Safety and efficiency performance framework
- ASBU methodology-

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Presentation Outline

- Performance framework
  - Adoption by PIRGs and States, PFF
- Seamless global air navigation systems
  - Integration HQ /Regional work programme
- Why we need change
- Transition to ASBU approach
- Definition of ASBU methodology
- Incorporation of ASBU in Global Plan, Regional Plan and National Plan
- Feedback on ASBU and its rollout
- Upcoming Revised Global Plan - summary
- Comparative analysis of Current and upcoming Revised Global Plan
Performance Framework - Background

- In the 1990s the aviation industry was evolving into corporatized environment with greater accountabilities and consequently adopted a performance-based approach to planning.
- Recognizing global developments, the Eleventh AN Conf (2003) and A35 (2004) called upon ICAO to develop a performance framework for air navigation systems.
- ICAO in 2008 completed the development of relevant guidance material.
In 2008 all PIRGs adopted a regional performance framework and invited States to implement national performance framework for air navigation systems. Current methodology addresses ANSPs requirements only.

ICAO is providing more guidance to States through a series of workshops world over.

All PIRGs are in the process of developing regional performance objectives, related Performance Framework Forms (PFFs) and metrics.
## PERFORMANCE FRAMEWORK FORM  (for illustration purpose only)

### PERFORMANCE OBJECTIVE

**ENHANCE ENROUTE AIRSPACE CAPACITY AND EFFICIENCY**

<table>
<thead>
<tr>
<th>Performance Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
</tr>
<tr>
<td>• safety level maintained or improved</td>
</tr>
<tr>
<td>Environment</td>
</tr>
<tr>
<td>• reduced green house gas emissions through shorter flights and use of optimum routes/trajectories</td>
</tr>
<tr>
<td>Efficiency</td>
</tr>
<tr>
<td>• increased capacity through better utilization airspace resources</td>
</tr>
<tr>
<td>Cost effectiveness</td>
</tr>
<tr>
<td>• fuel cost reduction through availability of more optimized routes/trajectories and ability of aircraft to conduct flight more closely to preferred trajectories</td>
</tr>
</tbody>
</table>

### Performance Measurement

<table>
<thead>
<tr>
<th>Metrics</th>
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</thead>
<tbody>
<tr>
<td>• number of PBN routes implemented;</td>
</tr>
<tr>
<td>• Percent difference between optimal and actual route</td>
</tr>
<tr>
<td>• Number of aircraft entering a specified volume of airspace/hr</td>
</tr>
<tr>
<td>• Pounds of fuel burn per operations</td>
</tr>
</tbody>
</table>

### Strategy

**Medium term (2011 - 2014)**

<table>
<thead>
<tr>
<th>ATM Operational Concept Components</th>
<th>PROJECTS / TASKS</th>
<th>TIME FRAME</th>
<th>RESPONSIBILITY</th>
<th>STATUS (as of …)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Airspace organization and management (AOM)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• formulate airspace concept and determine near term requirements for quick wins</td>
<td>May 2011 - October 2011</td>
<td>CAA/Country X</td>
<td>Database under preparation</td>
<td></td>
</tr>
<tr>
<td>• analyze the en-route ATS route structure; reduce horizontal separation between aircraft</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• implement PBN</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• Implement WGS-84</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• transition to new flight plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• improve data and voice communications and enhance situational awareness</td>
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</tr>
</tbody>
</table>

**Linkage to GPIs**

GPI/5: performance-based navigation; GPI/7: dynamic and flexible ATS route management; GPI/8: collaborative airspace design and management; GPI/9: situational awareness; GPI/12: FMS-based arrival procedures; GPI/17 Data link applications; GPI/18 Aeronautical information; GPI/19 Meteorological systems; GPI/20 WGS-84; GPI/21 Navigation systems; and GPI/22 Communication infrastructure.
VISION - A seamless, global air navigation system

**Strategic Objectives – Safety and Environment/Sustainability**

**Major global programmes**

- Global Air Navigation Plan
- Global Air Traffic Management
- Regional Plans
- National Plans

**Strategic Operational Improvements**

Enhance navigation infrastructure
The incorporation of advanced aircraft navigation capabilities into the air navigation system infrastructure. Related Operational Concept Components: AUO and AOM

**HQ and Regional Work Programmes**

- Criteria for terminal separation minima
- Continuous Descent Operations
- RNP 2 in Oceanic airspace
- RNAV 5 in all non-oceanic enroute airspace
- PBN SIDs and STARs

**Resources**

- PIRGs
- ANC Panels and
- ANC Study groups
Integration of ICAO HQ & Regional Work Programmes

Strategic Operational Improvements

Projects

HQ Work Prog. (decision and delivery)
Annexes, GM / Workshops, etc.

Regional Work Prog. (PIRGs-Implementation)
PBN in X Airspace
Flight Plan Prog. in X State

Panels, SGs, Work Prog (SARPs development)

Strategic Objectives

Business Plan
Directive from A37

• 37th Session of ICAO Assembly (2010) directed Organization to sustain its focus on safety and redouble its efforts to support global interoperability

• Consequently, ICAO established a Technical Team (TT) and corresponding Challenge Team (CT) to come together to develop Aviation System Block Upgrade concept
  – States/International organizations/ Industry/Standard making bodies are members of TT/CT
Why we need change

- The different regional/national ATM modernisation programmes, such as NextGen, SESAR or CARATS, share the fundamental principles expressed in the Operational Concept and Global Plan.
- However, they cannot be spelled out in all details in the same way.
- They are developed and governed and funded in the context of, and for, different audiences/stakeholders/culture.
- They face different practical issues in terms of transition from legacy, specific business case etc.
- This results in a large collection of disconnected and/or competing descriptions.
An inclusive approach is required

• Implementation of Performance based approach (PBA) by PIRGs and States in 2009 is on the basis of Global Air Navigation Plan

• Current planning methodology adopted by PIRGs covers only ANSPs requirements.

• We need an inclusive approach that employs Performance Framework and at the same time takes into account both ANSP and Aircraft requirements as well as Regulatory aspects.

• This methodology is known as Aviation System Block Upgrade (ASBU)
• What is an ‘Aviation System Block Upgrade’ (ASBU)?

  – 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
Performance-based Navigation: An example of ASBU approach

<table>
<thead>
<tr>
<th>Operational Improvement</th>
<th>Necessary Procedures Air &amp; Ground</th>
<th>Necessary Technology Air &amp; Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fuel Savings</td>
<td>• Annex 4 &amp; 6 (2010)</td>
<td>• Rollout (planning &amp; implementation by PIRGs/States)</td>
</tr>
<tr>
<td>• Lower Pilot workload</td>
<td>• Annex 3 (2012)</td>
<td></td>
</tr>
<tr>
<td>• Lower ATC Workload</td>
<td>• Procedures Ops Vol. 1 &amp; 2 (2008+2010+2012)</td>
<td></td>
</tr>
<tr>
<td>Performance Monitoring by PIRGs/States</td>
<td>• Procedures ATM (2010+2012)</td>
<td></td>
</tr>
<tr>
<td>• Metrics</td>
<td>• Procedures ABC (2010)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• PBN Manual (2008+2011)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• RNP AR Manual (2009)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Continuous Descent Operations (2010)</td>
<td></td>
</tr>
<tr>
<td>Positive Business Case</td>
<td>• Continuous Climb Operations (2012)</td>
<td></td>
</tr>
<tr>
<td>• Minimum investment; using</td>
<td>• Quality Assurance Manual (2010)</td>
<td></td>
</tr>
<tr>
<td>existing airborne technology</td>
<td>• Airspace Design Handbook (2011)</td>
<td></td>
</tr>
<tr>
<td>• Rollout (Formulation of</td>
<td>• Rollout (planning &amp; implementation by PIRGs/States)</td>
<td></td>
</tr>
<tr>
<td>business case by States)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulatory Approval Plan Air &amp; Ground</td>
<td>• Ops Approval Handbook (2011)</td>
<td>Global Demonstrations and/or Trials</td>
</tr>
<tr>
<td></td>
<td>• PBN Model Regulations (2011)</td>
<td>• Oceanic – RNP 4; Pacific</td>
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<tr>
<td></td>
<td>• Rollout (planning &amp; implementation by PIRGs/States)</td>
<td>• Continental – RNAV 5; S. America</td>
</tr>
<tr>
<td>Global Demonstrations and/or Trials</td>
<td>• Rollout (planning &amp; implementation by PIRGs/States)</td>
<td>• RNAV 10; Red Carpet Africa</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Challenging Approaches</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lhasa, Queenstown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rollout (planning &amp; implementation by PIRGs/States)</td>
</tr>
</tbody>
</table>
ASBU's description

- ASBU's address ANSP, Aircraft and Regulatory requirements
- Comprises of 4 key Performance Improvement Areas (PIA):
  - Greener Airports
  - Globally Interoperable Systems and Data
  - Optimum Capacity and Flexible Flights
  - Efficient Flight Path
- Each PIA has 4 Blocks (Blocks 0, 1, 2 and 3)
- Each block has a number of corresponding modules described in standardized templates
ASBU- Definition of Blocks

- Block 0 – Baseline (13 modules): 2013
- Block 1 (17 modules): from 2018
- Block 2 (9 modules): from 2023
- Block 3 (7 modules): from 2028/beyond

- Block “0” optimizes current onboard equipage and provides baseline
  - ICAO Gap analysis is underway for any missing elements impeding implementation and will be presented to upcoming GANIS
ASBU – Explanation of Blocks

• A Block is a deployable performance package or capability, or an opportunistic grouping as well.

• A block should propose an understandable performance benefit, related to a change in operations, supported by procedures, technology, regulation/standards as necessary and a positive business case.

• A block should not be seen in isolation or as a final achievement.

• Each block, comprising of number of modules, deliver progress and creating the basis for the subsequent improvements.
Improvement Areas, Blocks & Modules

Performance Improvement Areas
- Block 0 (2013) 13 Modules
- Block 1 (2018) 17 Modules
- Block 2 (2023) 9 Modules
- Block 3 (2028 & >) 7 Modules

- Greener Airports
- Globally Interoperable Systems and Data
- Optimum Capacity and Flexible Flights
- Efficient Flight Path
Example of Mapping

Performance Improvement Areas

**Greener Airports**

- Optimisation of Approach Procedures Including Vertical Guidance (GBAS I)
- Wake Vortex Separation, Refined
- Runway Sequencing
- etc.

**Block 0 (2013)**

- Optimisation of Approach Procedures Including Vertical Guidance (GBAS II/III)

**Block 1 (2018)**

- Wake Vortex Separation (Time-based)
- AMAN/DMAN Metroplex
- etc.

**Block 2 (2023)**

- Advanced Wake Vortex Separation (Time-based)
- Linked AMAN/DMAN
- etc.

**Block 3 (2028 & >)**

- Integrated AMAN/DMAN/SMAN
- etc.
Summary of ICAO’s 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
ICAO’s ASBU Approach – Inclusion in Global Plan, Regional Plans and National Plans

• Revised **Global plan** will have an explanation of ASBU methodology as well as all templates of the modules of different Blocks

• In terms of **Regional Plans**, the ASBU methodology will be included in the FASID tables that reflects ANSP, Aircraft and Regulatory requirements

• For the **National Plans**, the Performance Framework Form (PFF) will be amended appropriately to reflect ANSP, Aircraft and Regulatory requirements
ICAO will host a GANIS (Global Air Navigation Industry Symposium) which provides the opportunity to:

- Outline Aviation System Block Upgrades to int’l community to gain their buy in and get their feedback
- ASBU working document is uploaded to ICAO/GANIS website
- States/IOs to provide comments on ASBU document through feedback form available on GANIS website.
- Also reviews CNS, AIM and Avionics roadmaps
ICAO 12th Air Navigation Conference
- Will approve a revised Global Air Navigation Plan that includes ASBU methodology
- Agreement on CNS, AIM and Avionics Roadmaps

ICAO will also rollout *electronic Regional Air Navigation Plans* which will:
- Provide web based real time data and transparency at the regional level
- Include ASBU approach (ANSP, Aircraft and Regulatory requirements) by reflecting appropriate changes to FASID tables
ASBU- Rollout

• 2 days Regional Seminars
  – Europe TBD
  – Asia/Pacific Completed
  – CAR/SAM Fall 2011
  – Middle East TBD
  – Africa TBD

• 5 days National Workshops
  – Planned under SIP mechanism for all regions from January to September 2012 as a preparation leading to 12 ANConf
New Revised GANP will be presented to 12 ANConf

Synergies between GANP and Global Aviation Safety Plan (GASP)
- 4 page umbrella document will appear in both GANP and GASP
- A paragraph referring to GASP will be included in the Foreword of GANP and vice-versa; provide a similar look to GANP/GASP docs
- A linkage will be established between GPIs/GSIs

Contents of New GANP:
- Global planning methodology including ASBU approach
- Explanation of GPIs
- Appendices include – ASBU templates for all modules; BORPC; CNS, AIM and Avionics Roadmaps; sample PFF; guidance on environment, air transport issues, CBA/BC, TC matters and competency based training guidance
GLOBAL AIR NAVIGATION PLAN

Comparative Analysis of
Current and Upcoming Revised Versions
<table>
<thead>
<tr>
<th>No</th>
<th>Current version (Nov 2006)</th>
<th>Upcoming revised version (Nov 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Covers only Air Navigation Service Providers (ANSP) Requirements</td>
<td>Expands to Regulatory and Aircraft requirements</td>
</tr>
<tr>
<td>2</td>
<td>P (paper)–based</td>
<td>E (electronic)–based</td>
</tr>
</tbody>
</table>
# What is new in the revised Global Plan?

<table>
<thead>
<tr>
<th>No</th>
<th>Current version (Nov 2006)</th>
<th>Upcoming revised version (Nov 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Does not support planning tools for its implementation</td>
<td>Number of planning tools (software, web-based, project mgt, etc.) available</td>
</tr>
<tr>
<td>4</td>
<td>Addresses individual improvements</td>
<td>Addresses a package of improvements</td>
</tr>
</tbody>
</table>
### What is new in the revised Global Plan?

<table>
<thead>
<tr>
<th>No</th>
<th>Current version (Nov 2006)</th>
<th>Upcoming revised version (Nov 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>No individual roadmap for enablers</td>
<td>Separate roadmaps for C, N, S and AIM Included</td>
</tr>
<tr>
<td>6</td>
<td>Aircraft equipage not specified</td>
<td>Avionics roadmap included</td>
</tr>
</tbody>
</table>
## What is new in the revised Global Plan?

<table>
<thead>
<tr>
<th>No</th>
<th>Current version (Nov 2006)</th>
<th>Upcoming revised version (Nov 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Module description for ATM Improvements/Enablers</td>
<td>Detailed description in a template format is included for each module</td>
</tr>
<tr>
<td></td>
<td>not available</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>BORPC that provides high level strategy is not part of</td>
<td>BORPC is explained in this revised plan</td>
</tr>
<tr>
<td></td>
<td>Global Plan</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Current version (Nov 2006)</td>
<td>Upcoming revised version (Nov 2012)</td>
</tr>
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<td>-----------------------------------</td>
</tr>
<tr>
<td>9</td>
<td>Global plan was not presented to Industry forum</td>
<td>Global Plan reviewed by GANIS</td>
</tr>
<tr>
<td>10</td>
<td>Implementation was based on near term and medium terms</td>
<td>Implementation is based on Blocks (Block 0, 1, 2 and 3)</td>
</tr>
<tr>
<td>No</td>
<td>Current version (Nov 2006)</td>
<td>Upcoming revised version (Nov 2012)</td>
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<td>-----------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Performance improvement areas not specified</td>
<td>Four Performance Improvement Areas have been designated</td>
</tr>
<tr>
<td>12</td>
<td>Limited guidance on performance framework</td>
<td>Detailed guidance on performance framework and PFF template included</td>
</tr>
<tr>
<td>No</td>
<td>Current version (Nov 2006)</td>
<td>Upcoming revised version (Nov 2012)</td>
</tr>
<tr>
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<td>-----------------------------------</td>
</tr>
<tr>
<td>13</td>
<td>Supported by paper based Regional ANPs</td>
<td>Supported by web based Regional ANPs</td>
</tr>
<tr>
<td>14</td>
<td>Quantification of fuel savings and corresponding environmental benefits is not available</td>
<td>ICAO Fuel Savings Estimation Tool (IFSET) will be a part of the revised global plan</td>
</tr>
</tbody>
</table>
ICAO
Uniting Aviation on
Safety | Security | Environment