



# Aviation Trends

Speaker: Jamie Bloomfield

ASI  
Symposium  
2024

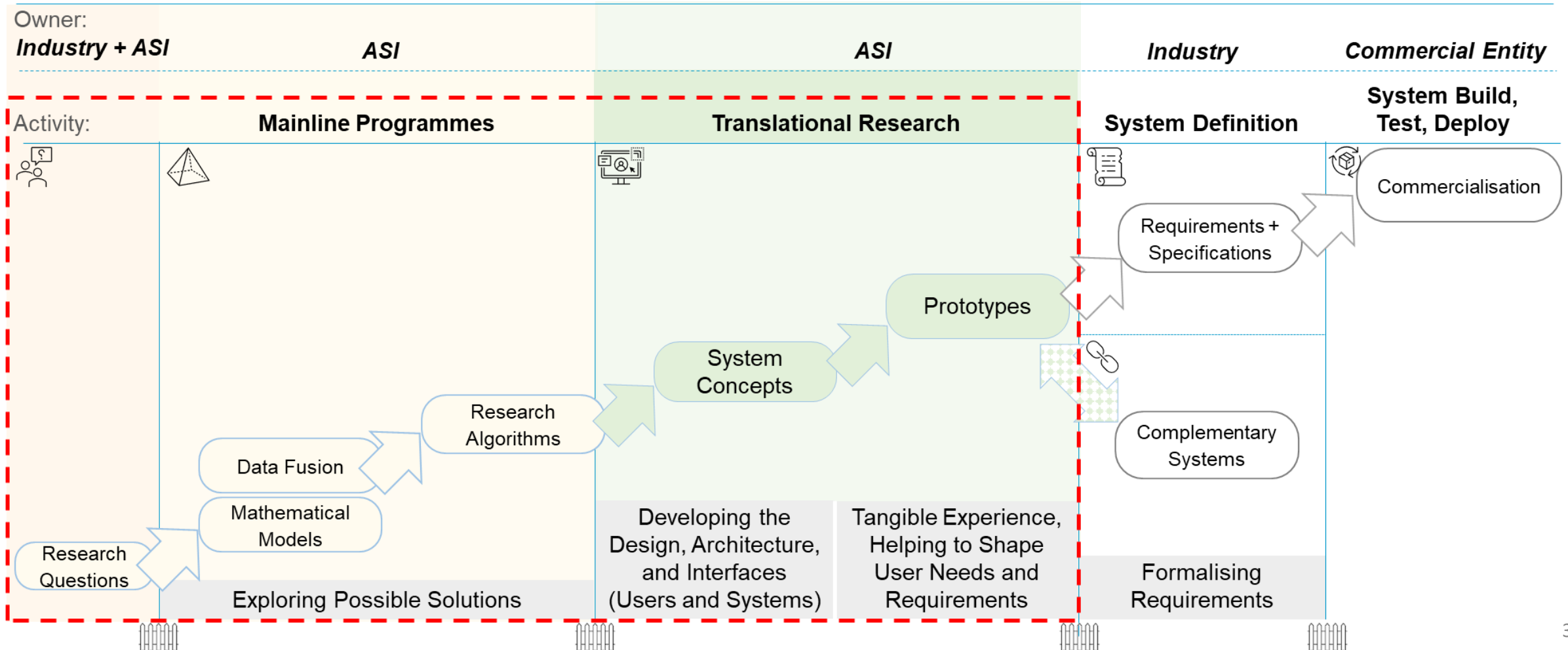


# Aviation Trends and Developments in Air Traffic Management

7 March 2024

# About

ASI provides early identification of solutions to operational and research related challenges. We further the development of promising solutions into user-defined capabilities.

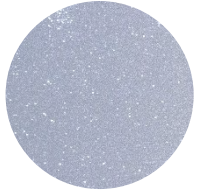


## Research Translation



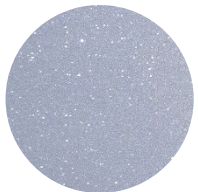
### **Development of Software Prototypes**

– to support user engagement in design and iterative development



### **White space research**

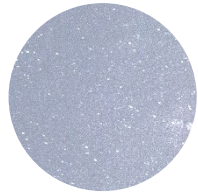
– identifying new problem statements and exploring ways to solve



### **Industry Engagement**

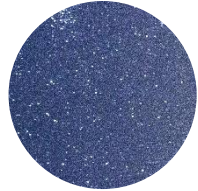
– raising awareness of policy issues for consideration

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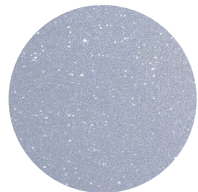
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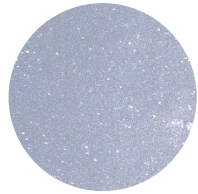
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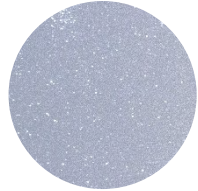
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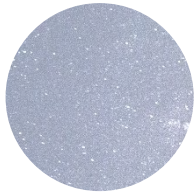
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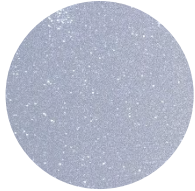
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## Research Translation



### Development of Software Prototypes

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### White space research

– identifying new problem statements and exploring ways to solve



### Industry Engagement

– raising awareness of **policy issues** for consideration

# Policy Insights on the Aviation Ecosystem



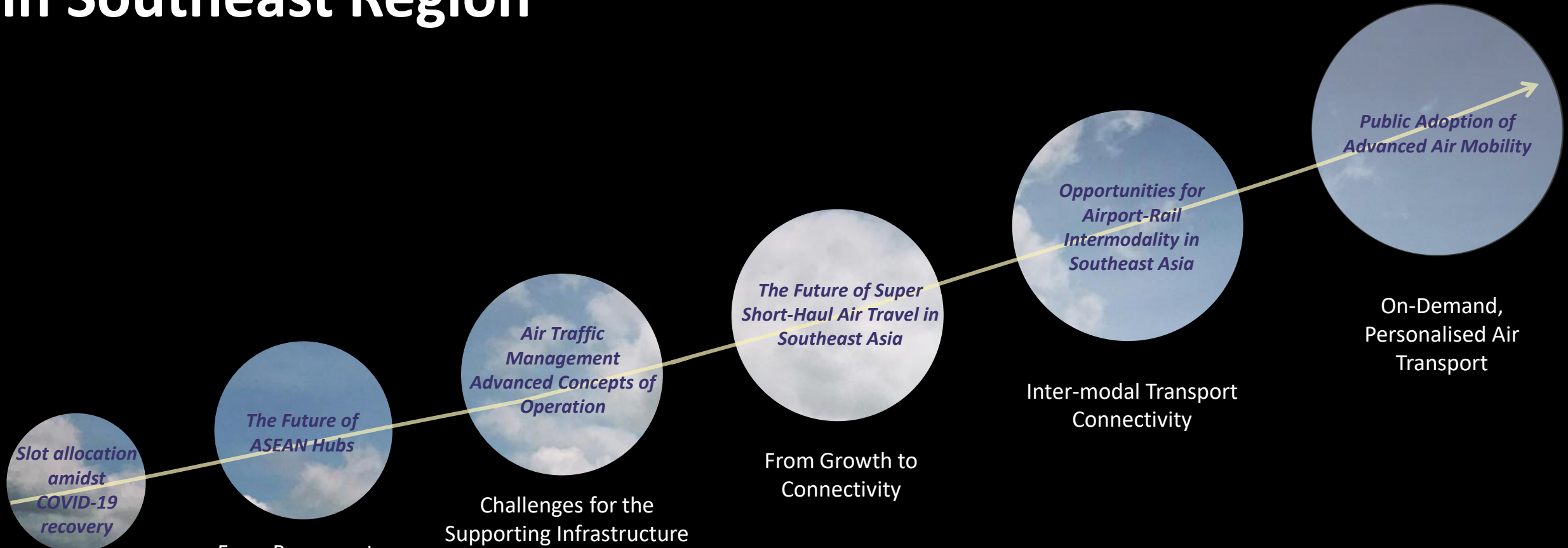
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**6 White Papers over  
the last 2-years**

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**Air Transport,  
Airport Connectivity,  
Air Traffic Management**

# The Evolution of Transport Challenges + Opportunities in Southeast Region



Lessons Learnt for Future Resilience

From Recovery to Growth

Challenges for the Supporting Infrastructure

From Growth to Connectivity

Inter-modal Transport Connectivity

On-Demand, Personalised Air Transport

Recovery

Servicing Future Demand

Improving Efficiencies

Integration

# From Recovery to Growth



## The Future of ASEAN Hubs

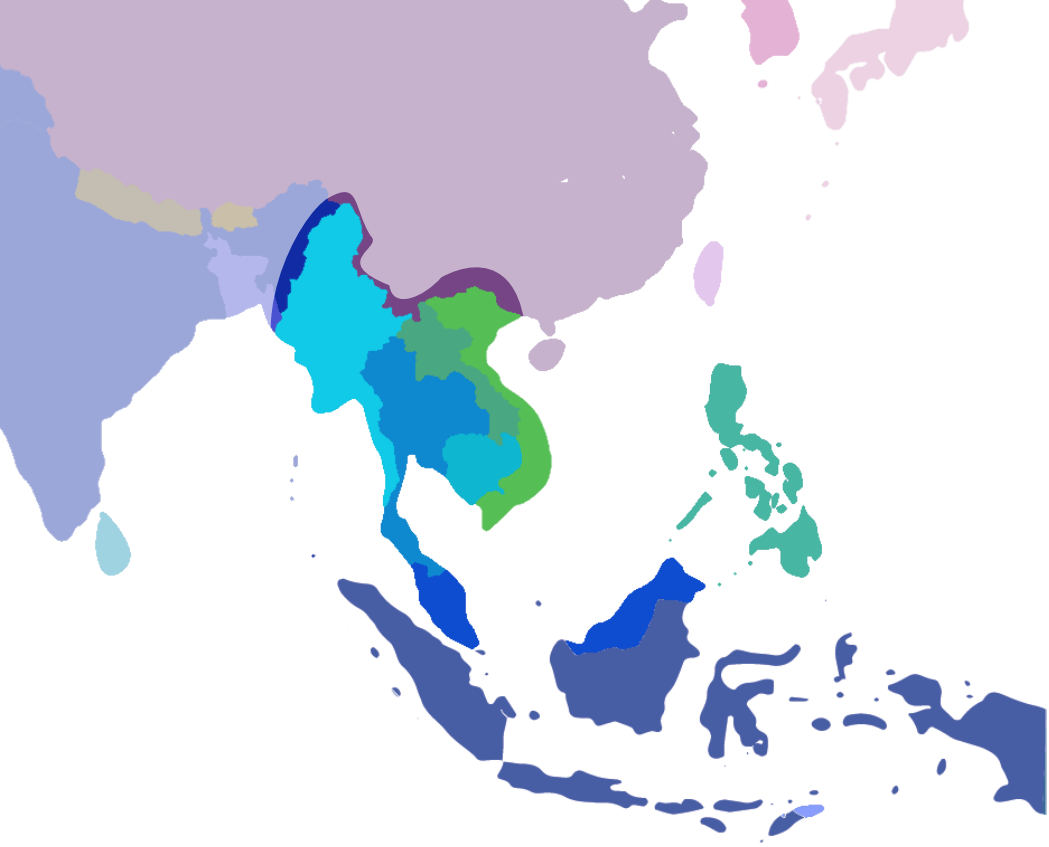
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# From Recovery to Growth



**Published in February 2022:**

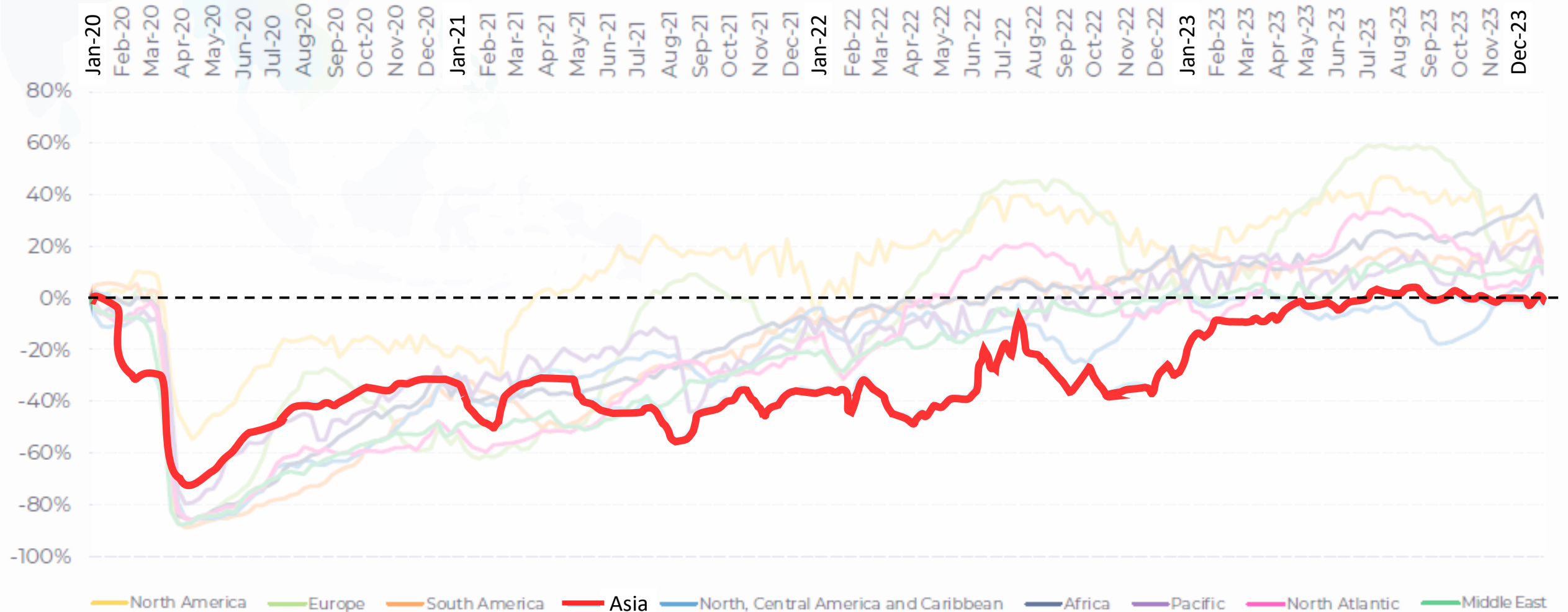
**An assessment of the future of Hub Airports  
in ASEAN during the recovery from COVID-19**



# From Recovery to Growth

## An Air Traffic Management Perspective

Percentage change in air traffic movements by region (compared to 2019)



# From Recovery to Growth

## From an Airline and Airport Perspective

- Recovery of Demand and Capacity
- Recovery of Connectivity

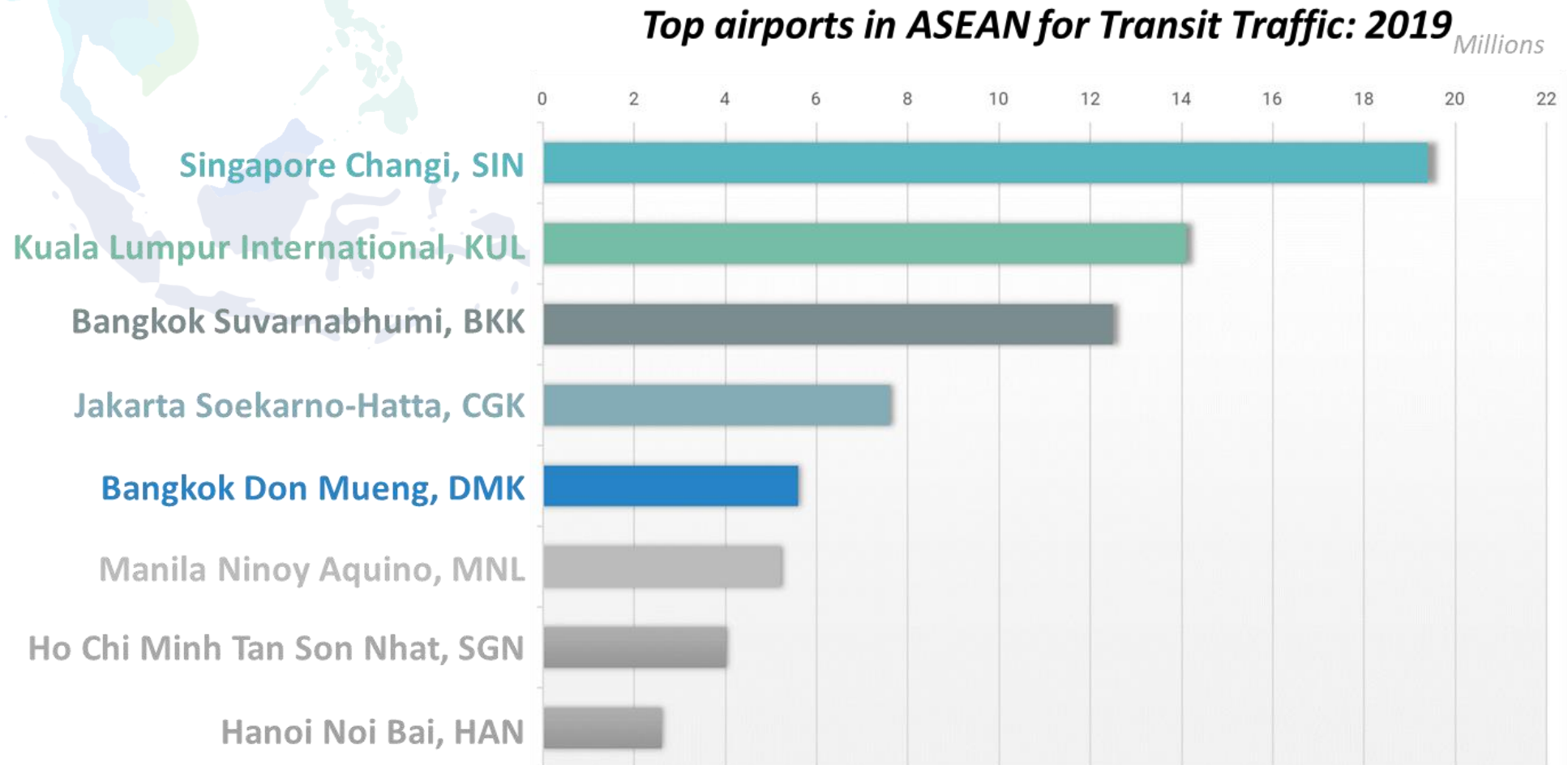


Chart Data Sourced from OAG and Sobie Aviation

# From Recovery to Growth

## Examples of Secondary Routes

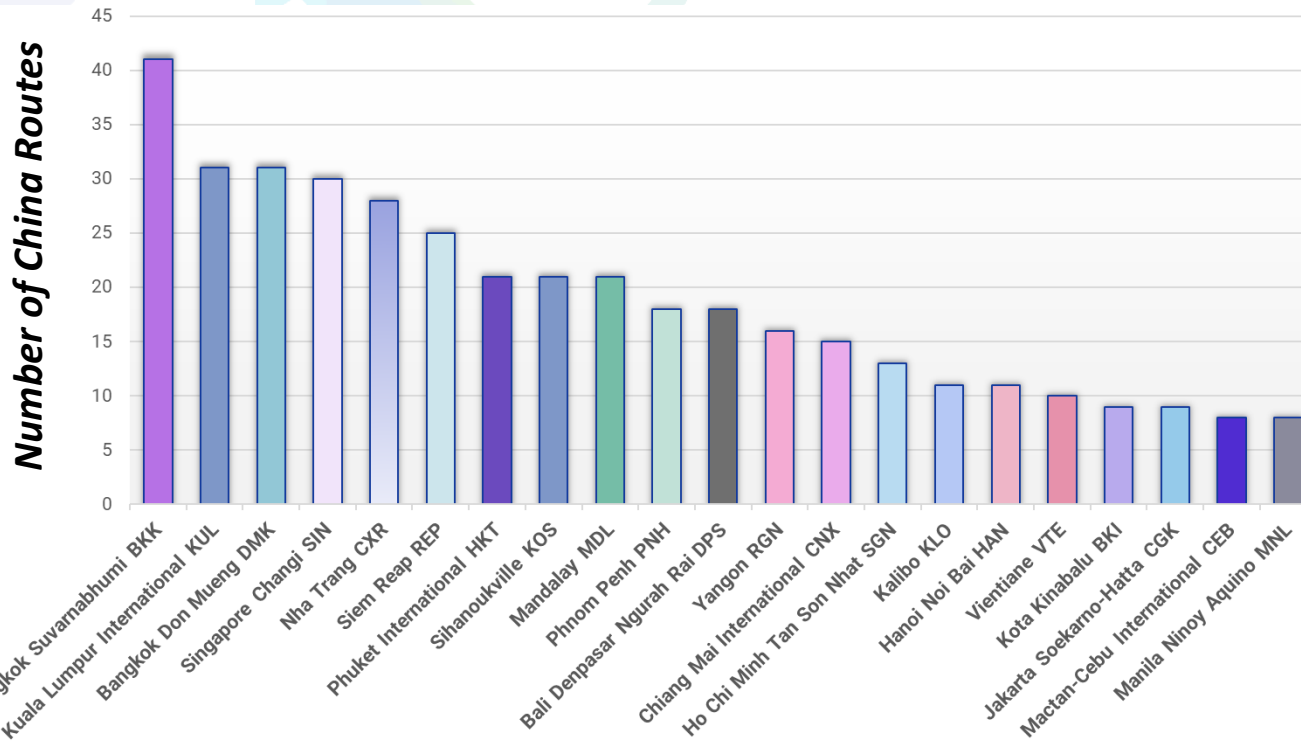


Great Circle Mapper ([www.gcmap.com](http://www.gcmap.com)) - Copyright Karl L. Swartz.

- Several links between airport hubs within ASEAN to secondary destinations within ASEAN were established pre-pandemic
- Risk of loss after-pandemic
- Opportunity to leverage as part of economic recovery

# From Recovery to Growth

**Top ASEAN airports for China connectivity (pre-pandemic)**

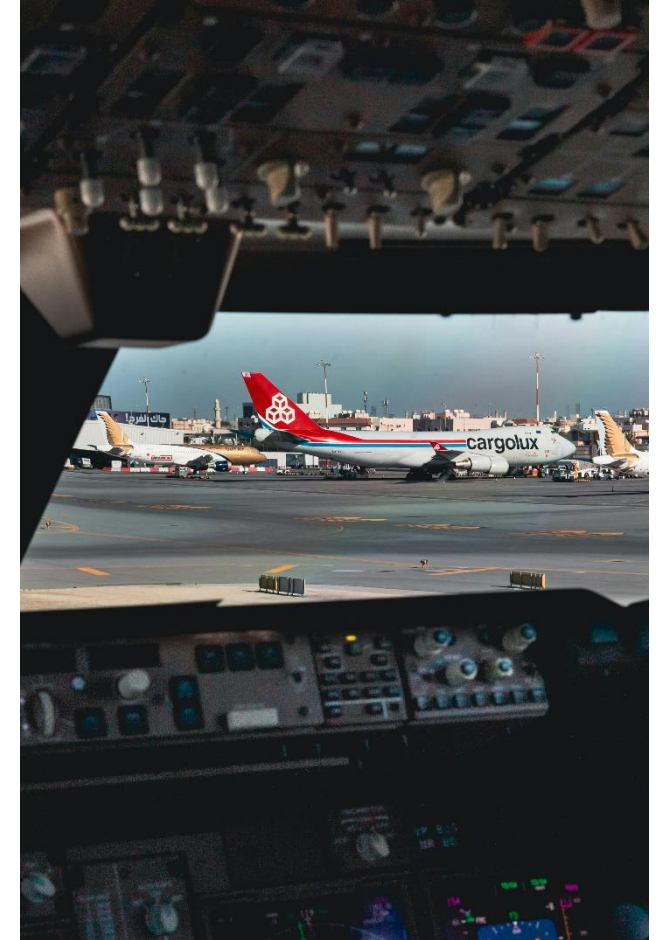


- **Pre-COVID-19:  
Growing Dependency on China Market**
- **24% of total visitors to ASEAN in 2019  
were from China**
- **Highlights the importance of  
diversification**

# From Recovery to Growth

## Lessons for the Future

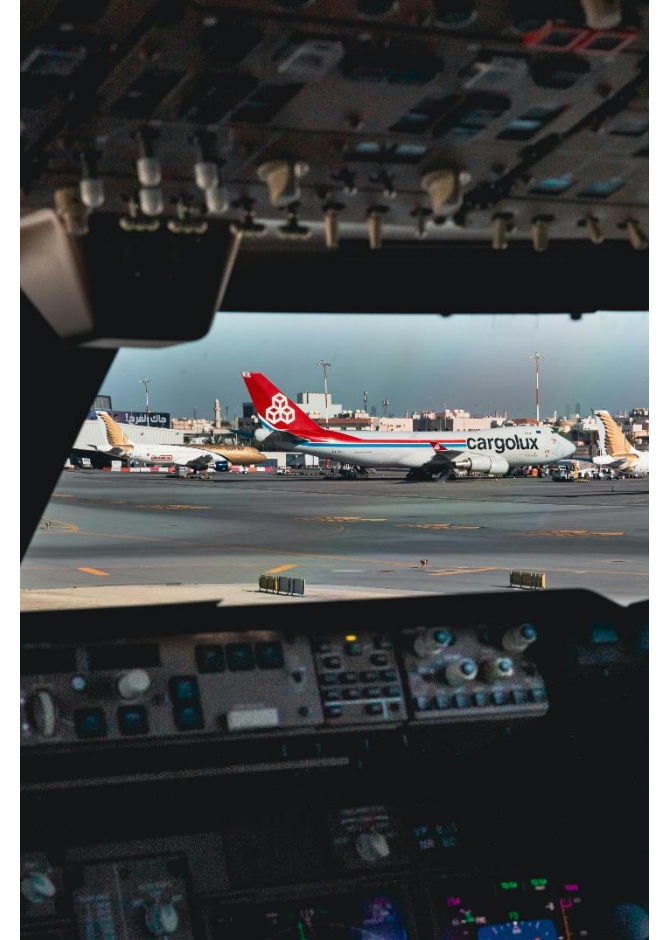
- **Diversity:**
  - Network spread for Airports and Airlines
  - Aircraft Gauge (esp. for domestic markets) aids flexibility, but does increase complexity
- **Cargo:**
  - Cargo can act as a hedge for airlines
  - Temporary boost during COVID-19
  - Needs greater investment in cargo infrastructure in Southeast Asia to compete with North Asia and Middle East cargo hubs
- **Government Support Effective (but not a panacea):**
  - Staff retention – even though still recruiting today
  - Fleet capacity
  - Supply chain effects (still reverberating)



# From Recovery to Growth

## Lessons for the Future

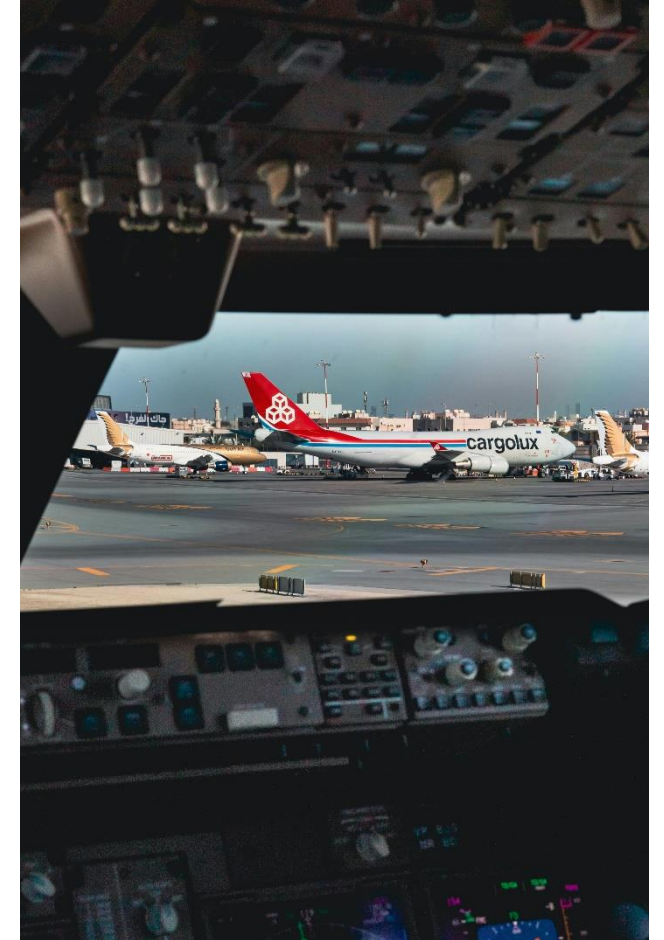
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# From Recovery to Growth

## Lessons for the Future

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# Lessons Learnt for Future Resilience



## Slot allocation amidst COVID-19 recovery

Recovery

Servicing Future Demand

Improving Efficiencies

Integration

# Lessons Learnt for Future Resilience

## Airport Slot Coordination and COVID-19

### Worldwide Airport Slot Guidelines (WASG)

- Access to airport facilities: aprons, terminals, **runways**, taxiways
  - Level 3 – demand exceeds capacity
  - Level 2 – demand sometimes exceeds capacity at certain times (e.g. morning peaks)
  - Level 1 – capacity sufficient
- Airline and Airports coordinate twice a year



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Optimisation opportunities



# Lessons Learnt for Future Resilience

## Airport Slot Coordination and COVID-19

### Worldwide Airport Slot Board (WASB)

- Recommendations and guidance
- Best Practice - Not mandatory
- Implementation by local organisations

### Slot Processes were relaxed during COVID-19

- Exemption to 'Use it or Lose it' Rules (Justified Non-Usage Schemes)
- Different approaches affecting Southeast Asia



# Lessons Learnt for Future Resilience

## Airport Slot Coordination and COVID-19

### Challenges:

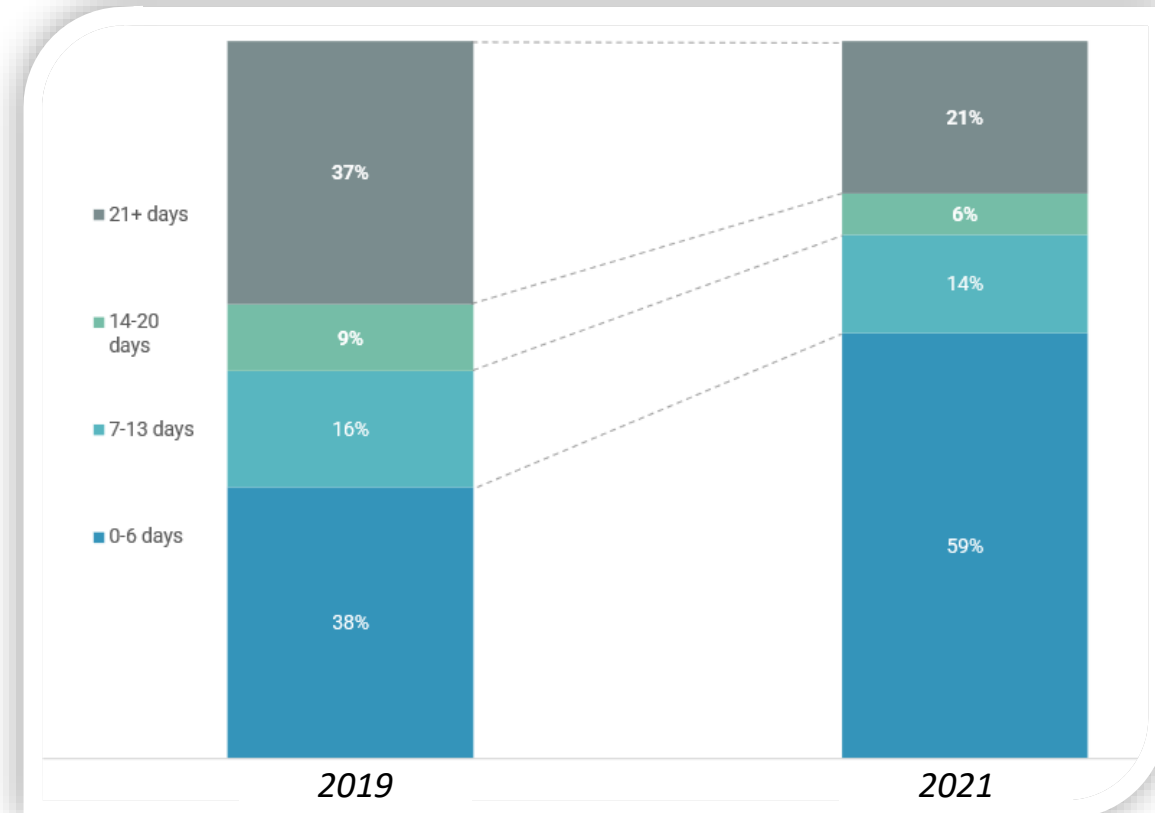
- Reduced lead-time for passenger bookings
- Variety of Health Restrictions
- Dynamic changes to capacity (short notice)
- Understaffed coordinators



### Examples

- 46 -> 20 movements per hour capacity reduction
- Daily passenger cap at airport level (not per flight level) leading to uncertainty

*Number of days between booking and travel time  
(in Asia Pacific)*



# Lessons Learnt for Future Resilience

## Industry Feedback on the Regional Measures used during COVID-19

### What Worked Well:

- Relief Measures - Relaxation of Use-It or Lose-It Rules
  - ✈ supported airlines with and without deep-pockets (i.e. new entrants).
- Inclusion of Reciprocity Clauses between states
  - ✈ leading to regional **consistency**
- Ability to return full series of slots (without loss of historical rights)
  - ✈ leading to **certainty**

### Improvement Required:

- More timely **communication** between authorities and the industry

# Challenges for the Supporting Infrastructure



## Air Traffic Management Advanced Concepts of Operation

Recovery

Servicing Future Demand

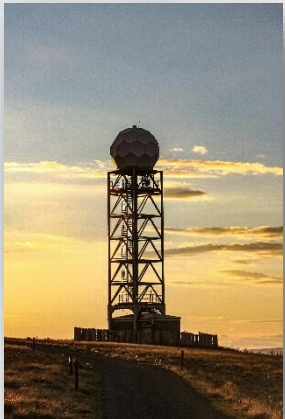
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# Challenges for the Supporting Infrastructure

## Air Traffic Management

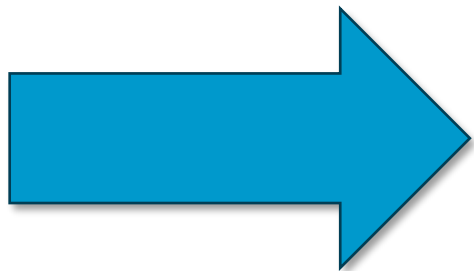
- Industry dependency upon *'Invisible Infrastructure'*
- Airspace users need to traverse multiple airspace
- Minimum standards and expectations:
  - Operating Concepts
  - Communication, Navigation, Surveillance capabilities
  - Language



# Challenges for the Supporting Infrastructure

## Air Traffic Management

- Industry dependency upon *'Invisible Infrastructure'*
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- Coordinated Development of ConOps
- Coordinated Implementation Timeframes
- Shared dependency on cross-border operations



# Challenges for the Supporting Infrastructure

- Common Concept of Operations: Global Air Traffic Management Operational Concept 'GATMOC'
- Coordinated Implementation via the Global Air Navigation Plan 'GANP' – 6<sup>th</sup> Edition:
  - Series of Capabilities 'Upgrades'
  - Benefits, Applicability, Stakeholders
  - Enablers

ASBU ELEMENTS

▼ Edit Filters    Change Request    Download PDF    Generate PDF

Functional Description     Enablers     Deployment Applicability     Performance Impact Assessment

ACAS

ACAS-B/1	ACAS Improvements	Operational	📄	🔍	⌵
ACAS-B2/1	New collision avoidance system	Operational	📄	🔍	⌵
ACAS-B2/2	New collision avoidance capability as part of an overall detect and avoid system for RPAS	Operational	📄	🔍	⌵

ACDM

ACDM-B0/1	Airport CDM Information Sharing (ACIS)	Operational	📄	🔍	⌵
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GLOBAL STRATEGIC

GLOBAL TECHNICAL

REGIONAL

NATIONAL



# Challenges for the Supporting Infrastructure

- Common Concept of Operations: Global Air Traffic Management Operational Concept 'GATMOC'
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  - Series of Capabilities 'Upgrades'
  - Benefits, Applicability, Stakeholders
  - Enablers
- Progress Reporting (Regional Basis)
  - Not a regulatory requirement
  - Stakeholder Interests
    - airlines and the travelling public

GLOBAL STRATEGIC

GLOBAL TECHNICAL

REGIONAL

NATIONAL

LEVEL 1

LEVEL 2

LEVEL 3

LEVEL 4

# Challenges for the Supporting Infrastructure

- Implementation timescales often lag ('long-tail' to see improvements)
- Budgetary Pressures
- Knowledge Retention



1980s and 1990s:

- Europe and North America reacted to capacity issues

2020s:

- Traffic in Asia is growing
- Opportunity to learn from others

# Challenges for the Supporting Infrastructure

## Example Concepts and Capabilities

### Trajectory Based Operations

Real-time (Digital) Negotiation  
between Stakeholders

Trajectory Prediction / EPP

### Information Exchange

Data Models + Services

IP Infrastructure

Collaborative Processes

✈ Mindsets ? / Culture ?

### Air Traffic Flow Management

From Tactical Control (ATC) ✈

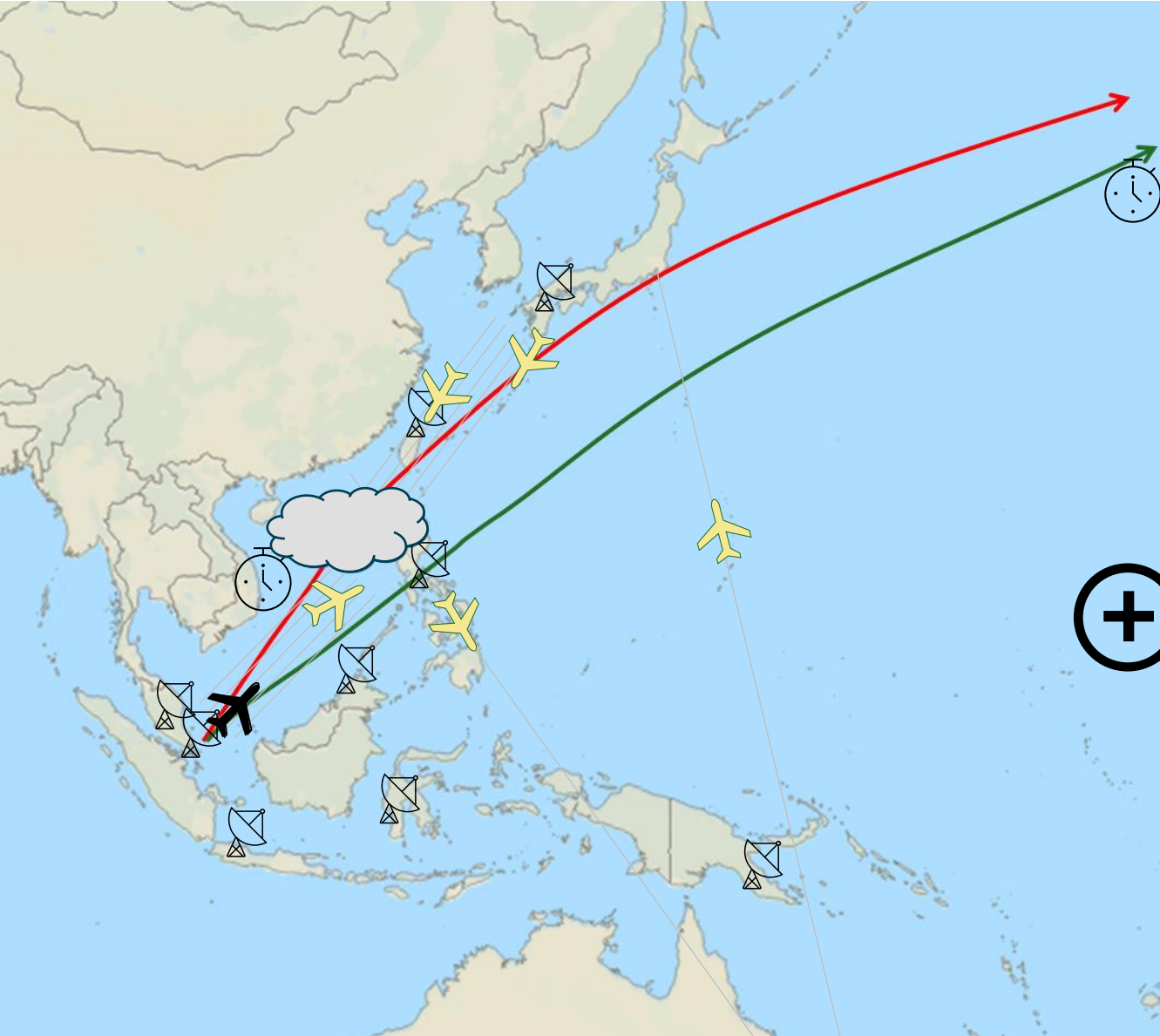
✈ To Strategic Management

*Paradigm or Complementary?*

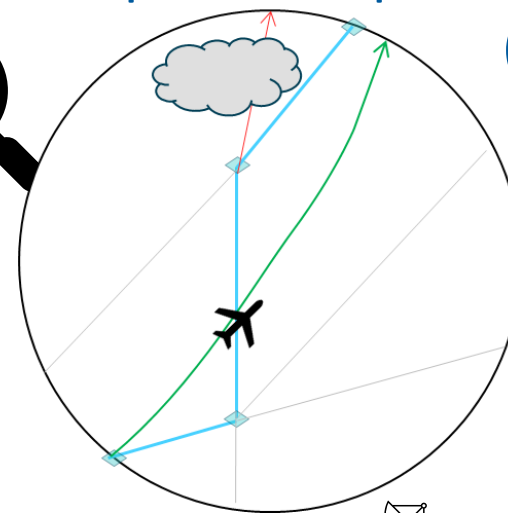
- New airspace users
- New traffic management technology organisations
- Future shift in business models: Increase in On-Demand?

# Challenges for the Supporting Infrastructure

## *Trajectory Based Operations – Concept Overview*



- Re-routing in-flight can have down-stream implications for other stakeholders
- Identification of impacts requires automated data sharing and prediction
- Negotiation of alternative re-routing options requires automation (for speed and capacity)



Example Air Traffic Control Centre

# Challenges for the Supporting Infrastructure

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✈ Mindsets ? / Culture ?

FF-ICE

SWIM

Task-Force(s) /  
Working Groups

### Air Traffic Flow Management

From Tactical Control (ATC) ✈

✈ To Strategic Management

*Paradigm or Complementary?*

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### **Virtualisation**

*Paradigm or Complementary?*

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*Paradigm or Complementary?*

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# From Growth to Connectivity



## The Future of Super Short-Haul Air Travel in Southeast Asia

Recovery

Servicing Future Demand

Improving Efficiencies

Integration

# From Growth to Connectivity

Scheduled flights on routes of less than 500km distance (~270 NM)

➤ *'super short-haul'*

*500km radii from a selection of airports*



# From Growth to Connectivity

## *Top 28 scheduled 'super short-haul' routes*

- Broad spread of routes across the region, mostly influenced by geography
- Shrinkage occurred during COVID-19
- Full recovery yet to occur - expected sometime this year.

***International Routes (2020)***



*White = At least Daily, Cyan = Non-Daily*

***Un-resumed International Routes (2023)***

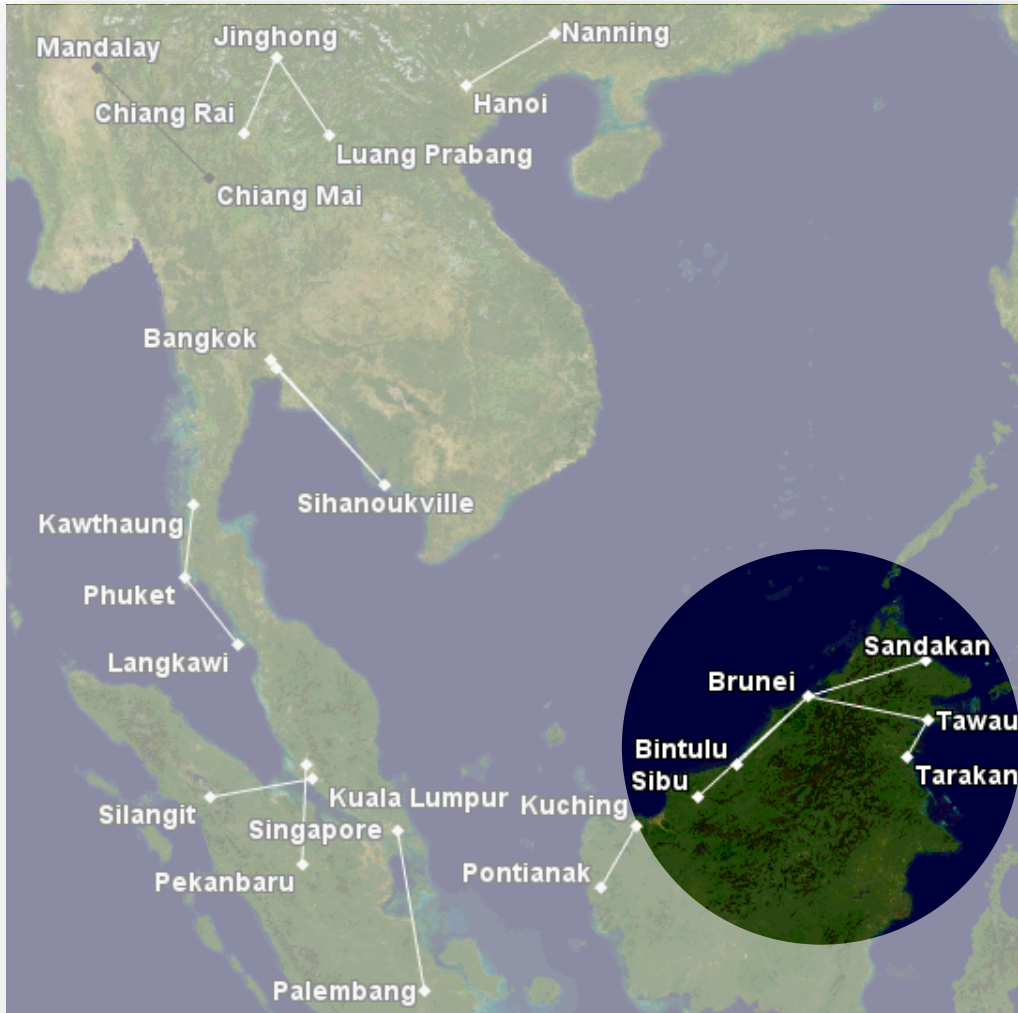


*Black = Chiang Mai-Mandalay. This was resumed on a very limited basis in March and April 2023 but with only one weekly frequency and was again suspended*

# From Growth to Connectivity

## Top 28 scheduled 'super short-haul' routes

### Un-resumed International Routes (2023)



New Brunei based airline due in 2024:

- 'Gallop Air' targeting entry in Q3 2024

Could this resurrect these routes?

- COMAC C919 narrowbodies  
...(targeting longer regional routes)
- ...no Air Operator Certificate, and pending investors...

<https://www.flightglobal.com/airlines/brunei-start-up-gallop-air-targets-q3-2024-launch-in-search-for-investors-partners/155230.article>

# From Growth to Connectivity

## *Challenges due to Aviation Policies - Indonesia*

- Only 15 airports permitted to handle scheduled international flights (as of 2022)
- Intended to stimulate development of hub airports and thicken routes
- Created some perverse outcomes

### *Shortest Route (separate tickets)*



Yellow = Original Shortest Route  
Cyan = New Shortest Routing

### *Land Route (Bus or Car)*



- Car: 4hr 30min
- Bus: 6hr 30min

# From Growth to Connectivity

## *Challenges due to Aviation Policies – Malaysia, Kuala Lumpur*

- Subang Airport 'Skypark', SZB
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- Change aimed at airport regeneration: target premium and business traveller segment

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New Jet-operators arriving



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Inducing an increased focus on high-traffic routes  
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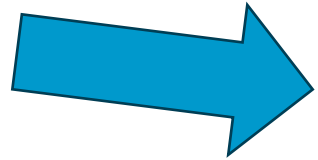
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### Risking:

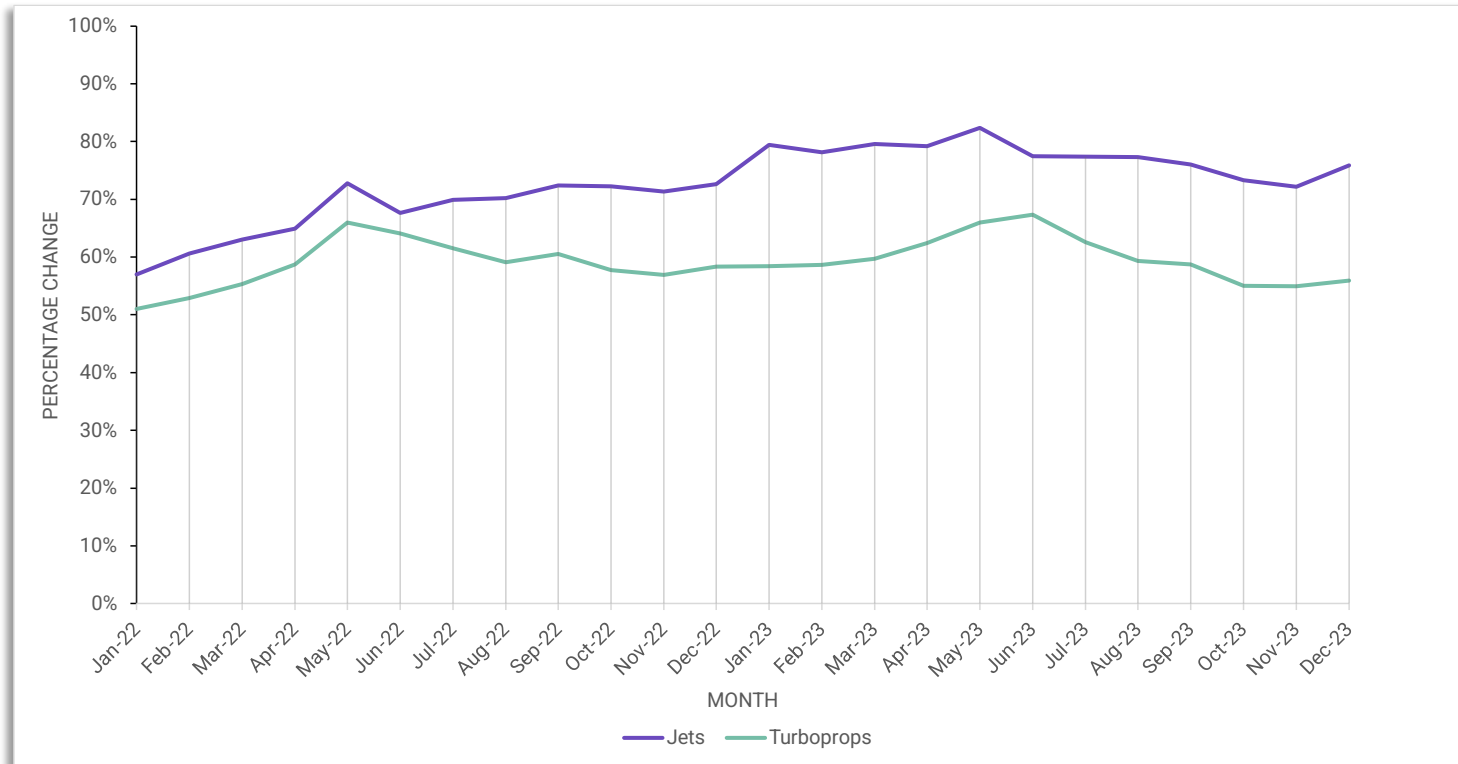
- A greater focus on truck-route operations at the expense of ‘thinner’ less served destinations
- Increased fuel consumption = increased greenhouse gas emissions
- Impairing opportunity for future electric aircraft operations

# From Growth to Connectivity

## General Trend to Jet Aircraft and away from Turboprops

Start of 2020 - 300 turboprop aircraft  
End of 2023 - 200 turboprop aircraft

## Recovery rate for Jet and Turboprop super short-haul flights 2022 - 2023



## Negative Public Perceptions:

- Safety
- Comfort
- Speed
- Environmental

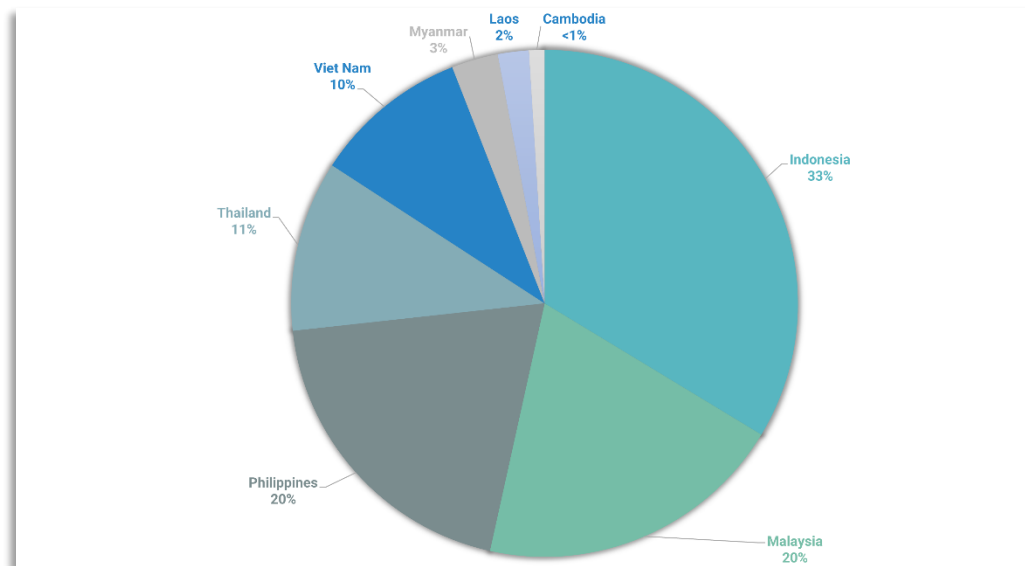
# From Growth to Connectivity

## Outlook for Super Short-haul

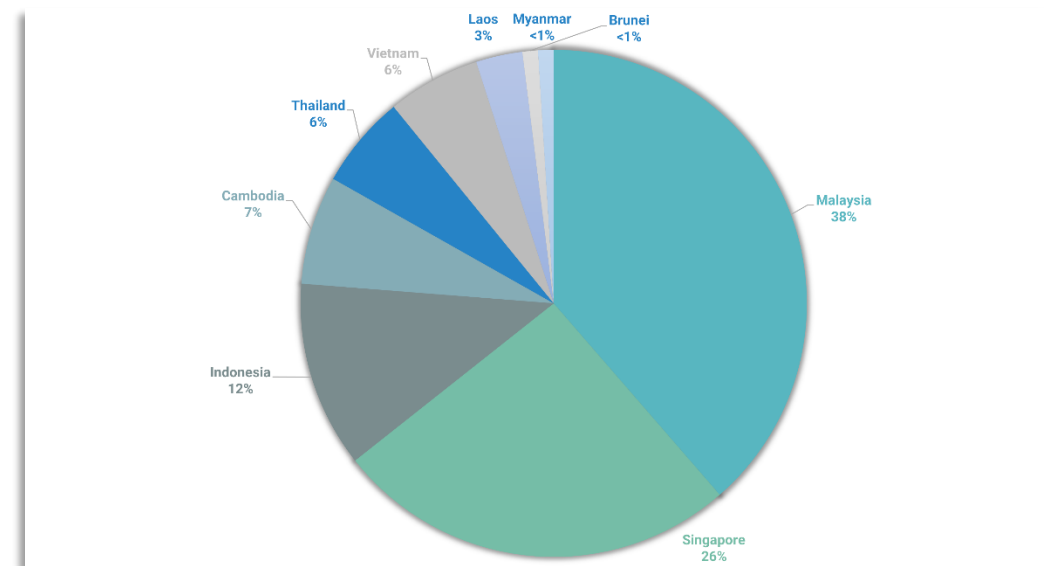
- Philippines** – Insulated by island archipelago. Constraints at MNL provide further support
- Indonesia** – Most routes are between islands, but some on Java may be impacted by HSR
- Malaysia** – Increasing use of Jets, causing longer term shift to hubs
- Singapore** – Constrained by lack of available destinations (e.g. Indonesia policy)
  - Changes in (non-Super Short) from Scoot's purchase of E190-E2 {trial}

**Number of super short-haul scheduled flights 2023 by Country**

**International**



**Domestic**



# Inter-modal Transport Connectivity



## Opportunities for Airport-Rail Intermodality in Southeast Asia

Recovery

Servicing Future Demand

Improving Efficiencies

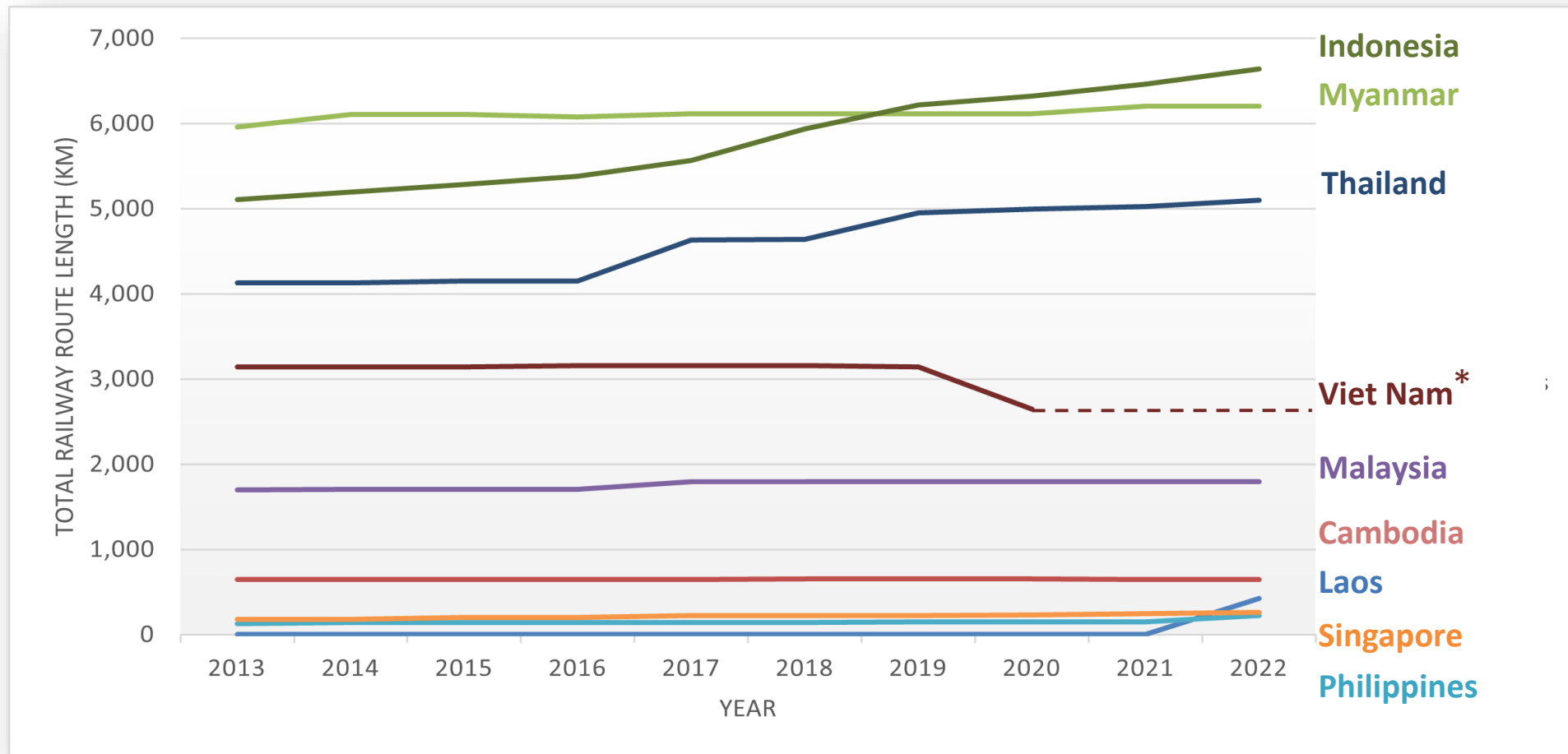
Integration

# Inter-modal Transport Connectivity

Air Transport continues to play a key role in the transportation of passengers and cargo.

Several rail infrastructure projects in Southeast Asia demonstrate a renewed focus on rail

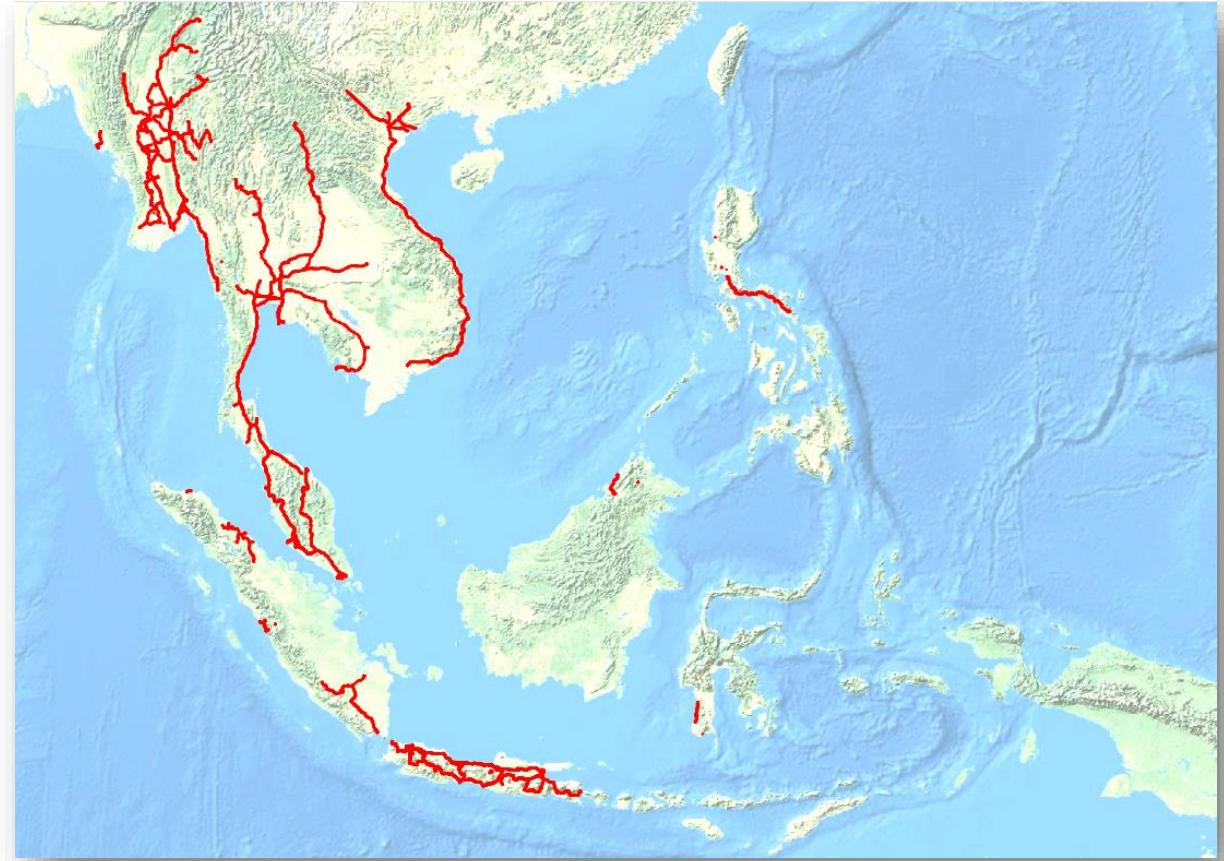
**Total Railway Length (inc. MRT) per Country**



Data from the ASEAN Statistical Yearbook 2023. Jakarta: ASEAN Secretariat, December 2023. Notes. Definition of Rail varies per country. \*Data for Viet Nam not available for 2021 and 2022.

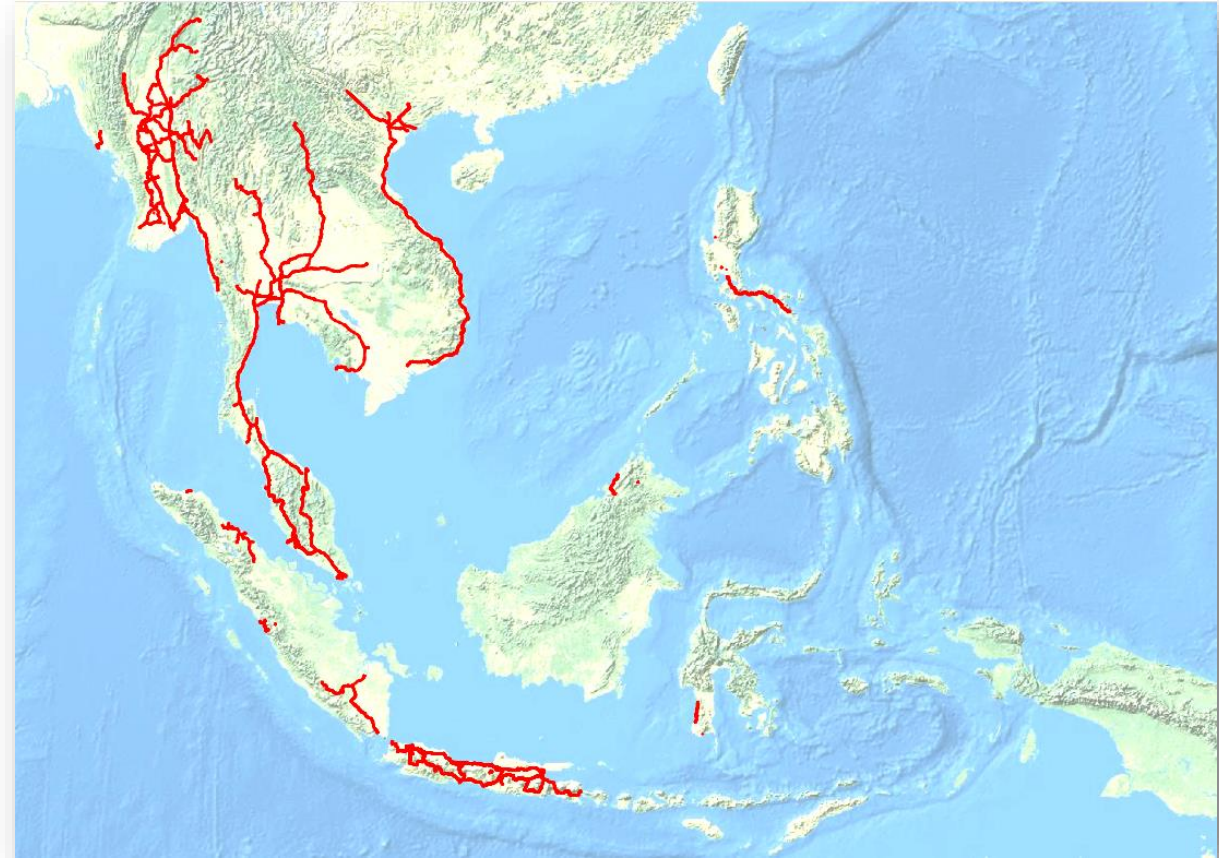
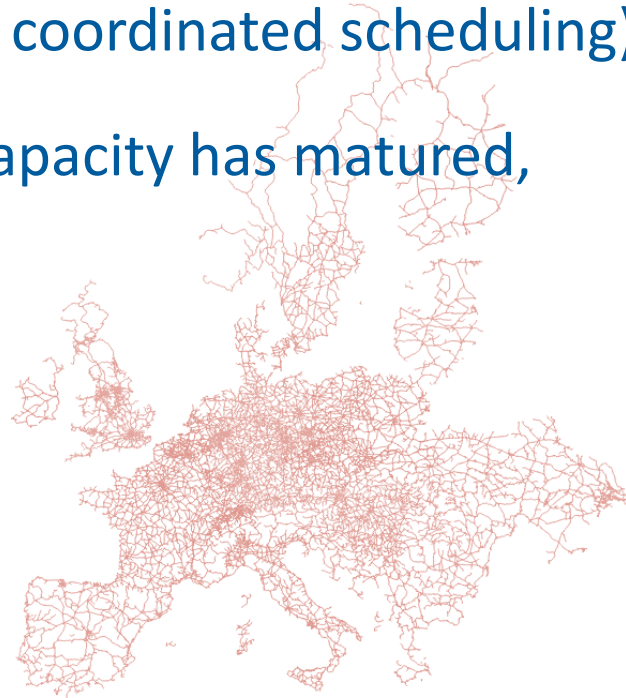
# Inter-modal Transport Connectivity

- Regional focus on building physical infrastructure
- Risk of missing Airport-Rail Infrastructure
- True inter-modality is not yet recognised (through ticketing, coordinated scheduling)
- May follow once capacity has matured, e.g. as in Europe



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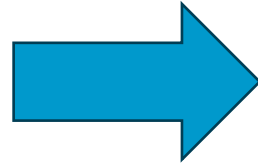


# Inter-modal Transport Connectivity

Some recognition is building – but not there yet

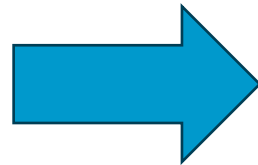
## Malaysia Airlines

- UK and South Korea...  
...No connections in KUL



## Nok Air

- Pseudo Add-Ons
- Focused on Ferries and Buses



Fly'n'Ferry Service



Fly'n'Ride Service

# Inter-modal Transport Connectivity

## Indonesia

- Extensive existing rail network
- Several existing airport-rail connections already (justified as part of airport investment)  
Limited retrofitting (with LRT and Metros), e.g. Palembang LRT due 2018 Asia Games.
- Recent investments in High-Speed Rail...  
...might compete with domestic flights once full route complete (3.5Hrs end-to-end)



# Inter-modal Transport Connectivity

## Indonesia

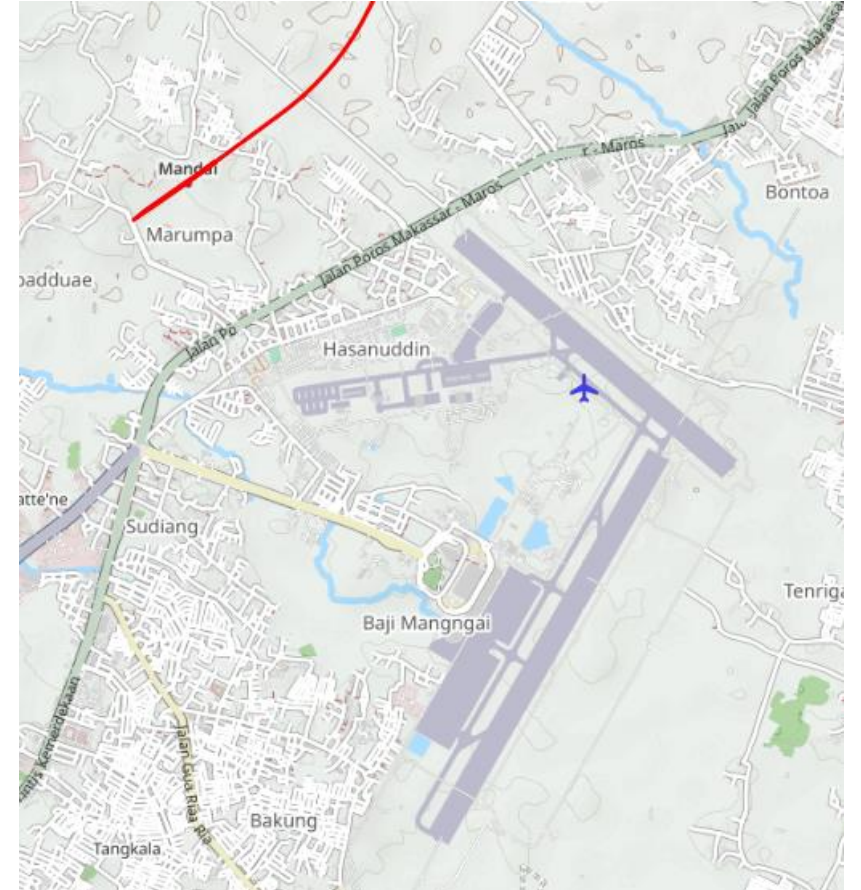
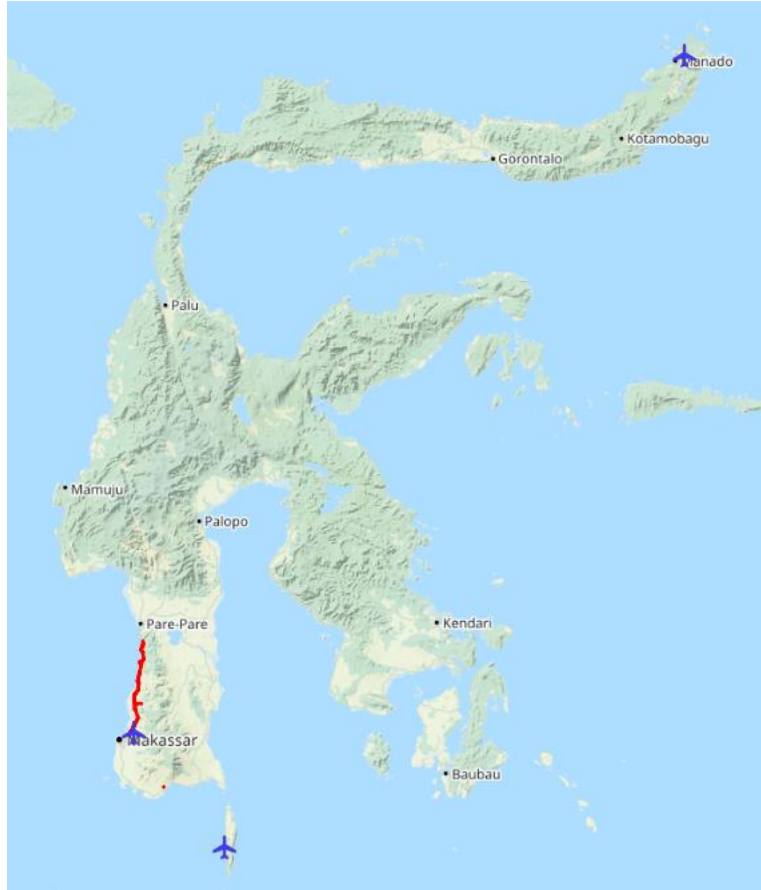
- Extensive existing rail network
- Several existing airport-rail connections already (justified as part of airport investment)  
Limited retrofitting (with LRT and Metros), e.g. Palembang LRT due 2018 Asia Games.
- Recent investments in High-Speed Rail...  
...might compete with domestic flights once full route complete (3.5Hrs end-to-end)



# Inter-modal Transport Connectivity

## Indonesia

- Some other rail investments occurring elsewhere in the country.
- Opportunities to build-in airport connections are being overlooked.



# Inter-modal Transport Connectivity

## Laos + Thailand

### Laos + Thailand Rail Network



- Laos implemented fast rail from its capital to Luang Prabang (2hrs)
  - Significant Reduction in Domestic Air Passenger Demand (Vientiane – Luang Prabang)
  - Lack of Airport-Rail connectivity. Could the loss of ‘connecting traffic’ make some ‘thin’ routes from Luang Prabang unsustainable?

# Inter-modal Transport Connectivity

## Laos + Thailand

### *Laos + Thailand Rail Network*



### Barriers to Inter-modality:

Ticket purchases a maximum of 3-days in advance:

- Initially in-person purchases only
- Tickets now available via mobile app – requiring local Laotian mobile number.

Neither station connected to the city nor airport

No infrastructure to connect rail stations and airport

# Inter-modal Transport Connectivity

## Laos + Thailand

### *Laos + Thailand Rail Network*



- Passenger rail upgrading planned in Thailand
  - Might reduce air passenger demand if journey times are quick enough + ticketing streamlined
  - Otherwise impact limited to VTE – BKK

# On-Demand, Personalised Air Transport



## Public Adoption of Advanced Air Mobility

[ Currently in Development ]

Recovery

Servicing Future Demand

Improving Efficiencies

Integration

# Summary

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## Air Transport:

- **Short-Haul Connectivity Improvements (near-term)**
- **'Super' Short-Haul [some shrinkage]**
- **Unlikely to see rail-air connectivity (near-term)**

**Electric Aviation will grow elsewhere before Southeast Asia**

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Recovery

Integration



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# Summary

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Infrastructure (e.g. ATM):

Short-term

- Capacity Improvements
- Improvements to Operational Efficiencies  
[Contributing to Environmental Performance]

Incremental Before Breakthrough

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Longer-term

Integration of an increase in  
diversity of airspace users



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**Questions?**

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