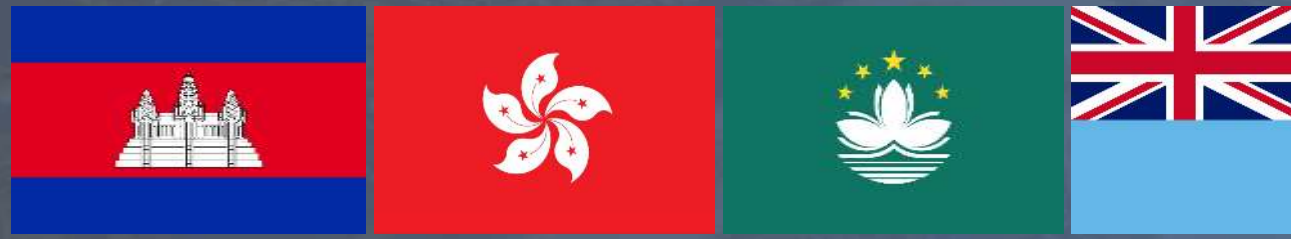
ICAO ASIA / PACIFIC

CAPACITY ASSESSMENT WORKSHOP

YOGYAKARTA - INDONESIA

Our Participants



EUROCONTROL

IFATCA

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Our Speakers

Mr. Manjunath Krishna Nelli

Regional Officer (ATM), ICAO Regional Sub-Office

- More than 30 years of experience in ATM
- Focus on Air Traffic Flow Management and Regional Air Navigation Plan
- Core team member in the establishment of Indian Air Traffic Flow Management Centre.

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Our Speakers

Ms. Almira Ramadani

Senior Air Traffic Representative, Asia Pacific

- From academia to consulting for NASA to the FAA, 25+ years of experience in civil aviation focused on ATM, integration of new technologies, operational concept and requirements validation, and performance analysis and reporting
- Currently serving as a technical liaison for air traffic matters to aviation stakeholders in Asia-Pacific
- Previously served as the FAA lead for TBO Industry Days and joint reporting of TBO benefits with stakeholders, and the NextGen lead for operational performance reporting to the US Congress

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Our Speakers

Mr. Vern Payne

Manager, CDM and International Operations

- ATCO since 1991
- 22 years as a controller and manager at Albuquerque ACC, including FMU
- ATC system expert
- ATFM systems expert
- 12 years at the FAA Command Center
- Member of multiple ICAO and CANSO workgroups/taskforces
- Rapporteur of the NACC ATFM Taskforce

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Our Speakers

Mr. Valerio Cappellazzo

Airport Integration and Optimisation Expert

- 13 years at EUROCONTROL
- Programme Manager for the Airport Operations Plan-Network (AOP-NOP) Integration
- Product owner of the Continuous Capacity and Performance Monitoring (CCPM) tool

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Our Speakers

Mr. Raffaele Russo

Head of Network Operations Performance Plan

- Lead on capacity planning, sector capacity assessment and ATFM strategic activities
- More than 15 years experience in increasing European airspace capacity, assessing workload and sector capacity

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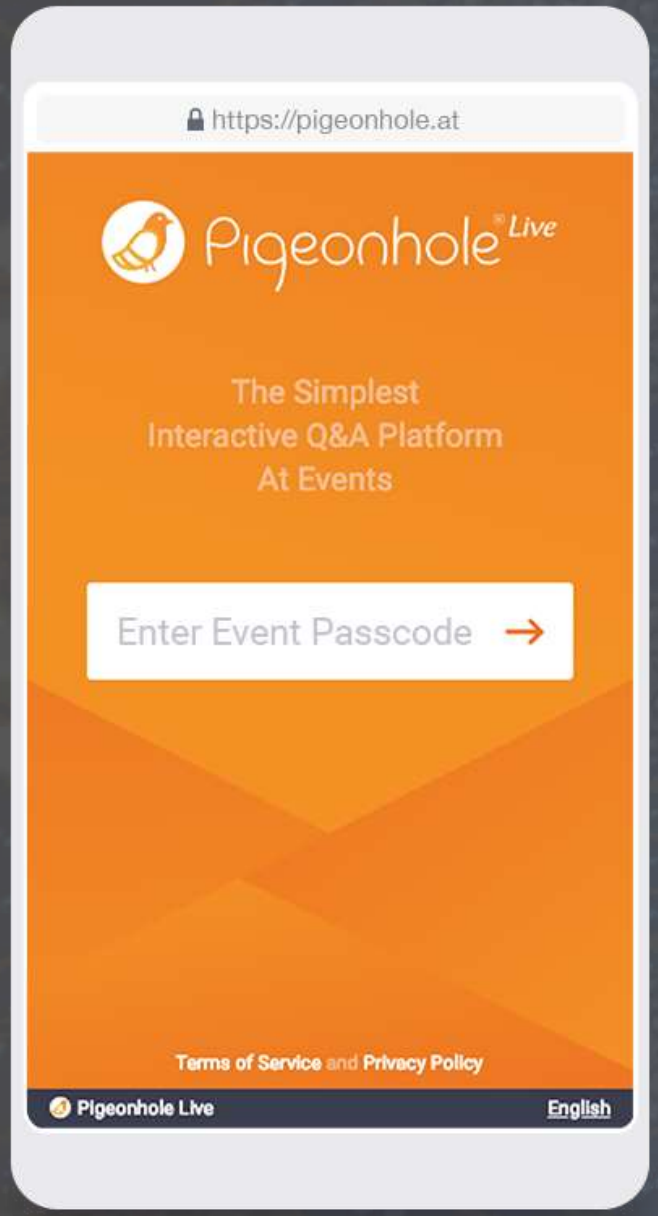
Our Speakers

Mr. CHENG Ming Kang (Roger)

Head (ATM-Performance), Air Traffic Services, CAAS

- Joined CAAS in 2010
- Accumulated 10 years of experience, in aerodrome and approach control operations, as an ATCO
- Currently leads efforts to enhance air traffic performance through:
  - Stakeholder engagement and collaboration
  - Implementation of performance improvement initiatives
  - Development and planning of future operational concepts



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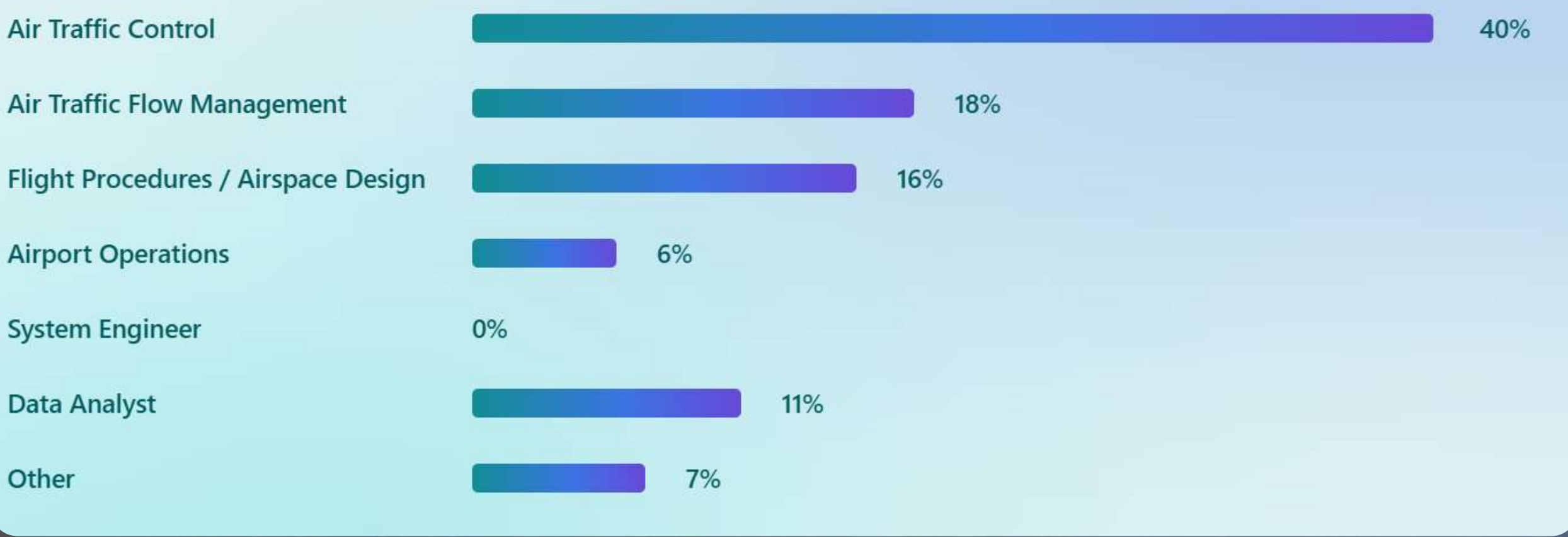
CAPACITY

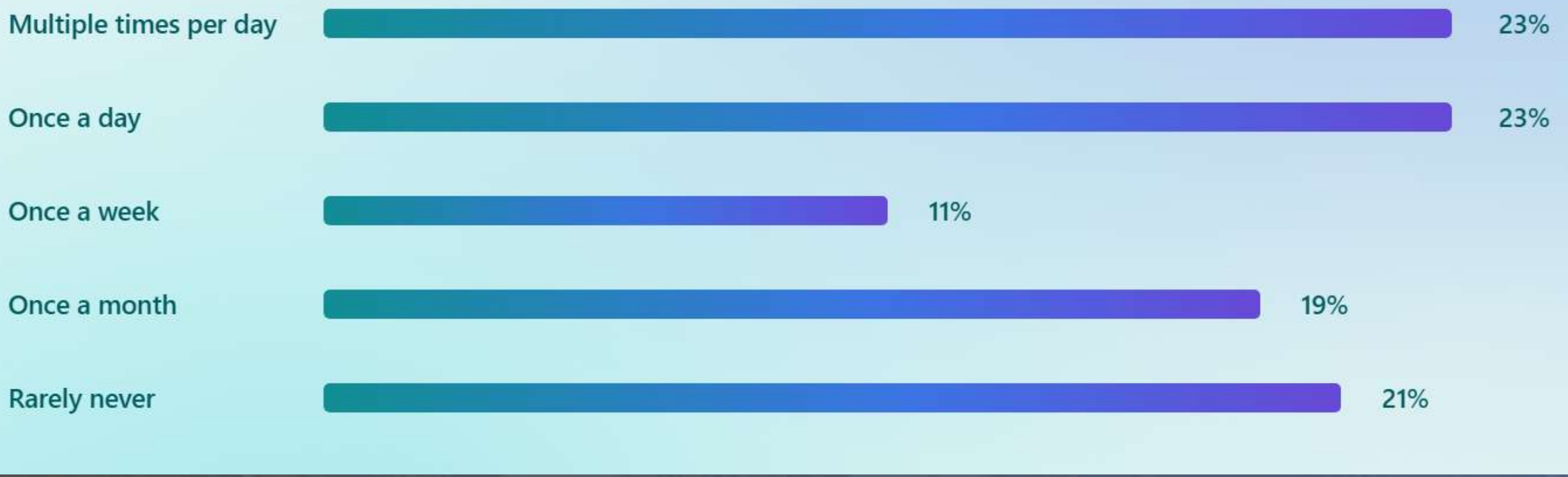
Overview of Pre-Workshop Survey

Composition of Participants

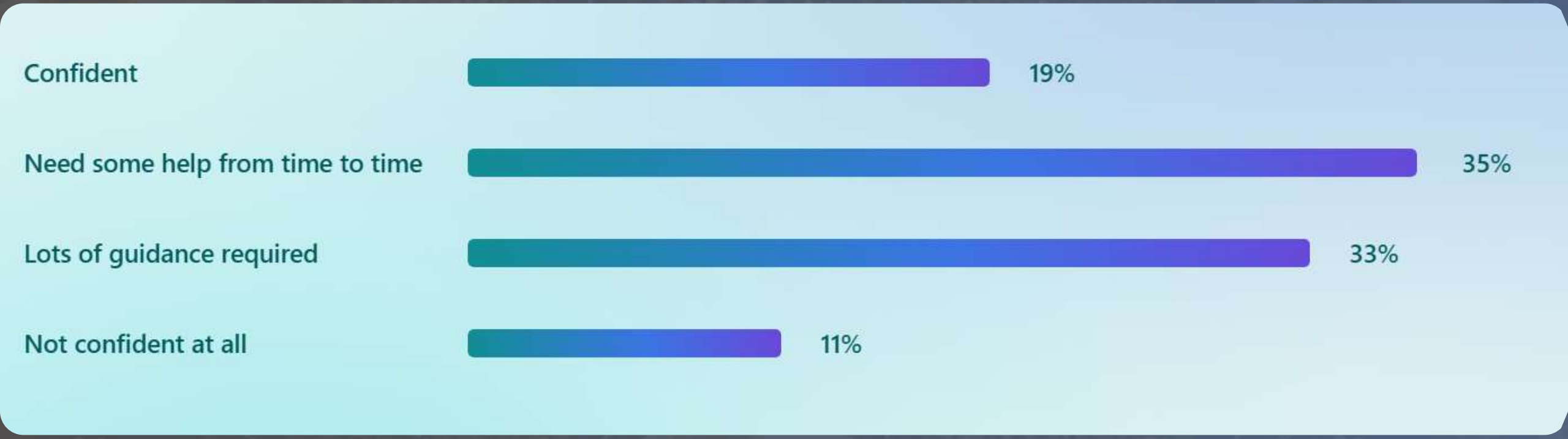


Knowledge on Capacity Assessment

Frequency of Air Traffic Demand Capacity Imbalance Encounters

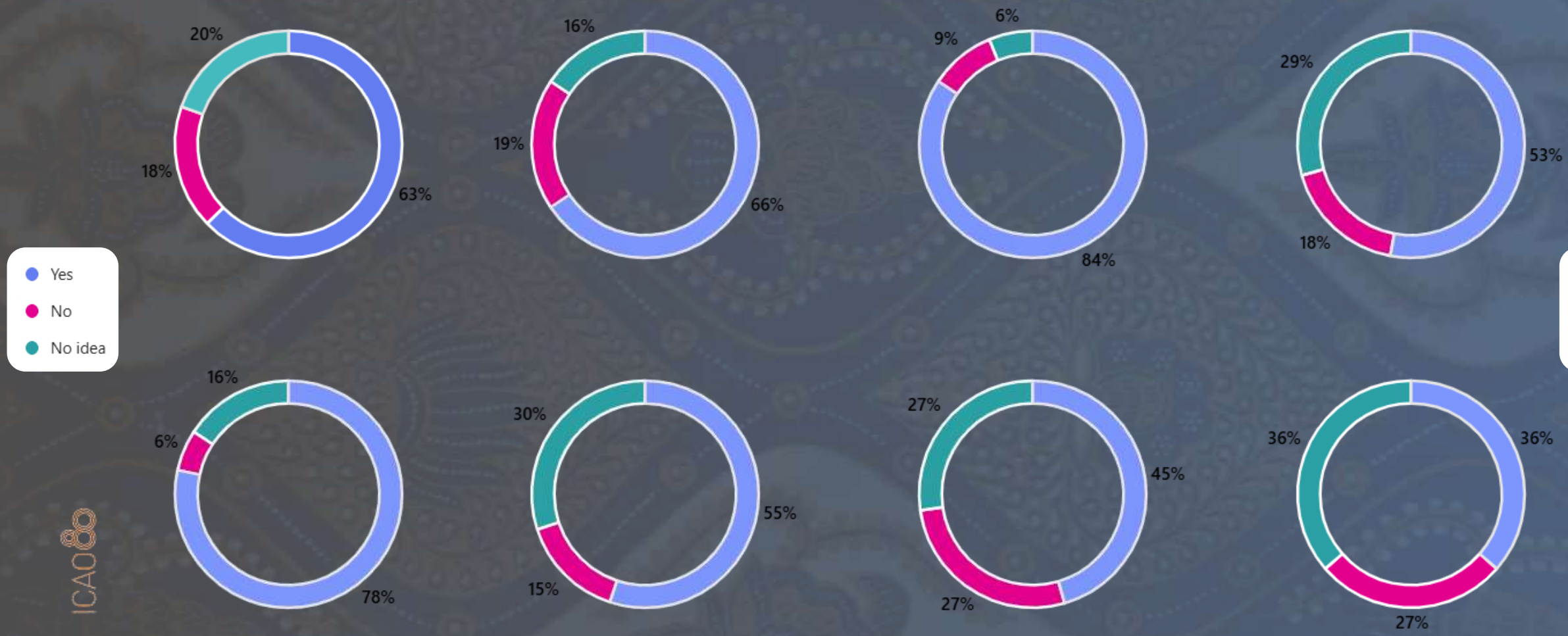


Confidence in Managing Capacity Imbalance



Expected Key Take-aways

Questions on State's Current Status



Overview
Airport & Airspace
Capacity Assessment Workshop

ICAO

- **Objective of Workshop**
- **Background – ICAO Provisions**
  - What is Capacity?
  - What is Capacity Assessment
  - Why Capacity Assessment?
- **Data from APAC States**
- **Brief Overview of the Workshop**
- **Expected Deliverables**

Objective of the Workshop

- Improve understanding of the capacity assessment process for airspace and airport as capacity assessment is the basis of ATFM implementation.

- Assessment of ATC Capacity is also required as part of USOAP CMA ANS PQs, viz., 7.081 and 7.082. Hence this process will also be of interest to regulators.

Demand & Capacity

DEMAND

CAPACITY

Background - Definitions

- **Capacity**: The maximum number of aircraft that can be accommodated in a given time period by the system or one of its components (throughput)- (Doc 9982)
- **ATC capacity**: The term ATC capacity reflects the ability of ATC system or any of its subsystems or operating positions to provide service to aircraft during normal activities and is expressed in numbers of aircraft entering a specified portion of the airspace in a given period of time. The maximum peak capacity achieved for short periods may be appreciably higher than the sustainable capacity. (Doc 9426)
- **Declared Capacity**: A measure of the ability of the ATC system or any of its subsystems or operating positions to provide service to aircraft during normal activities. It is expressed as the number of aircraft entering a specified portion of airspace in a given period of time, taking due account of weather, ATC unit configuration, staff and equipment available, and any other factors that may affect the workload of the controller responsible for the airspace. –(Annex 11)
- **Operational capacity (available capacity)**: The expected capacity associated with the tactical situation at the airport or airspace.(Doc 9971)
- **Air Traffic Flow Management (ATFM)**: A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilized to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority. (PANS-ATM)

Background – Annex 11

- **3.7.5.1** Air traffic flow management (ATFM) shall be implemented for airspace where air traffic demand at times exceeds, or is expected to exceed, the declared capacity of the air traffic control services concerned.

  Note. The capacity of the air traffic control services concerned will normally be declared by the appropriate ATS authority

- **3.7.5.2** Recommendation.— ATFM should be implemented on the basis of regional air navigation agreements or, if appropriate, through multilateral agreements. Such agreements should make provision for common procedures and common methods of capacity determination.

Background – USOAP PQ

- **PQ 7.081**
  Does the State ensure that the ATS provider assesses and declares the ATC capacity?

- **PQ 7.082**
  Does the State ensure that air traffic flow management (ATFM) is implemented when air traffic demand at times exceeds, or is expected to exceed, the declared ATC capacity?

Background – Doc 4444 (PANS-ATM) Safety Consideration

- **Para 3.1.1.1**
  ATS authority shall ensure that safety risk assessment is conducted prior to the implementation of any measures to increase capacity. State's responsibility for capacity assessment.

- **Para 3.1.1.2**
  In order to define the maximum number of flights which can be safely accommodated, the appropriate ATS authority should assess and declare the ATC capacity for control areas, for control sectors within a control area and for aerodromes.

Background – Doc 4444 (PANS-ATM) ATFM and DCB

- **Para 3.2.1.1**
  An Air Traffic flow management (ATFM) service shall be implemented for airspace where traffic demand at times exceeds the defined ATC Capacity.
- **Para 3.1.1.2**
  The number of aircraft provided with an ATC service shall not exceed that which can be safely handled by the ATC unit concerned under the prevailing circumstances. To define the maximum number of flights which can be safely accommodated, the appropriate ATS authority should assess and declare the ATC capacity for control areas, for control sectors within a control area and for aerodromes.
- **Para 3.1.3.2**
  In case of particular events which have a negative impact on the declared capacity of an airspace or aerodrome, the capacity of the airspace or aerodrome concerned shall be reduced accordingly for the required time period. Whenever possible, the capacity pertaining to such events should be predetermined

Background – Doc 4444 (PANS-ATM) Factors for assessing capacity

- Minimum factors to consider in assessing capacity
- **Para 3.1.2 PANS-ATM**

a) the level and type of ATS provided [aerodrome/Approach/En- Route # ATC/advisory/Flight information/Alert service…]

b) the structural complexity of the control area, the control sector or the aerodrome concerned [Lower/Upper airspace # ATS routes and hotspots # existing SUAs # number of sectors # runway exits number and layout]

c) controller workload, including

- ❖ background tasks (Planning tasks)
- ❖ transition tasks (entry/exit/clearance RT)
- ❖ recurrent tasks (coordinations)
- ❖ ATC conflict management tasks (detection/resolution)

Background – Doc 4444 (PANS-ATM) Factors for assessing capacity

- Minimum factors to consider in assessing capacity
- **Para 3.1.2 PANS-ATM**

d) the types of communications, navigation and surveillance systems in use, their degree of technical reliability and availability as well as the availability of backup systems and/or procedures [Voice/datalink # conventional/GNSS # PSR/SSR/ADS-B/ADSC/ MLAT]

e) availability of ATC systems providing controller support and alert functions [automated FPL processing System # STCA/MTCA/APW/MSAW etc.]

f) any other factor or element deemed relevant to controller workload. [Weather/Military activities/ATC contingencies etc.]

Doc 9971 (Manual on Collaborative ATFM)

- **Para 3.1.2**
  The number of aircraft provided with ATC service should not exceed that which can be safely handled by the ATS unit concerned. In order to define the maximum number of flights that can be safely managed, the appropriate ATS authority should assess and declare the capacity for control sectors (en-route and terminal control area) and for airports. This capacity is the "declared capacity" for the airspace or airport.
- **Para 3.1.5.3**
  Strategic airport slot allocations should be consistent with declared airport ATM capacities, i.e., the number of allocated strategic airport slots should not exceed the declared capacity of the airport.
- **Para 3.1.6 – Operational Capacity**
  Operational capacity is the expected capacity associated with the tactical situation at the airport or airspace. ATFM solutions are based on the expected dynamic operational capacity.

Asia/Pacific Seamless ANS Plan V4.0 Requirements

- **PARS Phase II**
- **Para 7.1c** regular airport capacity analysis, which included a detailed assessment of passenger, airport gate, apron, taxiway and runway capacity.

- **Para 7.40** All ATC Sectors should have a nominal aircraft capacity figure based on a scientific capacity study and safety assessment, to ensure safe and efficient aircraft operations.

Note: Appendix C provides some guidance on Airport and Airspace capacity assessment and provides capacity data of some States

Background – Why?

- **Capacity Assessment is necessary for following reasons**

  - For long-term infrastructure (airport, airspace, ATM, CNS, MET services etc.) augmentation planning, adequate warning is required of any future shortfall in capacity, as indicated by traffic forecasts;

  - If there is already a shortage of capacity requiring the application of flow control, it is necessary to know what the capacity is, to limit air traffic to a level which does not overload the system or penalize the airspace users excessively;

  - Capacity Assessment process helps in increase in aviation safety.

How to measure capacity ?

Doc 9426 – ATS Planning Manual

- Appendix C-Techniques for ATC sector/position capacity estimation (Two techniques indicated)
  - ❖ **DORATASK** technique
  - ❖ Main criteria: ATC workload based on
    - ➢ Observable tasks [ATC transmit on RT, Strip markings, coordination etc.]
    - ➢ Non-observable tasks [Conflict detection, resolution planning and monitoring]
    - ➢ Recuperation time [time with no task performed]

How to measure capacity ?

Doc 9426 – ATS Planning Manual

- Appendix C-Techniques for ATC sector/position capacity estimation (Two techniques indicated)
  - ❖ **MBB** technique
  - ❖ Main criteria: ATC workload based on
    - ➢ Categorization of observed working actions [RTF conversation, Strip processing, flight information sharing etc.]
    - ➢ Time measuring of all observed categories
    - ➢ Sector structure and traffic characteristics [Number of hotspots, mix traffic IFR/VFR, aircraft performance etc.]
  - ❖ Limit of applicability:
    - ➢ cannot readily be used to assess capacity under a future airspace organization, with different equipment or procedures, under different traffic loadings, or with different manning

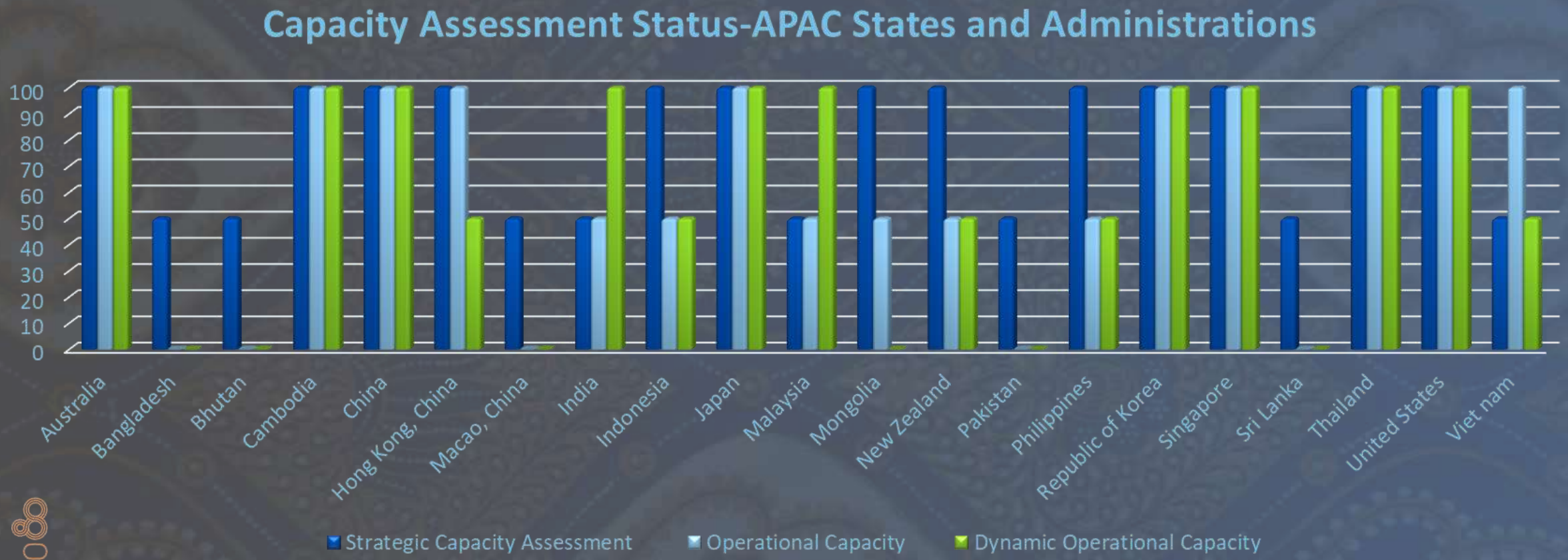
Guidance Material- Doc 9971

Global Manual on Collaborative ATFM

- **Capacity determination**

- **3.1.7.4** Capacity measurement and calculation methodologies should be developed according to the requirements and conditions of their operational environment.
- **3.1.7.5** Each State is responsible for determining capacity, while using the methodology of its choice. Due consideration should, however, be given to the methods employed by neighbouring States, so as to ensure as much consistency as possible in the methods used to determine capacity for sectors or airports used by the same traffic flows. When regional agreements are established, this specific provision should be addressed

Data from APAC States



References

- Doc 9971 – Part II and Appendix II-B, II-C and II-D
- APAC Regional Framework for Collaborative ATFM
- Guide for the Application of A Common Methodology to Estimate Airport and ATC Sector Capacity for the SAM Region. (2009)
- Airport Capacity Assessment Methodology (ACAM) Manual | EUROCONTROL

Expected Deliverables

- Better understanding of the process of Capacity Assessment of Airspace and Airports by States

- Enhance State's capability to conduct airport and airspace capacity assessment as a step towards assessing on the need for ATFM and A-CDM systems where needed

- Use the outcomes from the workshop to develop a draft regional guidance document for airport and airspace capacity assessment which will help States in this process. This document can then be shared with other regions for further improvement

Summary

- ❑ Capacity Assessment is necessary
- ❑ Responsibility is with the States
- ❑ Ensuring Safety is most important while assessing capacity
- ❑ Capacity Assessment enables better planning

Roundtable Discussion

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Roundtable Discussion

Rules of Engagement

1. **If your table consists of more than 1 party,**
   - Share the following items with your fellow table-mates
     A. **Whether you State/Administration has ever conducted Airport/Airspace capacity assessment;**
     B. **Current challenges in handling capacity demand imbalance;**
     C. **Current application of capacity assessment result/findings;**
     D. **Improvement plans (if any)**

2. **If your table consist of only 1 party,**
   - Go over to another table and share the above 4 items

3. **Towards the end of the session, you will be asked to present on your findings from the other party.**