FAA
Air Traffic Organization

FAA: ASBU Implementation Status

For: ASBU WS @ICAO SAM

Prepared by: Midori Tanino, ATO International NextGen Lead

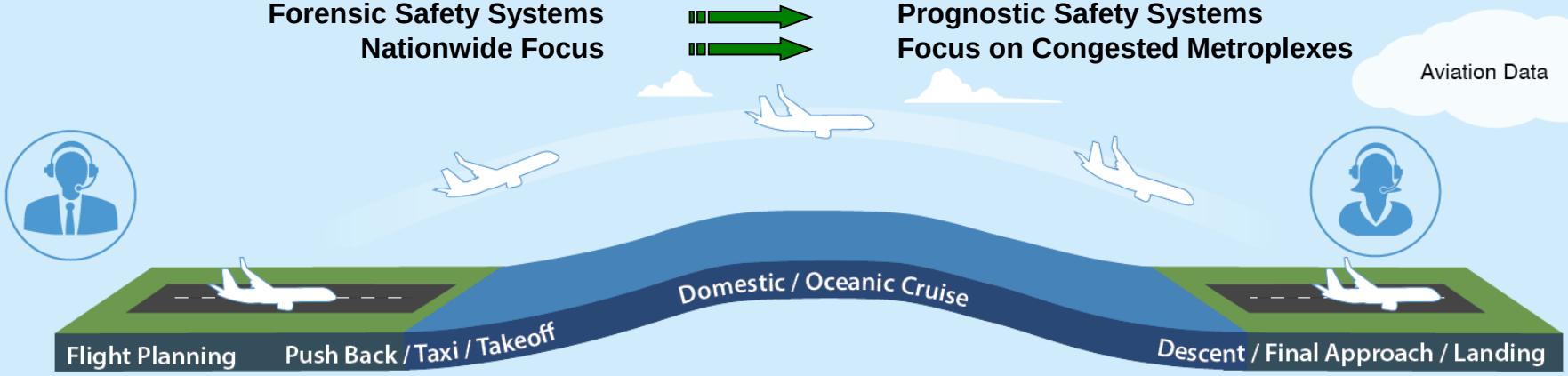
Date: August, 2017

Contents

- Background
- Implementation Approach
- Block 0 Implementation Status
- Block 1 Implementation Prospect
- Thoughts on State ANP

Delivering NextGen Improvements

Legacy System	NextGen
Radar	Satellite
Inefficient Routes	Performance Based Navigation (fuel savings)
Voice Communications	Voice & Digital Communications
Disparate Information	Automated Decision Support Tools
Fragmented Weather Forecasting	Integrated Weather Information
Weather Restricted Visibility	Improved Access in Low Visibility
Forensic Safety Systems	Prognostic Safety Systems
Nationwide Focus	Focus on Congested Metroplexes



Implementation TFDM PBN TBFM ASIAS AIM NWP

Transformational ADS-B CATM-T SWIM CSS-Wx NVS DataComm

Foundational

Terminal Automation Modernization and Replacement

En Route Automation Modernization

Terminal Automation Modernization and Replacement

Building the Future NAS

2014-2016	2016-2020	2020-2025	Beyond 2025

Foundational Infrastructure

- En Route Automation Modernization
- Terminal Automation Modernization & Replacement
- Automation Dependent Surveillance-Broadcast (ADSB) Out infrastructure
- SWIM

Expanded NextGen

- Delivering NAS information
- NextGen Weather
- Equip 2020
- Community engagement
- Accommodate unmanned aircraft systems (UAS)
- Accommodate commercial space operations

Realize NextGen

- NAS Voice System
- ADS-B In
- Data Communications
- TFDM
- Integrate UAS
- Integrate commercial space operations
- Align aircraft equipage
- Software applications

Leverage NextGen

- Enhanced service delivery
- Expand equipage
- Advanced applications for NextGen systems
- More easily address new capabilities

NAC Priorities

Expanded PBN
Initial Data Comm
Increased surface efficiency
Expanded Multiple Runway Operations

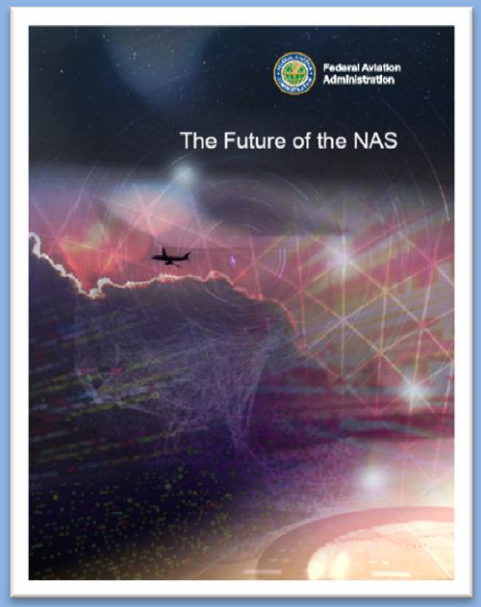
Transparent, Sustainable, Agile, and Resilient NAS

community/stakeholder engagement, tech refresh, cybersecurity, cost containment

2014-2016	2016-2020	2020-2025	Beyond 2025

NextGen Documents and Tools

5 Years



Future of the NAS

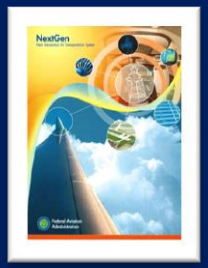
- Concept document
- Future look at NAS evolution
- Goals for modernization
- Update to Midterm ConOps

Annual

Enterprise Architecture

- Planning & engineering tool
- Plan for entire NAS
- NAS Service & Infrastructure Roadmaps
- Internal

Annual



NAS Segment Implementation Plan

- Planning document
- All milestones for NextGen programs and execution
- Internal

Annual

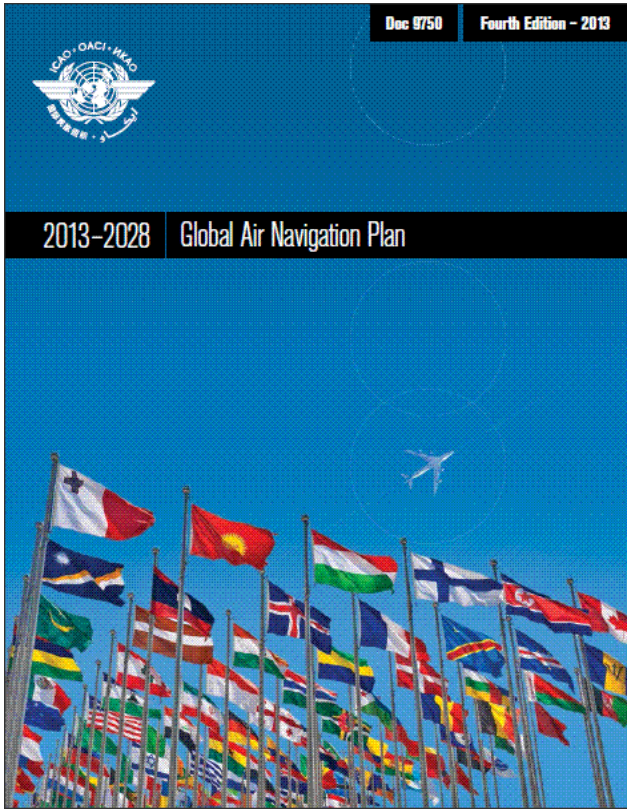
NextGen Implementation Plan

- Tracking document
- Updates, milestones of major NextGen programs
- External

NextGen Integration Working Group

- Tracking document
- Short-term priorities
- External

2013 – GANP and ASBU



WORKING DOCUMENT

FOR THE

Aviation System Block Upgrades

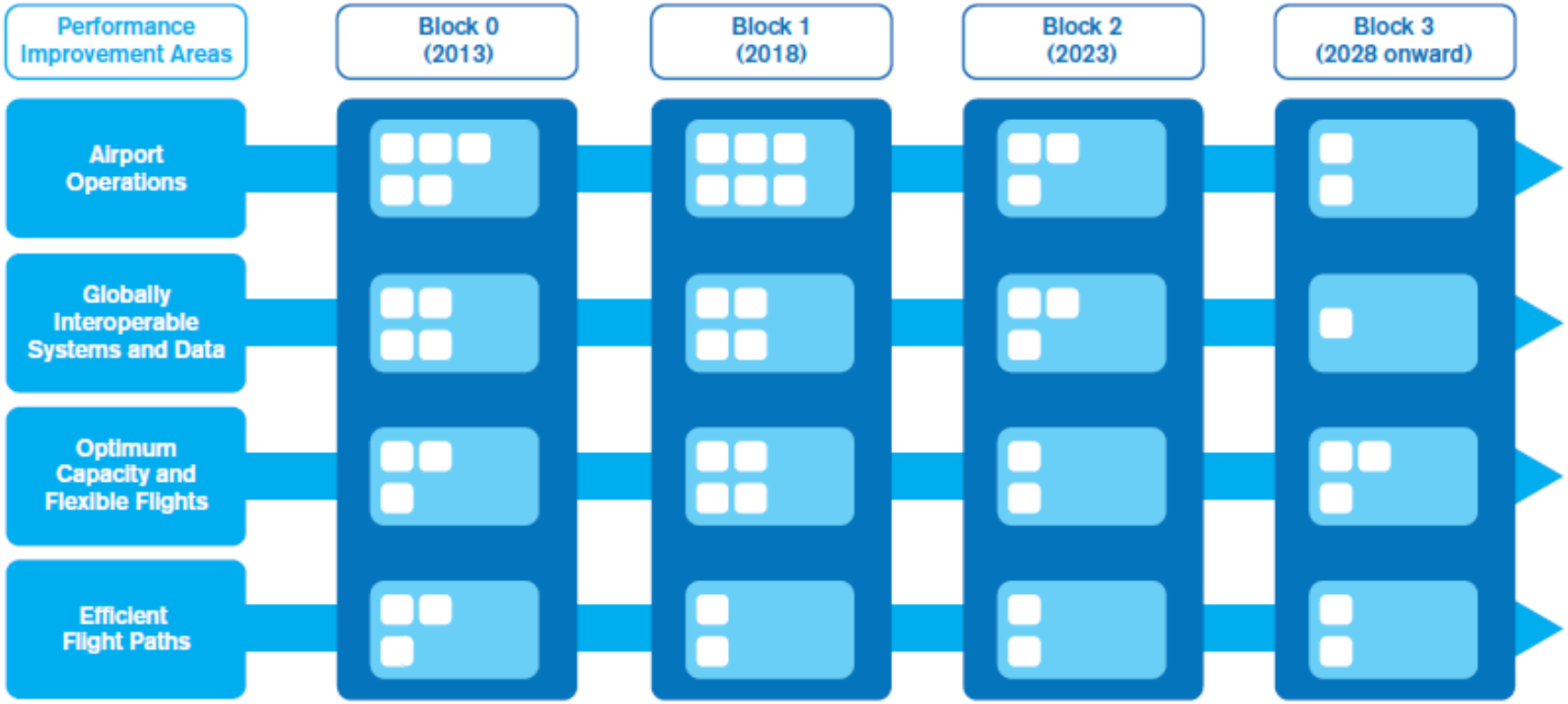
THE FRAMEWORK

FOR GLOBAL HARMONIZATION

ISSUED: 28 MARCH 2013

ASBU Structure:

(1) Performance Improvement Areas (PIA), (2) Blocks, (3) Threads, (4) Modules



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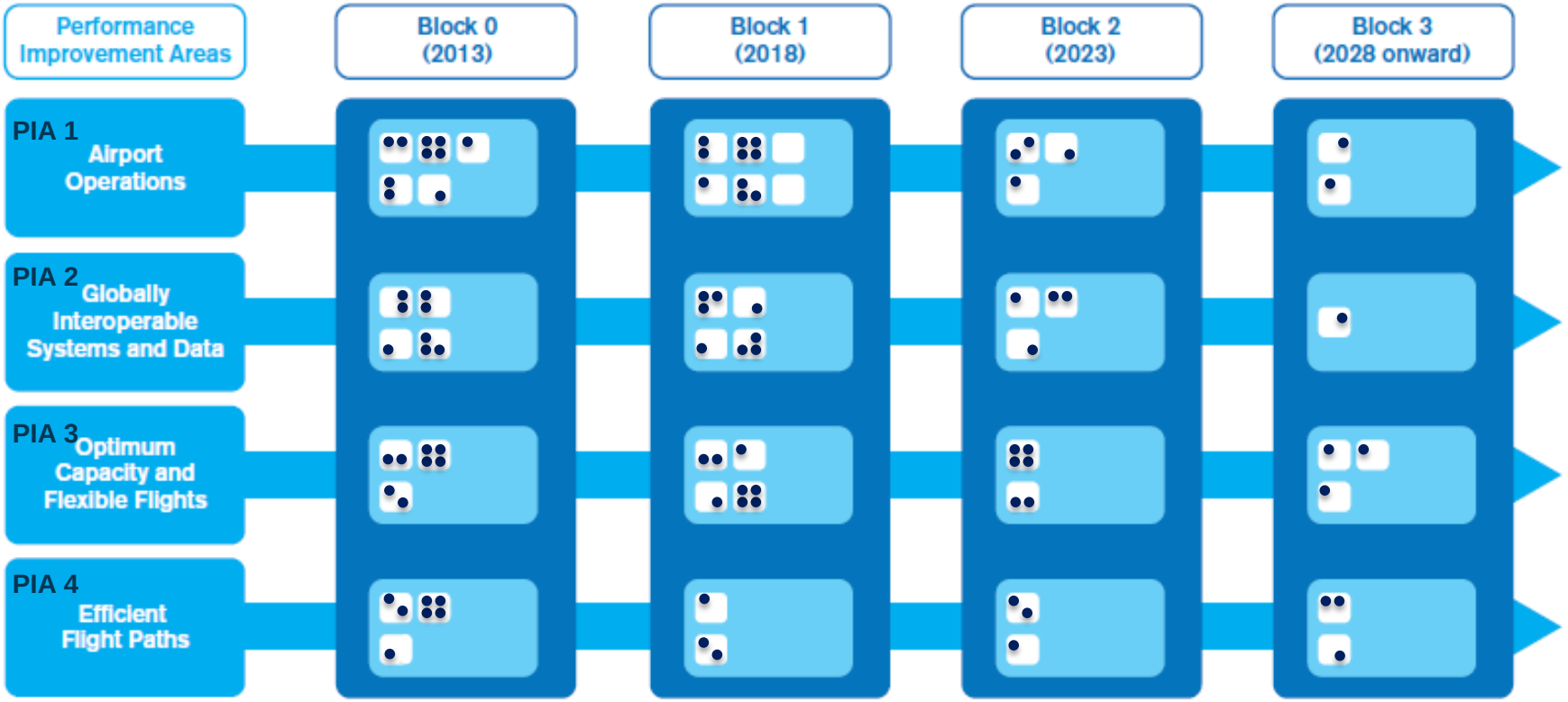
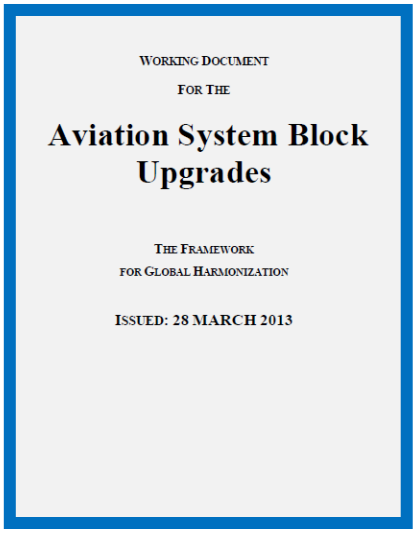
Implementation Approach

- How to plan, monitor, and report our implementation status?
  - Which **Elements** do we need?
  - What is the expected benefit?
  - How much does it cost?
  - What is our implementation schedule?
  - What is our implementation status?
  - Did our needs change?
  - How to report?

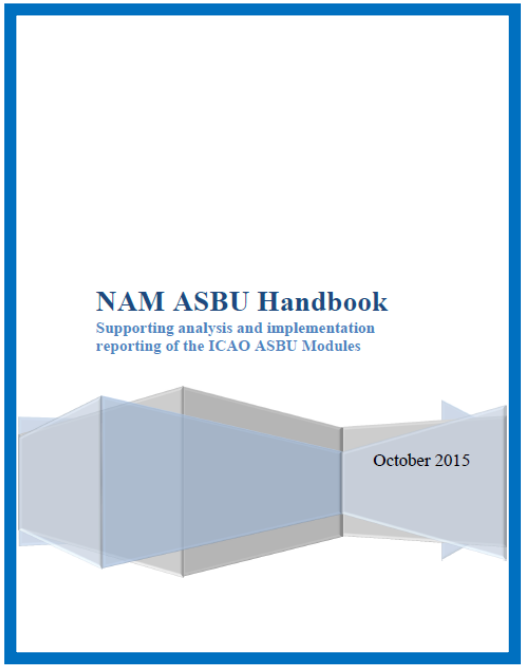
ASBU Structure: (1) Performance Improvement Areas (PIA), (2) Blocks, (3) Threads, (4) Modules, and (5) Elements



Elements Identification

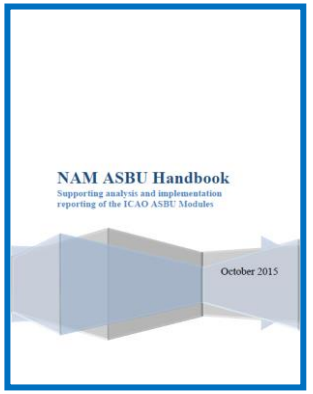


- Identification of Elements is completed based on the ASBU document
- Collaboration with NavCANADA and ICAO NACC Office via North American ANP
- Creation of ASBU Handbook – emphasis on Elements



- ICAO North Atlantic (NAT) and North American, Central American and Caribbean (NACC) ROs have adopted the ASBU Handbook
- Regions and States can add their specific requirements as Elements
- Need to work with ICAO HQ to agree on the definition of elements

Sample Elements



B0 WAKE Elements

1. (**Defined**: Element 1) New PANS-ATM wake turbulence categories and separation minima
2. (**Derived** from Element 2) Dependent diagonal paired approach procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart
3. (**Derived** from Element 3) Wake independent departure and arrival procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart
4. (**Derived** from Element 3) Wake turbulence mitigation for departures procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart
5. (**Identified by** the United States) 6 wake turbulence categories and separation minima

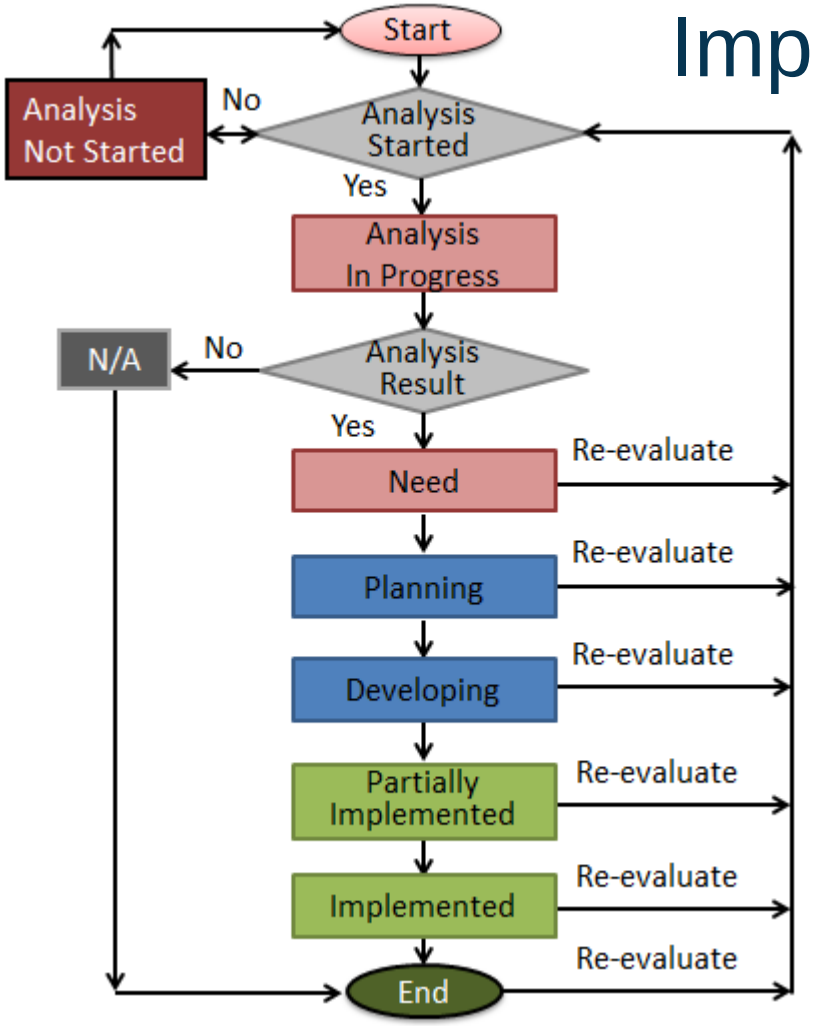
ASBU are designed so that:

- Regions and States can select ~~Module~~ **Elements** and implement them based on their operational needs
- Regions and States can implement ~~Module~~ **Elements** according to their schedule

ASBU must be…

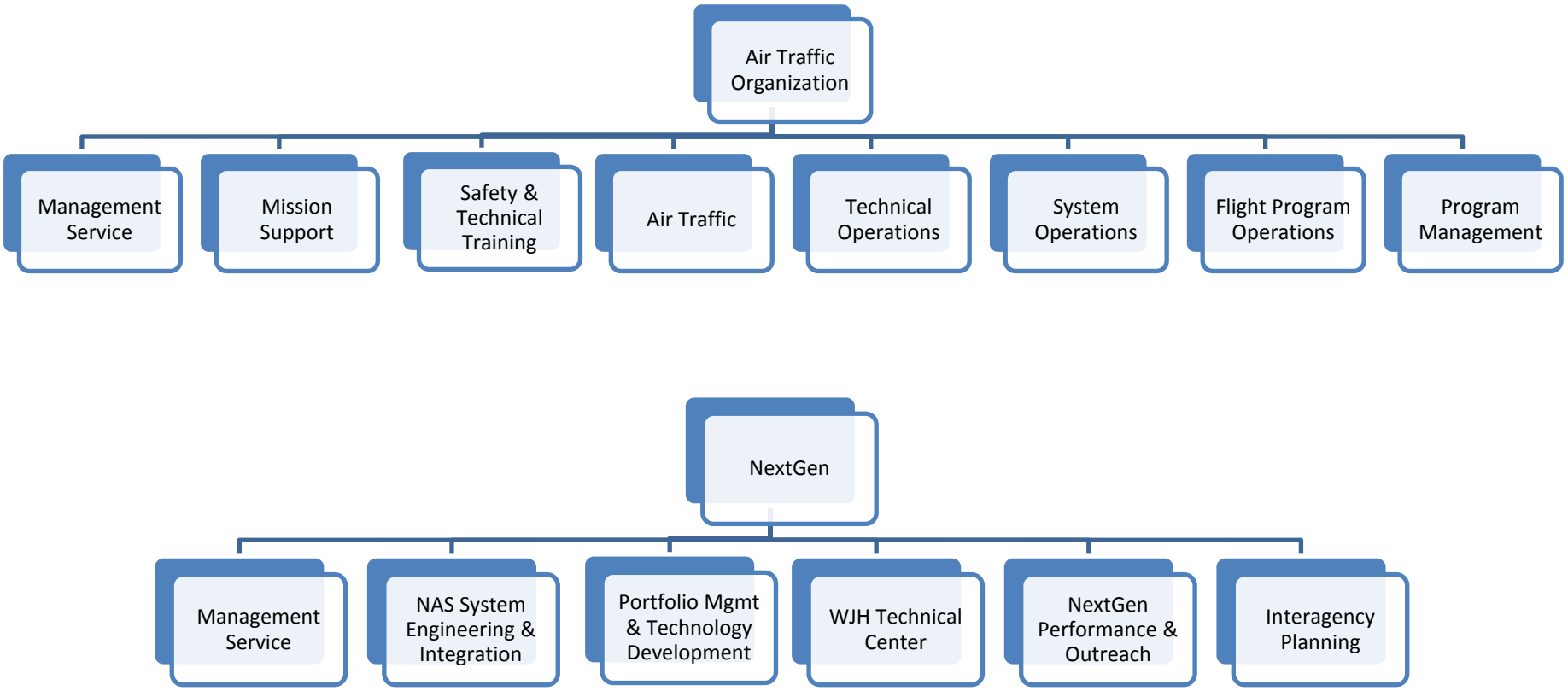
- **Simple**
- **Understandable**
- **Meaningful**

ASBU Element Analysis and Implementation Process



- Evaluate Elements one by one
  - Understand environments
  - Understand needs
  - Understand status
  - Prioritize
  - Plan accordingly
- Report
- If it fails…
  - Analysis Not Started

ASBU B0 Information Search



Simplified ANRF

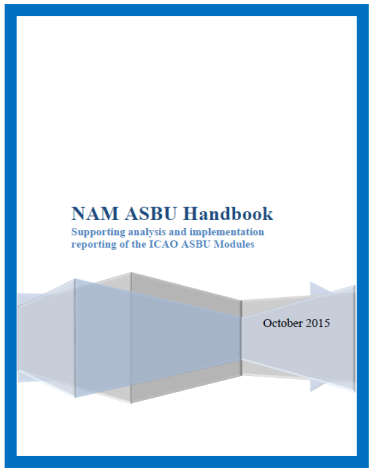
1. AIR NAVIGATION REPORT FORM (ANRF) MY STATE Planning for ASBU Modules 2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-05/CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO) Performance Improvement Area 4: Efficient Flight Path					
3. ASBU B0-05/CDO: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	Capacity	Efficiency	Environment	Safety
Applicable	N	N	Y	N	Y
4. ASBU B0-05/CDO: Planning Targets and Implementation Progress					
5. Elements	6. Targets and implementation progress (Ground and Air)				
1. CDO implementation	2015				
2. PBN STARs	2015				
7. ASBU B0-05/CDO: Implementation Challenges					
Elements	Implementation Area				
	Ground System Implementation	Avionics Implementation	Procedures Availability	Operational Approvals	
1. CDO implementation	The ground trajectory calculation function will need to be upgraded.	CDO Function	LOAs and Training	In accordance with application requirements	
2. PBN STARs	Airspace Design		LOAs and Training		
8. ASBU B0-05/CDO: Performance Monitoring and Measurement 8A. ASBU B0-05/CDO: Implementation Monitoring					
Elements	Performance Indicators/Supporting Metrics				
1. CDO implementation	Indicator: % of International Aerodromes/TMA with CDO implemented Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented				
2. PBN STARs	Indicator: % of International Aerodromes/TMA with PBN STAR implemented Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented				
8. ASBU B0-05/CDO: Performance Monitoring and Measurement 8 B. ASBU B0-05/CDO: Performance Monitoring					
Key Performance Areas	Metrics (if not indicate qualitative Benefits)				
Access & Equity	NA				
Capacity	NA				
Efficiency	Cost savings through reduced fuel burn. Reduction in the number of required radio transmissions				
Environment	Reduced emissions as a result of reduced fuel burn (IFSET)				
Safety	More consistent flight paths and stabilized approach paths. Reduction in the incidence of controlled flight into terrain (CFIT)				

Before

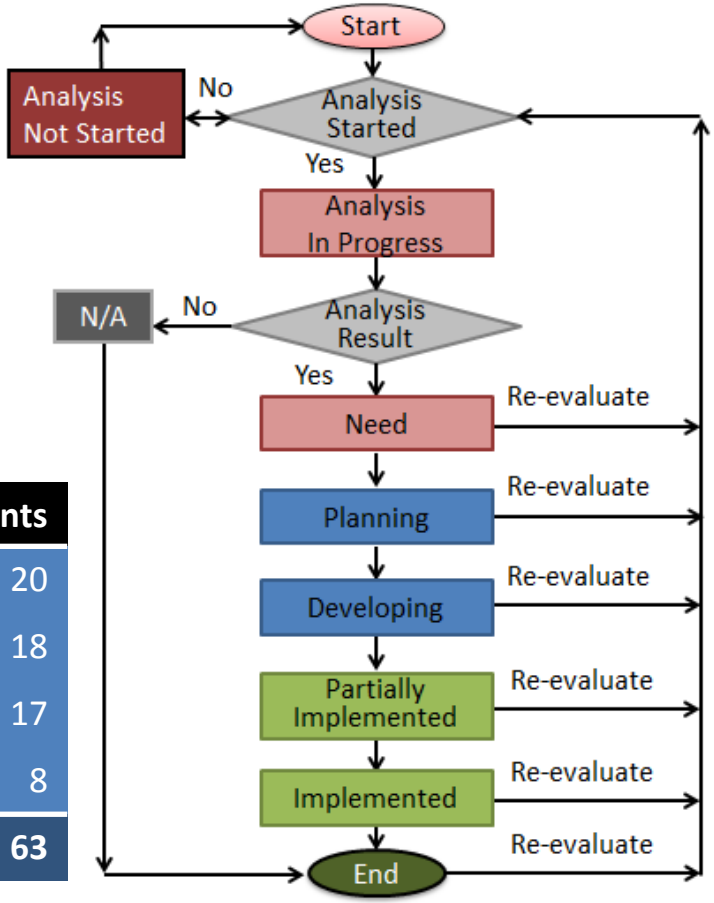
[STATE] ASBU Air Navigation Reporting Form (ANRF)					
PIA	4	Block - Module	B0 - CDO	Date	Month Day, 2016
Module Description: Performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs). This will optimize throughput, allow fuel efficient descent profiles, and increase capacity in terminal areas.					
Element Implementation Status					
1	**Element Description:** (Derived from Element 1) Procedure changes to facilitate CDO			**Date Planned/Implemented**	**Status**
	Status Detail:				
2	**Element Description:** (Derived from Element 1) Route changes to facilitate CDO			**Date Planned/Implemented**	**Status**
	Status Detail:				
3	**Element Description:** (Derived from Element 2) PBN STARs			**Date Planned/Implemented**	**Status**
	Status Detail:				
Achieved Benefits					
Access and Equity					
Capacity					
Efficiency					
Environment					
Safety					
Implementation Challenges					
Ground system Implementation					
Avionics Implementation					
Procedures Availability					
Operational Approvals					
Notes					

After

Following the Process



B0 PIA	Modules	Elements
PIA 1	5	20
PIA 2	3	18
PIA 3	7	17
PIA 4	3	8
Total	**18**	**63**



[STATE] ASBU Air Navigation Reporting Form (ANRF)

PIA	4	Block - Module	B0 - CDO	Date	Month Day, 2016

Module Description: Performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs). This will optimize throughput, allow fuel efficient descent profiles, and increase capacity in terminal areas.

Element Implementation Status

	Element Description	Date Planned/Implemented	Status
1	Element Description: (Derived from Element 1) Procedure changes to facilitate CDO Status Details:		
2	Element Description: (Derived from Element 1) Route changes to facilitate CDO Status Details:		
3	Element Description: (Derived from Element 2) PBN STARs Status Details:		

Achieved Benefits

Access and Equity

Capacity

Efficiency

Environment

Safety

Implementation Challenges

Ground system Implementation

Avionics Implementation

Procedures Availability

Operational Approvals

Notes

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FAA: ASBU B0 PIA 1 Implementation Status Table

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
Performance Improvement Area 1: Airport Operations									
ACDM	1. Interconnection between aircraft operator & ANSP systems to share surface operations information								30
	2. Interconnection between aircraft operator & airport operator systems to share surface operations information							30	
	3. Interconnection between airport operator & ANSP systems to share surface operations information								30
	4. Interconnection between airport operator, aircraft operator & ANSP systems to share surface operations information								30
	5. Collaborative departure queue management								30
APTA	1. PBN approach procedures with vertical guidance to LNAV/VNAV minima								30
	2. PBN approach procedures with vertical guidance to LPV minima								30
	3. PBN approach procedures without vertical guidance to LNAV minima								30
	4. GBAS Landing System (GLS) procedures to CAT I minima								30
RSEQ	1. AMAN via controlled time of arrival to a reference fix								30
	2. Departure management							30	
	3. Departure flow management						30		
	4. Point merge				30				
SURF	1. A-SMGCS with at least one cooperative surface surveillance system								30
	2. ADS-B APT								30
	3. A-SMGCS alerting with flight identification information								30
	4. EVS for taxi operations				30				
	5. Airport vehicles equipped with transponders								30
WAKE	1. New PANS-ATM wake turbulence categories and separation minima				30				
	2. Dependent diagonal paired approach procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart								30
	3. Wake independent departure and arrival operations (WIDAO) for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart							30	
	4. Wake turbulence mitigation for departures (WTMD) procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart based on observed crosswinds								30
	5. 6 wake turbulence categories and separation minima								30

Note: Airport number distribution needs to be verified.

FAA: ASBU B0 PIA 2 Implementation Status Table

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
Performance Improvement Area 2: Globally Interoperable Systems and Data									
AMET	1. WAFS								√
	2. IAVW								√
	3. TCAC forecasts								√
	4. Aerodrome warnings								30
	5. Wind shear warnings and alerts								30
	6. SIGMET								√
	7. Other OPMET information (METAR, SPECI and/or TAF)								√
	8. QMS for MET								√
DATM	1. Standardized Aeronautical Information Exchange Model (AIXM)								√
	2. eAIP								√
	3. Digital NOTAM								√
	4. eTOD								30
	5. WGS-84								√
	6. QMS for AIM								√
FICE	1. AIDC to provide initial flight data to adjacent ATSUs								√
	2. AIDC to update previously coordinated flight data								√
	3. AIDC for control transfer								√
	4. AIDC to transfer CPDLC logon information to the Next Data Authority					√			

Note: Airport number distribution needs to be verified.

FAA: ASBU B0 PIA 3 Implementation Status Table

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
Performance Improvement Area 3: Optimum Capacity and Flexible Flights									
ACAS	1. ACAS II (TCAS version 7.1)				√				
	2. AP.FD function				√				
	3. TCAP function				√				
ASEP	1. ATSA-AIRB								√
	2. ATSA-VSA								√
ASUR	1. ADS-B								√
	2. Multilateration (MLAT)								√
FRTO	1. CDM incorporated into airspace planning								√
	2. Flexible Use of Airspace (FUA)								√
	3. Flexible routing								√
	4: CPDLC used to request and receive re-route clearances								√
NOPS	1. Sharing prediction of traffic load for next day								√
	2. Proposing alternative routings to avoid or minimize ATFM delays								√
OPFL	1. ITP using ADS-B								√
SNET	1. Short Term Conflict Alert implementation (STCA)								√
	2. Area Proximity Warning (APW)								√
	3. Minimum Safe Altitude Warning (MSAW)								√
	4. Medium Term Conflict Alert (MTCA)								√

FAA: ASBU B0 PIA 4 Implementation Status Table

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
Performance Improvement Area 4: Efficient Flight Paths									
CCO	1. Procedure changes to facilitate CCO								30
	2. Airspace changes to facilitate CCO								30
	3. PBN SIDs								30
CDO	1. Procedure changes to facilitate CDO								30
	2. Airspace changes to facilitate CDO								30
	3. PBN STARs								30
TBO	1. ADS-C over oceanic and remote areas								√
	2. CPDLC over continental areas					√			
	3. CPDLC over oceanic and remote areas								√

Note: Airport number distribution needs to be verified.

ANRFs Submitted

- All Block 0 ANRFs are submitted to the ICAO NACC office and available to share with you at:

https://www.icao.int/NACC/Pages/regional-group-asbu.aspx

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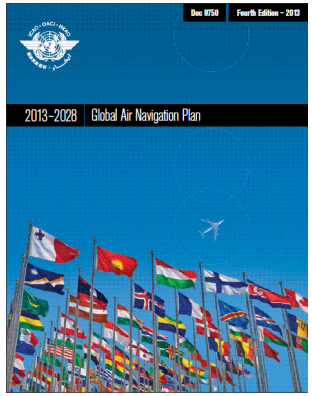
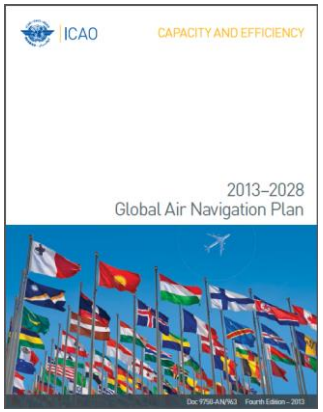
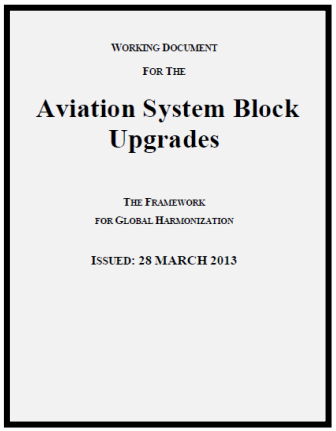
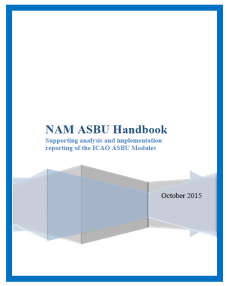
4th Edition (2013) vs 5th Edition (2016)



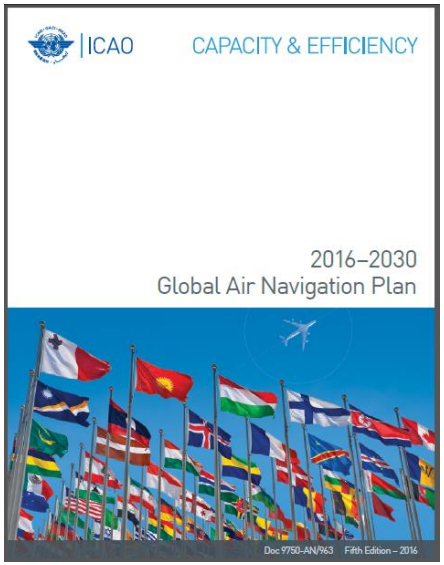


4th Edition GANP

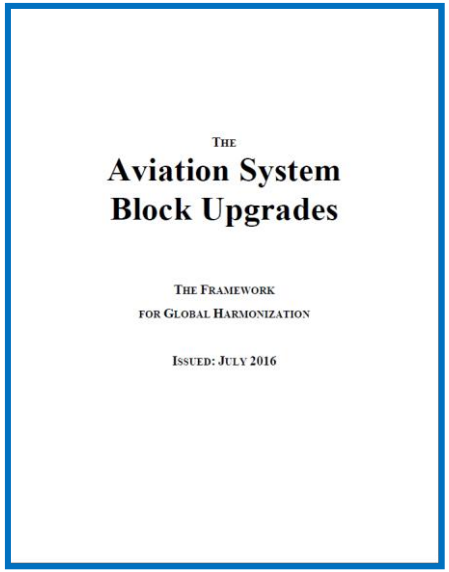


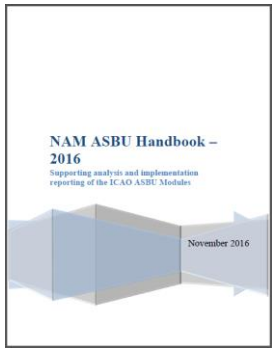


4th Edition ASBU



5th Edition GANP





5th Edition ASBU

4th Edition (2013) vs 5th Edition (2016)

Elements in the 4th Edition (2013)

B0 PIA	Modules	Elements
PIA 1	5	20
PIA 2	3	18
PIA 3	7	17
PIA 4	3	8
Total	**18**	**63**

Elements in the 5th Edition (2016)

B0 PIA	Modules	Elements
PIA 1	5	23
PIA 2	3	18
PIA 3	7	18
PIA 4	3	10
Total	**18**	**69**

Changes in Elements
4th Edition vs 5th Edition

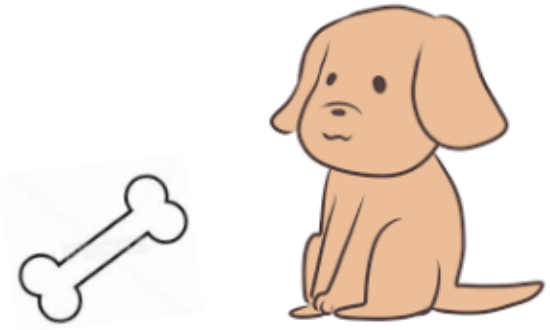
	4th Edition Elements	mapping	5th Edition Elements
Performance Improvement Area 1: Airport Operations			
ACDM	1. Airport CDM procedures	Old 1 and 2 are mapped onto new 1 - 4	1. Interconnection between aircraft operator & ANSP systems to share surface operations information
	2. Airport CDM tools		2. Interconnection between aircraft operator & airport operator systems to share surface operations information
			3. Interconnection between airport operator & ANSP systems to share surface operations information
			4. Interconnection between airport operator, aircraft operator & ANSP systems to share surface operations information
	3. Collaborative departure queue management	old 3 -> new 5	5. Collaborative departure queue management
APTA	1. PBN Approach Procedures with vertical guidance (LPV, LNAV/VNAV minima, using SBAS and Baro VNAV)	Old 1 mapped onto new 1 & 2	1. PBN approach procedures with vertical guidance to LNAV/VNAV minima
			2. PBN approach procedures with vertical guidance to LPV minima
	2. PBN Approach Procedures without vertical guidance (LP, LNAV minima; using SBAS)	old 2 -> new 3	3. PBN approach procedures without vertical guidance to LNAV minima
	3. GBAS Landing System (GLS) Approach procedures	old 3 -> new 4	4. GBAS Landing System (GLS) procedures to CAT I minima
RSEQ	1. AMAN via controlled time of arrival to a reference fix	No change	1. AMAN via controlled time of arrival to a reference fix
	2. AMAN via controlled time of arrival at the aerodrome	Deleted	Deleted
	3. Departure management	old 3 -> new 2	2. Departure management
	4. Departure flow management	old 4 -> new 3	3. Departure flow management
	5. Point merge	old 5 -> new 4	4. Point merge

Changes in Elements
4th Edition vs 5th Edition (Cont.)

	4th Edition Elements	mapping	5th Edition Elements
Performance Improvement Area 1: Airport Operations			
SURF	1. A-SMGCS with at least one cooperative surface surveillance system	No change	
	2. Including ADS-B APT as an element of A-SMGCS	No change	
	3. A-SMGCS alerting with flight identification information	No change	3. A-SMGCS alerting with flight identification information
		New	4. EVS for taxi operations
	4. Airport vehicles equipped with transponders	old 4 -> new 5	5. Airport vehicles equipped with transponders
Performance Improvement Area 3: Optimum Capacity and Flexible Flights			
NOPS	1. ATFM	Old 1 mapped onto new 1 & 2	1.Sharing prediction of traffic load for next day
			2. Proposing alternative routings to avoid or minimize ATFM delays
Performance Improvement Area 4: Efficient Flight Paths			
TBO	1. ADS-C over oceanic and remote areas	No change	
	2. Continental CPDLC	Old 2 mapped onto new 2 & 3	1. CPDLC over continental area
			2. CPDLC over oceanic and remote area

2019 version of GANP/ASBU

- Big changes are expected
- Big changes may include a new Block
- Big changes include the definition of Modules
- Big changes include the definition of **Block 1 Elements**
- Wait and see
- Apply the same process



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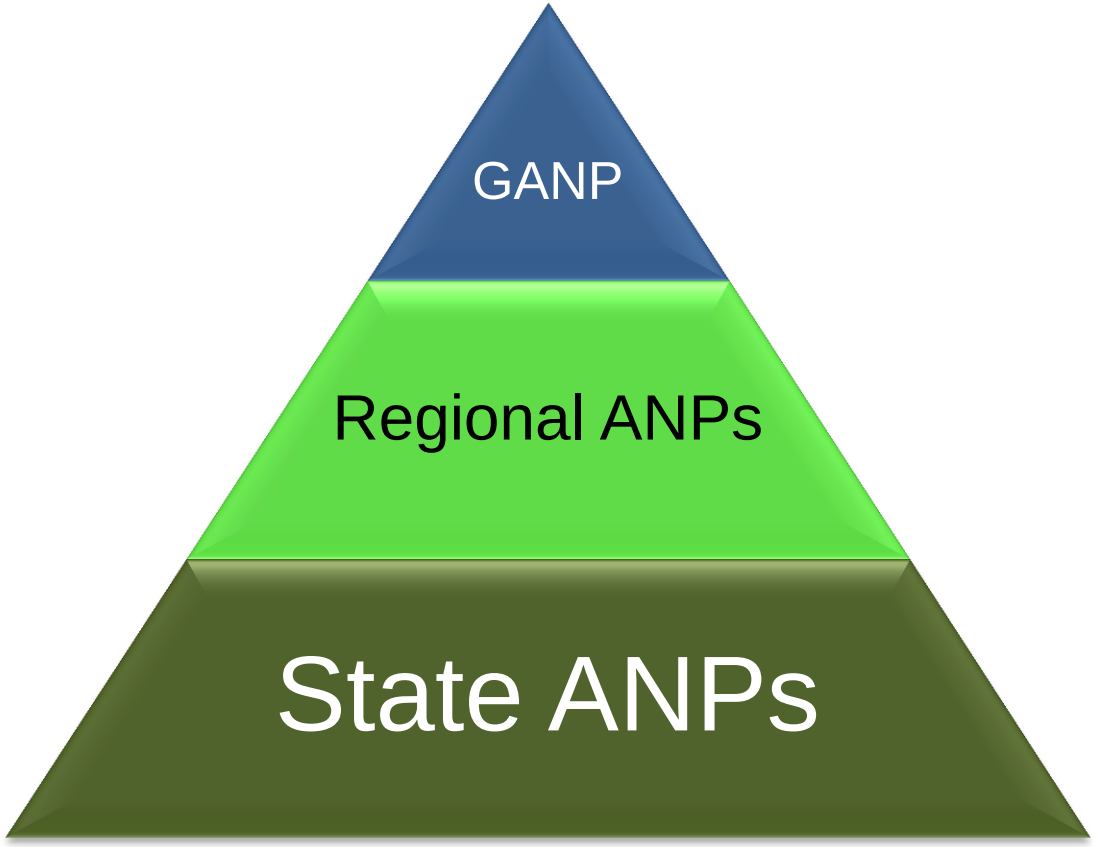
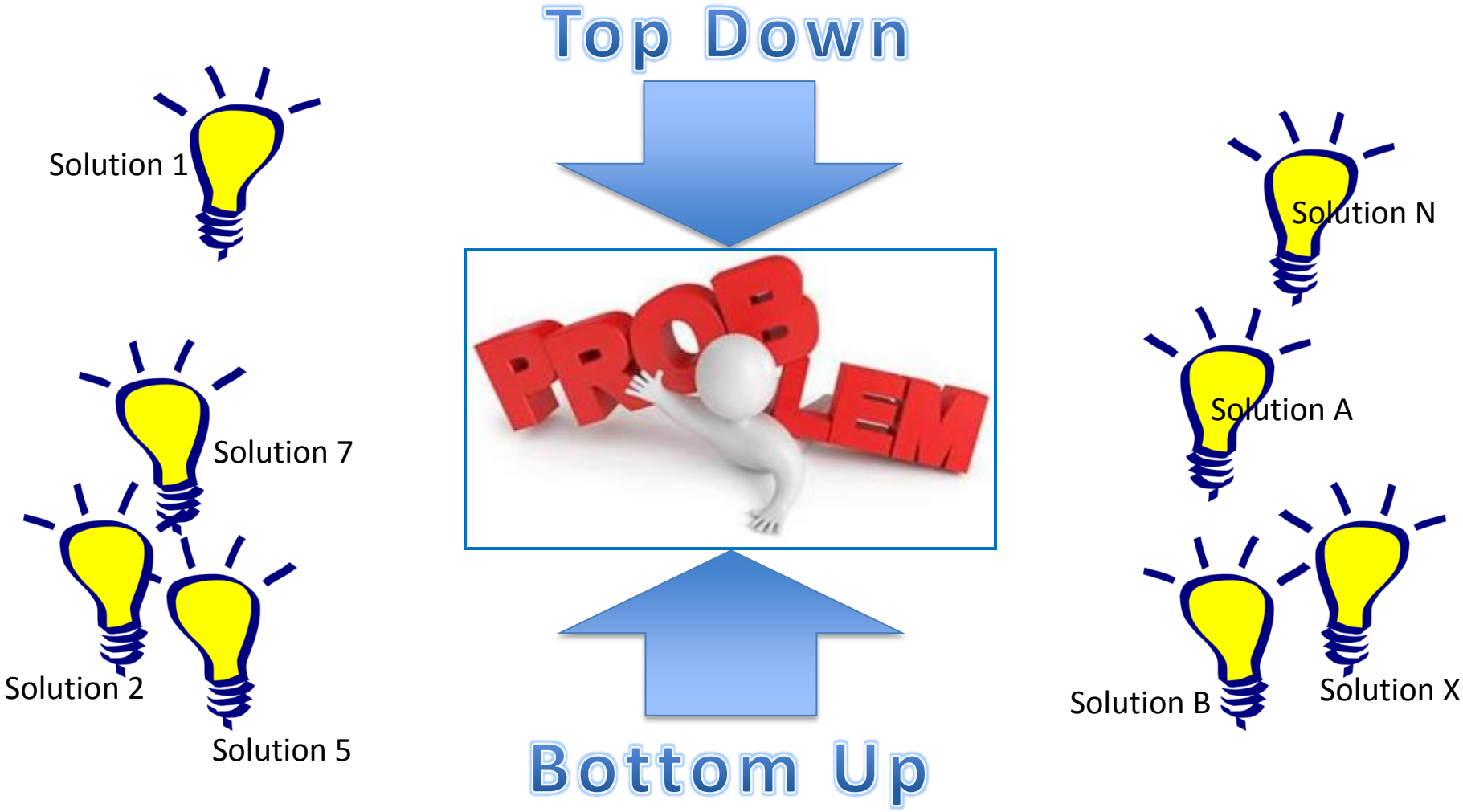
Problems

We are together to



Problem Solution



National Air Navigation Plan

[**Your State**]
National Air Navigation Plan

[Date]
[version control number]
[prepared by XXX]

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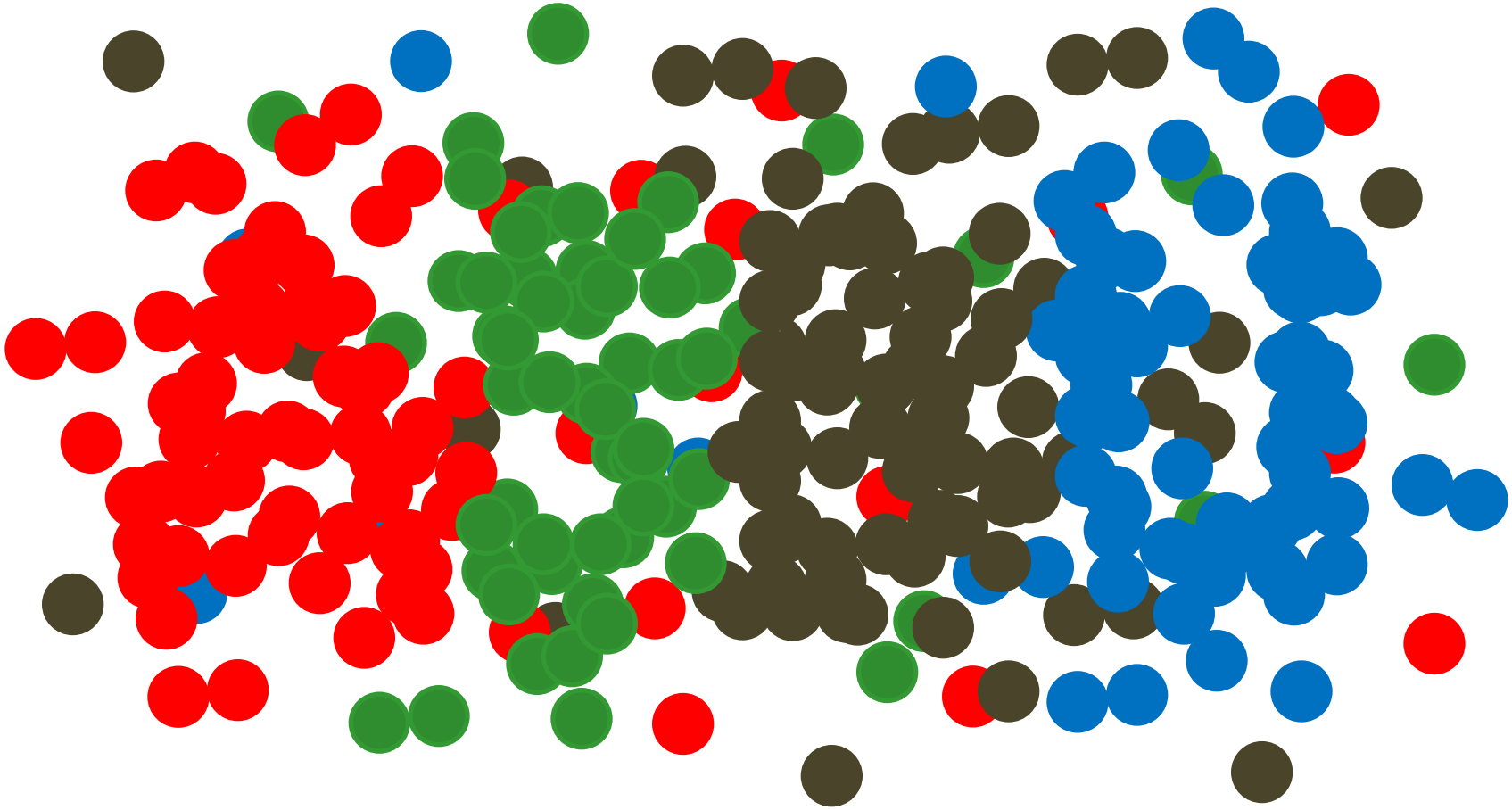

Questions?

Thank you!

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