DRIVING ATM PERFORMANCE

by SINGAPORE

Presentation overview

➢ Challenges faced by the ATM community

➢ Why performance matters

➢ Data-driven approach to performance

➢ Existing workgroup focusing on performance

➢ Proposal to start a new task under workstream 2

Challenges faced by the ATM community

Increasing Air Traffic Volume

Growing complexity and congestion in airspace; ATCO workload and complexity expected to increase correspondingly

New Entrants

New flight rules and traffic management services required to accommodate new operating characteristics and safe coexistence of manned and unmanned aircraft

Weather-related Disruptions

Climate change expected to cause more frequent, severe and unpredictable weather events and patterns that will impact flight routes and air traffic flow

Environmental Sustainability

Increased public awareness that drives higher expectations for sustainable practices in aviation

Future ConOps

Need to share and consume pre-flight and real-time data as a region to make joint informed decisions and facilitate the most optimal flight paths

Why performance measurement matters

- Amidst multiple demands and limited resources, performance measurement enables ANSPs to identify their individual areas of strengths and improvements, using a universally-accepted, evidence-based and data-driven approach, to prioritise resources and investments to areas that matter most.

- Adopting such a robust approach helps build consensus on the actions needed and secure stakeholders' support for investments and capacity building efforts

Data-driven approach to diagnose operational issues

- In APAC, 8 KPIs were identified for initial measurement.

- These KPIs can be derived from just 6 data fields and they provide answers to help diagnose operational issues
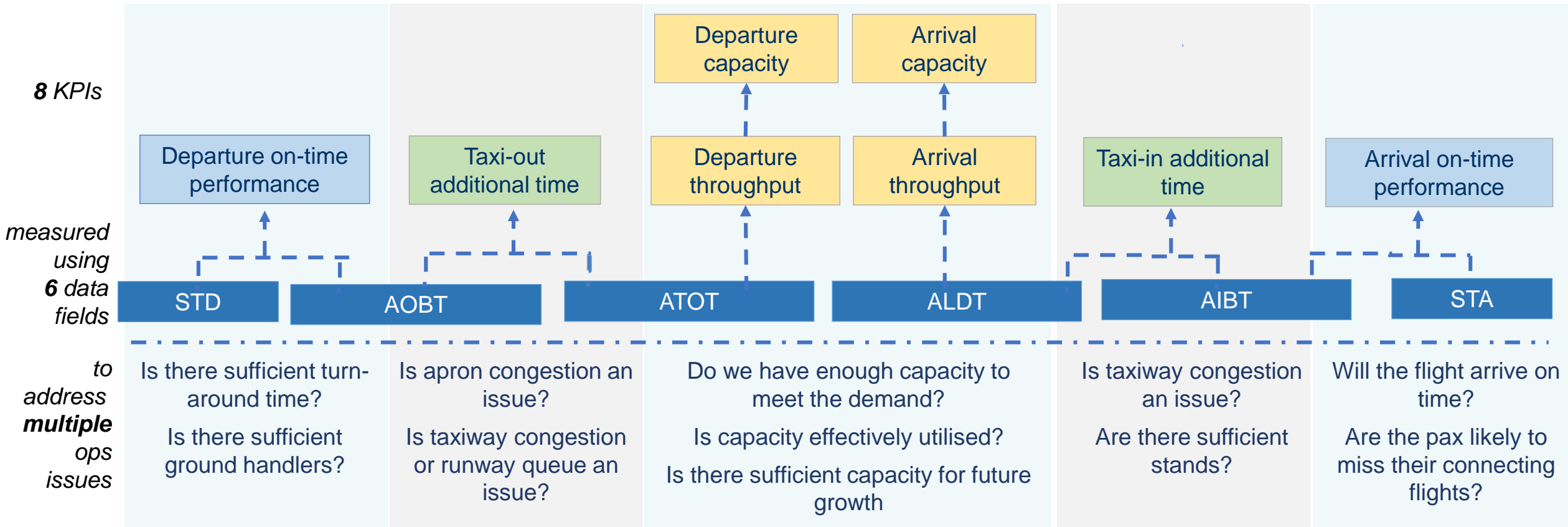
STD: *Scheduled time of departure*   AOBT: *Actual off-block time*   ATOT: *Actual take-off time*   ALDT: *Actual landing time*   AIBT: *Actual in-block time*   STA: *Scheduled time of arrival*

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Data-driven approach to enhance operations

Resource Planning

Manpower planning is based on fixed sectors and shift system

Air Traffic Flow Management

Demand based on flight plan and expected capacity is based on heuristics

Route management

In-flight changes are usually driven by airspace users

Tactical actions

Tactical actions based on heuristics because no 'what-if' to support decision-making

Current workflow

T – 30   T – 6   T – 4   T0

Future workflow

Efficient Resource Allocation

Manpower and resource allocation by analysing historical air traffic data and predicted future traffic patterns

Air Traffic Flow Management

Predict demand and capacity at airports and airspace sectors, reducing congestion and delays especially during peak hours

Weather Forecasting and Monitoring

Analyse historical weather data and real-time weather information to understand the impact of weather on operations

Route Optimisation

Analyse historical flight data to identify the most time-efficient, cost-efficient and fuel-efficient routes

Air Traffic Controller Support

Provide decision support tools for ATCOs to manage complex air traffic situations more effectively, offering real-time data insights and recommending appropriate actions to handle critical situations

# Example 1: Mitigating an increase in taxi-out delay

- Surface efficiency as measured by taxi-out delay was determined as an important indicator of ATM.

- The ANSP determined that the percentage of departures experiencing taxi-out delay shall not exceed 3.8%
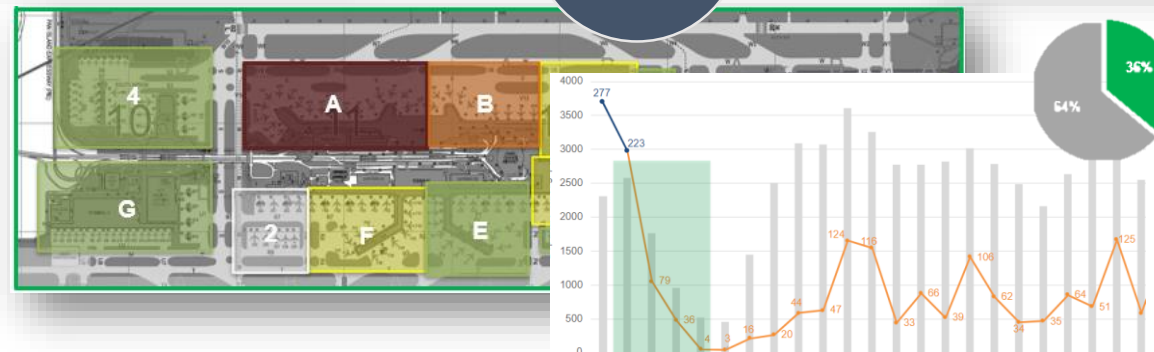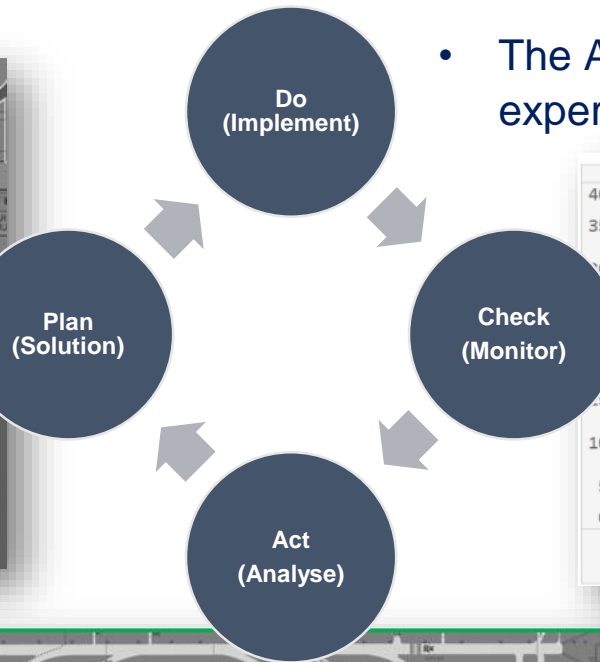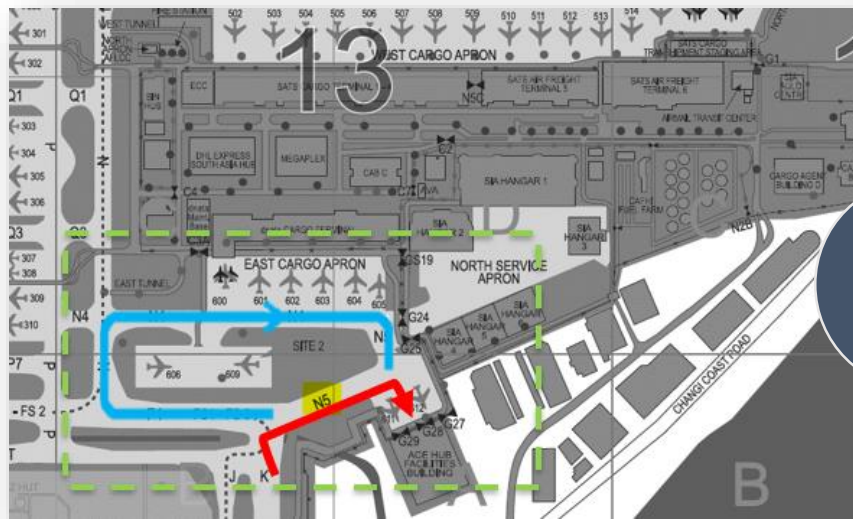
# Example 2: Collaboration on Green ATM between ANSPs

- Two ANSPs collaborated to trial Green ATM operations flights between two of their major city-pairs.

- The Green ATM operations included facilitation of continuous climb and descent operations as well as optimal cruising flight levels*.

- A data-driven approach to examining flight trajectories, route adherence, and vertical cruise profiles could provide insight on how to improve cross-border operational procedures to fulfil ICAO's Long-Term Aspirational Goal (LTAG) for international aviation of net-zero carbon emissions by 2050.

Vertical flight profile of departures with level-offs

Majority of level-off around SID restriction (6,000ft)
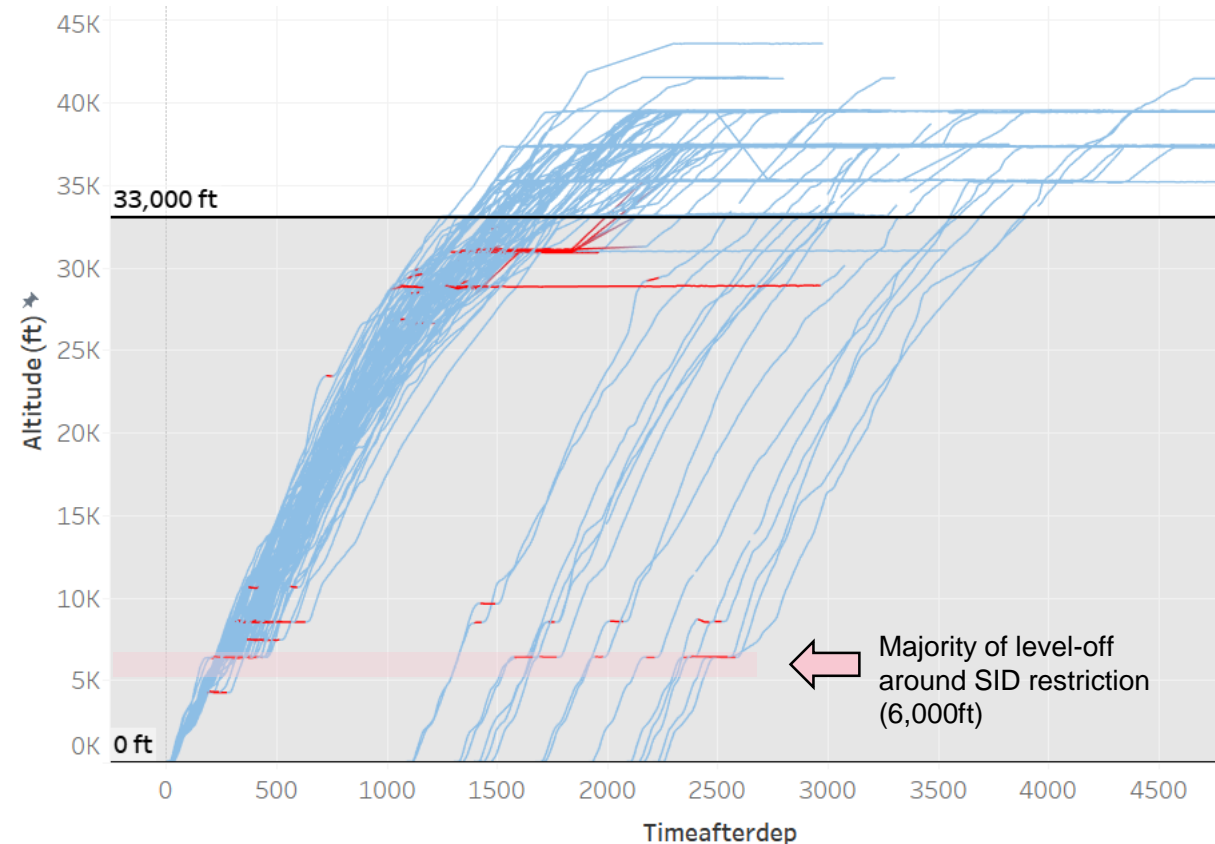
*A descent was considered continuous if the rate of descent was at least 5ft/sec for every rolling 20-second interval, while a climb was considered continuous if the rate of climb was at least 5ft/sec for every rolling 20-second interval. The flight was assessed to be cruising at optimal flight level if it operated at the user preferred altitude.
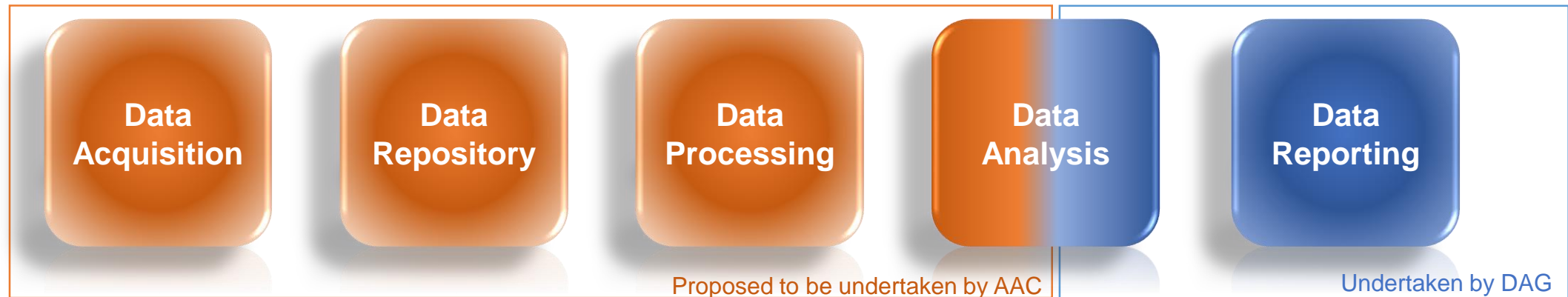
Work by ICAO Asia Pacific Data Analytics Group
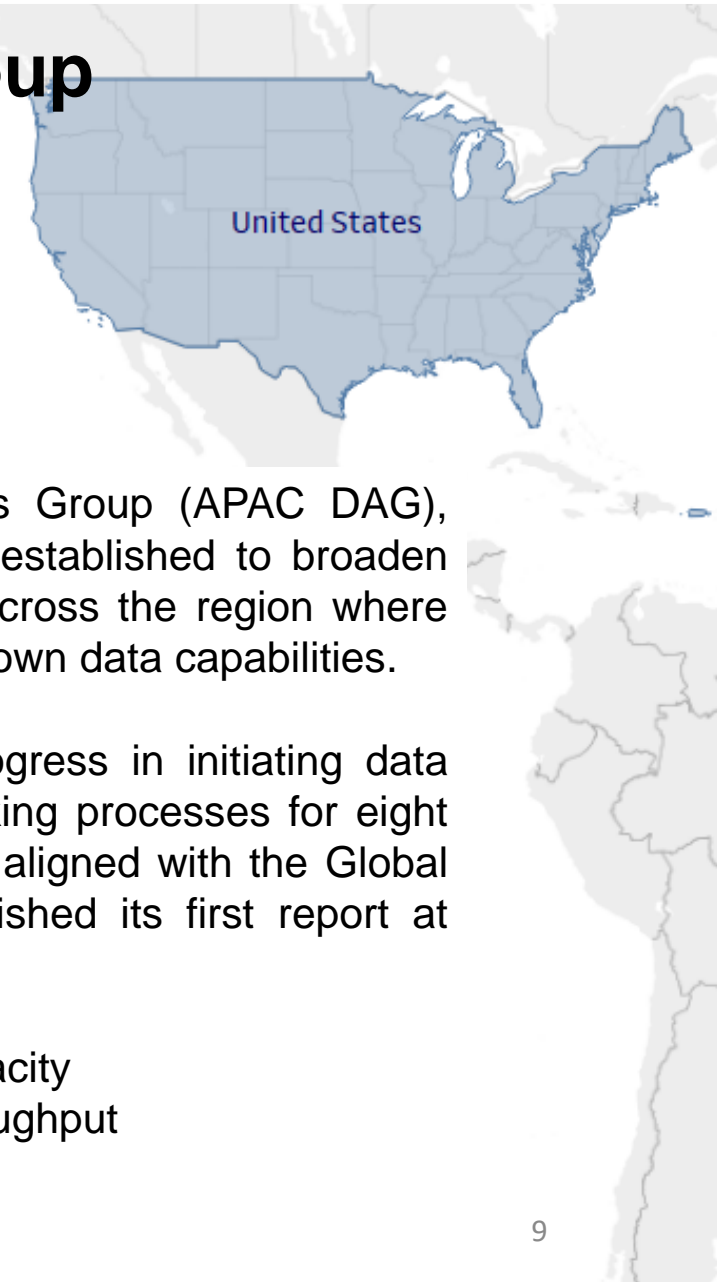
- The ICAO Asia Pacific Data Analytics Group (APAC DAG), consisting of 13 member States, was established to broaden performance measurement capability across the region where each state contribute according to their own data capabilities.

- The APAC DAG made substantial progress in initiating data sharing, measurement, and benchmarking processes for eight key performance indicators (KPIs) that aligned with the Global Air Navigation Plan (GANP) and published its first report at ATM/SG/13:

  - Airport peak arrival/ departure capacity
  - Airport peak arrival/ departure throughput
  - Additional taxi-out/ in time
  - Arrival/ Departure punctuality

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Useful to consider new tasks under WS2 to drive regional data and performance efforts

- To accelerate adoption of performance measurement, there is a need to go beyond DAG's current scope of work – collating and processing performance information manually.

Data Acquisition | Data Repository | Data Processing | Data Analysis | Data Reporting

Proposed to be undertaken by AAC

Undertaken by DAG

- There is value to share data which will enable the region to assess performance measurement holistically
  - ➢ Flight-centric as compared to State-centric
  - ➢ Set the stage for future ConOps in the region

- Propose to start a new task under workstream 2 to undertake work on data and performance

Possible projects for the performance workgroup

Project 1:

Gate-gate efficiency study

- Synopsis: member States often conduct performance assessment for flight within their respective FIR. There are benefits to measure and understand ATM performance holistically as a region

- Objectives: measure performance for every segment of identified city-pair flight routes; identify areas with performance gaps and propose mitigation measures to enhance regional performance

- Expected outcomes: develop a regional performance dashboard and identify a set of programmes to raise efficiency in the region

Project 2:

Data management

- Synopsis: increasingly, regional projects require data contribution by member States or where data is not available, to acquire data as a region. However, the region has varying data science capabilities and different States have different data governance framework

- Objectives: develop a regional data management framework to govern the acquisition, storage and use of operational and performance data

- Expected outcomes: data management framework that can be applied for all projects within the region including but not limited to the work of the DAG

Thank you