Implementing Seamless ATM

ICAO Asia/Pacific Office

Outline

- ‘Seamless ATM’?
- The Asia/Pacific Seamless ATM Plan
  - Background
  - Objectives
  - Priorities
  - Targets
- ASBU overview
  - Traceability ASBU/Seamless
- Seamless ATM plan: Implementation Guidance Material
- Monitoring the implementation

‘Seamless ATM’?

A safe and interoperable provision of harmonized and consistent air traffic management service provided to a flight, appropriate to the airspace category and free of transitions due to a change in the air navigation service provider or Flight Information Region.

(Asia/Pacific Seamless ATM Planning Group, APSAPG)

The Asia/Pacific Seamless ATM Plan

Background

- Historically
  - States and ANSPs have developed their own infrastructure to suit their own national needs
  - Some ANSPs did not operate within a business-like environment
- Other regions have undertaken programmes like SESAR or NextGen
- Asia/Pacific aims to make huge strides in safety and efficiency, simply by addressing the organisational and human performance issues that prevent optimal ATM, even with the current systems.

Background

The 46th DGCA conference (Japan, 2009) committed to a Seamless ATM Asia/Pacific by issuing the

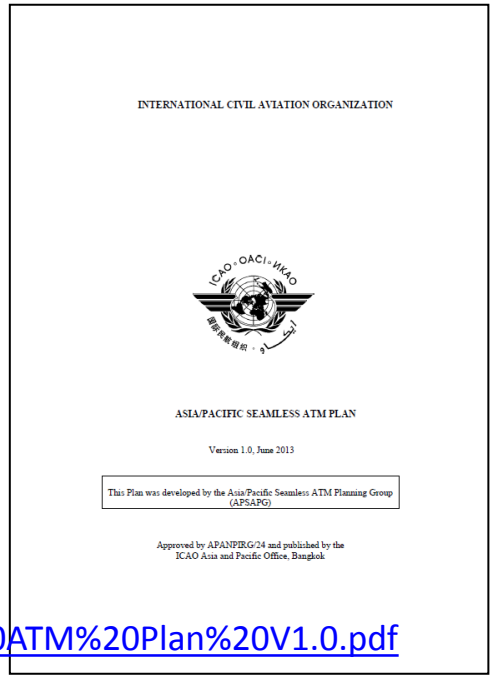
Kansai Statement

APANPIRG formed the APSAPG to develop a Seamless ATM Plan

APSAPG/4, Hong Kong China, June 2013

Objectives

- To set minimum requirements for seamless gate-to-gate ATM operations – an efficiency focus for passengers and aircraft in Asia-Pacific
- To implement selected ASBU elements in APAC
- To address trans-regional issues
  - Europe – Asia/Pacific
  - Middle East/Africa – Asia
- 42 objectives 2 phases
  - Phase 1: November 2015
  - Phase 2: November 2018


INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA/PACIFIC SEAMLESS ATM PLAN

Version 1.0, June 2013

This Plan was developed by the Asia/Pacific Seamless ATM Planning Group (APSAPG)

Approved by APANPIRG/24 and published by the ICAO Asia and Pacific Office, Bangkok

http://www.icao.int/APAC/Documents/edocs/Asia%20Pacific%20Seamless%20ATM%20Plan%20V1.0.pdf

Highest priority

Reference	Specification title	Module	ASBU - Module title	Priority agreed by Chairperson's SG 17 Jan.2014
110	Performance-based Navigation (PBN) Approach	B0-APTA	Optimization of Approach Procedures including vertical guidance	1
80	Air Traffic Flow Management/Collaborative Decision-Making (ATFM/CDM)	B0-NOPS	Improved Flow Performance through Planning based on a Network-Wide view	1
300	Aeronautical Information Management	B0-DATM	Service Improvement through Digital Aeronautical Information Management	1
220	ATS Inter-facility Data-link Communications (AIDC)	B0-FICE	Increased Interoperability Efficiency & Capacity through Ground-Ground Integration	1
360	Civil Military use of SUA	B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	1
370	Strategic Civil Military coordination	-	-	1
380	Tactical Civil Military coordination	-	-	1
180	Ground-based surveillance	B0-ASUR	Initial Capability for Ground Surveillance	1
270	Situation display integrating surveillance data	B0-ASUR	Initial Capability for Ground Surveillance	1
280	ADS-C, CPDLC	B0-TBO	Improved Safety and Efficiency through the initial application of Data Link En-Route	1

The allocation of priority was based on factors including its importance in promoting Seamless ATM
Priority 1 = critical upgrade, Priority 2 = recommended upgrade, Priority 3 = may not be universally implemented

Priority 2

Reference	Specification title	Module	ASBU - Module title	Priority agreed by Chairperson's SG 17 Jan.2014
120	Standard Instrument Departures/Standard Terminal Arrivals (SID/STAR)	B0-CCO	-	2
50	Arrival Manager/Departure Management (AMAN/DMAN)	B0-RSEQ	Improve Traffic flow through Sequencing (AMAN/DMAN)	2
60	ATC Sector Capacity	-	-	2
70	Airport Collaborative Decision-Making (ACDM)	B0-ACDM	Improved Airport Operations through Airport-CDM	2
90	Continuous Descent Operations (CDO)	B0-CDO	Improved Flexibility and Efficiency in Descent Profiles using Continuous Descent Operations (CDOs)	2
100	Continuous Climb Operations (CCO)	B0-CCO	Improved Flexibility and Efficiency Departure Profiles – Continuous Climb Operations (CCO)	2
140	Performance-based Navigation (PBN) Routes	B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	2
150	Performance-based Navigation (PBN) Airspace	-	-	2
160	Safety Nets	B0-SNET	Increased effectiveness of ground-based safety nets	2
170	Airborne Safety Systems	B0-ACAS	Airborne Collision Avoidance Systems (ACAS) Improvements	2
-	-	B0-ASEP	Air Traffic Situational Awareness (ATSA)	2
190	Airspace classification	-	-	2
200	Flight Level Orientation Scheme (FLOS)	-	-	2
210	Flight Level Allocation Schemes (FLAS)	-	-	2
230	Automated Transfer of Control	-	-	2
240	ATS Surveillance data sharing	-	-	2
250	ATM systems enabling optimal PBN/ATC operations	B0-APTA	Optimization of Approach Procedures including vertical guidance	2
260	ATC Horizontal separation	-	-	2
310	Meteorological Information	B0-AMET	Meteorological information supporting enhanced operational efficiency and safety	2
320	ATM Managers' Performance	-	-	2
330	ATC simulators performance	-	-	2
340	Safety assessment of changes	-	-	2
350	ATM Operators' performance	-	-	2
390	Civil Military system integration	-	-	2
400	Civil Military Navaids joint provision	-	-	2
410	Civil Military common training	-	-	2
420	Civil Military common procedures	-	-	2

Priority 3

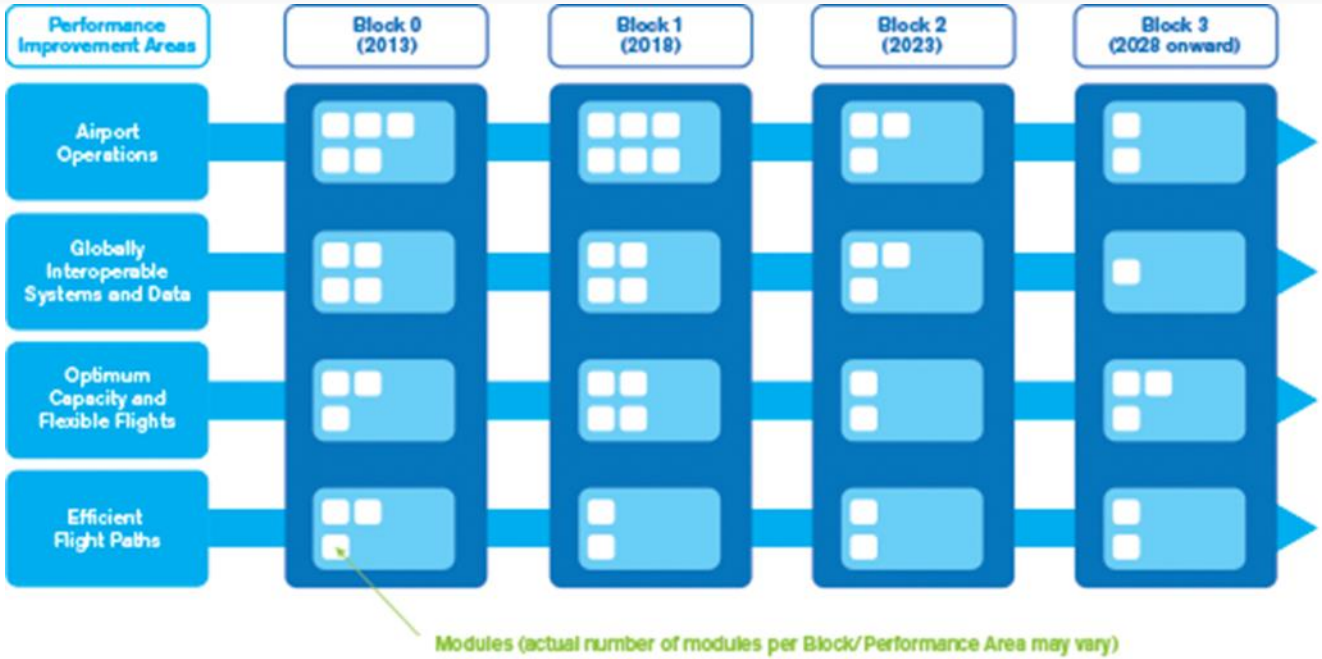
Reference	Specification title	Module	ASBU - Module title	Priority agreed by Chairperson's SG 17 Jan.2014
10	Apron Management	-	-	3
20	ATM-Aerodrome Coordination	-	-	3
30	Aerodrome capacity	-	-	3
40	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	B0-SURF	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	3
130	Performance-based Navigation (PBN) Visual Departure and Arrival Procedures	-	-	3
290	UPR and DARP	B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	3
-	-	B0-WAKE	Increased Runway Throughput through Optimized Wake Turbulence Separation	3
-	-	B0-OPFL	Improved Access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B	3

Targets

Regional Priorities agreed 30-10-13 by Chairpersons of APANPIRG SGs and ICAO Secretariat	Highest Priority Regional Targets As agreed 16-01-14 by Chairpersons of APANPIRG SGs and ICAO Secretariat	Respective B0 module	Regional Reporting Form Item #
APV (B0-APTA)	1. Approach: Where practicable, all high density aerodromes with instrument runways serving aeroplanes should have precision approaches or APV or LNAV.	B0-APTA	110
ATFM/A-CDM (B0-NOPS)	2. Network Operations: All High Density FIRs supporting the busiest Asia/Pacific traffic flows and high density aerodromes should implement ATFM incorporating CDM using operational ATFM platform/s.	B0-NOPS	80
AIM (B0-DATM)	3. Aeronautical Information Management: ATM systems should be supported by digitally-based AIM systems through implementation of Phase 1 and 2 of the AIS-AIM Roadmap	B0-DATM	300
AIDC (B0-FICE)	4. System Wide Information Management: All States between ATC units where transfers of control are conducted have implemented the messages ABI, EST, ACP, TOC, AOC as far as practicable.	B0-FICE	220
FUA (B0-FRTO)	5. Civil/Military- Enhanced En-Route Trajectories: All States should ensure that SUA are regularly reviewed by the appropriate Airspace Authority to assess the effect on civil air traffic and the activities affecting the airspace.	B0-FRTO	360
	6. Civil/Military- Enhanced En-Route Trajectories: All States should ensure that a national civil/military body coordinating strategic civil-military activities is established.	Regional	370
	7. Civil/Military- Enhanced En-Route Trajectories: All States should ensure that formal civil military liaison for tactical response is established.	Regional	380
Surveillance (B0-ASUR)	8. Ground Surveillance: All FIRs with airspace supporting high density aerodromes have Category S upper controlled airspace and Category T airspace designated as non-exclusive or exclusive as appropriate requiring operation of ADS-B.	B0-ASUR	180
	9. Ground Surveillance: All States should implement ATS surveillance using ADS-B, MLAT or radar for Category S airspace as far as practicable, with data integrated into the ATC system situation display.	B0-ASUR	270
Data-link ADS-C and CPDLC (B0-TBO)	10. Trajectory-Based Operations-Data Link En-Route: All FIRs utilise ADS-C and CPDLC to provide service within all category R airspace.	B0-TBO	280

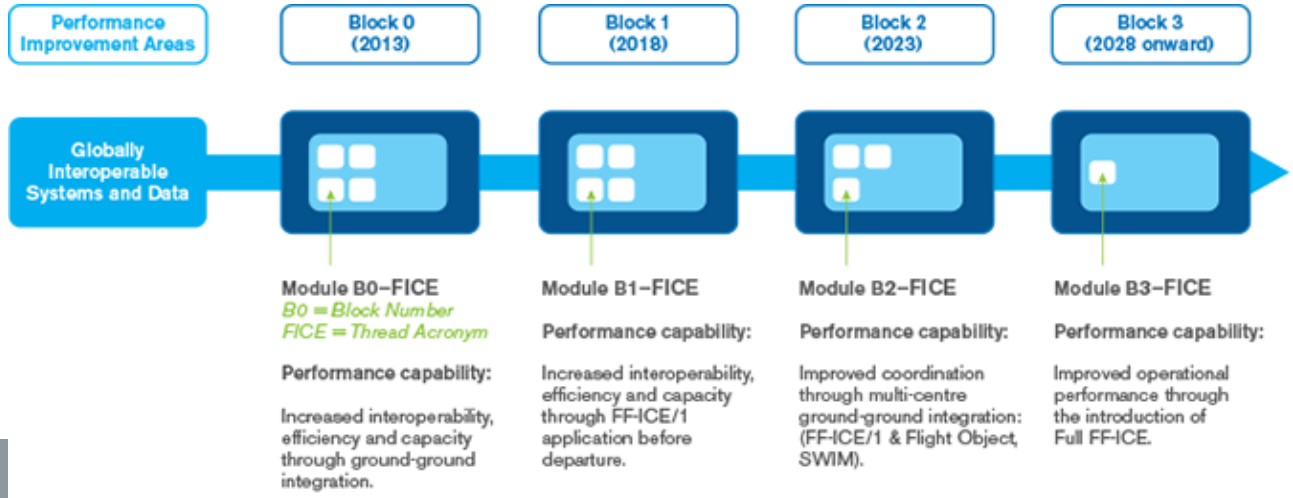
Those targets will be circulated and proposed to APANPIRG/25 meeting for endorsement

ASBU overview



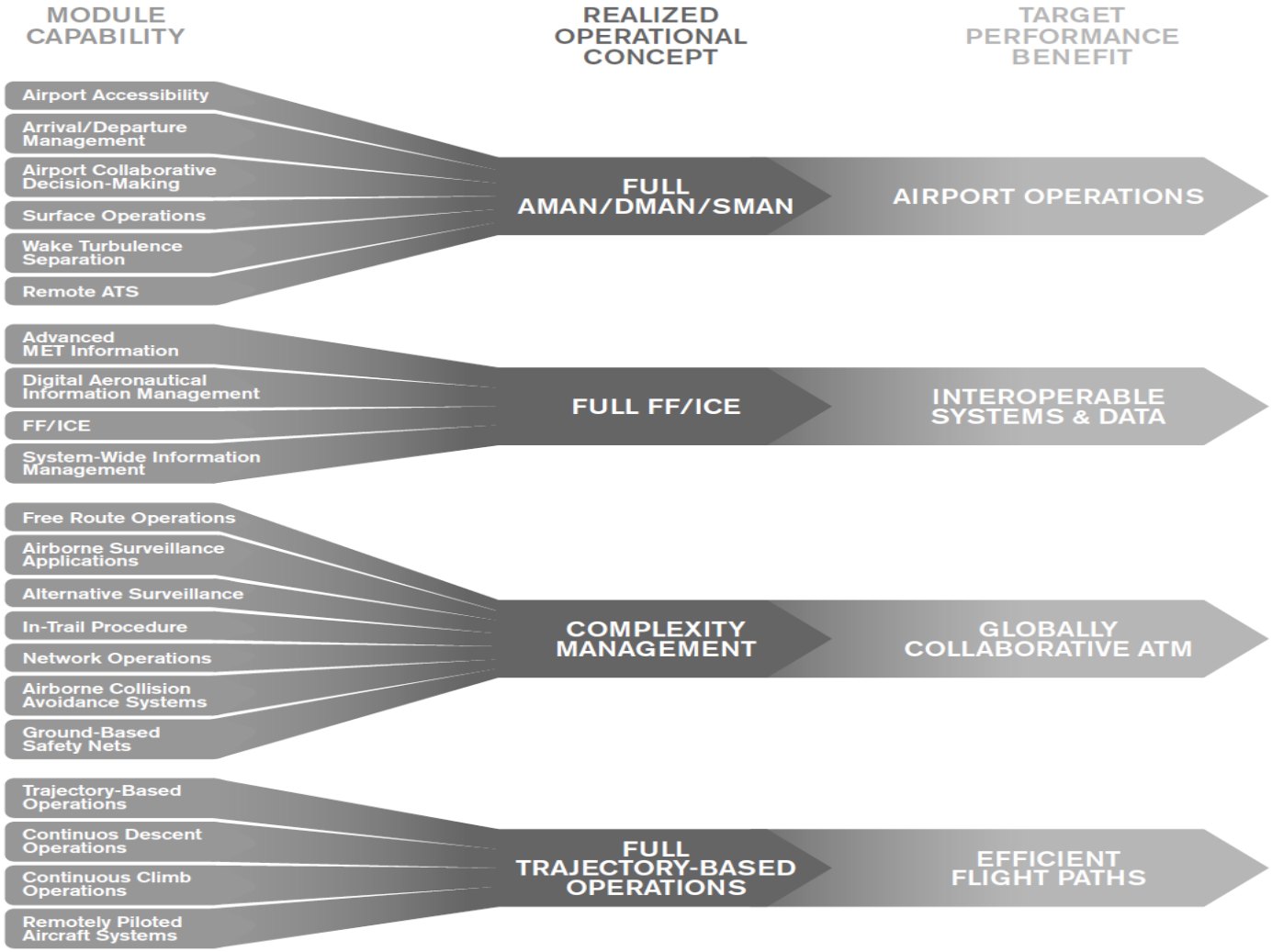
A S B U

Example of FICE



CAPACITY & EFFICIENCY

A S B U



A
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B
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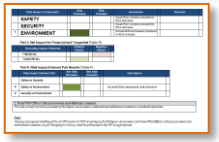
PERFORMANCE IMPROVEMENT AREA 1: AIRPORT OPERATIONS	PERFORMANCE IMPROVEMENT AREA 2: GLOBALLY INTEROPERABLE SYSTEM AND DATA	PERFORMANCE IMPROVEMENT AREA 3: OPTIMUM CAPACITY AND FLEXIBLE FLIGHTS	PERFORMANCE IMPROVEMENT AREA 4: EFFICIENT FLIGHT PATHS
B0-APTA: Optimization of approach procedures including vertical guidance (2013/2018)	B0-FICE: Increased interoperability, efficiency and capacity through ground-ground integration (2013/2018)	B0-FRTO: Improved operations through enhanced en-route trajectories (2013/2018)	B0-CDO: Improved flexibility and efficiency in descent profiles using continuous descent operations (CDO) (2013/2018)
B0-WAKE: Increased runway throughput through optimized wake turbulence separation (2013/2018)	B0-DAIM: Service Improved through Digital Aeronautical Information Management (2013/2018)	B0-NOPS: Improved flow performance through planning based on a network-wide view (2013/2018)	B0-TBO: Improved safety and efficiency through the initial application of data link en route (2013/2018)
B0-SURF: Safety and efficiency of surface operations (A-SMGCS Level 1-2) (2013/2018)	B0-AMET: Meteorological information supporting enhanced operational efficiency and safety (2013/2018)	B0-ASUR: Initial capability for ground surveillance (2013/2018)	B0-CCO: Improved flexibility and efficiency through departure profiles – Continuous climb operations (CCO) (2013/2018)
B0-ACDM: Improved airport operations through airport CDM (2013/2018)		B0-ASA: Air traffic situational awareness (ATSA) (2013/2018)	
B0-ADM: Improved traffic flow through sequencing (AMAN/DMAN) (2013/2018)		B0-ITP: Improved access to optimum flight levels through climb/descent procedures using ADS-B (2013/2018)	
		B0-ACAS: Airborne collision avoidance systems (ACAS) improvements (2013/2018)	
		B0-SNET: Increased effectiveness of ground based safety nets (2013/2018)	

APSAPG

Needs Analysis

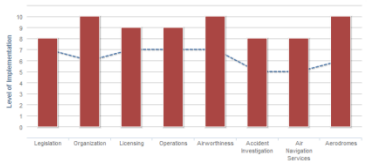


"Why"

- Seamless plan v1.0 (Jun.13)
- Reg. Priorities and Targets

(Proposed: Jan. 14, endorsed Sep 14)

Compliance & Verification



if needed

Plans

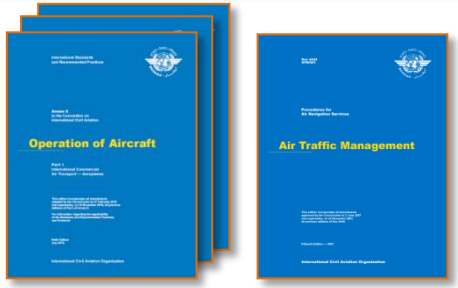
Global & Regional
"What"

Improve the APAC Air Navigation System

Assess & Measure

"When"

SARPs & PANS



Implementation

Training & Guidance
"How and Whether"

- GIS-based regional picture (Sep 14)
- Online collection process (Mar 14)
- Indicators and Metrics

(Proposed: Jan. 14, endorsed Sep 14)

- Seamless imp. Guidance (Sep.13)
- State seamless plan template (Jun 13)
- State seamless plans (ASAP, 2014)

Traceability ASBU/Seamless

- Global Air Navigation Plan:

*"**Regional and State Air Navigation Priorities***

ICAO regions, sub-regions and individual States through the PIRGs should establish their own Air Navigation priorities to meet their individual needs and circumstances in line with the Global Air Navigation Priorities."

- ASBU B0 18 items, 2013-2018
- Seamless plan 42 items 2013-2018 (2 Phases)
- ASBU/Seamless: Top down and bottom up traceability

Traceability ASBU>Seamless

Module	ASBU - Module title	Reference	Specification title
B0-ACAS	Airborne Collision Avoidance Systems (ACAS) Improvements	170	Airborne Safety Systems
B0-ACDM	Improved Airport Operations through Airport-CDM	70	Airport Collaborative Decision-Making (ACDM)
B0-AMET	Meteorological information supporting enhanced operational efficiency and safety	310	Meteorological Information
B0-APTA	Optimization of Approach Procedures including vertical guidance	110	Performance-based Navigation (PBN) Approach
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B0-ASEP	Air Traffic Situational Awareness (ATSA)	-	-
B0-ASUR	Initial Capability for Ground Surveillance	180	Ground-based surveillance
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B0-CCO	-	120	Standard Instrument Departures/Standard Terminal Arrivals (SID/STAR)
B0-CCO	Improved Flexibility and Efficiency Departure Profiles – Continuous Climb Operations (CCO)	100	Continuous Climb Operations (CCO)
B0-CDO	Improved Flexibility and Efficiency in Descent Profiles using Continuous Descent Operations (CDOs)	90	Continuous Descent Operations (CDO)
B0-DATM	Service Improvement through Digital Aeronautical Information Management	300	Aeronautical Information Management
B0-FICE	Increased Interoperability Efficiency & Capacity through Ground-Ground Integration	220	ATS Inter-facility Data-link Communications (AIDC)
B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	360	Civil Military use of SUA
B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	140	Performance-based Navigation (PBN) Routes
B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	290	UPR and DARP
B0-NOPS	Improved Flow Performance through Planning based on a Network-Wide view	80	Air Traffic Flow Management/Collaborative Decision-Making (ATFM/CDM)
B0-OPFL	Improved Access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B	-	-
B0-RSEQ	Improve Traffic flow through Sequencing (AMAN/DMAN)	50	Arrival Manager/Departure Management (AMAN/DMAN)
B0-SNET	Increased effectiveness of ground-based safety nets	160	Safety Nets
B0-SURF	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	40	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)
B0-TBO	Improved Safety and Efficiency through the initial application of Data Link En-Route	280	ADS-C, CPDLC
B0-WAKE	Increased Runway Throughput through Optimized Wake Turbulence Separation	-	-

Traceability Seamless>ASBU

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210	Flight Level Allocation Schemes (FLAS)	-	-
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230	Automated Transfer of Control	-	-

Reference	Specification title	Module	ASBU - Module title
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320	ATM Managers' Performance	-	-
330	ATC simulators performance	-	-
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350	ATM Operators' performance	-	-
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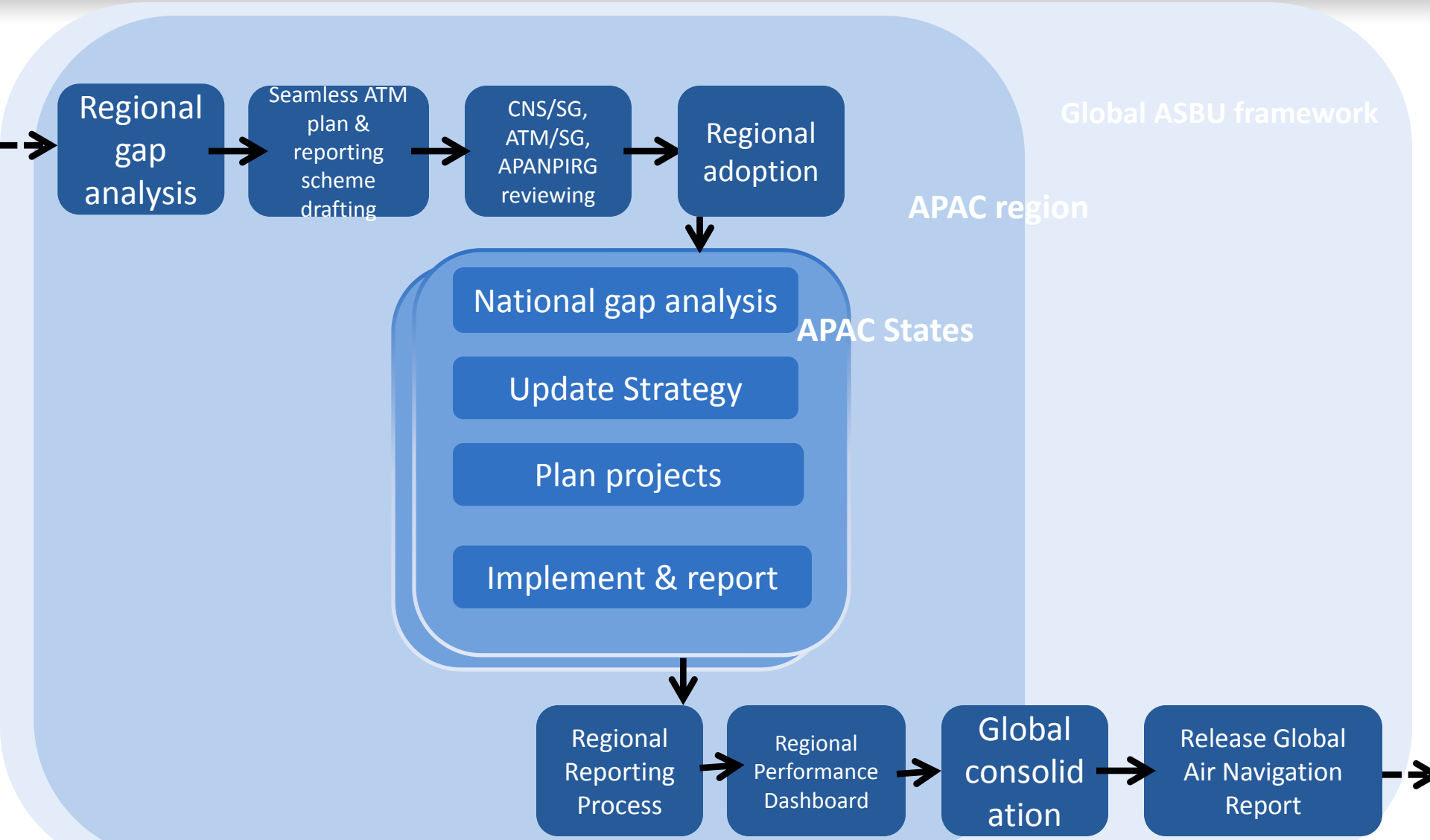
370	Strategic Civil Military coordination	-	-
380	Tactical Civil Military coordination	-	-
390	Civil Military system integration	-	-
400	Civil Military Navaids joint provision	-	-
410	Civil Military common training	-	-
420	Civil Military common procedures	-	-
-	-	B0-ASEP	Air Traffic Situational Awareness (ATSA)
-	-	B0-OPFL	Improved Access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B
-	-	B0-WAKE	Increased Runway Throughput through Optimized Wake Turbulence Separation

Seamless ATM plan: Implementation Guidance Material

Process overview



Implementation Guidance Material

- Informal guidance material
- http://www.icao.int/APAC/Pages/edocs.aspx

Implementation Guidance Material

- Implementation matrix: 7 stages, 30 actions
- Achieving **measurable** results

1. PROJECT PLANNING
2. DESIGN
3. SAFETY
4. COMMUNICATION
5. TRAINING
6. IMPLEMENTATION
7. POST -IMPLEMENTATION

Stage Number	Action A	Action B	Action C	Action D	Action E	Action F
1. PROJECT PLANNING	Identify the problem or improvement required	Assess applicability to operating environment and State regulations	Gather and review data related to the desired change	Assess economic feasibility and cost/benefit	Start the project, determine project budget and milestones	Plan tendering and maintenance contract process
2. DESIGN	Determine initial design of the desired change, including alternatives	Determine Key Performance Indicators and/or success criteria	Design backup and transition procedures/ steps, including reversion	Determine maintenance considerations	Refine and agree on final design	Define system validation and verification (FAT, SAT)
3. SAFETY	Form safety teams or engage relevant safety experts	Assess operational strengths and weaknesses, opportunities, and threats (SWOT)	Develop the safety case	**Prepare and apply for regulatory approval or certification**		
4. COMMUNICATION	Consult with key stakeholders	Coordinate Regionally and bilaterally	Conduct formal promulgation/ notification	Advertise and brief about the change		
5. TRAINING	Develop simulations and procedures	Source relevant training experts	Conduct simulation and relevant training	Assess competency and authorise		
6. IMPLEMENTATION	**Conduct operational trials and testing**	Assess stability and performance	Make a Go/No-Go decision	**Implement and monitor**		
7. POST - IMPLEMENTATION	Develop review -Lessons learnt -KPI achievement -Report	Monitor medium and long term performance and safety				

Seamless ATM plan elements

No	Element	Phase I (expected implementation by 12 November 2015)	Phase II (expected implementation by 08 November 2018)	Implementation actions (Refers to Table 2, implementation matrix)	Main impacts / Main requirements and guidance references
10	**Apron Management REGIONAL**	7.1.a All high density aerodromes should provide an appropriate apron management service in order to regulate entry of aircraft into and coordinate exit of aircraft from the apron		A B C D E F 1 √ √ √ √ **√** √ 2 √ √ √ √ √ √ 3 √ √ √ **√** 4 √ √ √ √ 5 √ √ √ √ 6 **√** √ √ **√** 7 √ **√**	**Main impacts** • People: Airport development and maintenance planners, Airport Operators, ANSP Capacity and safety Managers and procedure designers
20	**ATM (Airport) Coordination - REGIONAL**	7.1.b All high density should have appropriate ATM coordination (including meetings and agreements) related to: • airport development and maintenance planning; • coordination with local authorities regarding environmental, noise abatement, and obstacles; • ATM/PBN procedures affecting the aerodrome		A B C D E F 1 √ √ √ - **√** - 2 √ √ - - - - 3 √ √ - - 4 √ √ √ √ 5 √ - - - 6 - - √ **√** 7 - -	**Main impacts** • People: Airport development and maintenance planners, Airport Operators, ANSP Capacity and safety Managers and procedure designers, Airspace users
30	**Aerodrome capacity - REGIONAL**	7.1.c All high density aerodromes (100,000 scheduled movements per annum or more) should conduct regular airport capacity analysis, which includes a detailed assessment of passenger, airport gate, apron, taxiway and runway capacity	7.13 All high density aerodromes should have a declared airport terminal and runway capacity based on a capacity and efficiency analysis, to ensure the maximum possible efficiency of aircraft and passenger movement.	A B C D E F 1 √ √ √ - **√** - 2 - - - - - - 3 √ √ - - 4 √ √ √ - 5 √ - - - 6 - - √ **√** 7 - -	**Main impacts** People: Airport development and maintenance planners, Airport Operators, ANSP Capacity and safety Managers and procedure designers, Airspace users

PARS or PASL element

Objective for Phase I

Objective for Phase II

Actions (refers to Impl. Matrix)

Segments impacted (people/procedures/systems) requirements and **guidance**

Monitoring the implementation

Monitoring the Air Navigation System improvements

- Global level: performance monitoring
  - Regional Performance Dashboard and the annual Global Air Navigation Report
    - Safety, Air Navigation, Environment
- Regional and national levels: progress monitoring
  - Regional picture for APANPIRG expected for APANPIRG/25
  - Data collection through an online form
  - For ABSU and seamless items

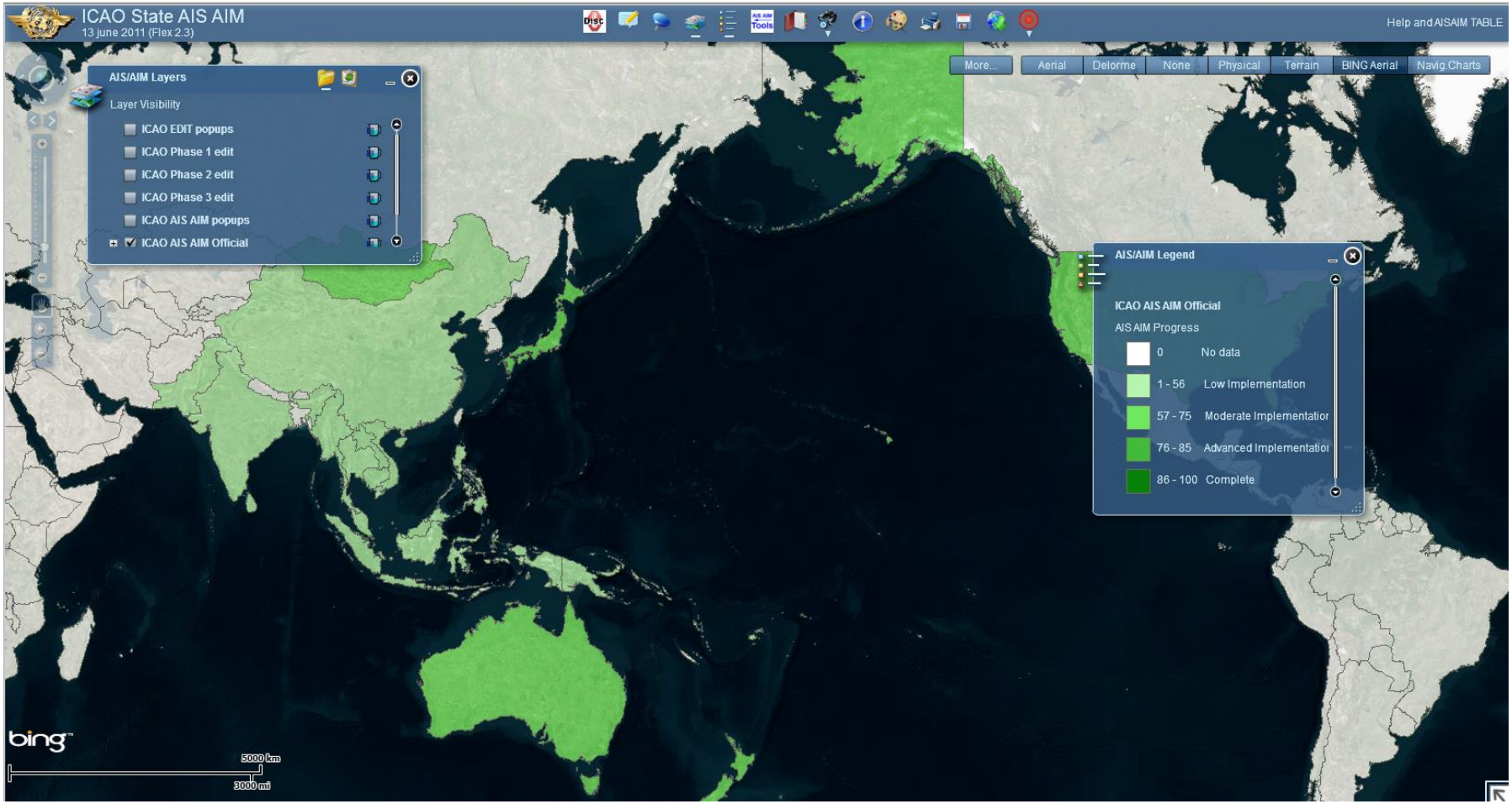
Online data collection (mock-up)

Regional Seamless Reporting Form

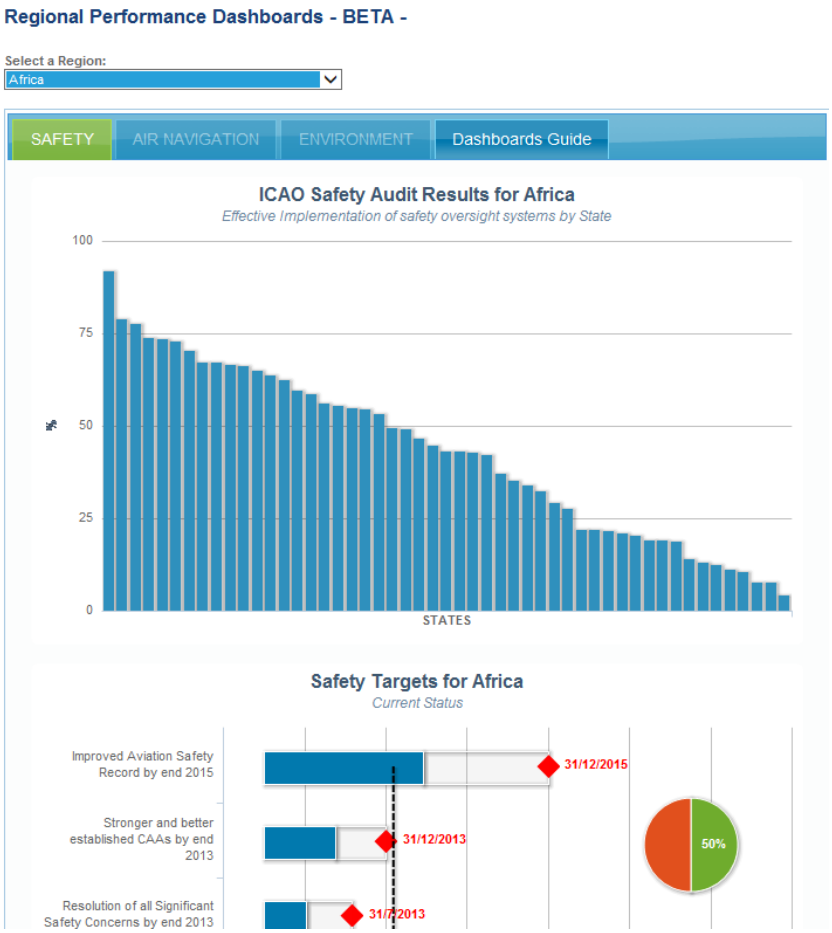
State/Administration :	United States	Number of FIR:	7	General Comment (Optional):
		Number of high density FIR:	0	
Date of Report:	*	Number of high density international aerodromes:	0	
		Number of ATS units:	0	

Priority		Seamless Plan Reference	Applicable or not	Reaching the Objective Phase I		Reaching the Objective Phase II		Remarks (e.g. project scope, FIRs or routes concerned by implementation, etc.)	Issues Encountered/Expected
Regional (TBC)	Seamless			Date of Complete Implementation (Planned or Actual)	Current Progress	Date of Complete Implementation (Planned or Actual)	Current Progress		
PBN Approach	2	Continuous Descent Operations (CDO)	Applicable	31/07/2014	9 FIR				
PBN Approach	2	Continuous Climb Operations (CCO)	Not yet analy		No data				
PBN Approach	2	Performance-based Navigation (PBN) Approach	Not yet analy						

Regional picture (mock-up)



Performance dashboard (prototype)

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South American (SAM) Office Lima
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Western and Central African (WACAF) Office Dakar
European and North Atlantic (EUR/NAT) Office Paris
Middle East (MID) Office Cairo
Eastern and Southern African (ESAF) Office Nairobi
Asia and Pacific (APAC) Office Bangkok

Thank You