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# PBN Workshop / Go-Team



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# Outline

- Objective of PBN Go Team
- ICAO Global Priorities
- Status of PBN Implementation
- ICAO provisions in support of PBN
- Roles of National Stakeholders
- Go Teams Activities



# Objective

- Support States in enhancing their capabilities to effectively use PBN , which will improve Global and Regional PBN implementation.

## Why PBN?

- Growing demand for solutions to airspace congestion.
- Growing fuel efficiency requirements.
- Growing Environmental requirements.
- Growing demand for RNAV approaches (safety, accessibility).



# ICAO Assembly 38th Session

- The ICAO Assembly is the Organization's sovereign body. It meets at least once every three years and is convened by ICAO's governing body, the Council
- ICAO's Member States and a large number of international organizations are invited to the Assembly, which establishes the worldwide policy of the Organization for the upcoming triennium (2014-2016)
- During Assembly Sessions, ICAO's work programme in the technical, economic, legal and technical cooperation fields is reviewed in detail
- Key Items of A38
  - Endorsement of the Global Aviation Safety Plan
  - Endorsement of the Global Air Navigation Plan (ASBUs)
  - Endorsement of ICAO's 5 Strategic Objectives
    - Safety
    - Air Navigation Capacity and Efficiency
    - Security and Facilitation
    - Economic Development of Air Transport
    - Environmental Protection



# **GASP** Objectives and Priorities

## Near-term

**2017**

- All States establish **effective safety oversight systems**
- States with effective safety oversight (over 60% EI) **fully implement SSP**
- States / Stakeholders support RASGs with the **sharing of safety information**

## Mid-term

**2022**

- All Member States **fully implement the ICAO SSP Framework**
- RASGs incorporate **regional monitoring and safety management** programmes

## Long-term

**2027**

- Member States implement **safety capabilities** as necessary to support future Air Navigation Systems

### **PRIORITIES**

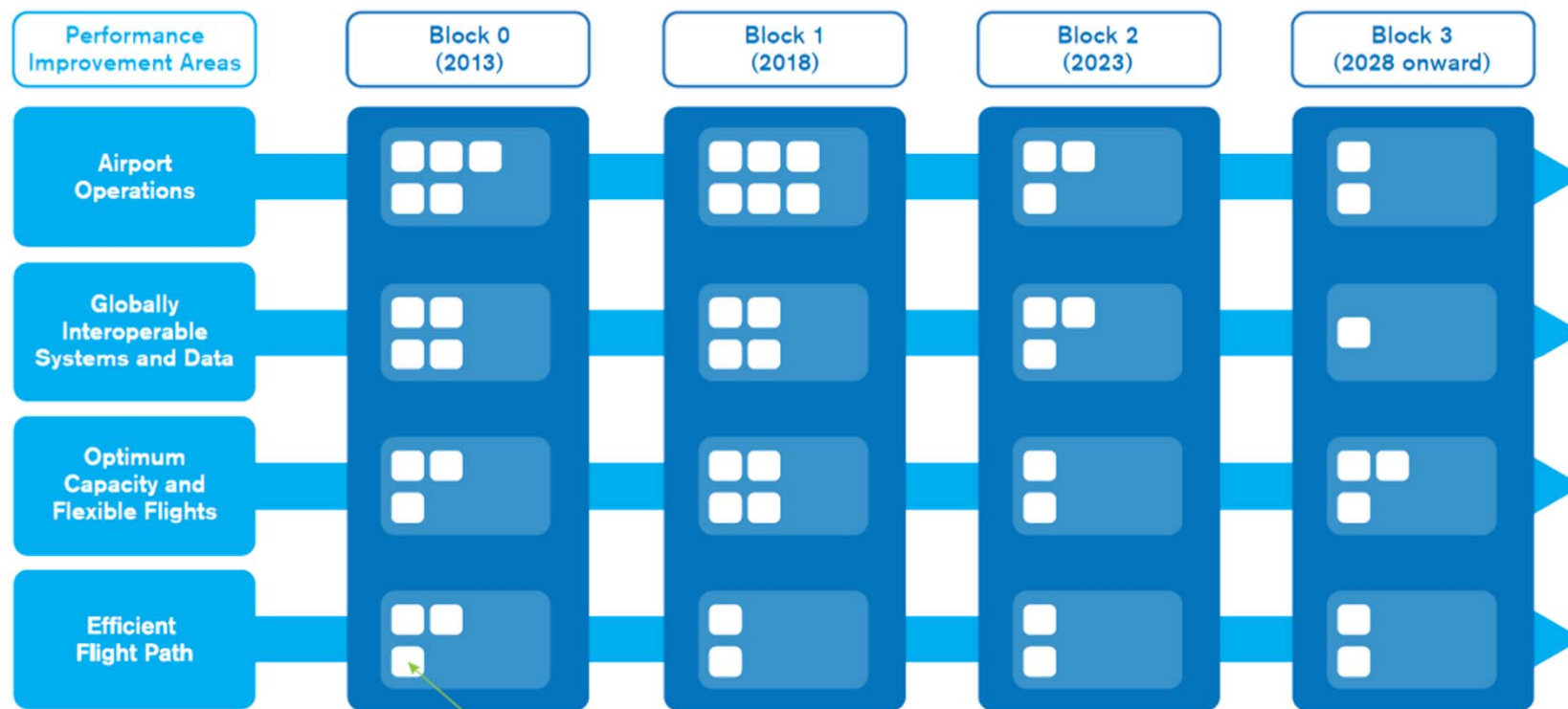
**RUNWAY SAFETY**

**CONTROLLED FLIGHT INTO TERRAIN (CFIT)**

**LOSS OF CONTROL - INFLIGHT**



# GANP Objectives and Priorities



## PRIORITIES

PERFORMANCE BASED NAVIGATION (PBN)

CONTINUOUS DESCENT AND CLIMB OPERATIONS (CDO/CCO)

AIR TRAFFIC FLOW MANAGEMENT & COLLABORATIVE DECISION-MAKING (ATFM/CDM)



## Performance Improvement Area 1: Airport Operations

### ASBU Block 0 Module

#### Airport Accessibility (APTA)

- The use of performance-based navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) procedures will enhance the reliability and predictability of approaches to runways, thus increasing safety, accessibility and efficiency. This is possible through the application of basic GNSS Baro VNAV, SBAS and GLS.



**Performance Improvement Area 4: Efficient Flight Path – *Through  
Trajectory-based Operations***  
ASBU Block 0 Module  
**Continuous Descent Operations (CDO)**

- To use performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs). This will enhance safety, optimize throughput, allow fuel efficient descent profiles and increase capacity in terminal areas.



**Performance Improvement Area 4: Efficient Flight Path – *Through  
Trajectory-based Operations***  
ASBU Block 0 Module  
**Continuous Climb Operations (CCO)**

- To implement continuous climb operations in conjunction with performance-based navigation (PBN) to provide opportunities to optimize throughput, improve flexibility, enable fuel-efficient climb profiles and increase capacity at congested terminal areas.



# ICAO PBN Strategy

## □ 37<sup>th</sup> Session of ICAO Assembly (2010)

Resolution 37/11 – develop national plans to implement:

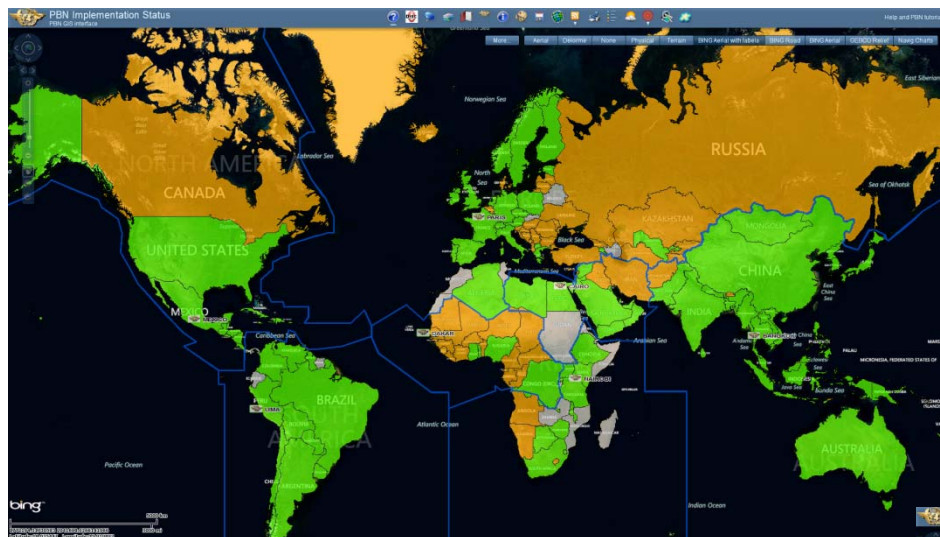
- I. implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014; ICAO PBN work programme
- II. ICAO global provisions
- III. Regional task forces to coordinate implementation, share best practices and lessons.
- IV. Direct assistance (workshops/Go Team projects)



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# Global Implementation Status



104 of 191 States have submitted a PBN Plan (54%)

*Assembly Resolution 37-11 resolved that States complete a PBN plan as a matter of urgency*

30% of International Runways have PBN procedures

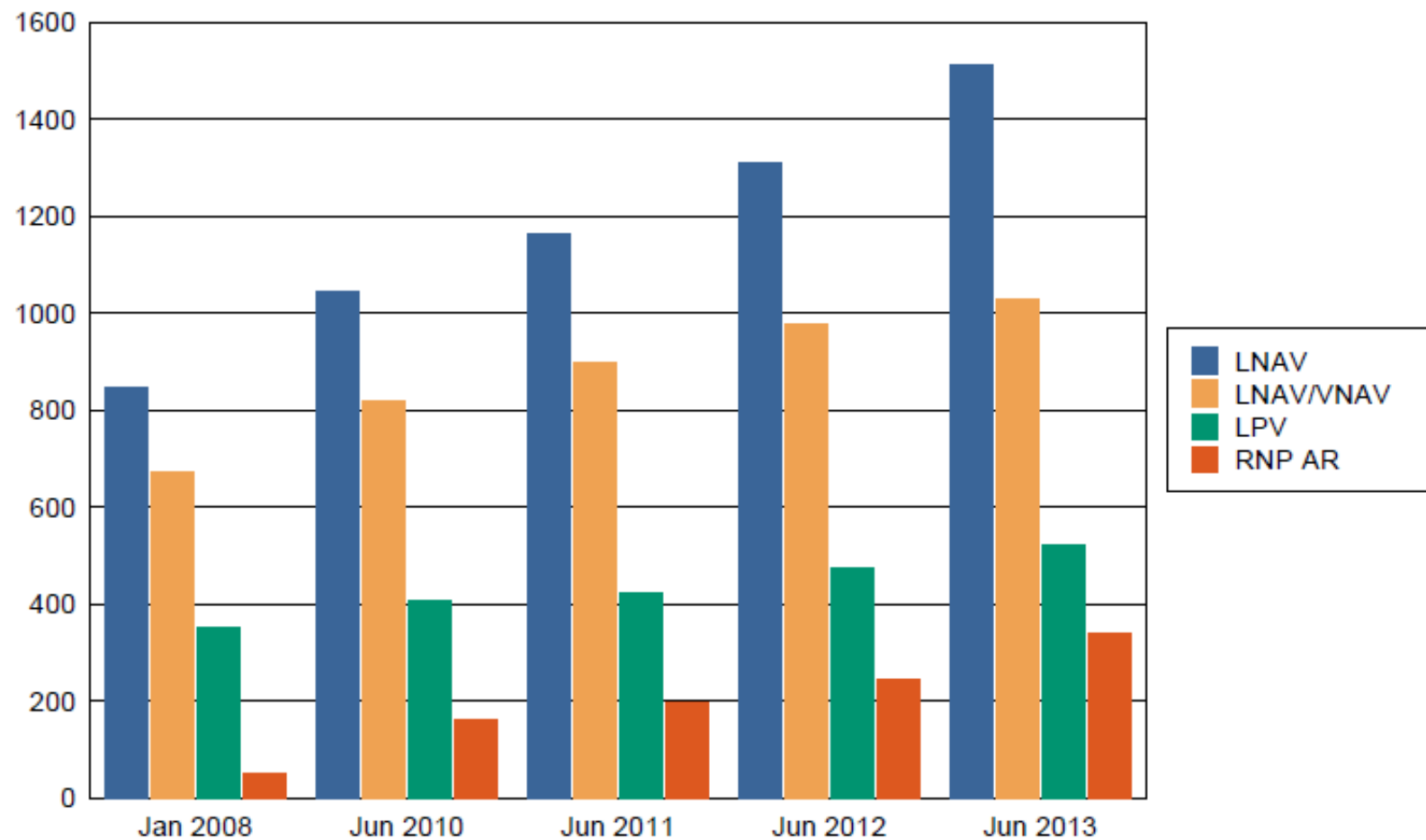
*Assembly Resolution 37-11 Targets:*

- 30% by 2010
- 70% by 2014
- 100% by 2016



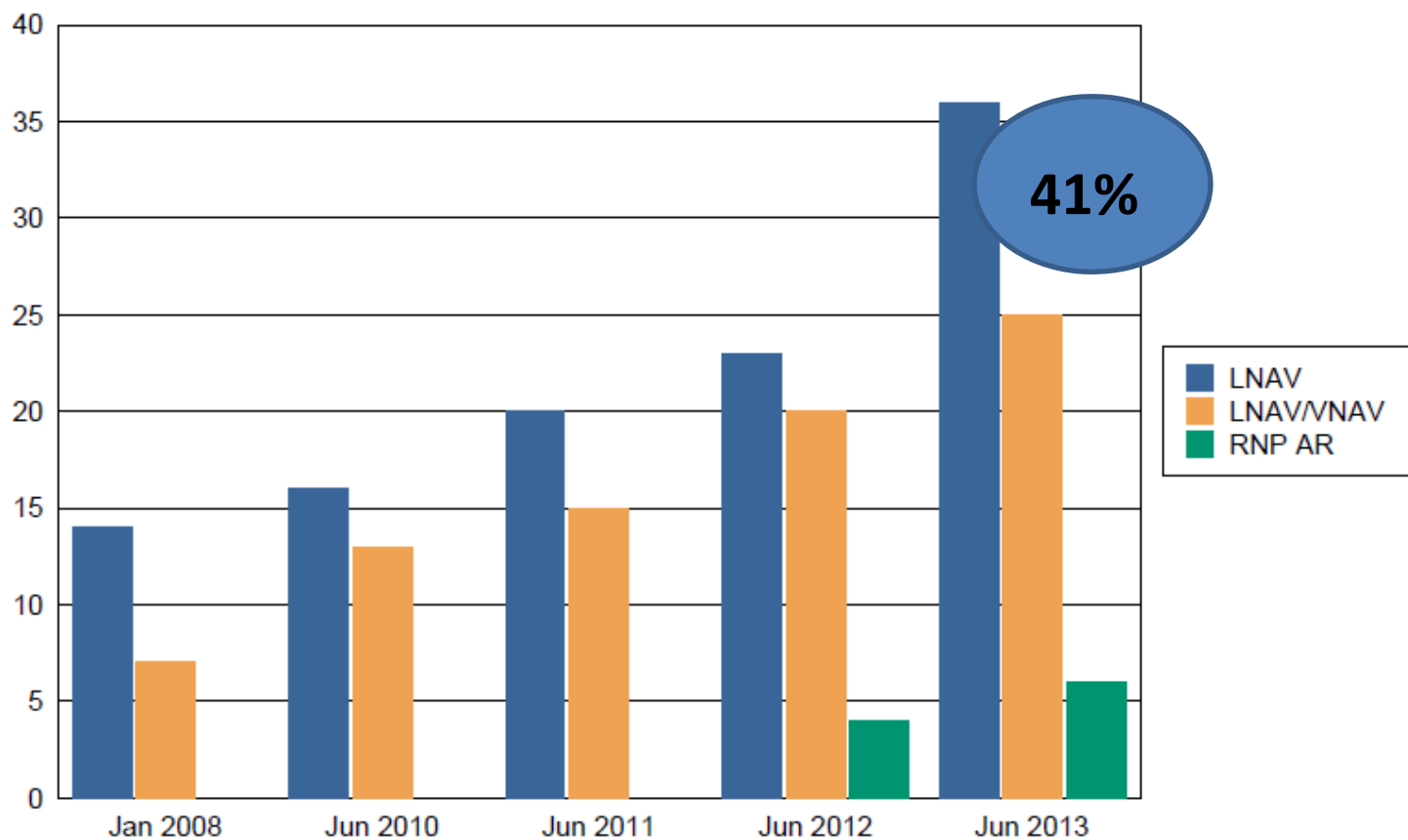


### International Airport Approach Type – All regions

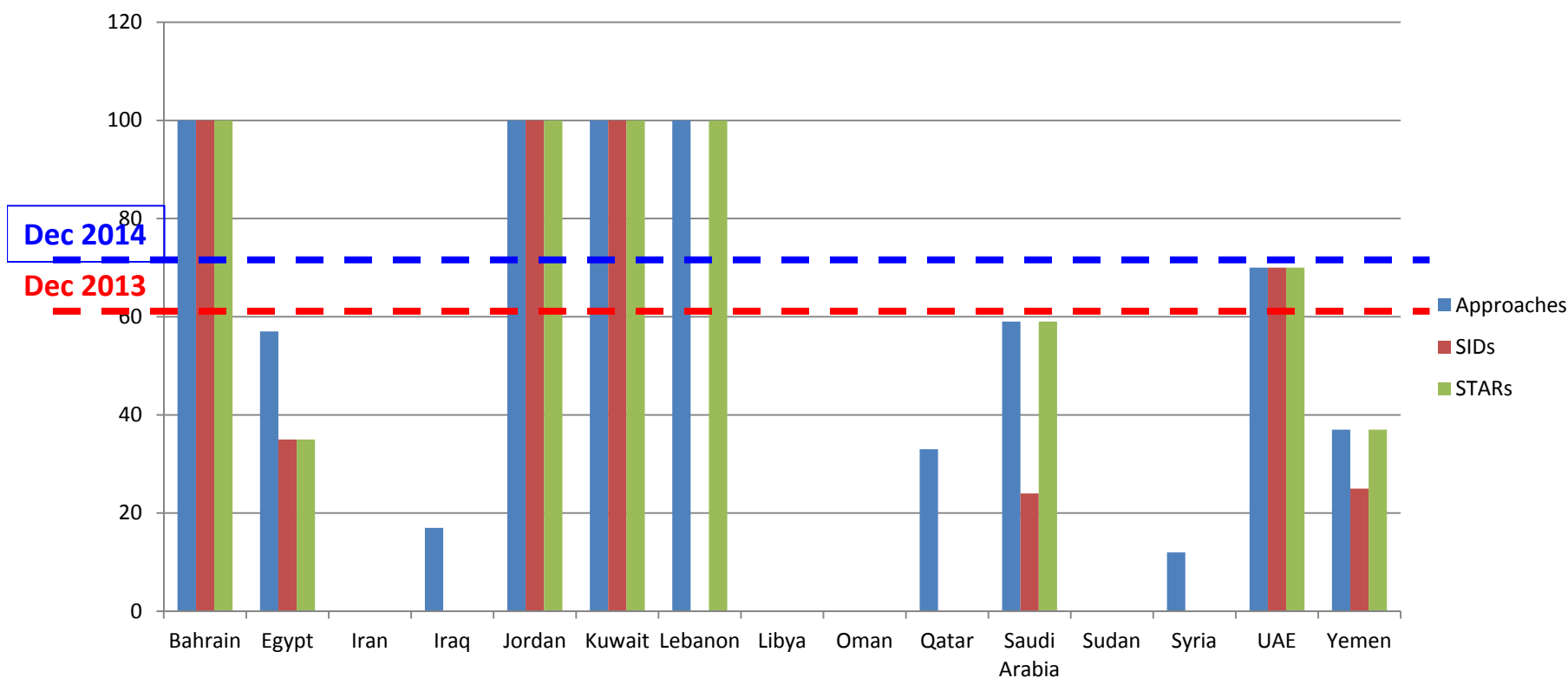




### International Airport Approach Type – MID



# MID implementation status

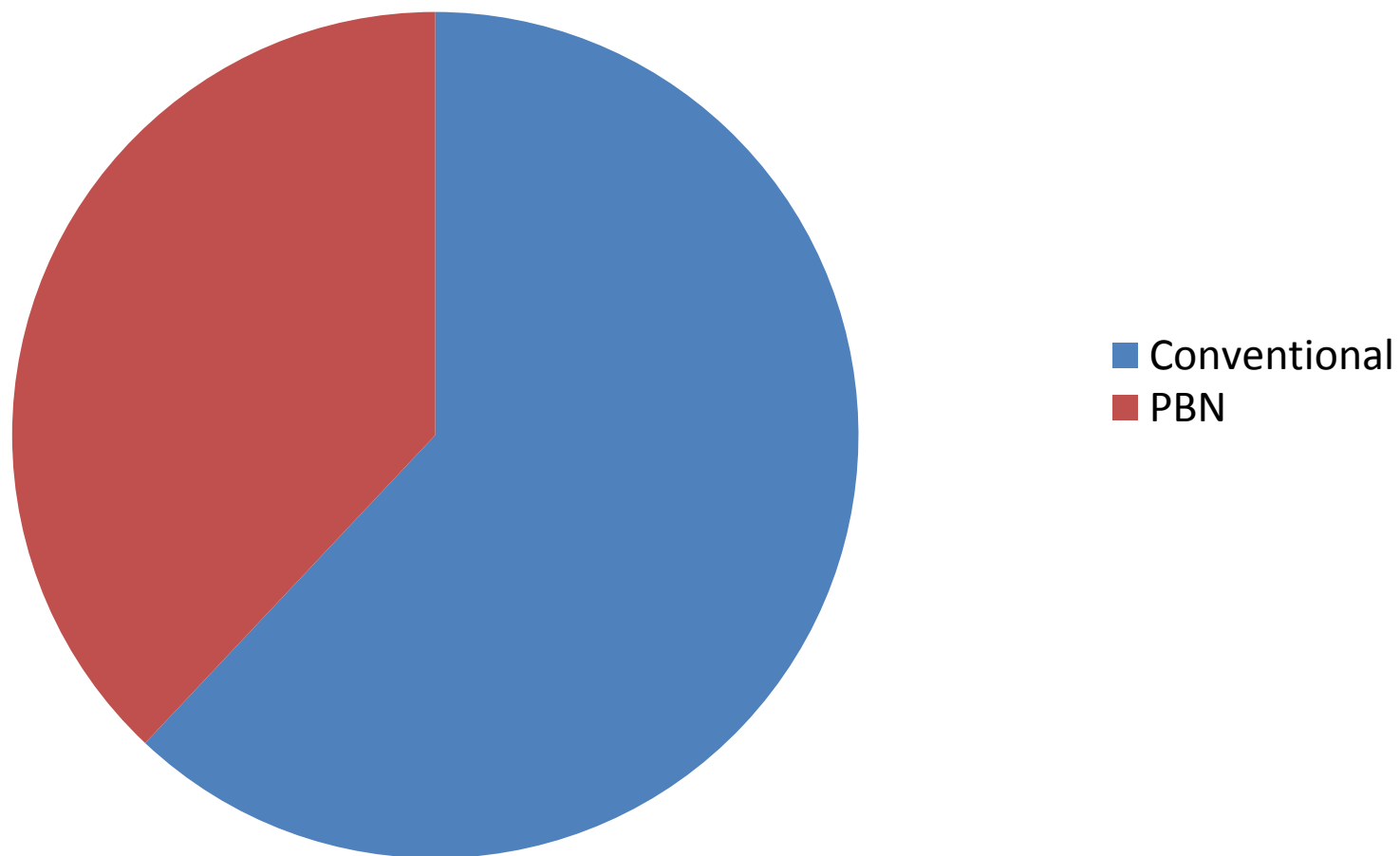




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## ROUTES - WORLD



# PBN Products

*to help you with implementation*

- PBN related Publications and Annexes
  - Bundled specifically for Stakeholders
  - Hard and soft copies
- **eLibrary Solutions**
- PBN ikit
- CBT Training (iLearn)





## eLibrary

- Built for Stakeholders
  - Simplifies search for relevant PBN information
    - From all ICAO Documentation
  - By March, 3 eLibrary based bundles:
    - PBN for Regulators (PBN\_REGS)
    - PBN for ANSP-Airspace Designers (PBN\_ANSP\_AD)
    - PBN for Aircraft Operators (PBN\_AC\_OPS)
  - More stakeholder bundles to follow:
    - Executives
    - Manufacturers
    - ANSPs – Master, AIM/AIS, ATC, Instrument Flight Procedures
- Available through ICAO e-store: [www.store1.icao.int](http://www.store1.icao.int)*



# Documentation Framework



- PANS Ops Volume II
- PBN Manual (Doc 9613) 4<sup>th</sup> Edition
- RNP AR Procedure Design Manual (Doc 9905)
- PBN Ops Approval Manual (Doc 9997)
- Manual on Use of PBN in Airspace Design (Doc 9992)
- CDO Manual (Doc 9931)
- CCO Manual (Doc 9993)
- GNSS Manual (Doc 9849)
- Procedure QA Manual (Vol 1 to Vol 6) (Doc 9906)



# Future Initiatives – Computer Based Learning

PBN for Air Traffic  
Controllers (ATCOs)

PBN for Pilots

PBN for Flight  
Dispatchers



*To improve overall knowledge and understanding of PBN*



# ICAO State Letter SP 65/4-13/24

Effective date 14 November 2014

**Subject:** Proposal for the amendment of PANS-OPS, Volumes I and II regarding procedure design criteria and charting requirements to support performance-based navigation (PBN) as well as helicopter point-in-space (PinS) approach and departure operations with consequential amendments to Annexes 4; 6, Parts I, II and III; 14, Volume II; 15 and the PANS-ABC.

## Transition from RNAV Approach Procedures to RNP by 2022

One-step eight-year transition period, starting 13 November 2014, is being proposed to allow States sufficient time to develop a transition plan and to convert the existing RNAV approach procedures to RNP by 2022. ICAO will issue a new circular (Circ 336 — *Circular on Conversion of RNAV to RNP Approach Chart Depiction*) which will provide guidance to States on what should be considered in their transition planning.

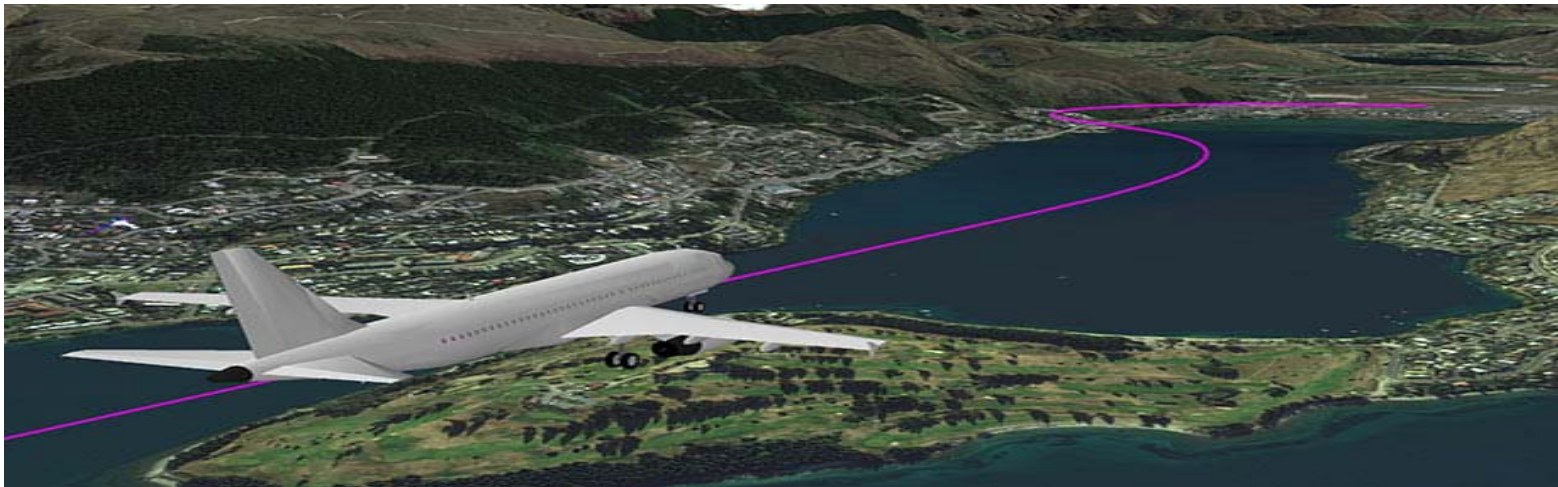
RNAV (GNSS) RWY 19 = RNP RWY 19

RNAV (RNP) RWY 19 = RNP RWY 19 (AR)



## Future Initiatives – Procedure Design

- Advanced RNP
- RNP Holding and RNP AR departures
- RNAV/RNP transitions to ILS
- RNAV Visual
- Terminal RNP  $> 0.3$
- Offset Baro-VNAV
- Advanced PBN uses – FRT, GLS
- Helicopter PBN applications – SBAS LPV, PinS, route visual segment





# Roles of National Stakeholders

## □ Management

### States

- i. ensure that policies and enabling legislations/regulations are in place.
- ii. promote establishment of the PBN implementation teams (Regional or National)

### ANSP, aircraft operators, airport operators

- i. Establish implementation teams involving all players



# Roles of National Stakeholders

## ☐ Airspace design

### ANSP

- i. Develop airspace concept as part of the implementation plan
- ii. implementation

### States

- i. Approval and oversight of the plan, mainly the safety aspects

## ☐ Operations approvals

### Aircraft operators

- i. Compile documentation and submit operations approvals request States
- ii. Ensure availability of the necessary regulatory framework
- iii. Process the approvals request and grant the approvals
- iv. Oversight



# Regional Go Teams

- Workshops on the use of PBN in airspace design
- Go-Team projects
  - Go-Team Report
  - Areas of improvement and recommendations
    - Enhancement of national PBN Implementation Plan
    - PBN Implementation Project – 3 years – including implementation plan for each airport and transition plan of conventional Nav aids
    - On case by case basis: sample implementation project (CDO/approach)
- 2012 Georgia, Azerbaijan, Armenia
- 2013 Kazakhstan, Cyprus/Israel (9-13 Dec 2013)
- 2014 Sweden (13-17 Jan) , Tunisia (24-28 Feb), Romania (Sep TBD), Turkey (Dec TBD)



# Global PBN GO Teams

- One more GO Team visit planned under Phase II
  - China (Dates and location TBD)
- Future GO Team Visits will be specific to Region and State requirements for PBN Implementation
  - On request basis (cost recovery basis?)
- Focus/Services provided will be:
  - PBN Assessments/Gap Analysis
  - PBN Plans
  - Training
  - Implementation Assistance

## Completed Global Visits Phase (I and II)

Thailand (2)	UAE (2)
Mexico	Kenya
Germany	India
Ecuador	Russia
South Africa	USA (CAR/SAM)



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Thank You