FAA
Air Traffic Organization

# FAA: ASBU Deployment Status

For: ASBU WS @NACC

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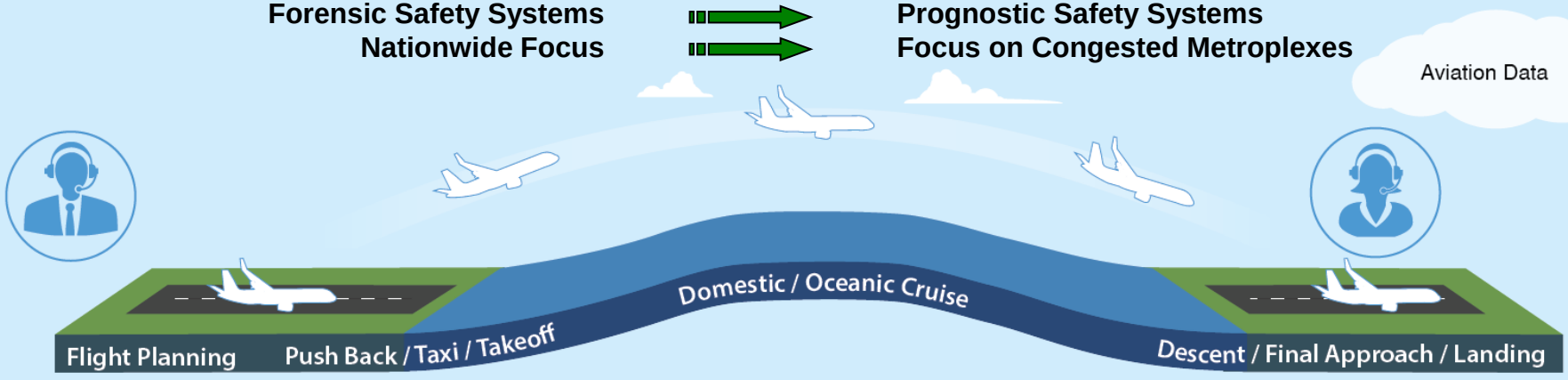
# Delivering NextGen Improvements

| 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

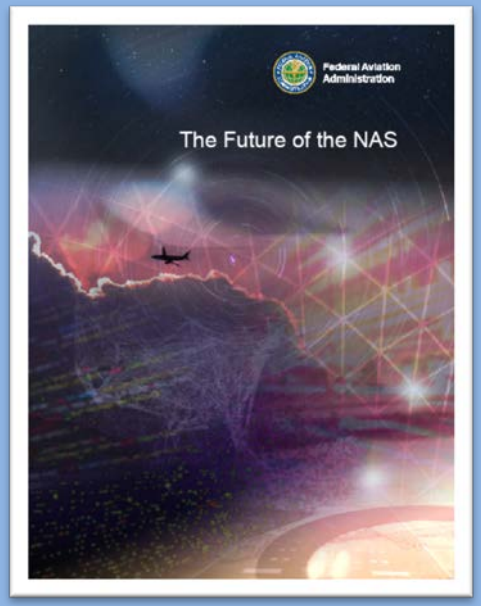
### Transparent, Sustainable, Agile, and Resilient NAS

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**

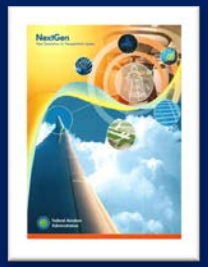
- Concept document
- Future look ahead at NAS evolution
- Goals for modernization
- Update to Midterm ConOps

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

# 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. Airport CDM procedures | | | | | | | √ | |
| | 2. Airport CDM tools | | | | | | | | √ |
| | 3. Collaborative departure queue management | | | | | | √ | | |
| **APTA** | 1. PBN Approach Procedures with vertical guidance (LPV, LNAV/VNAV minima, using SBAS and Baro VNAV) | | | | | | | | √ |
| | 2. PBN Approach Procedures without vertical guidance (LP, LNAV minima; using SBAS) | | | | | | | | √ |
| | 3. GBAS Landing System (GLS) Approach procedures | | | | | | | | √ |
| **RSEQ** | 1. AMAN via controlled time of arrival to a reference fix | | | | | | | | √ |
| | 2. AMAN via controlled time of arrival at the aerodrome | | | | | | | | √ |
| | 3. Departure management | | | | | | | √ | |
| | 4. Departure flow management | | | | | | √ | | |
| | 5. Point merge | | | | √ | | | | |
| **SURF** | 1. A-SMGCS with at least one cooperative surface surveillance system | | | | | | | | √ |
| | 2. Including ADS-B APT as an element of A-SMGCS | | | | | | | | √ |
| | 3. A-SMGCS alerting with flight identification information | | | | | | | | √ |
| | 4. Airport vehicles equipped with transponders | | | | | | | | √ |
| **WAKE** | 1. New PANS-ATM wake turbulence categories and separation minima | | | | √ | | | | |
| | 2. Dependent diagonal paired approach procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart | | | | | | | | √ |
| | 3. Wake independent departure and arrival procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart | | | | | | | √ | |
| | 4. Wake turbulence mitigation for departures procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart | | | | | | | | √ |
| | 5. 6 wake turbulence categories and separation minima | | | | | | | | √ |

# 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 | | | | | | | | √ |
| | 5. Wind shear warnings and alerts | | | | | | | | √ |
| | 6. SIGMET | | | | | | | | √ |
| | 7. Other OPMET information (METAR, SPECI and/or TAF) | | | | | | | | √ |
| | 8. QMS for MET | | | | | | | | √ |
| DATM | 1. Aeronautical Information Exchange Model (AIXM) | | | | | | | | √ |
| | 2. eAIP | | | | | | | | √ |
| | 3. Digital NOTAM | | | | | | | | √ |
| | 4. eTOD | | | | | | | | √ |
| | 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 | | | | | √ | | | |

# 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. Auto Pilot/Flight Director (AP/FD) TCAS | | | | √ | | | | |
| | 3. TCAS Alert Prevention (TCAP) | | | | √ | | | | |
| 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 route system | | | | | | | | √ |
| | 4: CPDLC used to request and receive re-route clearances | | | | | | | | √ |
| NOPS | 1. ATFM | | | | | | | | √ |
| 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 | | | | | | | | √ |
| | 2. Route changes to facilitate CCO | | | | | | | | √ |
| | 3. PBN SIDs | | | | | | | | √ |
| **CDO** | 1. Procedure changes to facilitate CDO | | | | | | | | √ |
| | 2. Route changes to facilitate CDO | | | | | | | | √ |
| | 3. PBN STARs | | | | | | | | √ |
| **TBO** | 1. ADS-C over oceanic and remote areas | | | | | | | | √ |
| | 2. Continental CPDLC | | | | | | | | √ |

# FAA Activities to Support ASBU

- Elements identification
  - ASBU Handbook
- ASBU analysis and implementation process
- ANRF improvements and usage
- Metrix and Targets
- eANP Volume III
  - NAM eANP
  - NAT eANP
  - Sharing information with other regions

# FAA Activities to Support ASBU

- ASBU Workshops
  - With CAAS – Aug 2014
  - With JCAB – Aug 2014
  - With CANSO in Punta Cana, DR – Oct 2015
  - With CANSO in Queenstown, NZ – May 2016
  - With ICAO at NACC – Aug 2016
- EIWAC2015 paper and presentation – Nov 2015
  - “Harmonization of Future Technologies to Serve the ATM Community:  ICAO’s Global Air Navigation Plan (GANP) and Aviation System Block Upgrades (ASBU)”

# ASBU must be…

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

# Did someone asked you…

| B0-SURF | Surface Operations - Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2) |
|---|---|

1. Which airports in your State currently have implemented A-SMGCS level 1 and 2?
2. Estimate the percentage of aircraft movements which are operating girth A-MSGCS in your state/region?
3. Which additional airports in your state/organization will implement A-SMGCS Level 1 and 2 in 2018?
4. What percentage of aircraft movements do you estimate will be operating with A-SMGCS in your state in 2018?

# Did someone asked you…

| B0-FRTO | Free-Route Operations - Improved Operations through Enhanced En-Route Trajectories |
|---|---|

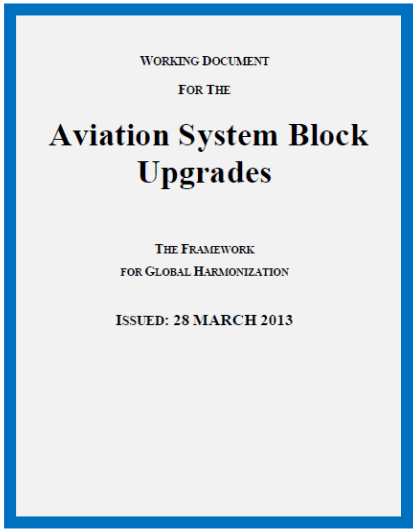
1. Is FUA currently implemented in your State/region (please specify the geographical extent in terms of FIR)?
2. Is there a plan to implement or increase FUA in your State/region (please specify the geographical extent in terms of FIR prior to 2018)?
3. How many track miles annually do you currently save as a result of FUA implementation or changes to validate periods for restricted airspace? What percentage of operations des this represent annually?
4. How many track miles annually do you expect to save in ….

# Did someone asked you…

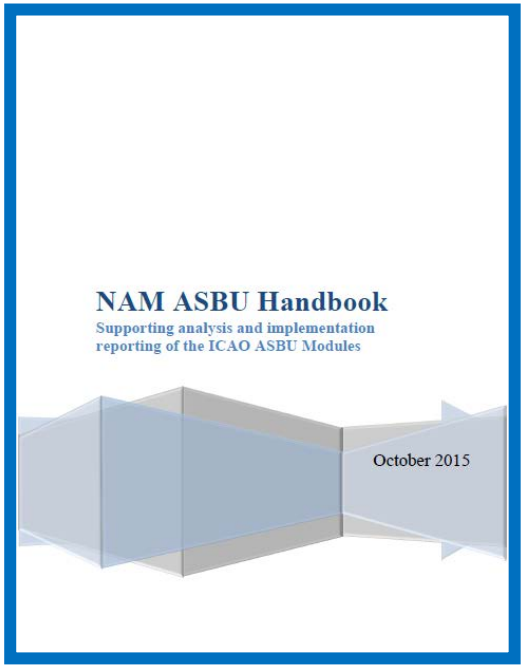
| B0-NOPS | Network Operations - Improved Flow Performance through Planning based on a Network-Wide view |
|---|---|

1. Is strategic traffic flow management currently used to manage runway/airspace slot allocation in your state/region? At all airport/airspace? Please specify where.
2. How many flights are subject to the ATFM process?
3. How many en-route delay did the ATFM measure save in 2013?
4. How much airport arrival delay did the ATFM measures save in 2013?
5. Will strategic traffic flow management be used to manage runway/airspace slot allocation in your State/region by the end of 2018? At all airports/airspace? Please specify where?
6. How many flights will be ….

# Elements Identification

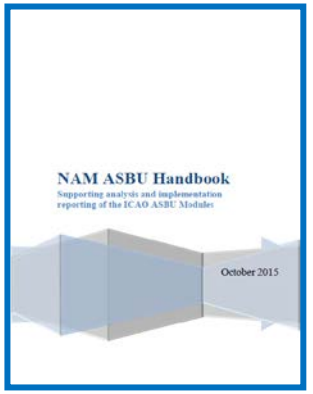



- Initial identification is completed based on the ASBU document
- Collaboration with NAVCANADA and ICAO NACC Office via North American ANP
- Creation of ASBU Handbook – emphasis on Elements
- ICAO North Atlantic (NAT) has adopted the ASBU Handbook




- 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

# B0 and B1 Elements (as of Oct 2015)

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

| B1 PIA | Modules | Elements |
|---|---|---|
| PIA 1 | 6 | 26 |
| PIA 2 | 4 | 16 |
| PIA 3 | 4 | 13 |
| PIA 4 | 3 | 14 |
| **Total** | **17** | **69** |

- Based on the NAM ASBU Handbook
  - Most Elements are “derived” from working document for ASBU
- Need to work with ICAO HQ to agree on the definition of elements

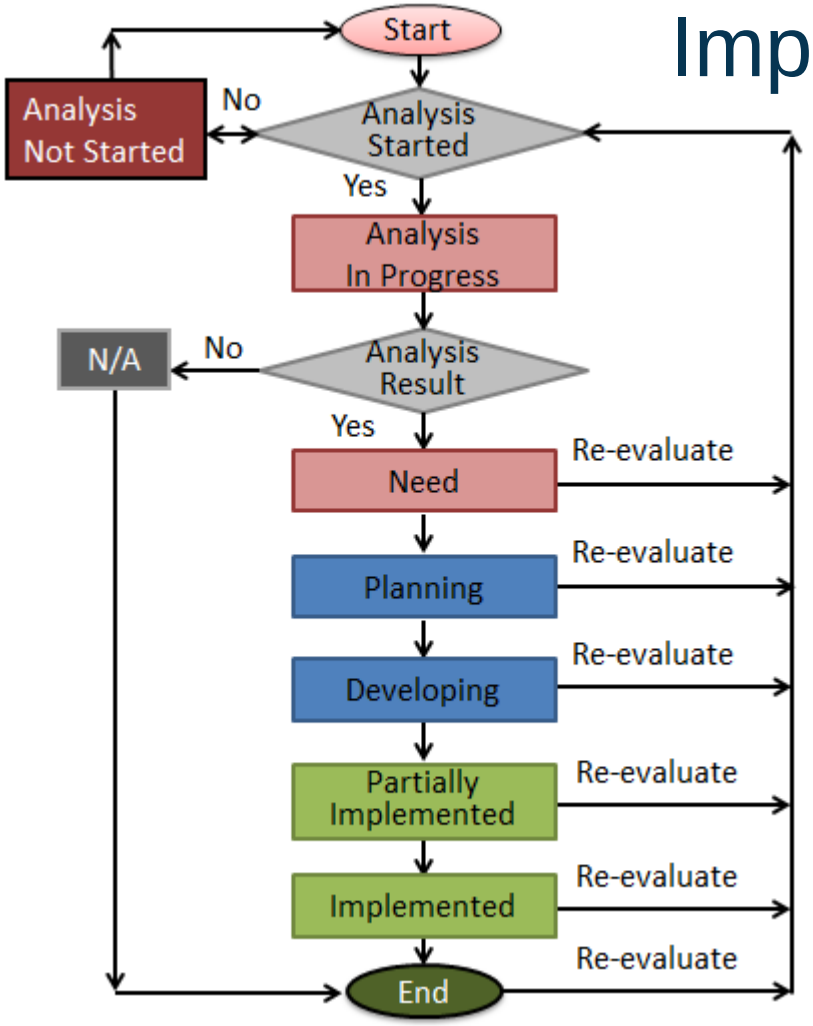
# ASBU are designed so that:

- Regions and States can select ~~Module~~ **Elements** and implement 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
- Reporting
- If fails…
  - Analysis Not Started

# Simplified ANRF

| 1. AIR NAVIGATION REPORT FORM (ANRF)<br>MY STATE Planning for ASBU Modules<br>2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-05/CD0:<br>Improved Flexibility and Efficiency in Descent Profiles (CDO)<br>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<br>8A. ASBU B0-05/CDO: Implementation Monitoring | |
|---|---|
| Elements | Performance Indicators/Supporting Metrics |
| 1. CDO implementation | Indicator: % of International Aerodromes/TMA with CDO implemented<br>Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented |
| 2. PBN STARs | Indicator: % of International Aerodromes/TMA with PBN STAR implemented<br>Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented |

| 8. ASBU B0-05/CDO: Performance Monitoring and Measurement<br>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 aerival 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**

# Metrics and Target

**met·rics** (/ˈmetriks/) (noun)

- a method of measuring something, or the results obtained from this

**tar·get** (/ˈtärgət/) (noun)

- a person, object, or place selected as the aim of an attack

**in·di·ca·tor** (/ˈindəˌkādər/) (noun)

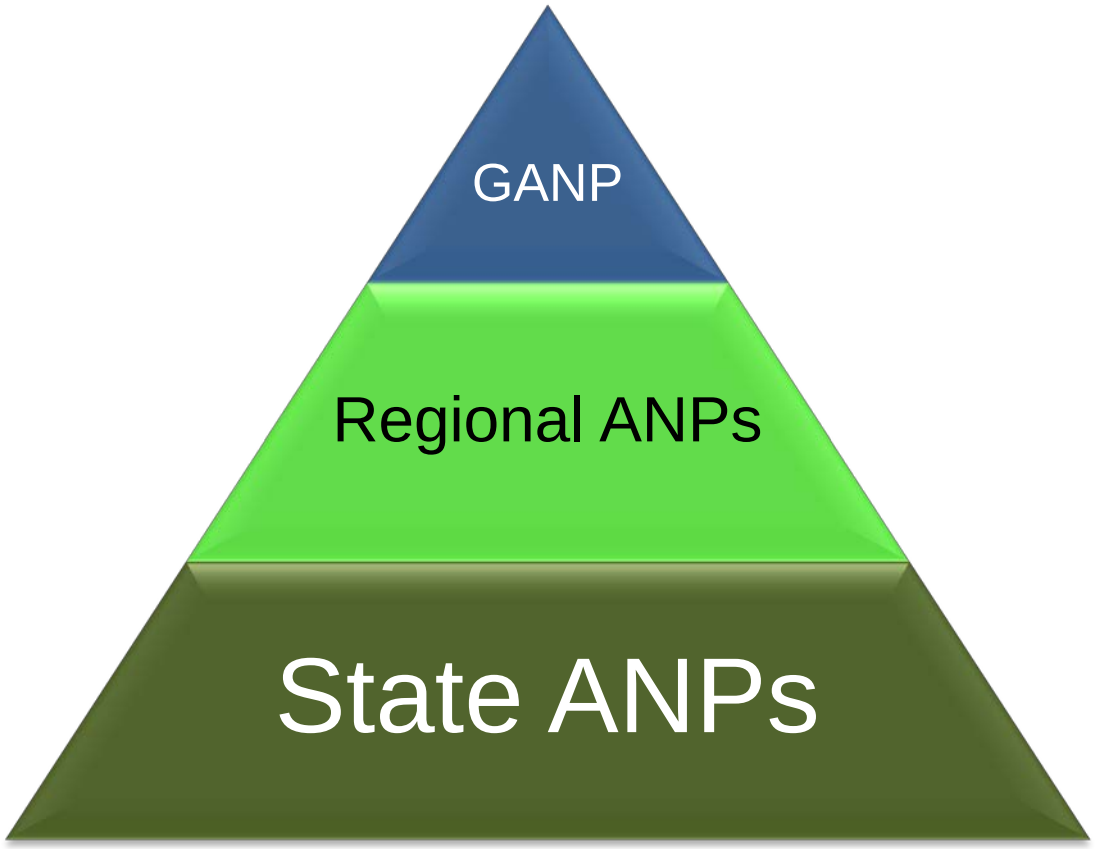
- a thing, especially a trend or fact, that indicates the state or level of something

# Metrics and Target

- Defining the Metrics and Targets

This subject will be discussed in the National ANP section of the workshop.

# We are together to



# Questions?

# Thank you!

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