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Leveraging ATM Innovation and Technology to emerge stronger



Mr. Graeme Sumner

Chief Executive Officer,
Airways New Zealand



Captain Victor Liu

Director General, CAD Hong
Kong



Mr. Han Kok Juan

Senior Dy Director General,
CAAS



Mr. Tinnagorn Choowong

Executive Vice President,
Operations, AEROTHAI

Emerging Stronger

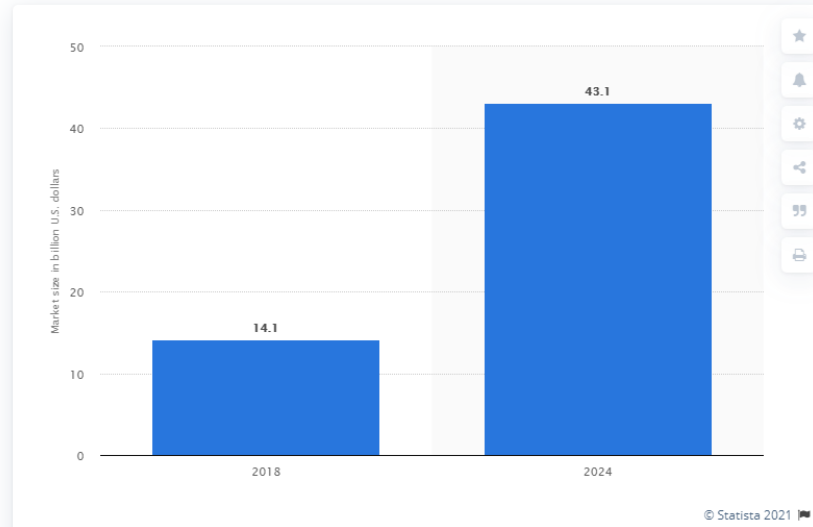


Mr. Graeme Sumner

Chief Executive,
Airways New Zealand

Life in a COVID World

Global commercial drone market size in 2018 and 2024
(in billion U.S. dollars)



France moves to ban short-haul domestic flights

6 days ago

Coronavirus pandemic

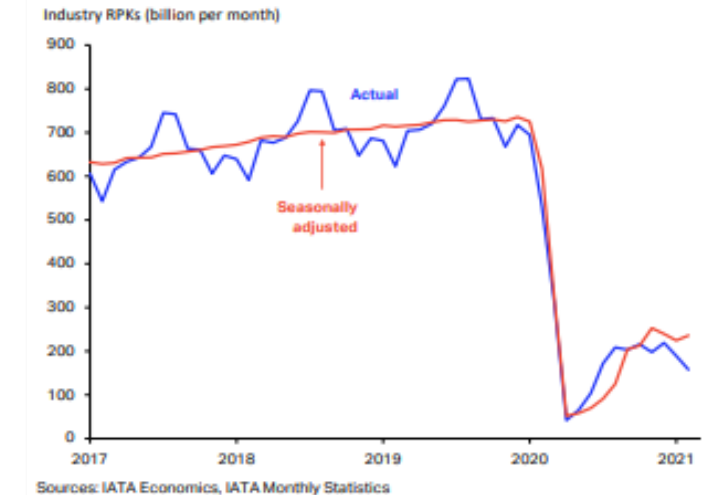


French lawmakers want the train to take the strain

Healthcare & Pharmaceuticals

South African variant may evade protection from Pfizer vaccine, Israeli study says

Chart 1 – Air passenger volumes



on 16th February 2021

AIRCRAFT

Image: Ryan Fletcher / Shutterstock.com

RYTIS BERESNEVICIUS

2 years after production cancellation, there is little hope for Airbus A380

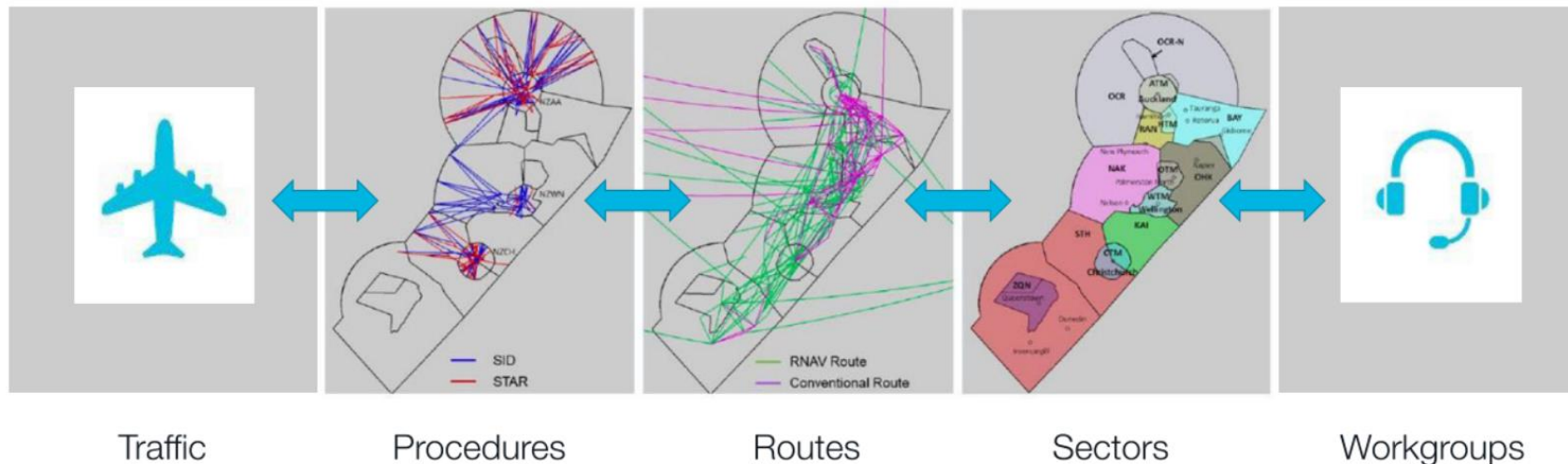


Politics

China and U.S. to Cooperate on Climate Change, Xinhua Says

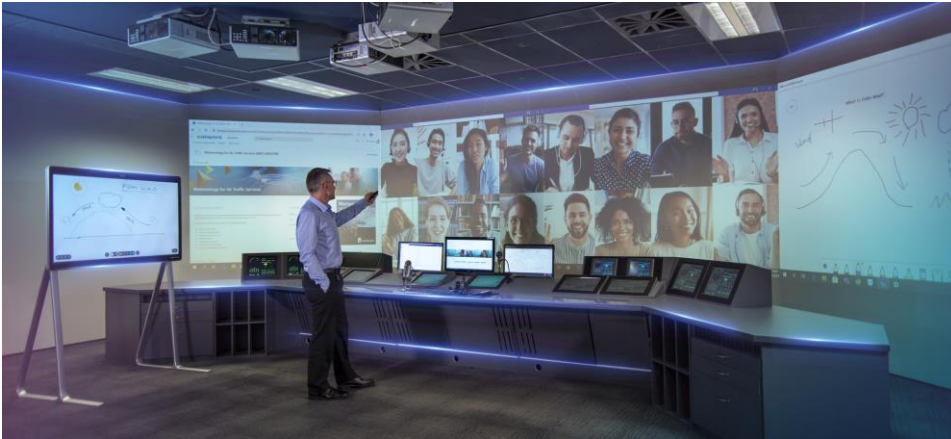
A Catalyst for Change

- ANSPs will need to plan individually and collaborate on issues such as cost reduction, climate change & UAV integration
- NZ has just completed a review of its airspace with a focus on many of these issues. 54 changes proposed that improve our Resilience, Efficiency and Environmental Outcomes.



A More Efficient, Digital World

- Digital learning will become the norm for many training requirements
- Greater demand for modelling & simulation capacity





Thank you



**Leveraging ATM
Innovation and
Technology to
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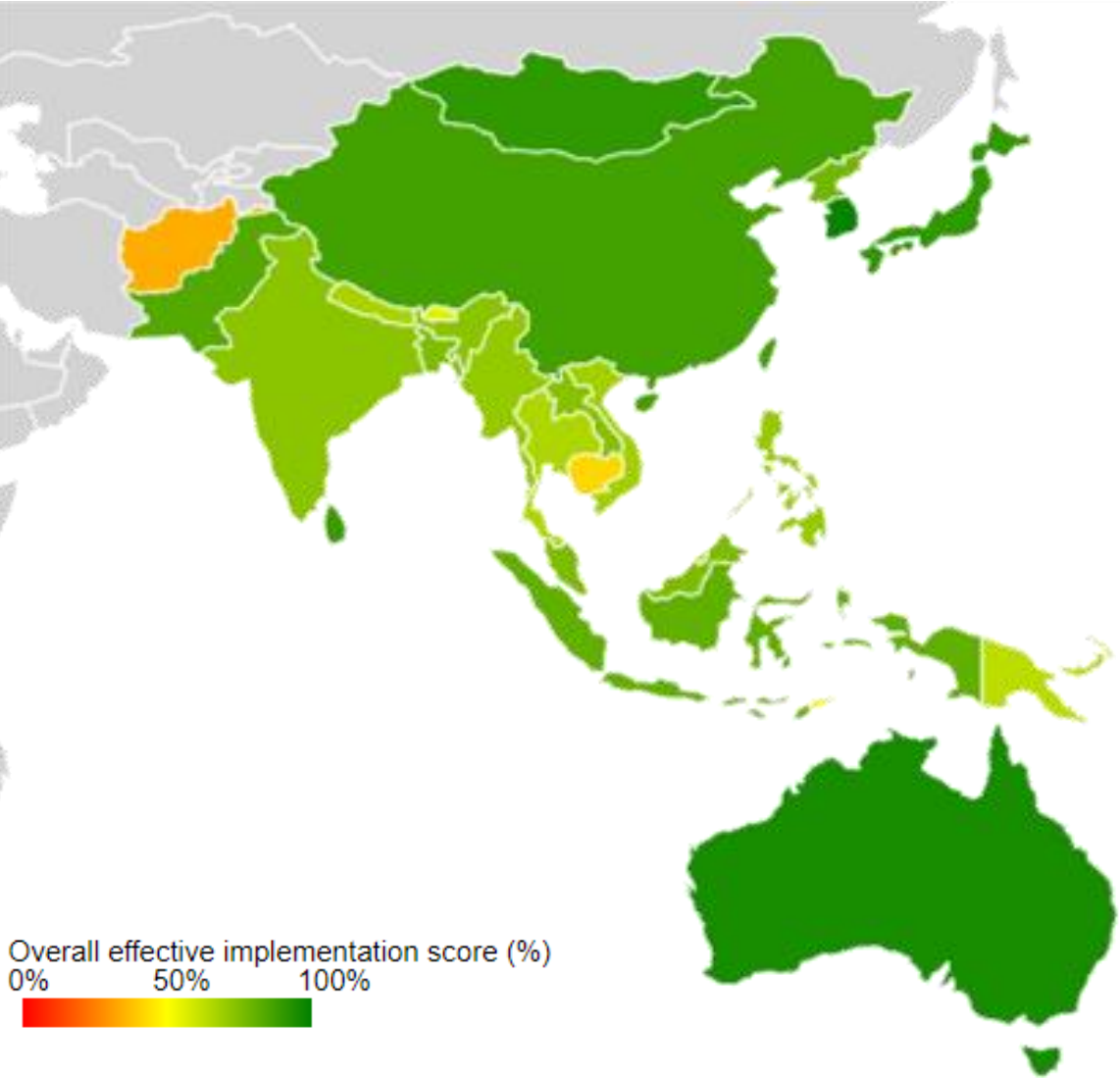


Captain Victor Liu

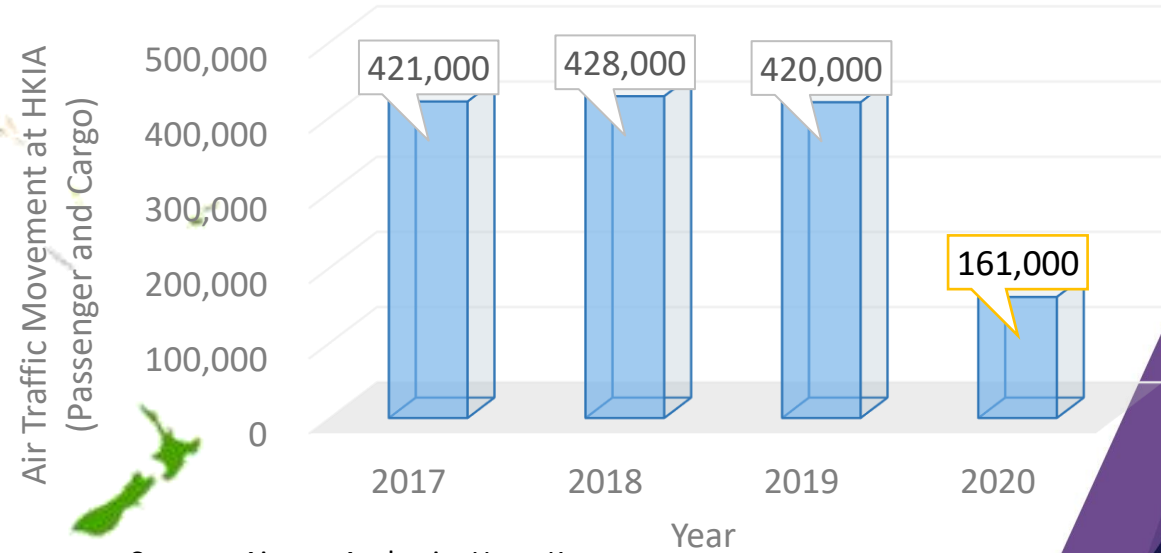
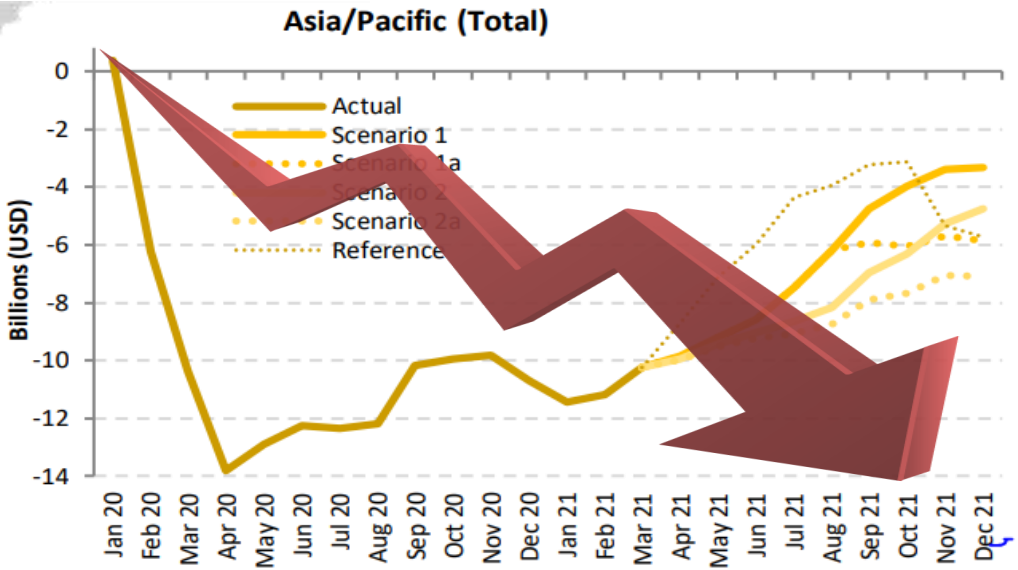
Director-General of Civil Aviation
Civil Aviation Department of Hong
Kong

High Diversification in APAC Region

Overall Effective Implementation (EI) under ICAO USOAP



Passenger Revenue



Source : Airport Authority Hong Kong

Source : ICAO



Challenge and Opportunity




Enhanced Wake Turbulence Separation at HKIA

ENHANCED WAKE TURBULENCE SEPARATION

Introduction to Hong Kong International Airport



From **5th November 2020** Hong Kong International Airport will adopt enhanced Wake Turbulence Separations for arrivals. The procedures and applied separations are aligned with the ICAO guidance material.

Hong Kong International Airport is one of Asia's busiest airports with over 71 million passengers and 420,000 air traffic movements handled in 2019. With the construction of the third runway already underway at full steam, the Airport Authority and Civil Aviation Department are introducing additional measures to enhance operating efficiency and capacity of the existing 2 runways prior to the 3 runway system being fully commissioned.

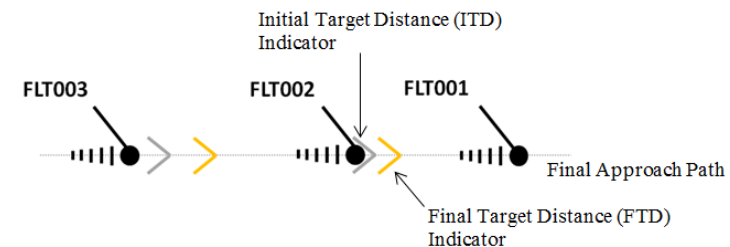
IN ASSOCIATION WITH

Enhanced Wake Turbulence Separation (eWTS) minima

Revised Separation Minima

		FOLLOWER						
		A	B	C	D	E	F	G
LEADER	A		4 NM	5 NM	5 NM	6 NM	6 NM	8 NM
	B		3 NM	4 NM	4 NM	5 NM	5 NM	7 NM
	C				3 NM	3.5 NM	3.5 NM	6 NM
	D							4 NM
	E							4 NM
	F							
	G							

Approach Spacing Management System (ASMS)



Digital Tower and Apron at HKIA

2019
Trial at HKIA



Digital Tower Facility (DTF) Trial System at ATC Tower

2022
Existing runway and new runway

2024
Three-Runway System

- Integrated platform for both Digital Tower and Digital Apron
- More than 220 nos. of 4K cameras being installed at HKIA apron
- Currently the largest scale implementation worldwide



Promoting DTF technology at HKIA Expo to public

Digital Tower and Apron Technology at HKIA



Augmented flight information on an approach flight



Detection and labelling of an aircraft on taxiway



Enhanced visibility during night-time

World-wide Travel Restrictions



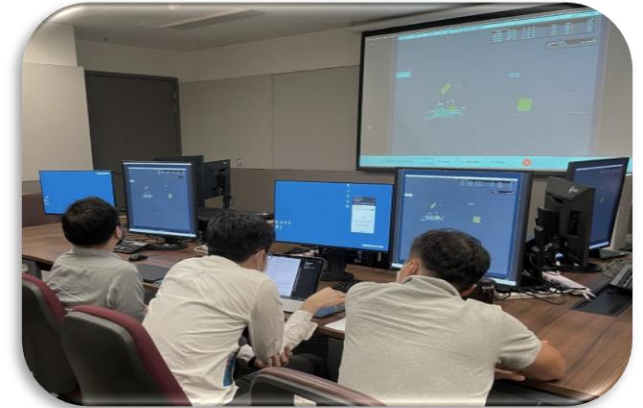
Remote ATC Training Using Cloud-based Platform



Tower simulator training



Surveillance simulator training



Training classroom

Client (CAD headquarters)

Contractor (overseas premise)



Trainer facilities

Cloud
Computing

New Entrant - Unmanned Aircraft Systems (UAS)

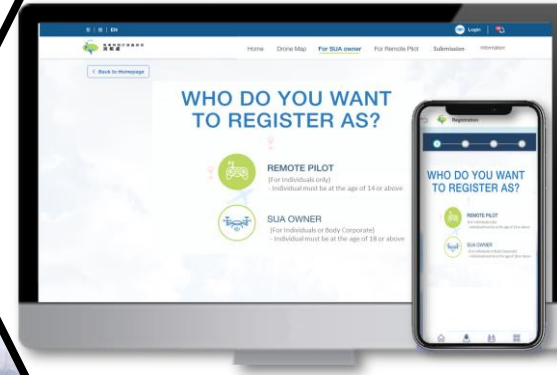


CAD's Facilitation on UAS applications while ensuring safety

➤ Enhancing legislation



➤ Electronic Portal for UAS



➤ Facilitation on use of UAS to carry out tasks



➤ UAS Detection System

Collaboration among CAAs, ANSPs and Industry



AN AIRBUS COMPANY



MICRONAV

*Asia-Pacific Multi-Nodal
ATFM Collaboration*



CRV Provider **PCCW Global**





Thank you



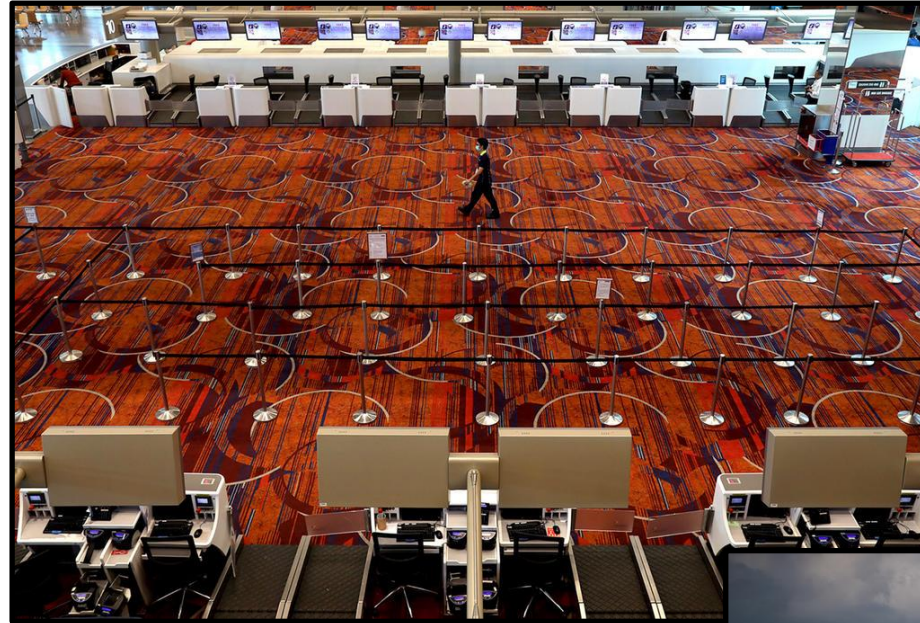
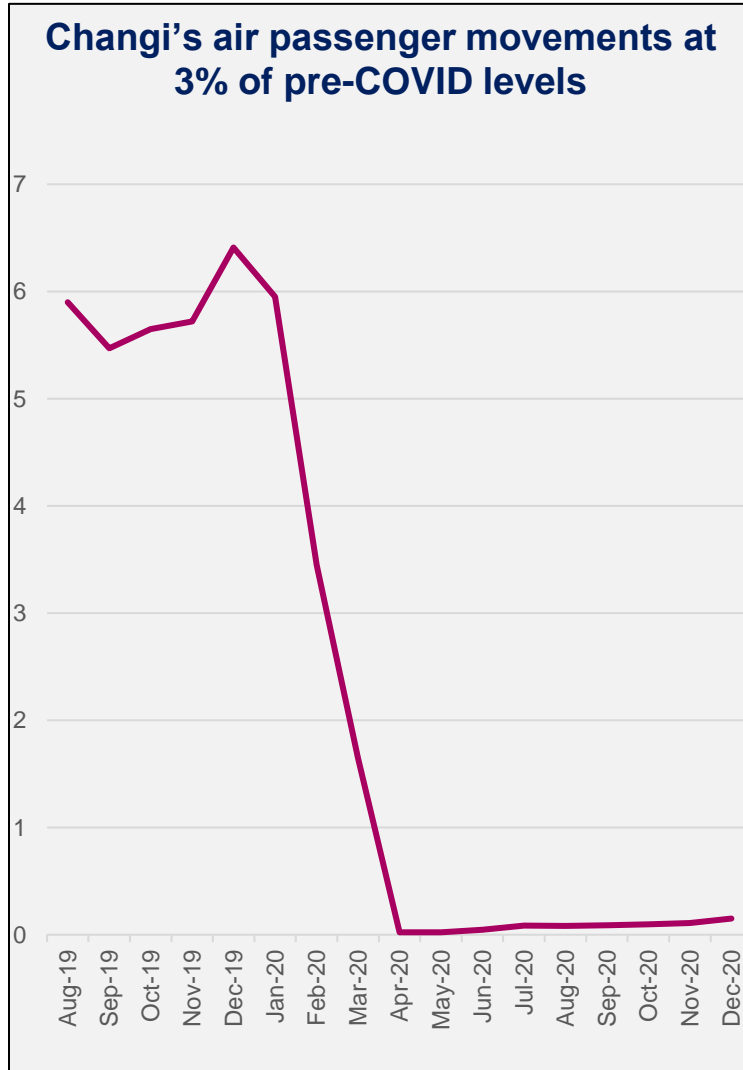
**Leveraging ATM
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Mr. Han Kok Juan
Senior Deputy Director-General

**Civil Aviation Authority of
Singapore (CAAS)**

COVID-19 has decimated air travel



Empty check-in counters at
Changi Airport Terminal 1
Source: www.todayonline.com

Planes parked on taxiway
near Changi Airfreight Centre
Source: www.changiairport.com



Our immediate focus: tide over this crisis

Help workers and companies



Maintain systems and currency



Work on recovery



But cannot lose sight of the future and what the future brings

Reconnecting the world



More efficiently



More sustainably



Need to innovate, leverage technology: COVID a challenge also an opportunity

Sustainable Aviation



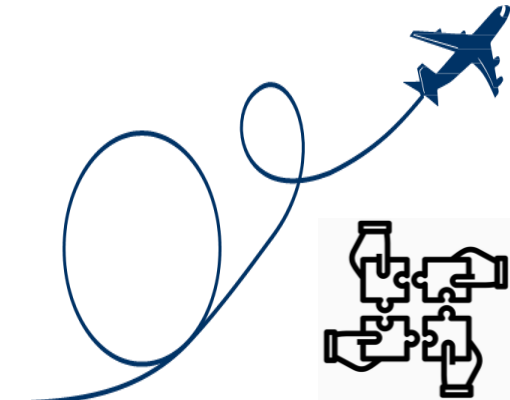
Introduce new concept of operations procedures to provide cost-effective, safe and efficient ATM

Innovative ATM



Adopt, adapt apply useful technologies for ATM Innovation

Collaborative Breakthrough



Collaborate to achieve cost-effective and game changing capabilities

Flexible ATM at Changi to reduce fuel burn, flight time and taxi time



14 April 2020

Attention: Joint CANSO/IATA Letter for CANSO Asia Pacific Members

Flexible air traffic management during the COVID-19 crisis.

With the downturn in air traffic due to the COVID-19 crisis, some air navigation service providers (ANSP) have been introducing more streamlined and flexible air traffic management procedures. We thank them for their effort in facilitating flight paths that deliver environmental and economic benefits through the reduction of fuel burn, emissions, noise and fuel costs during this period.

Aligned with a recent CANSO, IATA, and EUROCONTROL [initiative](#) in Europe, we take this opportunity to reinforce the need for similar efforts in the Asia Pacific region.

Please find below suggested actions for air traffic controllers (ATCO) and pilots for consideration by ANSPs and airlines to be applied according to their specific circumstances. The principles should ideally apply throughout the period of COVID-19 induced low traffic levels and be subject to regular review as operations recover to normal.



- **Continuous Descent Operations (CDO)**
- **Continuous Climb Operations (CCO)**
- **Tactical track shortening and cancellation of speed / altitude restrictions**
- **Mixed mode runway operations based on the shortest route to / from parking stand**

Trials on arrival sequencing to reduce flight paths



Arrival Sequencing in Singapore Terminal Maneuvering Area (ASIST)



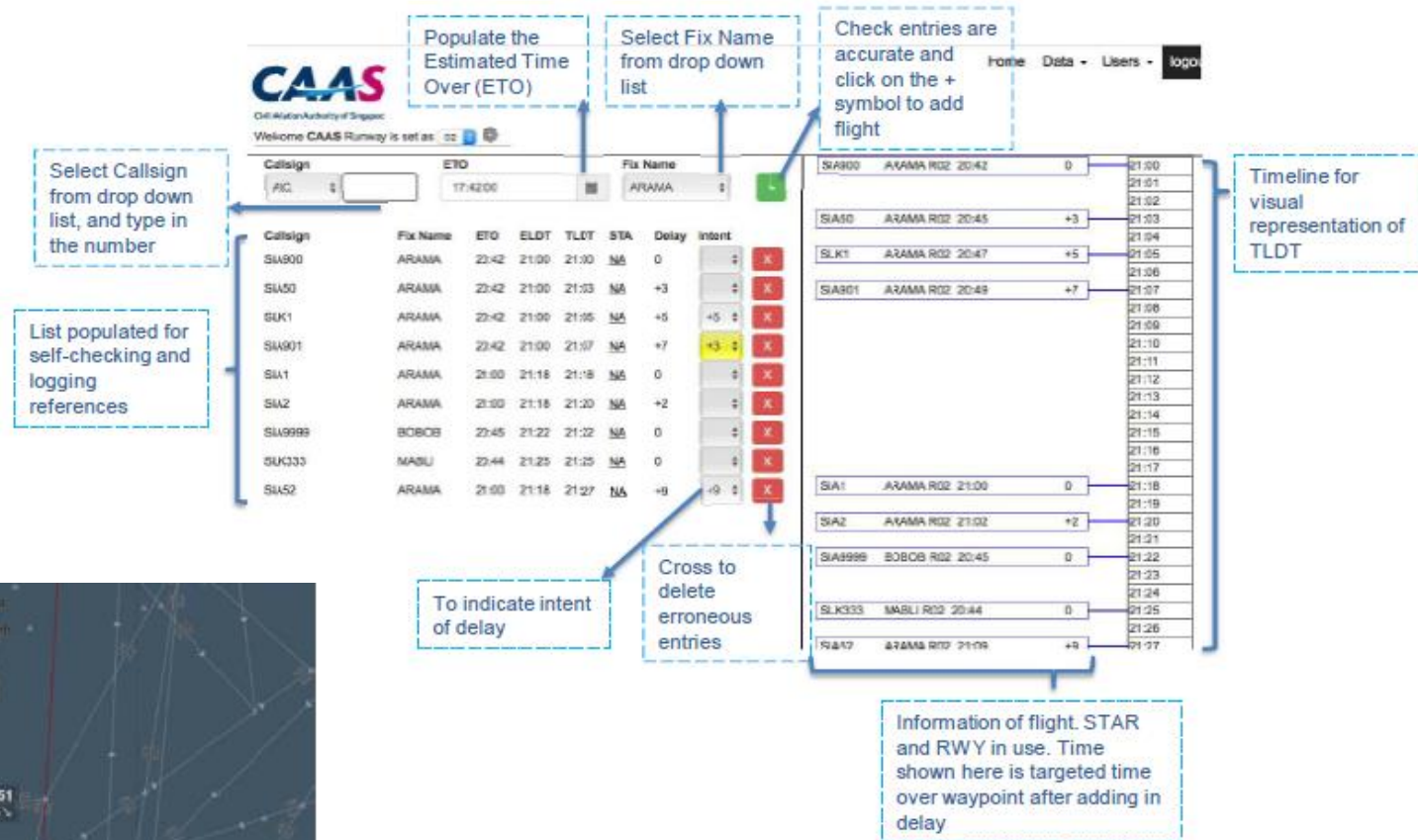
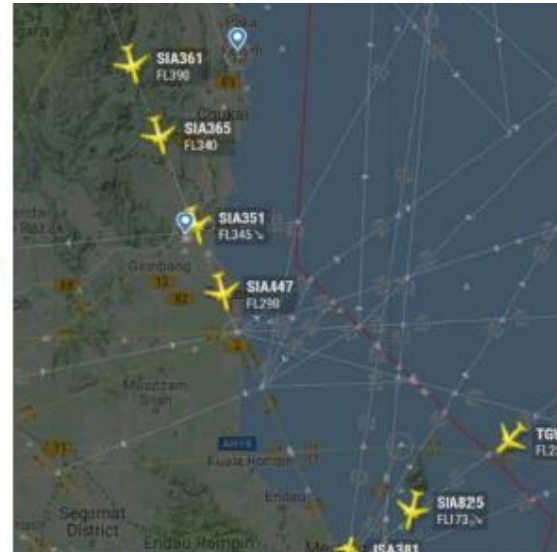
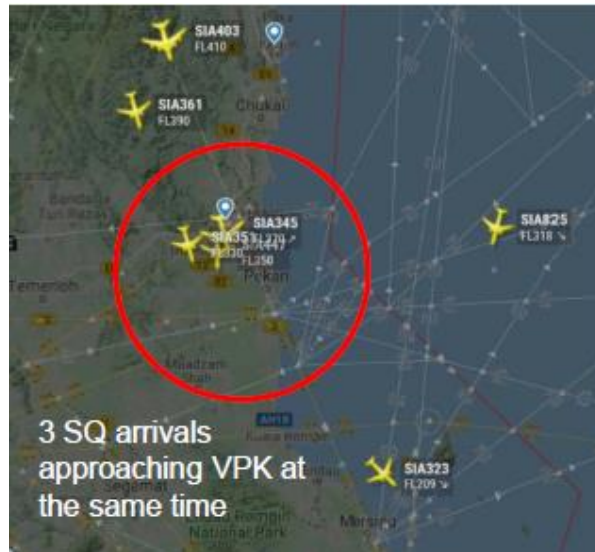
To regulate long haul arrival flights through time-based spacing prior to entering the Singapore FIR



Jan 2019 to present (3 phases)

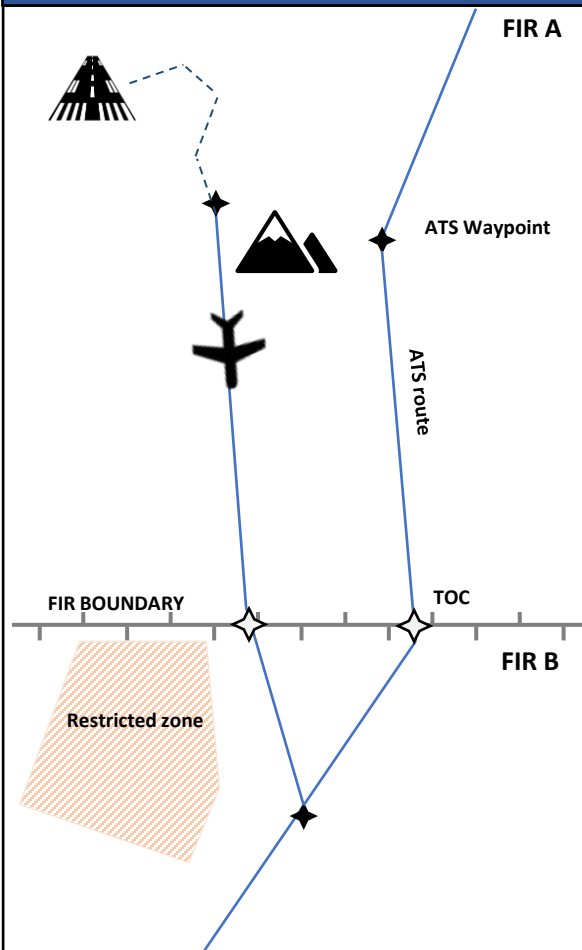


Trials scheduled in the morning where long hauls constitute 80% of arrivals



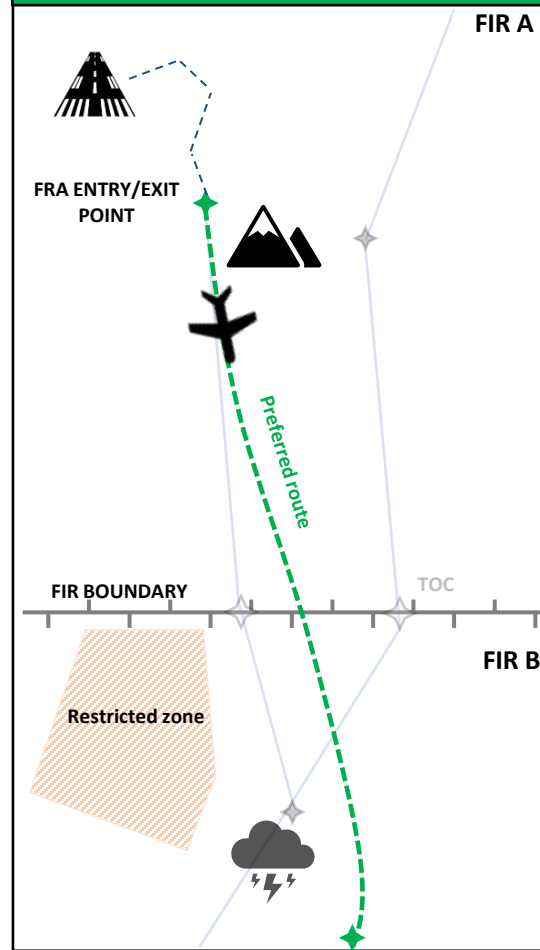
R&D on concept of ops to enable more direct, user-preferred routes

ATS Route Network – Conventional



- Structured ATS route to avoid obstacle and restricted zones
- Existing flight plan information is sufficient for today's operation
- Aircraft to fly via planned ATS route network and adhere to speed restriction
- ATC manages separation between flights

Free Route Airspace Concept – Future Development



- Airspace defined by a defined entry and exit points (inclusive of lat/long coordinates)
- Operators can freely plan flight route within FRA – requires more information
- Operator's responsibilities to plan a flight route clear of obstacle and restricted zones
- ATC continues to manage separation between flights, with better service quality through optimising flight trajectories

Digital tower operations to improve operations and performance



Operations Room : 1 video wall, 3 controller workstation positions

- Enhanced Operational Efficiency
- Improved Line of Sight
- Enhanced Safety and Situational Awareness

Smart Tower Prototype and Evaluation in 2020

47 ATCOs participated in live sessions

187 live hours were carried out from May to Jun 2020

Feedback from ATCOs was generally positive



Light glares and clarity of night scene require further studies



Key areas of evaluation:

- Operational safety, efficiency and capacity that can be provided by the Smart Digital Tower
- Assessment of ATCOs' capabilities, limitations and performance in operating the Smart Digital Tower
- ATCOs' acceptance of the new concept of operations, as well as an assessment of human-machine and human-human interactions.

Artificial intelligence assistive tools to augment work of ATCOs

Conflict Detection & Resolution

- Provide **conflict resolution advisories**
- Detect fresh **abnormalities not pre-known**
- Adapt to changing environment through **continuous learning**



Digital Assistant

- **Replace manual controller inputs** with automatic speech recognition technology
- **Issue commands** to ATM system through the use of voice commands
- **Transcribe** pilot and controllers' conversations **automatically** to aid in post operations incident review
- **Digitise** controller-pilot voice exchange for greater insights into ATM operations

Smart Digital Tower

- **Interpret and track video images** for runway clearances and anomalies
- Greater efficiency by enabling controllers to execute decisions **quicker, safer** and with **greater confidence**

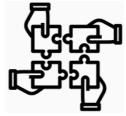
Airport Ground Movement Optimization

- **AI enhanced prediction algorithms** to aid diverse group of stakeholders in the ground operating environment (Changi Airport Group, controllers)
- Greater **efficiency** and **demand management**



- AI for Air operations
- AI for Ground operations
- AI for Productivity

Collaborate to achieve smart way of regulating air traffic



Collaboration among multiple Air Navigation Service Providers (ANSPs)



Tiered approach participation based on capabilities

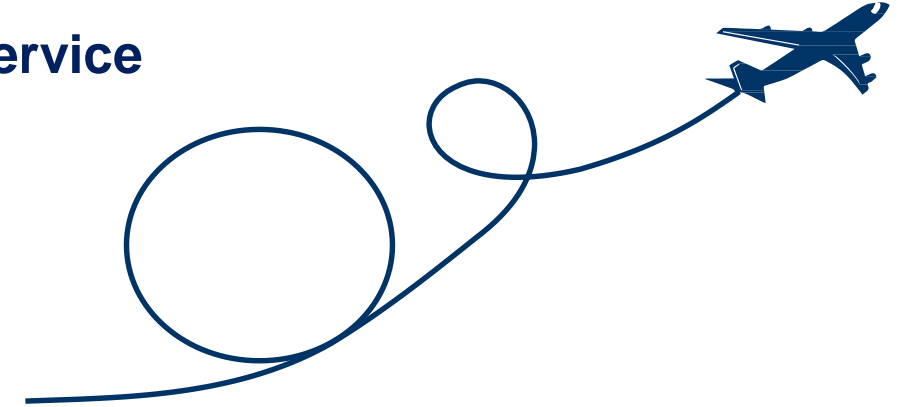
5+ Years since the start of operational trial (2015 – Today)

12 Participating ANSPs

38 Participating Airports

27 Airlines

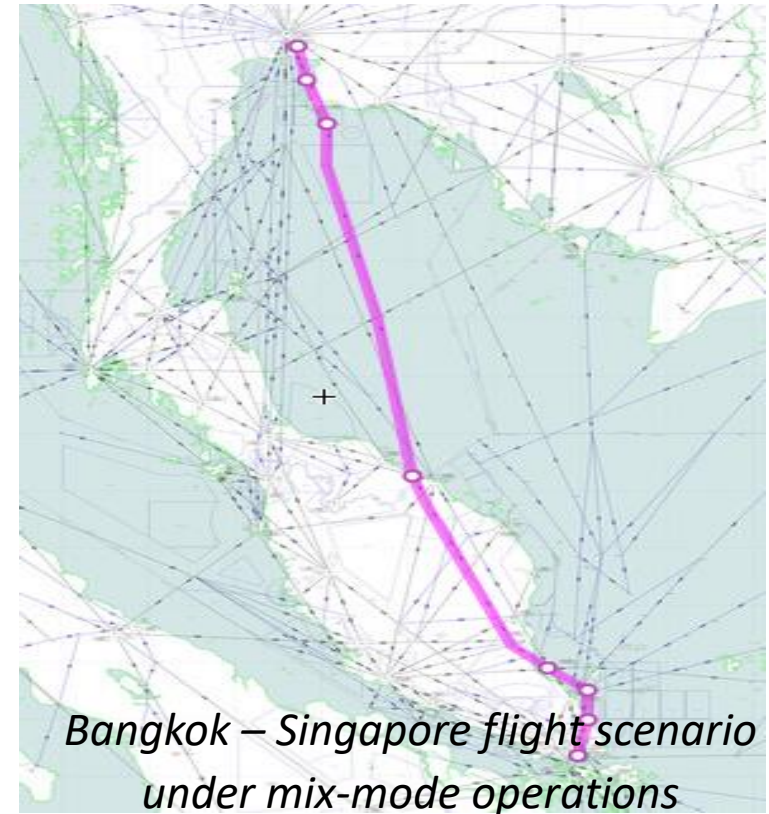
>100 Rounds of distributed ATFM programmes activated



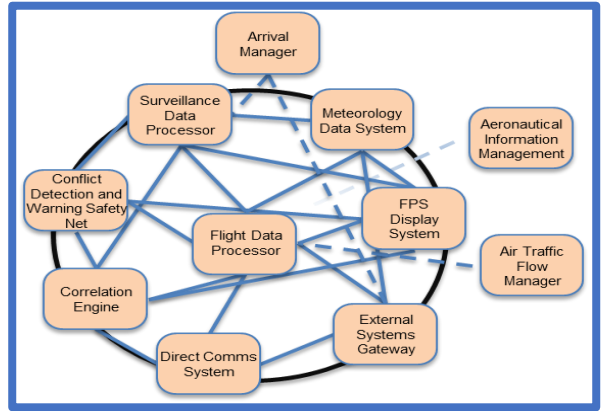
Riding the wave of information exchange, Asia-Pacific Cross-Border Multi-Nodal Air Traffic Flow Management initiative enables smart way of regulating traffic

Collaborate to enhance information exchange and achieve Multi-Regional Trajectory Based Operations

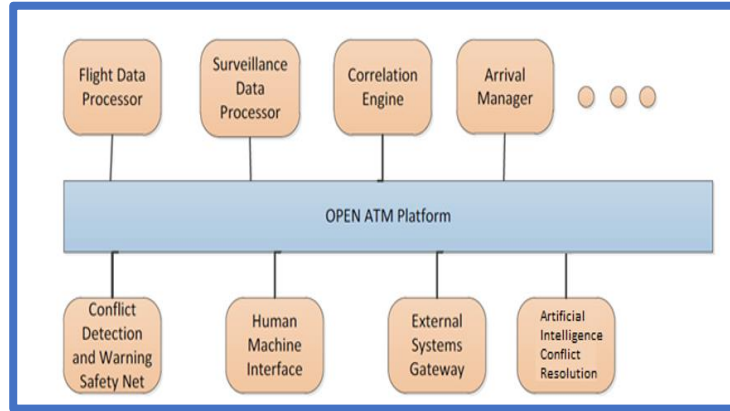
- Multi-Regional demonstration of Trajectory Based Operations
- Supported by CANSO members
- Negotiation of flight trajectory based on predicted traffic information through Flight and Flow information exchange



Collaborate to realise Open Architecture enabling plug and play of ATM products, tools and services



As-Is



To-Be



Riding the software development trend to realise the Open ATM architecture enabling plug and play of products, tools and services

Moving Forward

Aviation Intelligence Unit
Think Paper #10 - 20 April 2021

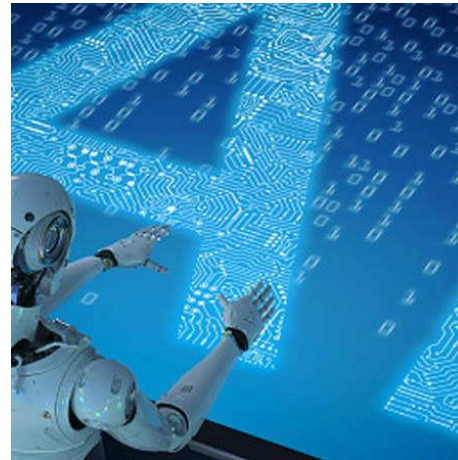


Flying the 'perfect green flight': How can we make every journey as environmentally friendly as possible?

European aviation has embarked on its most important trajectory for decades: the goal of achieving the ambitious target of carbon neutrality by 2050. The political will is there, with the European 'Green Deal' showing the way forward: the challenge is to make every journey as environmentally friendly as possible and aim to fly the 'perfect green flight'. This Think Paper takes the reader on a journey, looking at every aspect of a flight before, during and immediately after, to identify the main opportunities to improve aviation sustainability at each stage, the challenges that need to be tackled to get closer to that 'perfect green flight', and what we can do – now and in the medium term – to make that happen.



- *How can we make every journey as environmentally friendly as possible ?*
- *How can we integrate digital technology to enhance our customer experience ?*





Thank you



Innovative ATM

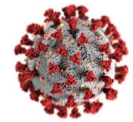


**Mr. Tinnagorn
Choowong**

Executive Vice President, Operations,
AEROTHAI



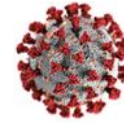
Better ATM Infrastructure



Cost cutting



Cost effectiveness

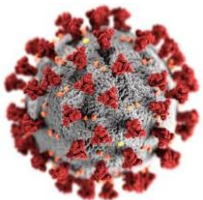
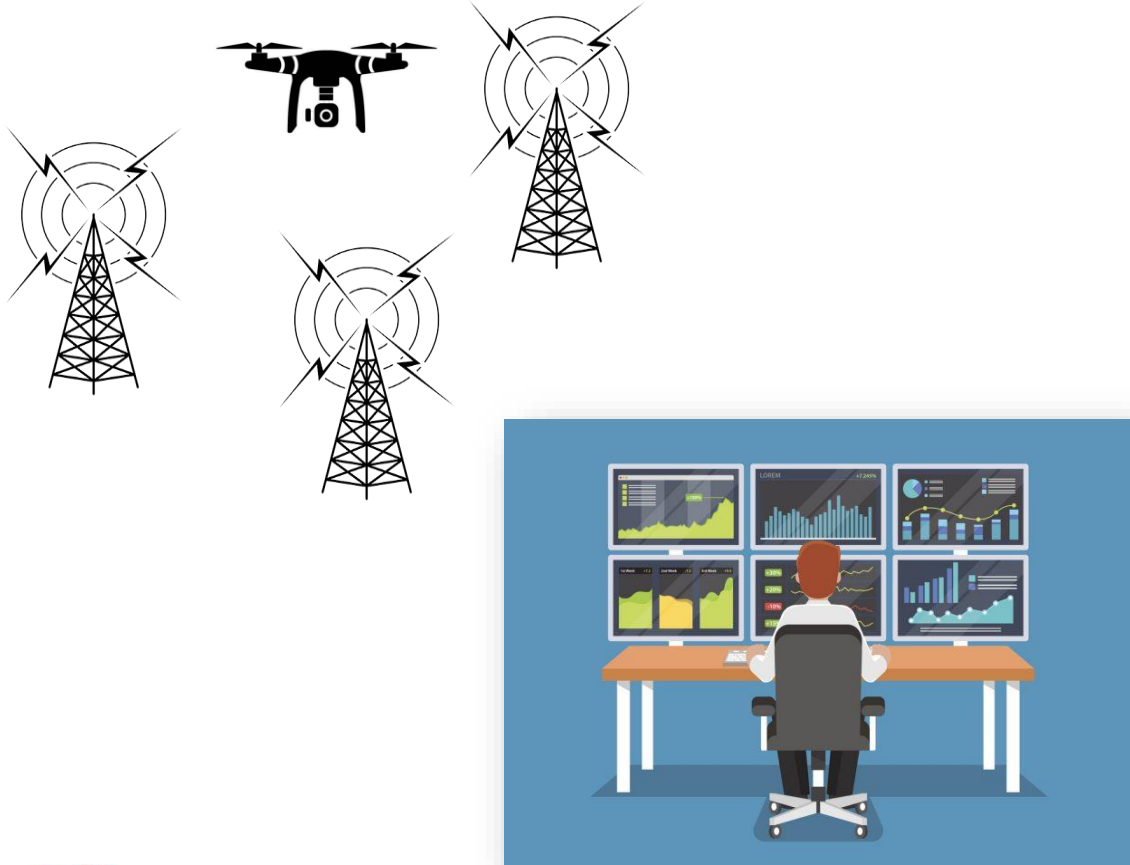


- Manpower management
- Remote operation
- Virtual working environment



Scalable system performance

New Operating Models



Remote monitoring



Cloud-based technology

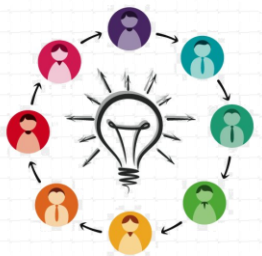
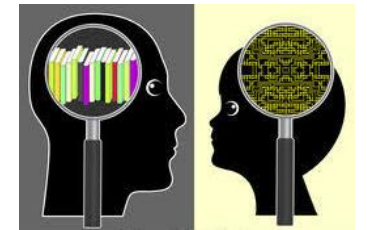
Virtual Training

Opportunity or Challenge



Mindset

Generation vs. Adoption of new learning approach



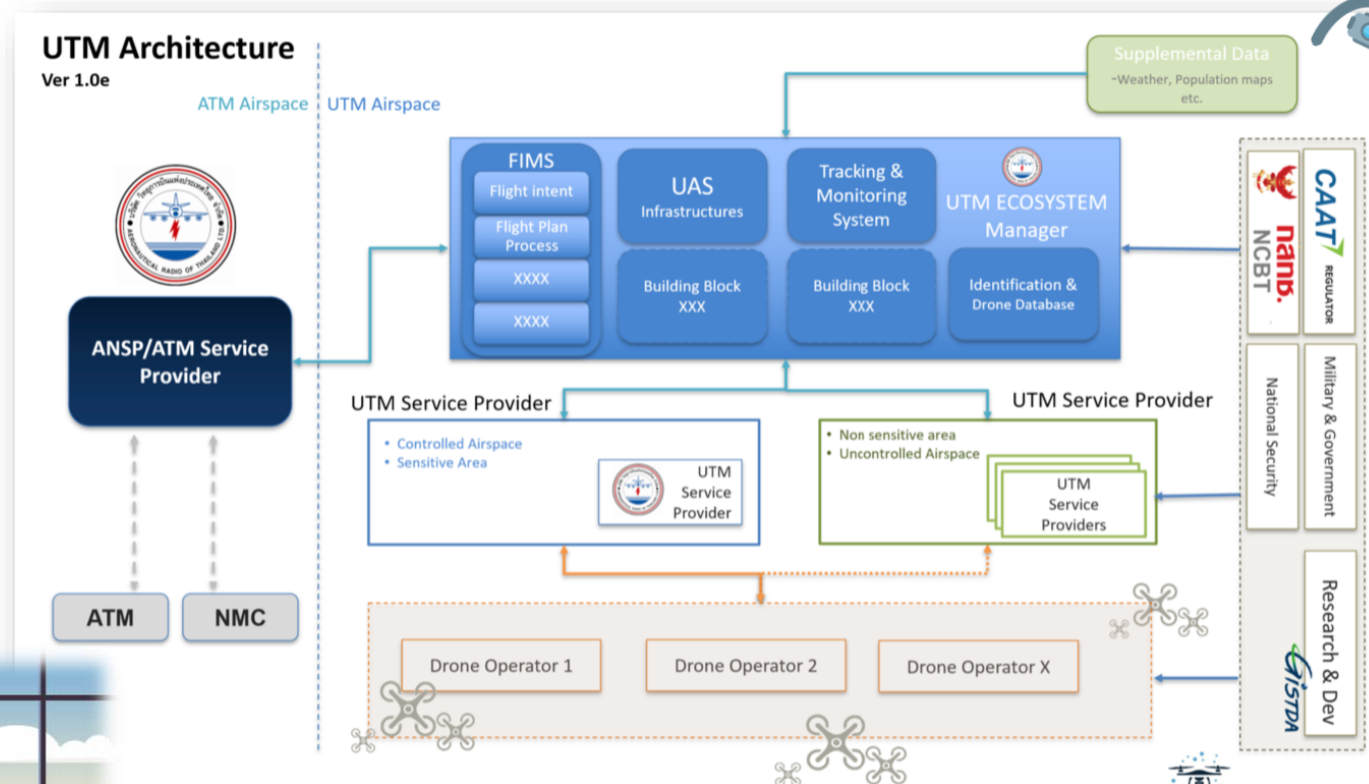
Knowledge sharing and knowledge management

Learner's Concentration



UAS/New Entrants

Opportunity or Challenge





Thank you

