmonization planning
- The outcomes of the Report could also help to identify annual tactical adjustment priorities for regional work programmes, as well as informing longer-term policy adjustments.



Annual Global Air Navigation Report Proposed contents

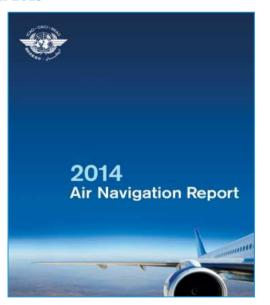


- global air navigation challenges;
- measuring against those challenges;
- status of operational measures for performance improvement;
- implementation progress of selected priority ASBU Block 0 Modules.
- sharing of successful initiatives and key demonstrations



Annual Global Air Navigation Report An initial dataset

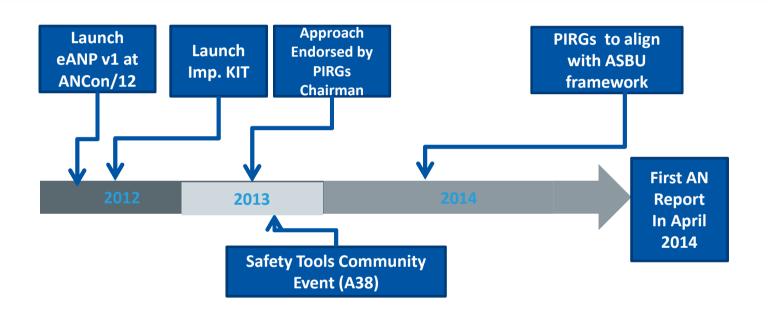
This initial dataset for both Regional Performance Dashboard and the Global Air Navigation Report was agreed by the PIRG Chairs in a coordination meeting held on 19 March 2013



- **1. Performance Based Navigation (PBN) Terminal** % of international aerodromes with APV
- **2. Performance Based Navigation (PBN) Enroute** % of PBN routes/airspaces
- **3. Continuous Descent Operations** (CDO) % of international aerodromes/TMAs with CDO
- **4. Continuous Climb Operations (CCO)**% of international aerodromes/TMAs with CCO
- **5.** Estimated Fuel Savings/ C02 Emissions Reduction Based on IFSET
- **6. Air Traffic Flow Management (ATFM)**% of ATS Units/international aerodromes providing
 ATFM service
- 7. Aeronautical Information Management (AIM) % of needed elements (from AIS to AIM Roadmap) facilitating the transition from AIS to AIM that have been implemented PHASE I



Annual Global Air Navigation Report Initial tasks and Roll Out





Summary of ASBU Approach

- Addresses ANSP, aircraft and regularity requirements
- Identified 4 improvement areas
- Implementation through Block Upgrades (0,1,2, and 3) each comprising a number of modules
- Each module is explained in a standardized 4-5 pages template
 - provide a series of measurable, operational performance improvements
 - Organized into flexible & scalable building blocks
 - Could be introduced as needed
 - all modules are not required in all airspaces



