



INTERNATIONAL CIVIL AVIATION ORGANIZATION

A United Nations Specialized Agency

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Performance management – Identification of metrics

Air Navigation Bureau

Outline

- Background
- Performance Framework
 - Requirements, terminology
- Measurement approach
- Metrics
- Next Steps



Vision Statement



To achieve an interoperable global ATM System for all users during all phases of flight that:

- meets agreed levels of safety
- provides for optimum economic operations
- is environmentally sustainable
- meets national security requirements



What is a Global ATM System?

It is a system of systems which:

- facilitates interoperability of different technologies;
- accommodates different procedures;
- covers all elements of AN systems (ATM, CNS, AGA, AIM and MET); and
- provides harmonization thus leading to seamlessness across regions.

This is achieved through progressive, cost effective and cooperative implementation of air navigation systems worldwide.



Performance Framework Background

- Eleventh Air Navigation Conference, held in September 2003, urged ICAO to develop a performance framework for Air Navigation Systems
- 35th Session of the ICAO Assembly, held in September 2004, adopted Resolution A35-15, App B and urged ICAO to ensure that the future global ATM system is performance based and that the performance objectives and targets for the future system are developed in a timely manner

Performance Framework Principles



- Focuses on results
 - through adoption of performance objectives and targets
- Encourages collaborative decision making
- Relies on facts and data for decisions
- Emphasizes on performance monitoring

Performance Framework Requirements



- Once an organization, State or a region has adopted performance based planning, it must acknowledge the following :
 - Commitment (*at the top*)
 - Agreement on goals (*desired results*)
 - Responsibility (*who is accountable*)
 - Human resources and know-how (*Culture & Skills*)
 - Data collection, processing, storage and reporting
 - Collaboration and coordination (*with other partners*)
 - Cost implication (*what does it cost*)

Performance Framework Advantages



- Result oriented, transparent and promotes accountability
- Shift from prescribing solutions to specifying performance
- Employs quantitative and qualitative methods
- Avoids a technology driven approach
- Allows optimum resource allocation

Performance Framework Terminology (1/3)



- **Expectation or Key Performance Area**

- 11 expectations are defined in the OCD

- Access/Equity, Capacity, Cost-effectiveness, Efficiency, Environment, Flexibility, Global interoperability, Participation by the ATM community, Predictability, Safety and Security

- **Focus Area**

- Focus areas may be defined as areas where performance must be addressed in any given KPA.

- For example, in the safety KPA, focus may be in such areas as CFIT accidents, runway incursions. For capacity, focus area could be enroute airspace or terminal airspace.

Performance Framework

Terminology (2/3)



- **Performance Objective**

- Each expectation should be reached through a set of specific, measurable, achievable, relevant and timely (SMART) performance objectives
- Performance Objectives is defined in a qualitative way - a desired trend from today's performance (e.g. improvement), within a well specified ATM planning environment. In other words it is a high level statement of outcome that satisfies ATM community expectations.
- Example : In ASBU approach the module itself becomes performance objective – ASBU B0-RSEQ: Improve traffic flow through runway sequencing

- **Performance Target**

- A set of agreed numerical values of related performance indicators, representing the minimum performance levels at which an objective is considered to be 'achieved'.
- Example: Ten percent increase in the capacity of terminal airspace.

Performance Framework Terminology (3/3)



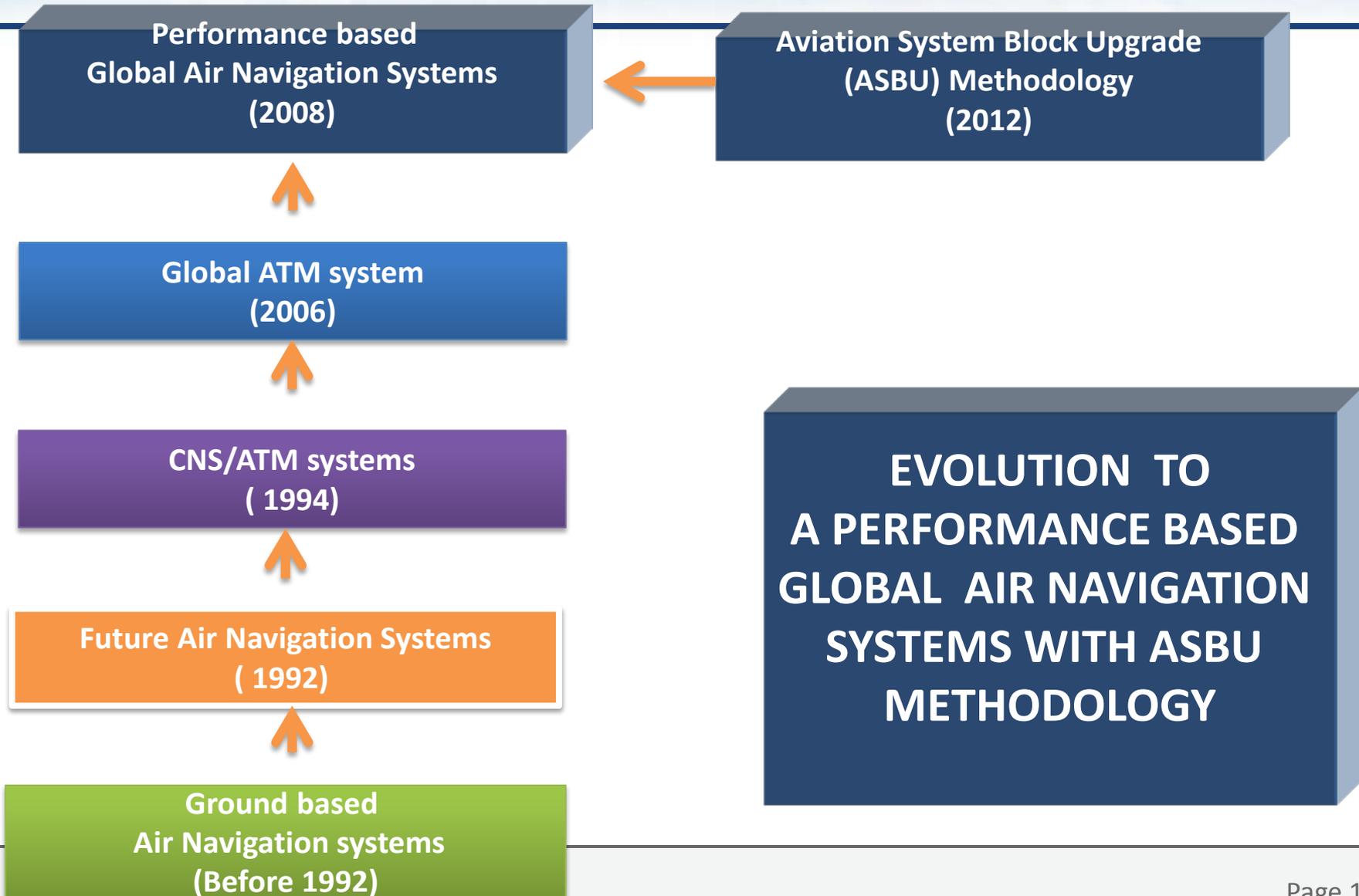
- **Performance Indicator**

- Indicators are defined when there is a need to document current performance levels and progress in achieving an objective. It is a measure of progressive achievement of performance objective.
- Example: Three percent increase in the capacity of terminal airspace

- **Performance Metric**

- Metrics are quantitative measures of system performance – through data.
- Example: Number of movements per day per aerodrome; Kilograms of fuel saved per operation; Kilograms of CO₂ emissions reduced per operation.

ICAO Performance Framework evolution



Performance Framework Tools



GAP analysis
operational enhancements/Technology

Safety analysis
Safety case and safety assessment

Economic analysis

Develop aircraft movement forecasts, assess costs and benefits of technology, calculate NPV, determine funding sources, agree on cost recovery methodology, identify risk factors and implement risk mitigation techniques
– the process is known as “Business case”

Performance Framework Definition



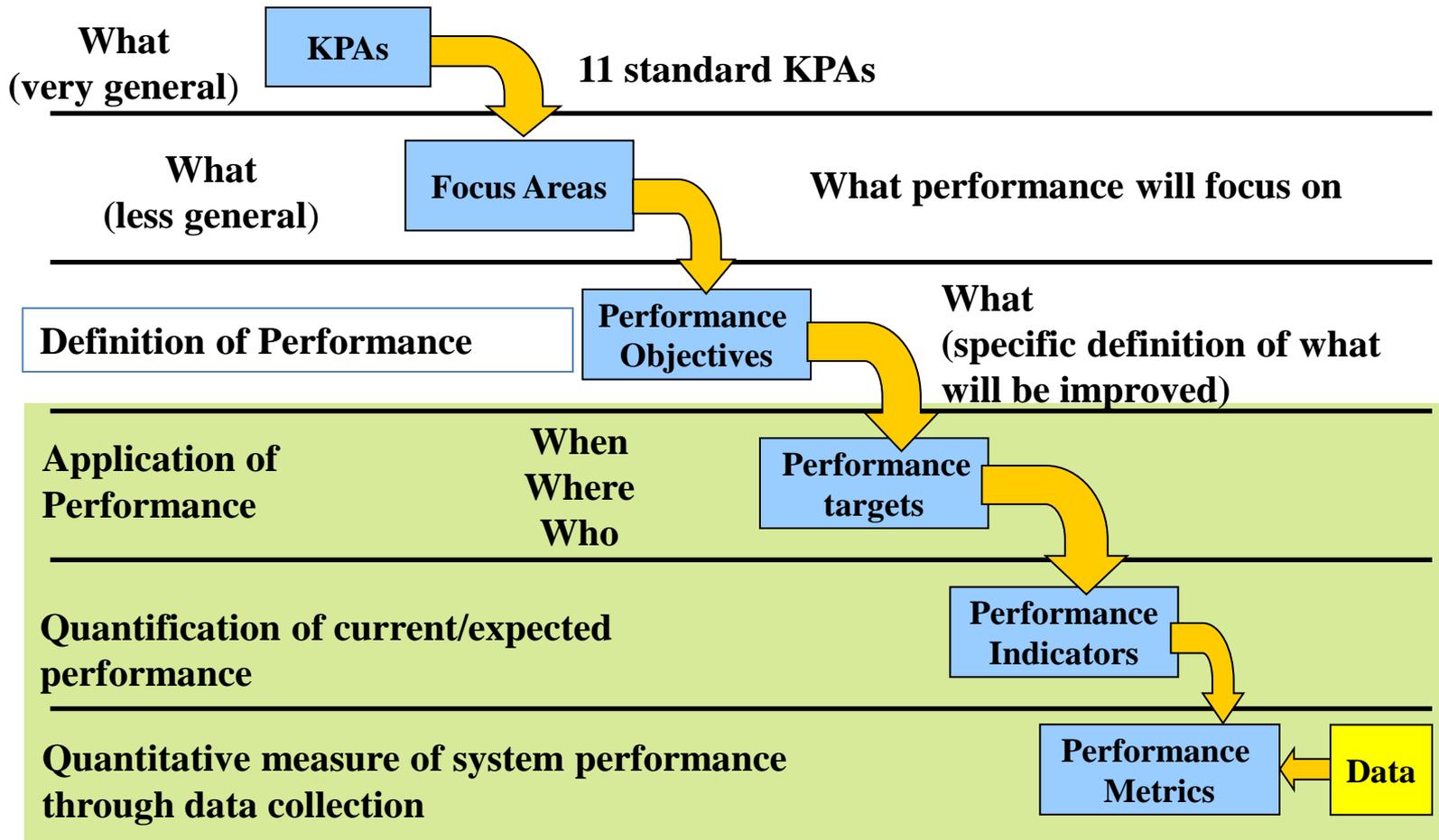
- In essence, a Performance Framework is a set of
 - principles
 - requirements
 - terminology
 - describes the building blocks/tools
 - used by ATM community members to collaborate and cooperate on performance driven activities/tasks

Measuring success



- Success of global air navigation system implementation
 - Based on outcomes
 - Meet 11 expectations of ATM Community
 - Each PIRG will choose measurable metrics related to KPAs

Measurement Approach



REGIONAL AIR NAVIGATION PLANNING PERFORMANCE METRICS- EXAMPLES



| KPA's | Related Performance Metrics |
|-------------------------------|---|
| 1. Access & Equity | <ol style="list-style-type: none"> 1. KPA/Access: Number of international aerodromes with APV 2. KPA/Access: Percentage of time Special Use Airspace (SUA) available to Civil Operations 3. KPA/Access: Percentage of requested flight level versus cleared flight level 4. KPA/Access: Number of access denials due to equipment failure 5. KPA/Equity Percentage of aircraft operators by class that equity is achieved 6. KPA/Equity: Percentage of different types of aircraft operating in a particular airspace or international aerodrome. |
| 2. Capacity | <ol style="list-style-type: none"> 1. Number of operations (arrivals+departures) per international aerodrome per day 2. Average ATFM delay per flight at an international aerodrome 3. Number of landings before and after APV per international aerodrome 4. Average en-route ATFM delay generated by airspace volume 5. Number of aircraft in a defined volume of airspace for a period of time |
| 3. Cost effectiveness | <ol style="list-style-type: none"> 1. IFR movements per ATCO hour on duty 2. IFR flights (en-route) per ATCO hour duty |
| 4. Efficiency | <ol style="list-style-type: none"> 1. Kilograms of fuel saved per flight 2. Average ATFM delay per flight at the international aerodrome 3. Percentage of PBN routes |
| 5. Environment | <ol style="list-style-type: none"> 1. Kilograms of CO₂ emissions reduced per flight (= KGs fuel saved per flight x 3.157) 2. The number of electronic pages dispatched |

REGIONAL AIR NAVIGATION PLANNING PERFORMANCE METRICS- EXAMPLES



| KPA's | Related Performance Metrics |
|--|---|
| 6. Flexibility | <ol style="list-style-type: none"> 1. Number of backups available in emergency 2. Number of changes approved to the flight plan 3. Number of alternatives granted |
| 7. Global Interoperability | <ol style="list-style-type: none"> 1. Number of ATC automated systems that are interconnected |
| 8. Participation of the ATM Community | <ol style="list-style-type: none"> 1. Level of participation in meetings 2. Level of responses to planning activities |
| 9. Predictability | <ol style="list-style-type: none"> 1. Arrival/departure delay (in minutes) at international aerodrome |
| 10. Safety | <ol style="list-style-type: none"> 1. Number of runway incursions per international aerodrome per year 2. Number of incidents/accidents with MET conditions as as a contributory factor 3. Number of ACAS RA events 4. Number of CFIT accidents 5. Number of missed approaches avoided due to use of CDO |
| 11. Security | Not Applicable |

REGIONAL AIR NAVIGATION PLANNING IMPLEMENTATION METRICS- EXAMPLES



| Infrastructure | Related Implementation Indicators/Supporting Metrics |
|--|--|
| Monitoring the Implementation of ASBU modules | <ol style="list-style-type: none">1. Percentage of aircraft fitted with ADS-B IN2. Percentage of aerodromes comply with Visual Aids for Navigation requirements as per Annex 143. Percentage of certified aerodromes used for international operations4. Number of States implemented WGS-845. Percentage of aircraft fitted with ACAS / logic Version 7.16. Percentage of aerodromes with PBN STAR implemented7. Percentage of aerodromes with CDOs implemented8. Number of ADS-Cs available over oceanic/remote area9. Number of continental CPDLC systems established10. Percentage of aerodromes with PBN SIDs implemented11. Percentage of aerodromes with CCOs implemented12. Percentage of ATS units with ground based safety nets |

Performance Framework

Next Steps



- The next step calls for establishment of measurement and reporting strategy.
- While PIRGs are progressively identifying a set of regional performance indicators and supporting metrics, States have recognized that data compilation, processing, storage and reporting for the identified regional performance metrics are fundamental to success of the performance-based approach.
- PIRG to assign the performance measurement to an existing subgroup of a PIRG or establish a new subgroup for this purpose;
- States to support the ICAO Regional Office by providing the requisite information to demonstrate operational improvements; and
- States, that have not yet done so, to establish a performance measurement strategy for their air navigation system.



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and Caribbean
(NACC) Office
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(SAM) Office
Lima

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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

A world map is shown in a light blue color. Eight colored dots are placed on the map, each connected by a thin line to a text label describing an ICAO office. The ICAO Headquarters in Montreal is marked with an orange dot, while all other regional offices are marked with blue dots. A large, rounded rectangular box with a grey-to-white gradient background and a dark border is positioned in the lower center of the map, containing the text "Thank You" in a bold, dark blue font.